WRITE-PROTECTED RECORDING

[0001] This application is a continuation of U.S. patent application serial no. 13/790553 filed on March 8, 2016, which is a continuation of U.S. patent application 12/560584, filed September 16, 2009, now issued U.S. patent no. 8692882 which is a continuation of U.S. patent application serial no. 12/268286, filed November 10, 2008, now issued U.S. patent no. 7593034, which is a continuation-in-part of U.S. patent application serial no. 11/770920, filed June 29, 2007, now issued U.S. patent no. 8310540, which claims the benefit of U.S. provisional patent 60/824097, filed August 31, 2006. This application and 12/268286 are also continuations-in-part of U.S. patent application serial no. 11/846217, filed August 28, 2007, which claims the benefit of U.S. provisional patent 60/824095, filed August 31, 2006. These and all other referenced extrinsic materials are incorporated herein by reference in their entirety. Where a definition or use of a term in an incorporated reference is inconsistent or contrary to the definition of that term provided herein, the definition of that term provided herein applies and the definition of that term in the reference does not apply.

I. Field of the Invention

[0002] The field of the invention is video camera recording technology.

II. Background

[0003] Conventional camcorders use a variety of storage formats including digital video cassettes, mini-DV cassettes, or DVD-R discs that offer a limited amount of memory to store data. One of the major shortcomings of the existing camcorder technology is that the memory runs out too soon. Once a portion of the memory has been recorded, there is less memory available for further recording. Then when the memory is full, users have to return to their home/work computer or media station to transfer the recorded data from the camera to free up the memory. This creates inconvenience and inflexibility for recording on the go.

[0004] WO 2006/044476 to Vanman describes an electronic camera mounted to a police vehicle with a circular buffer that is constantly recording. When the camera reaches the end of the memory it records from the beginning of memory, erasing the earliest recorded data. Such

Motorola v. Stellar
Motorola Exhibit 1032
Page 001

technology is often employed with surveillance cameras for long and continuous recording with little or no supervision. However, Vanman does not distinguish or differentiate any data that is of importance. To save data in the buffer, the user of the Vanman device needs to transfer important portions of the buffer wirelessly to a central office or physically to a DVD disc, or else risk having the interesting data be recorded over during loop recording. Such transfers are processor intensive and may not be possible when the central office is out of range or an empty DVD disc is unavailable.

[0005] Vanman and all other extrinsic materials identified herein are incorporated by reference in their entirety. Where a definition or use of a term in an incorporated reference is inconsistent or contrary to the definition of that term provided herein, the definition of that term provided herein applies and the definition of that term in the reference does not apply.

[0006] EP 1064783 to Mann describes a camera mountable to a pair of eyeglasses that continuously saves recorded images to a circular buffer in a computer on the user's waist. When a user wants to save a piece of recorded video, the user must stop recording and offload the data at another location before the user can record again. Mann also discusses streaming the images directly to a wireless memory that may have a larger capacity; however, this means that the camera does not work in the absence of a wireless connection. U.S. Patent 5,523,799 to Hattori et al. also describes storing data in a memory having an archival portion. However, Hattori fails to address sending data to a remote memory.

[0007] Thus, there is still a need for a recording camera that provides better recording and editing functions.

III. Summary of the Invention

[0008] The present invention provides apparatus, systems, and methods in which a surveillance apparatus processes images by (1) continuously recording a stream of imaged data, (2) write protecting segments of the recorded stream, and (3) sending write protected segments from a local memory to a remote memory using a wireless transmitter.

[0009] The surveillance apparatus generally has a camera functionally coupled to a local memory with a circular buffer. As used herein, the term "a local memory functionally coupled to

Motorola v. Stellar
Motorola Exhibit 1032
Page 002

the camera" means that the memory that is distanced less than 20 cm from the camera, and is coupled to the camera using entirely physical connectors (*e.g.*, wires, pins, conductive paths, etc.). This contrasts with a "remote memory functionally coupled to the camera", which would be a memory that is distanced from the camera by at least 20 cm, or is coupled to the camera using a wireless connection. The circular buffer is preferably organized into a series of memory segments that loops back on itself and is organized into both available segments and write-protected segments. This allows a recording facility to record the data stream available in portions of the circular buffer while skipping over write-protected matter. Preferably, the local memory is large enough to store at least 5 or 10 minutes of imaged data.

[0010] Preferably, the recording facility continuously records the data stream into the circular buffer any time the surveillance apparatus is powered on. As used herein, the term "continuous" with respect to recording a video data stream means that data is recorded at least every half second over a given ten second period. When a signal to record is sent to the surveillance apparatus, a protecting facility designates a segment of the circular buffer to be write-protected to prevent that segment from being overwritten during the next recording loop. Part of the write-protected portion could be a pre-recorded subset that is recorded before the signal is received, while part of the write-protected portion could be a post-recorded subset that is recorded after the signal is received. The pre-recorded subset could be as long as 5 seconds, 10 seconds, 30 seconds, or more. Preferably, various aspects of both the pre-recorded subset and the post-recorded subset can be configured with a user interface. While the write-protected portions could be electronically indexed using a memory heap or a clustered index, the write-protected portions are preferably stored as separate files in the memory. Such files could be stored in physically dis-contiguous parts of the circular buffer. Additionally, the indexing is preferably performed while the recording facility is still recording data into the memory.

[0011] The signal to record is preferably automatically triggered by a sensor that detects an image in the camera or a sound by the camera's microphone. For example, the signal to record could be triggered by a human face, an open book, a computer screen, a whistle, a verbal command, a recognized object, or a pattern of knocks. Alternatively, a user interface could allow a human user to manually send the signal to record and could even allow the human user to designate a length of time of the pre-recorded subset or the post-recorded subset. A user could

Motorola v. Stellar
Motorola Exhibit 1032
Page 003

send two signals, one to start recording and another to stop recording, but preferably the user merely sends a signal to start recording for a specified period of time. In an exemplary embodiment, when the specified period of time has almost expired, say, for example, 5 seconds, 10 seconds, or longer, the user could extend the length of specified time by sending another trigger to the surveillance apparatus. For example, the surveillance apparatus could send a warning 10 seconds before it is scheduled to stop recording by vibrating against the user; in response the user could say "don't stop" or merely cough to extend the length of the write-protected portion of memory.

[0012] While the surveillance apparatus could be a mounted on a hand-held video camera, the surveillance apparatus is preferably a small device that can be mounted inconspicuously on a person. For example, contemplated surveillance apparatus mounts are a pair of wearable sunglasses or eyeglasses, a lapel pin, a collar button, a hat or visor, a hair pin, or a front of a purse.

[0013] Since the surveillance apparatus is typically too small to house a large amount of memory, the surveillance apparatus also preferably has a wireless transmitter that is also functionally connected to the local memory. A sending facility uses the wireless transmitter to transmit write-protected portions of the circular buffer to a remote memory that is not physically connected to the local memory in some way. For example, the wireless transmitter could send write-protected portions of the circular buffer to a mobile phone, or the surveillance apparatus could be plugged into a mobile phone which is then used as a wireless transmitter to forward a write-protected portion to another remote memory. In a preferred embodiment, after a write-protected portion of the circular buffer is transferred to a remote memory, the protecting facility could remove the corresponding portion from protection so that the recording facility could use that portion to record data.

[0014] Various objects, features, aspects and advantages of the present invention will become more apparent from the following detailed description of preferred embodiments of the invention, along with the accompanying drawings in which like numerals represent like components.

Motorola v. Stellar
Motorola Exhibit 1032
Page 004

IV. Brief Description of The Drawing

[0015] Fig. 1 is a camera mounted on a pair of glasses connected to a circular buffer in a local memory that is controlled by a ring.

[0016] Fig. 2A and 2B show user interface buttons for the ring of Figure 1.

[0017] Fig. 3 shows a diagram representation of the circular buffer of Figure 1.

[0018] Fig. 4A-4H show representations of the circular buffer of Figure 1 while the surveillance apparatus is in use.

V. Detailed Description

[0019] In **Figure 1**, an example surveillance apparatus 100 generally comprising eyeglasses 110 having a camera 120 mounted at the nose bridge, and an optional viewfinder 130 applied onto one of the lenses. A data and power cord 140 couples the camera 120 to a belt-worn recorder 160, which cooperates with a ring-shaped signaling device 150 and a remote memory 170. Those skilled in the art will appreciate that the term "surveillance" is used herein in its broadest possible sense, to include not only professional or commercial types of surveillance, but also any other type of observation, including for example an ordinary person watching a baseball game or birthday party.

[0020] The eyeglasses 110 are used here euphemistically to represent any type of camera mount. In a preferred embodiment, the camera mount is disguised to be a common object worn by a person or lying around a house, but could also be shaped and sized to look like a camera. Contemplated mounts include lapel pins, hair clips, shirt buttons, purses, staplers, desk clocks, tripods, head gear, hand grips, or security camera mounts. As used herein the term "camera" means any device or collection of devices that includes an image capturing component that captures image data, and a converting component that converts the image data into digital data, possibly at least one data stream. An image capturing component could include one or more charge-couple devices (CCD) complimentary metal-oxide-semiconductors (CMOS), CMOS focal plane arrays (CFP), radiometers, or other manners of image obtaining devices. Camera 120 should be interpreted euphemistically to include all such variants. Likewise, a suitable converting

component could include one or more analog-to-digital converters, software codecs, or integrated circuits.

[0021] Camera 120 contains an imager lens 122 used to focus images for camera 120. Conventional lenses allow one or more of the following adjustments: aperture (to control the amount of light), zoom (to control the field-of-view), or shutter speed (to capture continuous motion.). In preferred embodiments, these adjustments are automatically controlled by the camcorder electronics, generally to maintain constant exposure onto the imager without the manual adjustment from a user. It is contemplated that the preferred embodiments offer direct user control of all major optical functions. As with most modern digital recorders and camcorders, an analog-to-digital (ADC) converter is used to digitize the analog imager waveform output into a discrete digital-video signal. Thus, the recorder can be used to record analog or digital formats.

[0022] Viewfinder image lens 130 is calibrated to have the same field of view as camera 120. Preferably, viewfinder image lens 130 is embedded in between the two glass lenses of eyeglasses 110. Preferably viewfinder image lens 130 is a zoom lens with preferred standard zoom ration of 3x in or out of the focal length of the camera. A more sophisticated viewfinder image lens 130 is contemplated to have a greater zoom range and also has nighttime vision or is able to render images under different light conditions. Within the lenses, viewfinder image lens 130 is outlined by tinted area or graticle and the outline graticle is embedded with glowing fiber optic filament. Eye-glasses are made preferably from opaque, translucent, or possibly photo gray-type tint of glasses. Alternatively, glasses change color slightly when energized.

[0023] Where the camera is a hand-held camera and is not embedded in a pair of eyeglasses, viewfinder image lens 130 can be permanently fixed to camera 120, or it can be interchangeable with lenses of different focal lengths and other properties depending on the need and circumstances of use.

[0024] Recorder 160 is any recording device that records video and/or audio/video data, including conventional recorders. Recorder 160 preferably includes a processor 162 with software or hardware that accomplishes the functions described herein, or one or more physical memories that are collectively referred to herein as memory 166. Typically, the recorder or the

Motorola v. Stellar
Motorola Exhibit 1032
Page 006

camera converts analog images into a digital format to be stored in the memory, or also preferably records both audio and video input analog signals from the camera to the memory. Those skilled in the art will also appreciate that the concepts described herein with respect to video and/or audio/video data can be applied to recordation of purely audio, or in fact any other type of data stream; this specification should be interpreted as expressly including such application. A wearer could clip recorder 160 as a belt clip or another compact device. Contemplated recorders include MP3 players, purses, or buttons. It is also contemplated that recorder 160 could also comprise a cell or mobile phone having a suitable recorder application installed that is configured to communicate with the other components of apparatus 100.

[0025] Although not expressly shown, recorder 160 also includes an appropriate power supply or connection, supporting electronics, or a display or other interface. The power source can vary considerably. For example, in embodiments where the recorded is relatively large, a suitable power source can include a rechargeable battery. On the other hand, when the recorder is relatively small, an appropriate power source can include an external power source (e.g., transformer for wall outlet or cigarette lighter adapter). Whether embodied in control buttons or in some other manner, it is also contemplated that recorder can include some sort of security control requiring a password and some sort of automatic turnoff feature that activates after a certain amount of inactivity. Authentication or authorization of user access provides for ensuring a proper user of apparatus 100 retains desired control. For example, once a user is authenticated, the user can control indexing, editing, transmitting, or adjusting content data in memory.

[0026] Recorder 160 would typically record images in digital format, but analog or combination formats are also contemplated. Preferably, the recorder's electronics are preferably all on a unitary printed circuit board with different functions, or facilities, encoded on a programmable chip or disk. For example, a recording facility 163 could record the data stream from camera 120 to local memory 166, a protecting facility 164 could protect segments (not shown) of recorded data on memory 166, or a sending facility 165 could transmit protected segments (not shown) of recorded data to remote memory 170. While the different facilities are preferably part of a single hardware or software program, the facilities could be split into different components as necessary. Other facilities could be installed, for example a facility that allows editing of the

Motorola v. Stellar
Motorola Exhibit 1032
Page 007

received image data or protected data. It is contemplated that such facilities could be purchased through or installed on a cell phone, possibly through an on-line application store.

[0027] The contemplated memory could vary depending on the particular configuration of the recorder. Particularly suitable memories include commercially available micro hard drives with a 1-inch disc (which can preferably have a capacity of more than 1 GB), flash memory cards with a capacity of up to 128 MB and more, or other transient and/or permanent memory units. Likewise, suitable memory can also include SDRAM, MRAM, racetrack memory, SIMM, DIMM, etc. with a capacity of at least 32 MB, more preferably at least 64 MB, or most preferably above 128 MB. In preferred embodiments, memory 166 is a SDRAM capable of storing at least 1000 frames of data. Once received by memory 166, frames are preferably compressed by employing conventional compression rates and methods to achieve at least a 50:1 ratio.

[0028] In preferred embodiments, image data received by recorder 160 is stored in a circular buffer 167 on memory 166. Preferably, all of the free space in memory 166 is used to create circular buffer 167, however, multiple circular buffers could be created in the memory where there exist multiple cameras connected to a single recorder. Once the recorder is turned on, image data is continuously stored in circular buffer 167 for access. If no record or protect button is pushed, the recorder will loop back and store the image data for a said length of time. Recording, book-marking and protecting are used synonymously herein. Recording, book-marking and protecting means that a portion of the imaged data is write-protected upon an activation of a signal by a user and can not then be overwritten unless the write-protection is later removed. Consequently, protected data cannot be overwritten by newly stored imaged data in the circular buffer.

[0029] The circular buffer is preferably large enough to store at least 3 minutes of data, more preferably 5 minutes and most preferred 10 minutes of data. However, it is contemplated that depending on the size and capacity of the device, any length longer or shorter is possible. It is preferred when the recorder is turned on the entire circular buffer is treated and stored as a single file. Thus, if no recording is protected or bookmarked, then the entire file will be erased and the recording will start at the beginning of the circular buffer.

Motorola v. Stellar
Motorola Exhibit 1032
Page 008

[0030] Signaling device 150 is shown in the figure as a ring that communicates wirelessly (*e.g.,* BlueTooth, Skinplex, wireless USB, 802.11, 802.15, UWB, Z-Wave, IrDa, Zigbee, etc.) with the recorder, possibly as part of a personal area network (PAN). The ring can have any suitable interface, shown in **Figures 2A and 2B**, including for example buttons on its outer periphery, or a sensor along its inner edge. In Figure 2A, ring 150 has user interface 200, with a start signal button 210, a stop signal button 220, a transmit button 230, a zoom in button 240, or a zoom out button 250. Alternatively, the buttons could have decorative symbols in lieu of words of function as shown in Figure 2B, or could even have arbitrary symbols surrounding the entirety of signaling device 150. These buttons allow a user to manipulate and control image data and to generate protected data.

[0031] In an alternative embodiment, turning the ring in one direction might produce a start signal, and continuing to turn the ring in that direction might extend backwards the time period that is protected. Where a default time period for storing pre-start signal data is used, extending the time can be considered overriding the default. Similarly, turning the ring in the opposite direction might produce a stop signal, and where a default time period for storing post-start signal data is used, extending the time can be considered overriding that default. Electronics for such a ring or other control device are readily available, and for example are similar to those used in key fobs. Indeed, signaling device 150 should be interpreted euphemistically to include key fob type device.

[0032] It is contemplated that the signaling device could be integrated into other items as an accessory and that is wearable on an individual, for example a lapel pin or a pen within a pocked protector. It is also contemplated that the switch could be portable or can be hidden or attached to other devices such as a vehicle, furniture, etc. The signal could also be generated in non-tactile ways, for example by an audio command or whistle, or by an automatic sensor. Preferably, the user could configure the audio signal to match only his/her voice.

[0033] At any moment, the user can signal recorder 160 to place a "bookmark" in the recording. This signal can be sent by pressing a button that will then transmit a signal through wires 140 that attach to the glasses then to the recorder. The wires 140 could be fiber optic wires that are small and thin to avoid detection. In an exemplary embodiment, the user could control the entire

Motorola v. Stellar
Motorola Exhibit 1032
Page 009

system using signaling device 150, for example by turning the camera on and off, recording a portion of image data, stop the recording, zooming in and out of image data; or transmitting protected data into the remote memory 170.

[0034] While remote memory 170 is shown in the figure as a mobile or cell phone, remote memory 170 should be interpreted euphemistically to include any memory that is not connected to surveillance apparatus 100, for example, a DVD writer, a wireless network attached storage (NAS) device, a wireless storage area network (SAN) device, a home computer, or even a second surveillance apparatus. Preferably, sending facility 165 sends protected segments of circular buffer 167 wirelessly to remote memory 170 whenever remote memory 170 is within range of wireless transceiver 169, possibly as part of a PAN using one or more wireless communication technologies (*e.g.,* BlueTooth, Skinplex, wireless USB, 802.11, 802.15, UWB, Z-Wave, IrDa, Zigbee, etc.). However, sending facility 165 could also respond to manual commands, for example through a button on signaling device 150, recorder 160, or the mobile phone itself. In an alternative embodiment, the mobile phone does not act as a remote memory depository, and instead forwards the protected segment to a remote memory via a mobile internet or wi-fi connection. Preferably, once protected data is transferred to a remote memory, the protected memory areas then will go back to become free memory areas that are available for further loop recording.

[0035] Write-protected data could be sent to the remote memory by an image sensor that outputs data directly in "block" format typically converted with a raster-to-block converter. Further compression could be used before transmitting the data if wireless bandwidth is an issue. Either DCT or wavelet transformed data on native sensor formats could be used. The data is preferably transmitted via the Internet, but could also be transmitted using radio waves, a pager, a two-way pager, a physical cable, email, text message, picture message, or any other suitable communication mechanism.

[0036] **Figure 3** shows a diagram representation of circular buffer 167 in memory 166, with unprotected segment 320 and write-protected segment 330. Write-protected segment 330 is characterized as a predefined portion of the recording data. The recording facility 163 continuously records the data stream 310 into circular buffer 167. The recording facility 163

Motorola v. Stellar
Motorola Exhibit 1032
Page 010

records over unprotected segment 320 of circular buffer 167, while skipping over protected segments 330 of circular buffer 167. It is contemplated that the portion of the circular buffer that is marked as write-protected data cannot be overwritten once the recorder loops back to the beginning of the media.

[0037] **Figures 4A-4H** show an alternative diagram representation of a circular buffer 300 as it is being used.

[0038] In **Figure 4A** the recording facility (not shown) records data stream "A" into circular buffer 400. The "_" character is used to designate blank memory, or unprotected memory that can be overwritten. The ellipsis "..." is used to show that the memory can be very large relative to the number of positions shown in the figure. It is contemplated, for example, that memory 400 can be up to several hundred megabytes, 1 GB, 2GB, 4GB, 8GB, or even more. Such memory is preferably of a flash type, non-volatile RAM, preferably in the form of a standard flash memory card. In a preferred embodiment, circular buffer 400 comprises a logical representation of a physical memory area. Buffer 400 can be configured to store data in the physical memory by taking into account wear-leveling across the physical memory.

[0039] In **Figure 4B** the protecting facility (not shown) has protected a recent period of data stream "A" as a function of a start signal, shown by the character "|". The start signal can be triggered in any suitable manner, including for example manual operation of a trigger or a switch by a user. For example, the ring of Figure 1 could be used as a switch, or any other wearable accessory could have a switch integrated into it. In other examples, start signals can be triggered by detection of a particular circumstance by a motion, sound or other sensor. In an exemplary system, software can operate upon content in the data stream, such as by monitoring an entrance to a building using a data stream received from one or more cameras, and could then send a start signal when the image shows a person loitering in a certain area of the screen.

[0040] The "[" character is used to designate the start of protected memory. Concomitantly, the portion of the data stream prior to the protected portion has once again been marked "_" to show that it is unprotected. In protecting recent data, the system can protect a default historical time period before the start signal is sent and protect a default period after the start signal is sent (such as 30 seconds, 2 minutes, etc). All suitable defaults are contemplated. Alternatively, the

Motorola v. Stellar
Motorola Exhibit 1032
Page 011

historical time period being protected could be altered in some manner, such as by software or by a user operating a history button. For example, if a user hits a start button, the system might default to protecting the last 30 seconds and the next 60 seconds; or it might protect the last 15 seconds and the next 2 minutes.

[0041] Preferably, before the protecting facility stops protecting data, the system sends a signal to the user that the system is about to stop write-protecting data. For example, the system could send an audio chirp signal, or in the case of a pair of eyeglasses, a portion of the glasses could slightly vibrate to signal that the system will stop recording in 10 seconds. If the user wishes to protect an additional 60 second time period, the user could hit a "more time" button. In this manner a user could protect a 5 or 10 minute period, or an even much longer portion of a data stream prior to a start signal. Indeed, if memory 400 is interpreted as a multi gigabyte flash memory, it is entirely possible that one could back up sufficiently to protect an hour or more of such a data stream.

[0042] In **Figure 4C** the protecting facility has received a "stop" signal some time after receiving the start signal, thereby lengthening the protected portion of the "A" data stream. The stop signal is shown as character "]" and could be automatically generated from software or hardware as a function of a default time after the start signal, or could be manually sent by the user of the system. All suitable defaults are contemplated, including for example a 30 second or 1 minute time period. Stop signals could also be generated in a variable fashion, again as a function of software or hardware, through action of a user, or in any other suitable manner. Thus, a user can well operate a start button or other switch, a more time switch, and a stop switch, which could have the same or different interfaces. It is also contemplated that the system could recognize a user's verbal commands for these functions.

[0043] Just as the system can utilize a default pre-start signal period of time for which a portion of the data stream is stored unless overridden in some manner, contemplated systems can utilize a default post-start signal period of time for which a portion of the data stream is stored unless overridden in some manner. Using defaults for both pre-start and post-start signal periods allows a system to operate with an extremely high level of user convenience. For example, in one contemplated class of systems using such defaults, a user could operate a single button, ring or

Motorola v. Stellar
Motorola Exhibit 1032
Page 012

other interface to initiate a start signal, and the system could respond by automatically storing a default 60 second portion of a data stream prior to the signal, as well as a default 30 time period of the data stream after the signal. And all of that could be accomplished with a single operation of the button. An interface could also be provided to allow the user to alter the length of time for the pre-recorded portion and the length of time for the post-recorded portion. As should be apparent from the description above, all reasonable the default time periods are contemplated.

[0044] In **Figure 4D**, the system has finished protecting the desired portion of the "A" data stream, and the recording facility continues to store a "B" data stream into circular buffer 400. Of course, the "B" data stream can be contiguous with the "A" data stream, so that differentiation of "A" and "B" streams is merely an artifact of how the data is being stored. For example, if a system included an eyeglasses camera being used at baseball game, the wearer might watch the game for an hour or more without anything of interest happening. During all that time the system would record image frames from the camera, looping in memory if the memory had remaining capacity for less than an hour of images. When finally the wearer sees an interesting play that he wants to protect, he operates a start button, or perhaps a more time button to protect the previous minute of play. Once the interesting action has completed, he operates a stop button, which thereby causes the system to complete protecting the entire "A" period of interest. But the wearer continues watching the game, and the subsequent images, continuous with the "A" images, would be considered "B" images. In some embodiments, the wearer can select to have more of previously recorded data to be protected. For example, once the wearer operates the start button, the wearer could also indicates that additional previously recorded data should be protected (*e.g.*, past 10 seconds, 30 seconds, one minute, five minutes, etc.) while new image data is being stored and protected.

[0045] In **Figure 4E** the system has again received a start signal, and has again protected a fixed or variable historical time period. In **Figure 4F** the system has received a stop signal, and has protected the entire desired portion of the "B" data stream.

[0046] In **Figure 4G t**he system has continued to record data, which is now depicted as data stream "C" because it follows data stream "B". This figure is particularly significant in that recordation of the "C" data stream skips over the protected portion of the "A" data stream. In

Figure 4H the system received another start signal, and has protected a desired portion of the "C" data stream that straddles the protected "A" stream. As shown, the C data stream is saved as a physically dis-contiguous file.

[0047] In a preferred embodiment, segments of recorded data are "write-protected" by being indexed in an electronic index. This scheme allows the system to protect previously recorded areas of memory without interrupting any concurrent recording, and further allows the system to easily locate such protected segments for play-back or offloading to a remote memory. Additionally, this allows the system to keep track of multiple fragments dis-contiguous fragments of a single write-protected segment. The electronic index is preferably a hash table or a clustered index, but other methods of addressing memory are also suitable.

[0048] Protected data can be copied to a memory separate from the circular buffer, for example in a separate file within a local memory. Multiple segments of protected data could thus be stored as a series of protected files in a directory structure. In an exemplary embodiment, as soon as the data is designated in the index as being protected, the recorder searches for a remote memory in range, and immediately copies the protected data from the circular buffer to the remote memory. Once confirmation of copying is received, the index can be updated to identify the previously protected portion of the circular buffer as being non-protected.

[0049] As previously discussed, a sending facility uses a wireless transmitter to transmit write-protected data to a remote memory. One should note that there are many additional aspects of the inventive subject matter surrounding transmitting the data to the remote memory. In some embodiments a surveillance apparatus participates in a PAN with other components including the remote memory. In such embodiments the apparatus can discover other components of the system, including the remote memory or signaling devices, by sending message over one or more suitable protocols (*e.g.,* BlueTooth, Skinplex, wireless USB, 802.11, 802.15, 802.16, UWB, Z-Wave, IrDA, Zigbee, etc.). Component discovery can be via a push where the apparatus sends a discovery message over a protocol to remote components or via a pull where the remote components send a discovery message to the apparatus. The components of the system can respond with a discovery response message. Preferred discovery or discovery response messages comprise characteristics of the various responding components including buffer size,

read/write rates, authentication, authorized command sets, or other parameters. For example, the surveillance apparatus could send a discovery message out to discover any suitable remote memories in the PAN where the message is encapsulated in a BlueTooth protocol packet. A cell phone could respond by allocating a memory area to operate as a remote memory and by sending a discovery response message back to the apparatus describing the amount of memory available. Such an approach provides for creating surveillance apparatus products that are able to operate across multiple cell phone platforms by allowing a cell phone user to download or install an application, or possibly a driver for their specific cell phone model, capable of being discovered and operating with the apparatus.

[0050] Another aspect of transmitting data to the remote memory includes authenticating the various components with respect to access or to control remote memory. In some embodiments, the surveillance apparatus, or even the signaling facility, can be authenticated with the remote memory via a suitable token exchange (*e.g.*, passwords, public-private key, handshakes, etc.). For example, a remote memory could be bound to a specific apparatus via a secret key, possibly having a UUID or GUID. Furthermore, the components of the system can be authorized to access various levels of functionality based on their authentication. Some apparatus could have read only access, while other could have write access, or while still others have editing capabilities.

[0051] Yet another aspect of transmitting data to the remote memory includes the remote memory providing access to multiple surveillance apparatus. For example, a single remote memory, possibly a cell phone, could be in close proximity (*e.g.*, physically local within 100 meters or logically local within the same network) to two or more apparatus. The remote memory can provide image storage as necessary to each apparatus, assuming appropriate authentication or permissions. In addition, it is contemplated that a single apparatus could have more than one camera where each camera has its data transmitted to the remote memory collectively via the apparatus or even individually, possibly where each camera has access to different remote memories, or different areas (*e.g.*, files) in the same remote memory.

[0052] One should also note that a surveillance apparatus can employ multiple wireless protocols to interact with the various components. For example, the apparatus's signaling device could

connect to a recorded via Zigbee or Skiplex protocols while the apparatus could connect to the remote memory via IEEE 802.16.

[0053] One purpose of the invention is to allow secret recording by a user. The user can integrate the recorder as part of his/her wardrobe or even as clothing accessories, such as a pin or a hat. Preferably, recorder will record video and audio as seen from the wearer's point of view without requiring the wearer to exert any special effort to operate the recorder. The recorder operates for extended periods of time while remaining unobtrusive both to the wearer/operator and to the subject(s) being recorded.

[0054] In order for the device to be practical, physical size and weight are of primary importance. The recorder portion must be small and lightweight enough to be unobtrusive. Preferably, the size of the recorder is two inches by three inches by one-half inch and six ounces in weight including battery. The camera or imaging component must be small and lightweight enough to be mounted on a pair of eyeglasses without conspicuous bulk or uncomfortable weight on the order of one-quarter inch by one-quarter inch by one inch or smaller and weighing one ounce or less. Further, the imaging component must be capable of sufficient resolution that the image quality of the resulting recording is comparable with existing consumer camcorder products. Preferred resolutions are at least 640 x 480 pixels. However, more preferred resolutions include high definition quality resolutions (*e.g.*, 720p, 1080i, 1080p, 2160p, etc.).

[0055] Since the recorder will be worn on the body and the wearer can move actively about when the device is in operation, it is important that the entire device be mechanically rugged and that all components, particularly the storage media, be impervious to the shocks resulting from such body movement. The device is also likely to be exposed to environmental stresses such as dust and moisture so the components and packaging must accommodate this exposure. Solid state media such as compact flash memory is particularly suitable as the recorder's storage media since it meets these requirements.

[0056] Alternatively, the recorder device can be mounted on vehicles, planes or any other objects for ease of use. It is contemplated that the present invention can be used in military or field intelligence operations.

Motorola v. Stellar
Motorola Exhibit 1032
Page 016

[0057] The advantages of the disclosed techniques are clear. A user of the inventive subject matter can capture image data while also participating with others in an event without being trapped behind a recording device. Furthermore, the user's hands can remain substantially free while recording.

[0058] Thus, specific embodiments and applications of recording images to a circular buffer in a local memory and transmitting it wirelessly to a remote memory have been disclosed. It should be apparent, however, to those skilled in the art that many more modifications besides those already described are possible without departing from the inventive concepts herein. The inventive subject matter, therefore, is not to be restricted except in the spirit of the appended claims. Moreover, in interpreting both the specification and the claims, all terms should be interpreted in the broadest possible manner consistent with the context. In particular, the terms "comprises" and "comprising" should be interpreted as referring to elements, components, or steps in a non-exclusive manner, indicating that the referenced elements, components, or steps can be present, or utilized, or combined with other elements, components, or steps that are not expressly referenced. Where the specification claims refers to at least one of something selected from the group consisting of A, B, C …. and N, the text should be interpreted as requiring only one element from the group, not A plus N, or B plus N, etc.

Motorola v. Stellar
Motorola Exhibit 1032
Page 017

CLAIMS

What is claimed is:

1. A recording system comprising:

a sensor interface that captures sensor data from at least one sensor;

a memory coupled with the sensor interface;

a recording facility coupled with the sensor interface and memory, and that records at least some of the sensor data into available portion of at least one buffer in the memory; and

a protecting facility coupled with the recording facility that responds to a trigger signal to record the at least some of the sensor data by designating a segment of the at least one buffer as a write-protected segment and by storing the write-protected segment as at least one file in the at least one buffer, wherein the write-protected segment includes a pre-recorded subset recorded before the trigger signal is received and a post-recorded subset to be recorded after the trigger signal is received.

2. The system of claim 1, further comprising a sending facility coupled with the memory and configured to transmit data associated with the at least one file from the memory to a remote memory.

3. The system of claim 1, wherein the sensor data comprises at least one of the following: image data and video data.

4. The system of claim 3, wherein the sensor data comprises a resolution of at least 640 x 480 pixels.

5. The system of claim 4, wherein the sensor data comprises a resolution of at least 1080p.

6. The system of claim 1, wherein the sensor data recorded into the available portions of the at least one buffer is compressed.

7. The system of claim 6, wherein the sensor data recorded into the available portions of the at least one buffer is time compressed.

Motorola v. Stellar
Motorola Exhibit 1032
Page 018

8. The system of claim 6, wherein the sensor data recorded into the available portions of the at least one buffer is frame compressed.

9. The system of claim 1, wherein the sensor data comprises at least one of the following: audio data and motion data.

10. The system of claim 1, wherein the memory comprises at least one of the following: RAM and flash.

11. The system of claim 1, wherein the sensor interface comprises a wireless interface to the at least one sensor.

12. The system of claim 11, wherein the wireless interface comprises a BlueTooth® wireless interface.

13. The system of claim 1, wherein the at least one buffer comprises a circular buffer.

14. The system of claim 1, further comprising a camera including the sensor interface, the memory, and the recording facility.

15. The system of claim 14, wherein the camera comprises a security camera.

16. The system of claim 1, further comprising a cell phone including the sensor interface, the memory, and the recording facility.

17. The system of claim 1, further comprising a personal area network coupled with the protecting facility and including at least two of the following: the sensor interface, the memory, and the recording facility.

18. The system of claim 1, wherein the at least one file in the at least one buffer comprises a single file.

19. The system of claim 18, wherein the single file comprises an entirety of the at least one buffer.

Motorola v. Stellar
Motorola Exhibit 1032
Page 019

20. The system of claim 1, wherein the trigger signal represents detection of at least one of the following: a motion, a sound, an image, content in a data stream, a pattern in the sensor data, a person, a human face, a computer screen, an event, a verbal command, operation of witch, and operation of a button.

21. The system of claim 1, wherein the protecting facility is further configured to update the write-protected segment as being non-protected and free for recording.

22. The system of claim 1, wherein the protecting facility is further configured to store the at least one file by indexing the write-protected segment in the at least one buffer.

23. The system of claim 22, wherein the protecting facility is further configured to index the write-protected segment while the recording facility is still recoding sensor data into the memory.

Motorola v. Stellar
Motorola Exhibit 1032
Page 020

ABSTRACT

A surveillance apparatus continuously records imaged data from a camera into a circular buffer in a local memory. When a record signal is received, the system records the video stream that was recorded before the record signal was received, and the video stream that is recorded after the record signal was received. The recorded segment is then write-protected, so that the surveillance apparatus does not overwrite the recorded segment. The recorded segment could then be sent to a remote memory via a wireless connection to free up local memory for future recording sessions.

Motorola v. Stellar
Motorola Exhibit 1032
Page 021

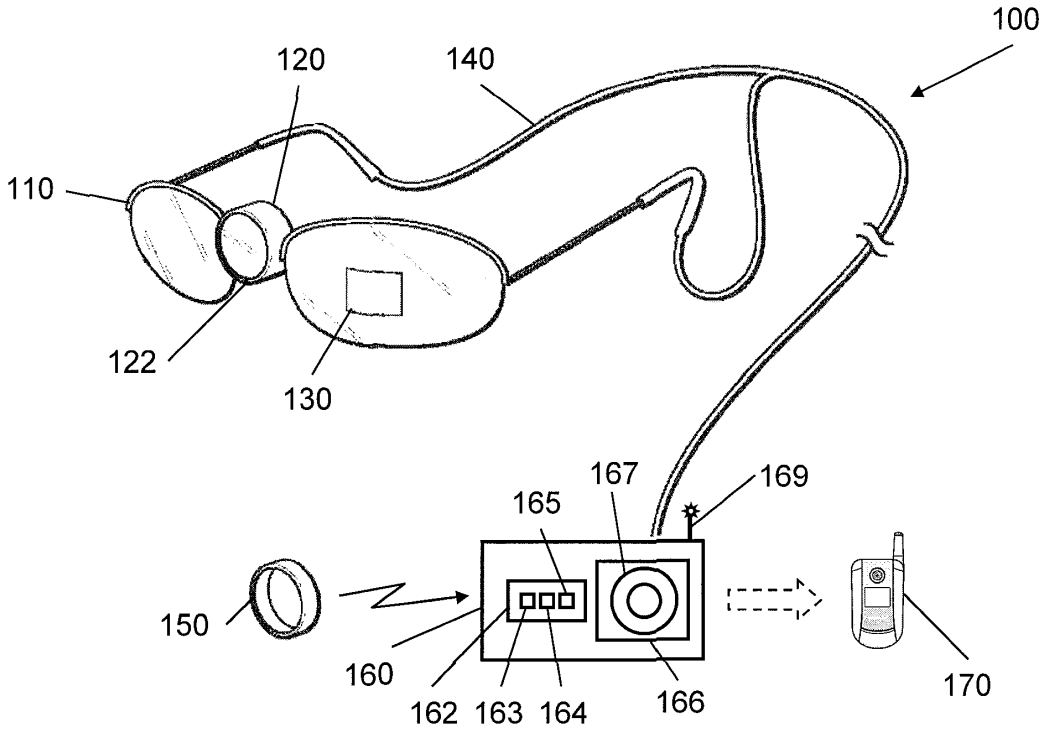

100
120
140
110
122
130
167
169
165
150
160
162
163
164
166
170

FIG. 1

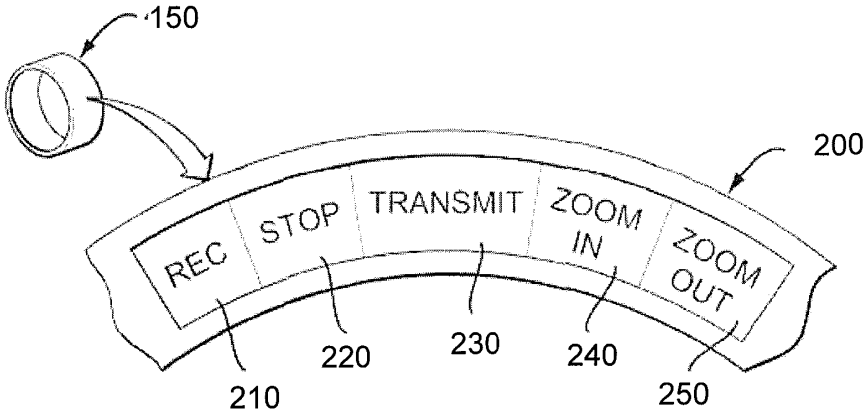

150
200
REC
STOP
TRANSMIT
ZOOM IN
ZOOM OUT
210
220
230
240
250

FIG. 2A

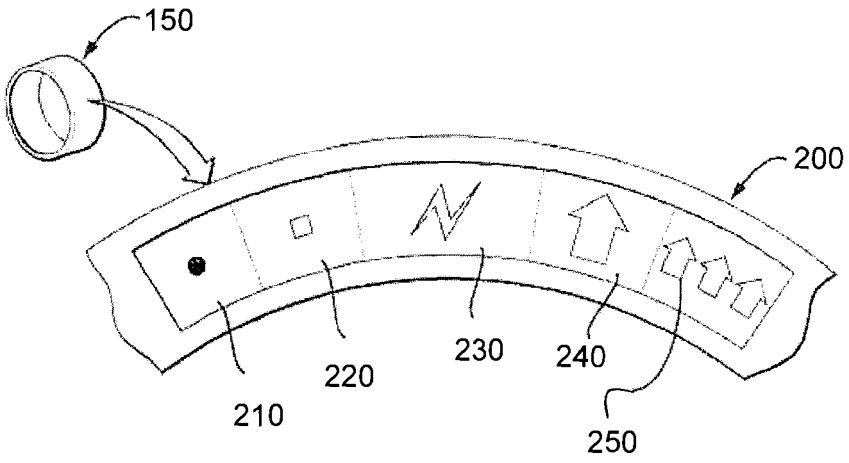


FIG. 2B

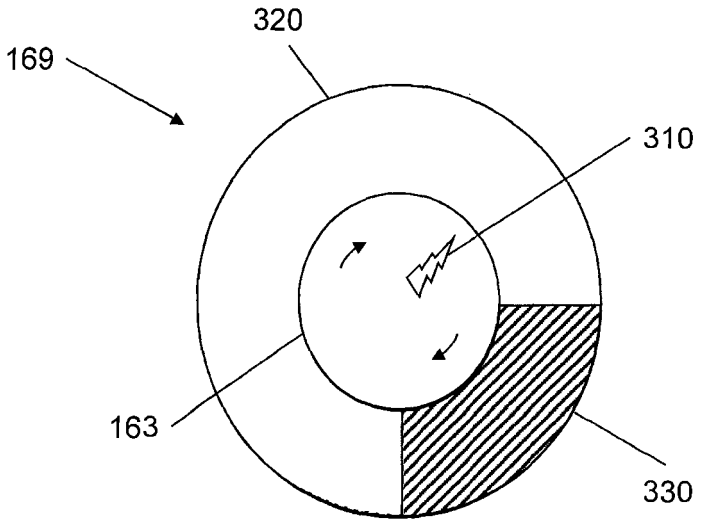


FIG. 3

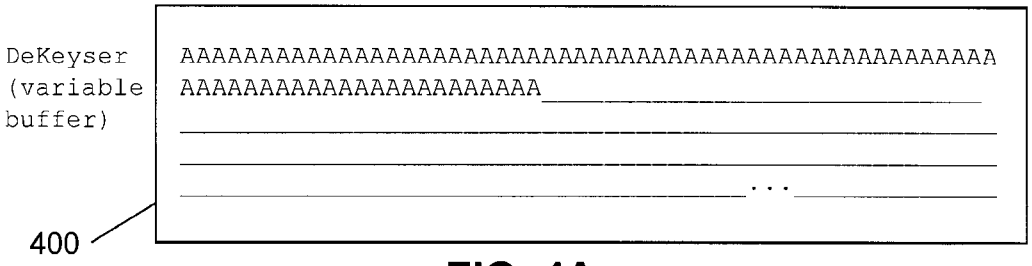


FIG. 4A

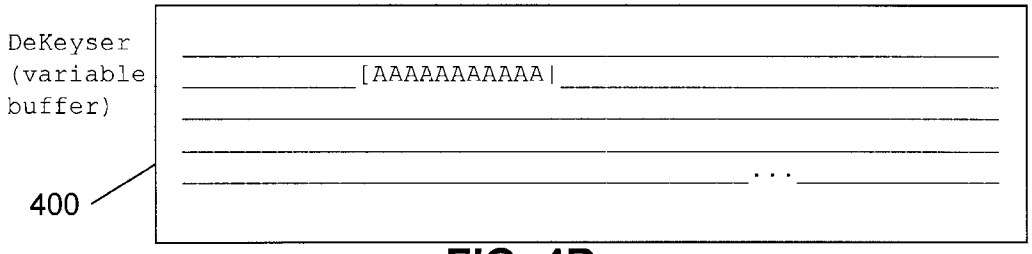


FIG. 4B

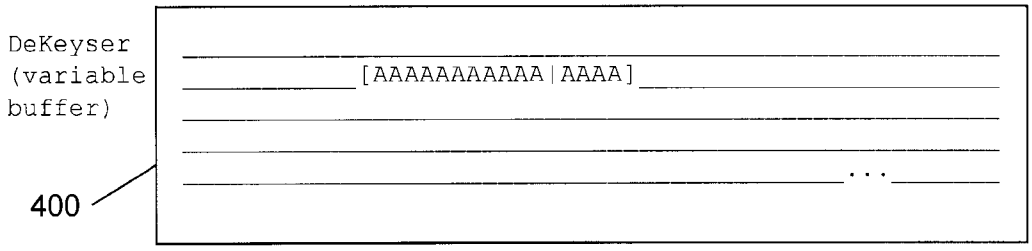


FIG. 4C

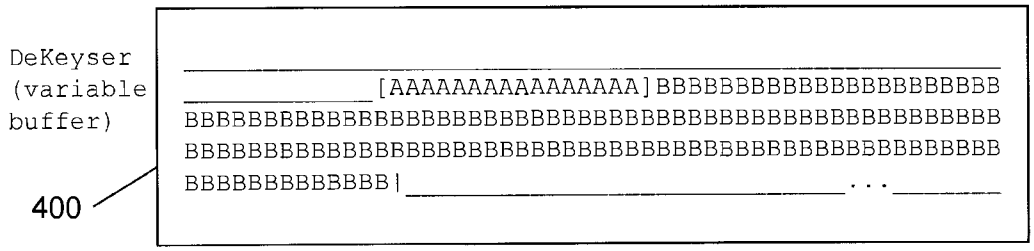


FIG. 4D

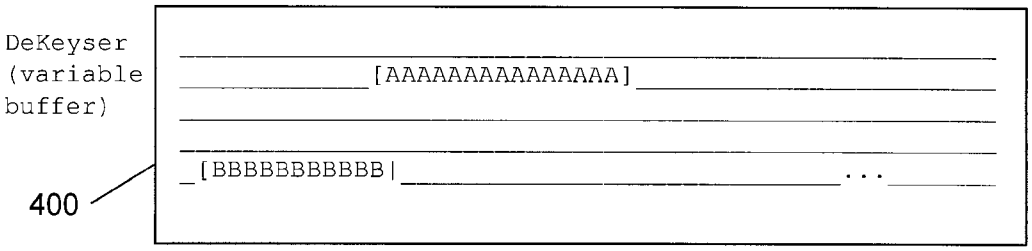


FIG. 4E

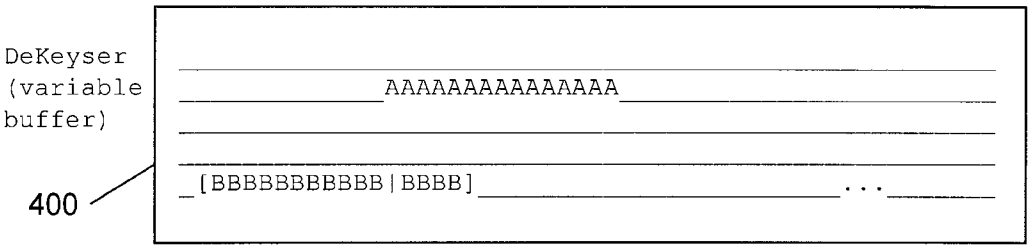


FIG. 4F

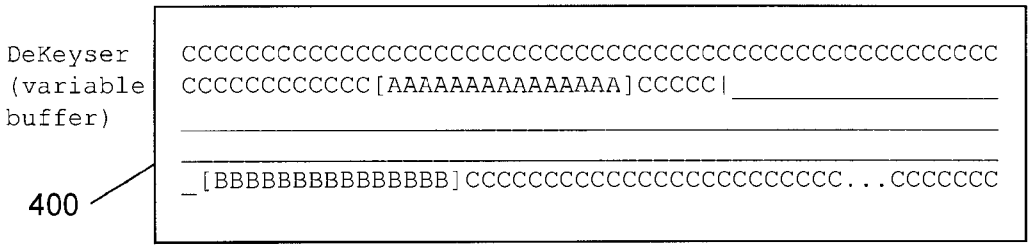


FIG. 4G

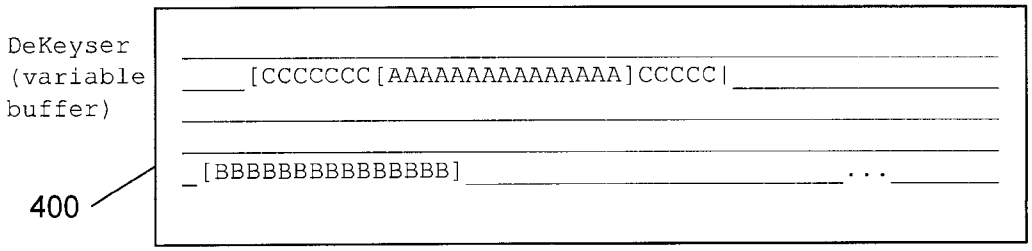


FIG. 4H

PTO/AIA/14 (11-15)
Approved for use through 04/30/2017. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	102246.0003US6
	Application Number	
Title of Invention	WRITE-PROTECTED RECORDING	

The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76.
This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.

Secrecy Order 37 CFR 5.2:

☐ Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)

Inventor Information:

Inventor 1 — Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Paul		DeKeyser	

Residence Information (Select One) ● US Residency Non US Residency Active US Military Service

City	Irvine	State/Province	CA	Country of Residence	US

Mailing Address of Inventor:

Address 1	55 Hidden Trail		
Address 2			
City	Irvine	State/Province	CA
Postal Code	92603	Country i	US

All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the **Add** button. Add

Correspondence Information:

Enter either Customer Number or complete the Correspondence Information section below.
For further information see 37 CFR 1.33(a).

☐ **An Address is being provided for the correspondence Information of this application.**

Customer Number	24392		
Email Address	patents@fishiplaw.com	Add Email	Remove Email

Application Information:

Title of the Invention	WRITE-PROTECTED RECORDING		
Attorney Docket Number	102246.0003US6	Small Entity Status Claimed	☒
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	4	Suggested Figure for Publication (if any)	

PTO/AIA/14 (11-15)
Approved for use through 04/30/2017. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	102246.0003US6
	Application Number	
Title of Invention	WRITE-PROTECTED RECORDING	

Filing By Reference:

Only complete this section when filing an application by reference under 35 U.S.C. 111(c) and 37 CFR 1.57(a). Do not complete this section if application papers including a specification and any drawings are being filed. Any domestic benefit or foreign priority information must be provided in the appropriate section(s) below (i.e., "Domestic Benefit/National Stage Information" and "Foreign Priority Information").

For the purposes of a filing date under 37 CFR 1.53(b), the description and any drawings of the present application are replaced by this reference to the previously filed application, subject to conditions and requirements of 37 CFR 1.57(a).

Application number of the previously filed application	Filing date (YYYY-MM-DD)	Intellectual Property Authority or Country

Publication Information:

☐ Request Early Publication (Fee required at time of Request 37 CFR 1.219)

☐ **Request Not to Publish.** I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application **has not and will not** be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32).
Either enter Customer Number or complete the Representative Name section below. If both sections are completed the customer Number will be used for the Representative Information during processing.

Please Select One:	● Customer Number	US Patent Practitioner	◯ Limited Recognition (37 CFR 11.9)
Customer Number	24392		

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, 365(c), or 386(c) or indicate National Stage entry from a PCT application. Providing benefit claim information in the Application Data Sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.
When referring to the current application, please leave the "Application Number" field blank.

Prior Application Status	Pending		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
	Continuation of	13/790553	2016-03-08

PTO/AIA/14 (11-15)
Approved for use through 04/30/2017. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	102246.0003US6
	Application Number	
Title of Invention	WRITE-PROTECTED RECORDING	

Prior Application Status	Pending			Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)	
13/790553	Continuation of	12/560584	2009-09-16	

Prior Application Status	Patented			Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
12/560584	Continuation of	12/268286	2009-09-16	8692882	2014-03-14

Prior Application Status	Patented			Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
12/268286	Continuation in part of	11/770920	2008-11-08	7593034	2009-09-22

Prior Application Status	Patented			Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
11/770920	Claims benefit of provis	60/824095	2006-08-31	8310540	2012-11-13

Prior Application Status	Patented			Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
12/268286	Continuation in part of	11/846217	2007-08-28	8928752	2015-01-06

Prior Application Status	Pending			Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)	
	Continuation in part of	11/84217	2015-01-06	

Prior Application Status	Patented			Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
11/846217	Claims benefit of provis	60/824095	2006-08-31	8928752	2015-01-06

Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the **Add** button. Add

Foreign Priority Information:

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55. When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX)[i] the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(i)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

PTO/AIA/14 (11-15)
Approved for use through 04/30/2017. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	102246.0003US6
	Application Number	
Title of Invention	WRITE-PROTECTED RECORDING	

Application Number	Country[i]	Filing Date (YYYY-MM-DD)	Access Code[j] (if applicable)

Remove

Additional Foreign Priority Data may be generated within this form by selecting the **Add** button. Add

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

☐ This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.
NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.

PTO/AIA/14 (11-15)
Approved for use through 04/30/2017. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	102246.0003US6
	Application Number	
Title of Invention	WRITE-PROTECTED RECORDING	

Authorization or Opt-Out of Authorization to Permit Access:

When this Application Data Sheet is properly signed and filed with the application, applicant has provided written authority to permit a participating foreign intellectual property (IP) office access to the instant application-as-filed (see paragraph A in subsection 1 below) and the European Patent Office (EPO) access to any search results from the instant application (see paragraph B in subsection 1 below).

Should applicant choose not to provide an authorization identified in subsection 1 below, applicant **must opt-out** of the authorization by checking the corresponding box A or B or both in subsection 2 below.

NOTE: This section of the Application Data Sheet is **ONLY** reviewed and processed with the **INITIAL** filing of an application. After the initial filing of an application, an Application Data Sheet cannot be used to provide or rescind authorization for access by a foreign IP office(s). Instead, Form PTO/SB/39 or PTO/SB/69 must be used as appropriate.

1. Authorization to Permit Access by a Foreign Intellectual Property Office(s)

A. Priority Document Exchange (PDX) - Unless box A in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the State Intellectual Property Office of the People's Republic of China (SIPO), the World Intellectual Property Organization (WIPO), and any other foreign intellectual property office participating with the USPTO in a bilateral or multilateral priority document exchange agreement in which a foreign application claiming priority to the instant patent application is filed, access to: (1) the instant patent application-as-filed and its related bibliographic data, (2) any foreign or domestic application to which priority or benefit is claimed by the instant application and its related bibliographic data, and (3) the date of filing of this Authorization. See 37 CFR 1.14(h)(1).

B. Search Results from U.S. Application to EPO - Unless box B in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the EPO access to the bibliographic data and search results from the instant patent application when a European patent application claiming priority to the instant patent application is filed. See 37 CFR 1.14(h)(2).

The applicant is reminded that the EPO's Rule 141(1) EPC (European Patent Convention) requires applicants to submit a copy of search results from the instant application without delay in a European patent application that claims priority to the instant application.

2. Opt-Out of Authorizations to Permit Access by a Foreign Intellectual Property Office(s)

☐ A. Applicant **DOES NOT** authorize the USPTO to permit a participating foreign IP office access to the instant application-as-filed. If this box is checked, the USPTO will not be providing a participating foreign IP office with any documents and information identified in subsection 1A above.

☐ B. Applicant **DOES NOT** authorize the USPTO to transmit to the EPO any search results from the instant patent application. If this box is checked, the USPTO will not be providing the EPO with search results from the instant application.

NOTE: Once the application has published or is otherwise publicly available, the USPTO may provide access to the application in accordance with 37 CFR 1.14.

PTO/AIA/14 (11-15)
Approved for use through 04/30/2017. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	102246.0003US6
	Application Number	
Title of Invention	WRITE-PROTECTED RECORDING	

Applicant Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Applicant 1 — Remove

If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.

Clear

● Assignee	Legal Representative under 35 U.S.C. 117	Joint Inventor
Person to whom the inventor is obligated to assign.	Person who shows sufficient proprietary interest	

If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:

Name of the Deceased or Legally Incapacitated Inventor:

If the Applicant is an Organization check here. ☒

Organization Name	STELLAR, LLC		
Mailing Address Information For Applicant:			
Address 1	55 Hidden Trail		
Address 2			
City	Irvine	**State/Province**	CA
Country	US	Postal Code	92603
Phone Number		Fax Number	
Email Address			

Additional Applicant Data may be generated within this form by selecting the Add button. Add

Assignee Information including Non-Applicant Assignee Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

PTO/AIA/14 (11-15)
Approved for use through 04/30/2017. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	102246.0003US6
	Application Number	
Title of Invention	WRITE-PROTECTED RECORDING	

Assignee 1

Complete this section if assignee information, including non-applicant assignee information, is desired to be included on the patent application publication. An assignee-applicant identified in the "Applicant Information" section will appear on the patent application publication as an applicant. For an assignee-applicant, complete this section only if identification as an assignee is also desired on the patent application publication.

Remove

If the Assignee or Non-Applicant Assignee is an Organization check here. ☐

Prefix	**Given Name**	Middle Name	**Family Name**	Suffix

Mailing Address Information For Assignee including Non-Applicant Assignee:

Address 1			
Address 2			
City		**State/Province**	
Country i		Postal Code	
Phone Number		Fax Number	
Email Address			

Additional Assignee or Non-Applicant Assignee Data may be generated within this form by selecting the Add button. Add

Signature:

Remove

NOTE: This Application Data Sheet must be signed in accordance with 37 CFR 1.33(b). **However, if this Application Data Sheet is submitted with the INITIAL filing of the application and either box A or B is not checked in subsection 2 of the "Authorization or Opt-Out of Authorization to Permit Access" section, then this form must also be signed in accordance with 37 CFR 1.14(c).**

This Application Data Sheet **must** be signed by a patent practitioner if one or more of the applicants is a **juristic entity** (e.g., corporation or association). If the applicant is two or more joint inventors, this form must be signed by a patent practitioner, **all** joint inventors who are the applicant, or one or more joint inventor-applicants who have been given power of attorney (e.g., see USPTO Form PTO/AIA/81) on behalf of **all** joint inventor-applicants.

See 37 CFR 1.4(d) for the manner of making signatures and certifications.

Signature	/Robert D. Fish/			Date (YYYY-MM-DD)	2016-09-28
First Name	Robert D.	Last Name	Fish	Registration Number	33880

Additional Signature may be generated within this form by selecting the Add button. Add

PTO/AIA/14 (11-15)
Approved for use through 04/30/2017. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	102246.0003US6
	Application Number	
Title of Invention	WRITE-PROTECTED RECORDING	

This collection of information is required by 37 CFR 1.76. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1 The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3 A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent CooperationTreaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Motorola v. Stellar
Motorola Exhibit 1032
Page 034

PTO/AIA/01 (06-12)
Approved for use through 01/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76)

Title of Invention	Write-Protected Recording

As the below named inventor, I hereby declare that:

This declaration is directed to:

- [x] The attached application, or
- [ ] United States application or PCT international application number _____

filed on _____.

The above-identified application was made or authorized to be made by me.

I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.

I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.

WARNING:

Petitioner/applicant is cautioned to avoid submitting personal information in documents filed in a patent application that may contribute to identity theft. Personal information such as social security numbers, bank account numbers, or credit card numbers (other than a check or credit card authorization form PTO-2038 submitted for payment purposes) is never required by the USPTO to support a petition or an application. If this type of personal information is included in documents submitted to the USPTO, petitioners/applicants should consider redacting such personal information from the documents before submitting them to the USPTO. Petitioner/applicant is advised that the record of a patent application is available to the public after publication of the application (unless a non-publication request in compliance with 37 CFR 1.213(a) is made in the application) or issuance of a patent. Furthermore, the record from an abandoned application may also be available to the public if the application is referenced in a published application or an issued patent (see 37 CFR 1.14). Checks and credit card authorization forms PTO-2038 submitted for payment purposes are not retained in the application file and therefore are not publicly available.

LEGAL NAME OF INVENTOR

Inventor: Paul DeKeyser Date (Optional): 3/7/13

Signature: Paul DeKeyser

Note: An application data sheet (PTO/AIA/14 or equivalent), including naming the entire inventive entity, must accompany this form. Use an additional PTO/SB/AIA01 form for each additional inventor.

This collection of information is required by 35 U.S.C. 115 and 37 CFR 1.63. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 1 minute to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Electronic Patent Application Fee Transmittal	
Application Number:	
Filing Date:	
Title of Invention:	WRITE-PROTECTED RECORDING
First Named Inventor/Applicant Name:	Paul DeKeyser
Filer:	Robert Fish/Marie Nuguid
Attorney Docket Number:	102246.0003US6
Filed as Small Entity	
Filing Fees for Utility under 35 USC 111(a)	

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
UTILITY FILING FEE (ELECTRONIC FILING)	4011	1	70	70
UTILITY SEARCH FEE	2111	1	300	300
UTILITY EXAMINATION FEE	2311	1	360	360
Pages:				
Claims:				
CLAIMS IN EXCESS OF 20	2202	3	40	120
Miscellaneous-Filing:				
Petition:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
			Total in USD ($)	850

Electronic Acknowledgement Receipt	
EFS ID:	27064924
Application Number:	15279155
International Application Number:	
Confirmation Number:	9873
Title of Invention:	WRITE-PROTECTED RECORDING
First Named Inventor/Applicant Name:	Paul DeKeyser
Customer Number:	24392
Filer:	Robert Fish/Marie Nuguid
Filer Authorized By:	Robert Fish
Attorney Docket Number:	102246.0003US6
Receipt Date:	28-SEP-2016
Filing Date:	
Time Stamp:	18:23:29
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$850
RAM confirmation Number	092916INTEFSW18242600
Deposit Account	
Authorized User	
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		1-Application-01e.pdf	108909 beceba2ba0cc07b1340907035d397273295b302e	yes	21
	Multipart Description/PDF files in .zip description				
	Document Description		**Start**	**End**	
	Specification		1	17	
	Claims		18	20	
	Abstract		21	21	
Warnings:					
Information:					
2	Drawings-only black and white line drawings	2-Figures_01a.pdf	92435 41fee504146458ffe2769e1fc9556881e15df458	no	4
Warnings:					
Information:					
3	Application Data Sheet	3-ADS.pdf	1823534 24864efa3122232528 4c4c7df1d7688010ed c75f	no	9
Warnings:					
Information:					
4	Oath or Declaration filed	4-declaration-signed.pdf	127433 a83d56dd1393a4f10d244c346928a692be324dfd	no	2
Warnings:					
Information:					
5	Fee Worksheet (SB06)	fee-info.pdf	36661 ad8817a692bc3ddb53889e5e71bcedec1a108b8b	no	2

Warnings:	
Information:	
Total Files Size (in bytes):	2188972

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
PO Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
15/279,155	09/28/2016	2688	850	102246.0003US6	23	1

CONFIRMATION NO. 9873

FILING RECEIPT

24392
FISH & TSANG LLP
ROBERT D. FISH
2603 Main Street
Suite 1000
Irvine, CA 92614-6232

Date Mailed: 10/12/2016

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Inventor(s)

Paul DeKeyser, Irvine, CA;

Applicant(s)

STELLAR, LLC, Irvin, CA;

Power of Attorney: None

Domestic Priority data as claimed by applicant

This application is a CON of 13/790,553 03/08/2013
which is a CON of 12/560,584 09/16/2009 PAT 8692882
which is a CON of 12/268,286 11/10/2008 PAT 7593034 *
which is a CIP of 11/770,920 06/29/2007 PAT 8310540
which claims benefit of 60/824,095 08/31/2006
and said 12/268,286 11/10/2008
is a CIP of 11/846,217 08/28/2007 PAT 8928752
which claims benefit of 60/824,095 08/31/2006
(*)Data provided by applicant is not consistent with PTO records.

Foreign Applications for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see http://www.uspto.gov for more information.) - None.
Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

Permission to Access Application via Priority Document Exchange: Yes

Permission to Access Search Results: Yes

Motorola v. Stellar
Motorola Exhibit 1032
Page 042

Applicant may provide or rescind an authorization for access using Form PTO/SB/39 or Form PTO/SB/69 as appropriate.

If Required, Foreign Filing License Granted: 10/07/2016

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 15/279,155**

Projected Publication Date: 01/19/2017

Non-Publication Request: No

Early Publication Request: No
** **SMALL ENTITY** **
Title

WRITE-PROTECTED RECORDING

Preliminary Class

360

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at http://www.uspto.gov/web/offices/pac/doc/general/index.html.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, http://www.stopfakes.gov. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific

Motorola v. Stellar
Motorola Exhibit 1032
Page 043

countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

GRANTED

The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where the conditions for issuance of a license have been met, regardless of whether or not a license may be required as set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign AssetsControl, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

NOT GRANTED

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

SelectUSA

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The U.S. offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to promote and facilitate business investment. SelectUSA provides information assistance to the international investor community; serves as an ombudsman for existing and potential investors; advocates on behalf of U.S. cities, states, and regions competing for global investment; and counsels U.S. economic development organizations on investment attraction best practices. To learn more about why the United States is the best country in the world to develop

Motorola v. Stellar
Motorola Exhibit 1032
Page 044

technology, manufacture products, deliver services, and grow your business, visit http://www.SelectUSA.gov or call +1-202-482-6800.

Motorola v. Stellar
Motorola Exhibit 1032
Page 045

PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number: 15/279,155

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY FEE($)
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	70		N/A	
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	300		N/A	
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	360		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	23 minus 20 =	* 3	x 40 =	120	OR		
INDEPENDENT CLAIMS (37 CFR 1.16(h))	1 minus 3 =	*	x 210 =	0.00			
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			0.00			
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				0.00			
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	850		TOTAL	

APPLICATION AS AMENDED - PART II

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY ADDITIONAL FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE($)
AMENDMENT A	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY ADDITIONAL FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE($)
AMENDMENT B	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".
The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
15/279,155	09/28/2016	Paul DeKeyser	102246.0003US6

CONFIRMATION NO. 9873

24392
FISH & TSANG LLP
ROBERT D. FISH
2603 Main Street
Suite 1000
Irvine, CA 92614-6232

PUBLICATION NOTICE



Title:WRITE-PROTECTED RECORDING

Publication No.US-2017-0019640-A1
Publication Date:01/19/2017

NOTICE OF PUBLICATION OF APPLICATION

The above-identified application will be electronically published as a patent application publication pursuant to 37 CFR 1.211, et seq. The patent application publication number and publication date are set forth above.

The publication may be accessed through the USPTO's publically available Searchable Databases via the Internet at www.uspto.gov. The direct link to access the publication is currently http://www.uspto.gov/patft/.

The publication process established by the Office does not provide for mailing a copy of the publication to applicant. A copy of the publication may be obtained from the Office upon payment of the appropriate fee set forth in 37 CFR 1.19(a)(1). Orders for copies of patent application publications are handled by the USPTO's Office of Public Records. The Office of Public Records can be reached by telephone at (571) 272-3150 or (800) 972-6382, by facsimile at (571) 273-3250, by mail addressed to the United States Patent and Trademark Office, Office of Public Records, Alexandria, VA 22313-1450 or via the Internet.

In addition, information on the status of the application, including the mailing date of Office actions and the dates of receipt of correspondence filed in the Office, may also be accessed via the Internet through the Patent Electronic Business Center at www.uspto.gov using the public side of the Patent Application Information and Retrieval (PAIR) system. The direct link to access this status information is currently http://pair.uspto.gov/. Prior to publication, such status information is confidential and may only be obtained by applicant using the private side of PAIR.

Further assistance in electronically accessing the publication, or about PAIR, is available by calling the Patent Electronic Business Center at 1-866-217-9197.

Office of Data Managment, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

Motorola v. Stellar
Motorola Exhibit 1032
Page 047

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/279,155	09/28/2016	Paul DeKeyser	102246.0003US6	9873

24392 7590 06/16/2017

FISH & TSANG LLP
ROBERT D. FISH
2603 Main Street
Suite 1000
Irvine, CA 92614-6232

EXAMINER	
DIEP, NHON THANH	

ART UNIT	PAPER NUMBER
2487	

NOTIFICATION DATE	DELIVERY MODE
06/16/2017	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

rfish@fishiplaw.com
patents@fishiplaw.com

Office Action Summary	Application No. 15/279,155	Applicant(s) DEKEYSER, PAUL	
	Examiner NHON DIEP	Art Unit 2487	AIA (First Inventor to File) Status No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *09/28/2016*.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

5)☒ Claim(s) *1-23* is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6)☐ Claim(s) _____ is/are allowed.

7)☒ Claim(s) *1-23* is/are rejected.

8)☐ Claim(s) _____ is/are objected to.

9)☐ Claim(s) _____ are subject to restriction and/or election requirement.

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☒ The drawing(s) filed on *09/28/2016* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

a)☐ All b)☐ Some** c)☐ None of the:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date _____.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

4) ☐ Other: _____.

Motorola v. Stellar
Motorola Exhibit 1032
Page 049

1. The present application is being examined under the pre-AIA first to invent provisions.

DETAILED ACTION

Double Patenting

2. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on nonstatutory double patenting provided the reference application or patent either is shown to be commonly owned with the examined application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement. See MPEP § 717.02 for applications subject to examination under the first inventor to file

provisions of the AIA as explained in MPEP § 2159. See MPEP §§ 706.02(l)(1) - 706.02(l)(3) for applications not subject to examination under the first inventor to file provisions of the AIA. A terminal disclaimer must be signed in compliance with 37 CFR 1.321(b).

The USPTO Internet website contains terminal disclaimer forms which may be used. Please visit www.uspto.gov/patent/patents-forms. The filing date of the application in which the form is filed determines what form (e.g., PTO/SB/25, PTO/SB/26, PTO/AIA/25, or PTO/AIA/26) should be used. A web-based eTerminal Disclaimer may be filled out completely online using web-screens. An eTerminal Disclaimer that meets all requirements is auto-processed and approved immediately upon submission. For more information about eTerminal Disclaimers, refer to www.uspto.gov/patents/process/file/efs/guidance/eTD-info-I.jsp.

3. Claims 1-23 are rejected on the ground of nonstatutory double patenting as being unpatentable over claims 1-10 of U.S. Patent No. 9,485,471 B2. Although the claims at issue are not identical, they are not patentably distinct from each other because the claims are an obvious variance to each other.

4. Claims 1-23 are rejected on the ground of nonstatutory double patenting as being unpatentable over claims 1-8 and 10 U.S. Patent No. 7,593,034 B2. Although the claims at issue are not identical, they are not patentably distinct from each other because the claims are an obvious variance to each other.

5. Claim 1 is rejected on the ground of nonstatutory double patenting as being unpatentable over claim 1 of U.S. Patent No. 8,310,540 B2. Although the claims

at issue are not identical, they are not patentably distinct from each other because claim 1 of the present application is an obvious variance over claim 1 of the U.S. Patent.

6. Claim 1 is rejected on the ground of nonstatutory double patenting as being unpatentable over claim 1 of U.S. Patent No. 8,928,752 B2. Although the claims at issue are not identical, they are not patentably distinct from each other because claim 1 of the present application is an obvious variance over claim 1 of the U.S. Patent.

7. Claims 1-23 are rejected on the ground of nonstatutory double patenting as being unpatentable over claims 1-12 of U.S. Patent No. 8,692,882 B2. Although the claims at issue are not identical, they are not patentably distinct from each other because claims 1-5, 6-12 and 14 of the present application is an obvious variance over claims 1 -12 of the U.S. Patent.

Allowable Subject Matter

8. Claims 1-23 appears to be allowable over prior art of record, if the DP rejections are to be overcome. The various prior art of record do not anticipate nor render obviousness a protecting facility that responds to a trigger signal to record the at least some of the sensor data by designating a segment of the at least one buffer as a write-protected segment as at least one file in the at least one buffer, wherein the write-protected segment includes a pre-recorded subset recorded before the trigger signal is received and a post-recorded subset to be recorded after the trigger signal is received and in combination with other limitations as specified in claim 1.

Conclusion

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to NHON DIEP whose telephone number is (571)272-7328. The examiner can normally be reached on m-f.

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at http://www.uspto.gov/interviewpractice.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dave Czekaj can be reached on 571-272-7327. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/NHON DIEP/
Primary Examiner, Art Unit 2487

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

BIB DATA SHEET

CONFIRMATION NO. 9873

SERIAL NUMBER	FILING or 371(c) DATE RULE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
15/279,155	09/28/2016	348	2487	102246.0003US6

APPLICANTS
STELLAR, LLC, Irvin, CA;

INVENTORS
Paul DeKeyser, Irvine, CA;

**** CONTINUING DATA ***************************
This application is a CON of 13/790,553 03/08/2013 PAT 9485471
which is a CON of 12/560,584 09/16/2009 PAT 8692882
which is a CON of 12/268,286 11/10/2008 PAT 7593034 *
which is a CIP of 11/770,920 06/29/2007 PAT 8310540
which claims benefit of 60/824,095 08/31/2006
and said 12/268,286 11/10/2008
is a CIP of 11/846,217 08/28/2007 PAT 8928752
which claims benefit of 60/824,095 08/31/2006
(*)Data provided by applicant is not consistent with PTO records.

**** FOREIGN APPLICATIONS ***************************

**** IF REQUIRED, FOREIGN FILING LICENSE GRANTED **** ** SMALL ENTITY **
10/07/2016

Foreign Priority claimed ☐ Yes ☑ No 35 USC 119(a-d) conditions met ☐ Yes ☑ No Verified and Acknowledged /NHON THANH DIEP/ Examiner's Signature	☐ Met after Allowance Initials	STATE OR COUNTRY	SHEETS DRAWINGS	TOTAL CLAIMS	INDEPENDENT CLAIMS
		CA	4	23	1

ADDRESS
FISH & TSANG LLP
ROBERT D. FISH
2603 Main Street
Suite 1000
Irvine, CA 92614-6232
UNITED STATES

TITLE
WRITE-PROTECTED RECORDING

FILING FEE RECEIVED		
850	FEES: Authority has been given in Paper No._____ to charge/credit DEPOSIT ACCOUNT No._____ for following:	☐ All Fees ☐ 1.16 Fees (Filing) ☐ 1.17 Fees (Processing Ext. of time) ☐ 1.18 Fees (Issue) ☐ Other _____ ☐ Credit

BIB (Rev. 05/07).

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	15279155	DEKEYSER, PAUL
	Examiner	Art Unit
	NHON DIEP	2487

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIM		DATE								
Final	Original	06/12/2017								
	1	✓								
	2	✓								
	3	✓								
	4	✓								
	5	✓								
	6	✓								
	7	✓								
	8	✓								
	9	✓								
	10	✓								
	11	✓								
	12	✓								
	13	✓								
	14	✓								
	15	✓								
	16	✓								
	17	✓								
	18	✓								
	19	✓								
	20	✓								
	21	✓								
	22	✓								
	23	✓								

Motorola v. Stellar
Motorola Exhibit 1032
Page 055

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	361926	H04n7/18 or H04n5/76 or H04n5/77 or G11B23/288 or G11B27/10 or G11B31/006 or G11B2220/216 or G08B13/19621 or G08B13/19676 or G08B15/001	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/06/12 09:47
L2	7	l1 and (pre-record$3 and post-record$3) same protect$3 same record$3 same trigger$3 same signal	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/06/12 09:48
L3	1	l1 and (pre-record$3 and post-record$3) same protect$3 same segment$3 same trigger$3 same signal	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/06/12 09:49
L4	7	l1 and (pre-record$3 and post-record$3) same protect$3 same portion same trigger$3 same signal	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/06/12 09:49
L5	1	l1 and (pre-record$3 and post-record$3) same protect$3 same buffer same trigger$3 same signal	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/06/12 09:49
L6	7	l1 and (pre-record$3 and post-record$3) same protect$3 same memory same trigger$3 same signal	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/06/12 09:49

EAST Search History (Interference)

<This search history is empty>

6/12/2017 9:50:05 AM
C:\Users\ndiep\Documents\EAST\Workspaces\default.wsp

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	15279155	DEKEYSER, PAUL
	Examiner	Art Unit
	NHON DIEP	2487

CPC- SEARCHED		
Symbol	Date	Examiner
H04N7/18; 5/76, 77; G11B23/288; 27/10; 31/006; 2220/216; G08B13/19621, 19676; 15/001	06/12/2017	N.D.

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner

SEARCH NOTES		
Search Notes	Date	Examiner
Inventor's names search, reviewed parents application , 13/790,553 (US 9,485,471 B2)	06/12/2017	N.D.

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner

Motorola v. Stellar
Motorola Exhibit 1032
Page 057

UNITED STATES PATENT AND TRADEMARK OFFICE
COMMISSIONER FOR PATENTS
P.O.BOX 1450
ALEXANDRIA VA 22313-1451

PRESORTED
FIRST-CLASS MAIL
U.S. POSTAGE PAID
POSTEDIGITAL
NNNNN

FISH & TSANG LLP
ROBERT D. FISH
2603 Main Street
Suite 1000
Irvine, CA 92614-6232

Courtesy Reminder for
Application Serial No: 15/279,155

Attorney Docket No: 102246.0003US6
Customer Number: 24392
Date of Electronic Notification: 06/16/2017

This is a courtesy reminder that new correspondence is available for this application. If you have not done so already, please review the correspondence. The official date of notification of the outgoing correspondence will be indicated on the form PTOL-90 accompanying the correspondence.

An email notification regarding the correspondence was sent to the following email address(es) associated with your customer number:

rfish@fishiplaw.com
patents@fishiplaw.com

To view your correspondence online or update your email addresses, please visit us anytime at **https://sportal.uspto.gov/secure/myportal/privatepair.** If you have any questions, please email the Electronic Business Center (EBC) at EBC@uspto.gov or call 1-866-217-9197.

PTO/SB/08a (01-10)
Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT
(Not for submission under 37 CFR 1.99)

Application Number	15279155
Filing Date	2016-09-28
First Named Inventor	Paul DeKeyser
Art Unit	2487
Examiner Name	DIEP, NHON THANH
Attorney Docket Number	102246.0003US6

U.S.PATENTS Remove

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	5204909		1993-04-20	Cowan	
	2	5381526		1995-01-10	Ellson	
	3	5418529		1995-05-23	De Luigi et al.	
	4	5523799		1996-06-04	Hattori et al.	
	5	5689442		1997-11-18	Swanson et al.	
	6	5790427		1998-08-04	Greer et al.	
	7	6163338		2000-12-19	Johnson et al.	
	8	6317817		2001-11-13	Shichiku et al.	

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	15279155
	Filing Date	2016-09-28
	First Named Inventor	Paul DeKeyser
	Art Unit	2487
	Examiner Name	DIEP, NHON THANH
	Attorney Docket Number	102246.0003US6

	9	6351798		2002-02-26	Aono	
	10	6370198		2002-04-09	Washino	
	11	6618546		2003-09-09	Ichioka et al.	
	12	6831652		2004-12-14	Orr	
	13	6950600		2005-09-27	Dietz	
	14	7162607		2007-01-09	Macy et al.	
	15	7195164		2007-03-27	Patel	
	16	7587323		2009-09-08	Matz et al.	
	17	7263073		2007-08-28	Petite et al	
	18	7813822		2010-10-12	Hoffberg	
	19	7546602		2009-06-09	Heilsberg	

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	15279155
	Filing Date	2016-09-28
	First Named Inventor	Paul DeKeyser
	Art Unit	2487
	Examiner Name	DIEP, NHON THANH
	Attorney Docket Number	102246.0003US6

If you wish to add additional U.S. Patent citation information please click the Add button. Add

U.S.PATENT APPLICATION PUBLICATIONS Remove

Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	20020005895		2002-01-17	Freeman et al.	
	2	20040183912		2004-09-23	Szolyga et al.	
	3	20060158968		2006-07-20	Vanman et al.	
	4	20070132773		2007-06-14	Plante	
	5	20070174538		2007-07-26	Christoffersson et al.	
	6	20050240942		2005-10-27	Smith	
	7	20080177994		2008-07-24	Mayer, Yaron	

If you wish to add additional U.S. Published Application citation information please click the Add button. Add

FOREIGN PATENT DOCUMENTS Remove

Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2] i	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	15279155
	Filing Date	2016-09-28
	First Named Inventor	Paul DeKeyser
	Art Unit	2487
	Examiner Name	DIEP, NHON THANH
	Attorney Docket Number	102246.0003US6

	1	0510968	EP		1992-10-28	Canon Kabushiki Kaisha		
	2	92/22983	WO		1992-12-23	Browne et al.		
	3	99/49656	WO		1999-09-30	Mann		
	4	99/56216	WO		1999-11-04	MacCormack et al.		
	5	2006/044476	WO		2006-04-27	VanMan et al.		
	6	1064783	EP		2003-04-06	Mann, Stephen		

If you wish to add additional Foreign Patent Document citation information please click the Add button Add

NON-PATENT LITERATURE DOCUMENTS Remove

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T5
	1		

If you wish to add additional non-patent literature document citation information please click the Add button Add

EXAMINER SIGNATURE

Examiner Signature		Date Considered	

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	15279155
	Filing Date	2016-09-28
	First Named Inventor	Paul DeKeyser
	Art Unit	2487
	Examiner Name	DIEP, NHON THANH
	Attorney Docket Number	102246.0003US6

[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	15279155
	Filing Date	2016-09-28
	First Named Inventor	Paul DeKeyser
	Art Unit	2487
	Examiner Name	DIEP, NHON THANH
	Attorney Docket Number	102246.0003US6

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

See attached certification statement.

The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Tomas Prieto/	Date (YYYY-MM-DD)	2017-08-31
Name/Print	Tomas Prieto	Registration Number	60675

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these record s.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Motorola v. Stellar
Motorola Exhibit 1032
Page 065

(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number : **0 510 968 A2**

(12) EUROPEAN PATENT APPLICATION

(21) Application number : **92303654.5**

(22) Date of filing : **23.04.92**

(51) Int. Cl.[5] : **H04N 5/91**, H04N 5/907, H04N 5/93

(30) Priority : **24.04.91 JP 94497/91**
24.04.91 JP 94468/91
24.04.91 JP 94469/91

(43) Date of publication of application :
28.10.92 Bulletin 92/44

(84) Designated Contracting States :
DE ES FR GB IT NL

(71) Applicant : **CANON KABUSHIKI KAISHA**
30-2, 3-chome, Shimomaruko, Ohta-ku
Tokyo (JP)

(72) Inventor : **Hattori, Yuichiro, c/o Canon Kabushiki Kaisha**
30-2, 3-chome, Shimomaruko
Ohta-ku, Tokyo (JP)
Inventor : **Nakaya, Akira, c/o Canon Kabushiki Kaisha**
30-2, 3-chome, Shimomaruko
Ohta-ku, Tokyo (JP)
Inventor : **Yamazaki, Tatsuro, c/o Canon Kabushiki Kaisha**
30-2, 3-chome, Shimomaruko
Ohta-ku, Tokyo (JP)

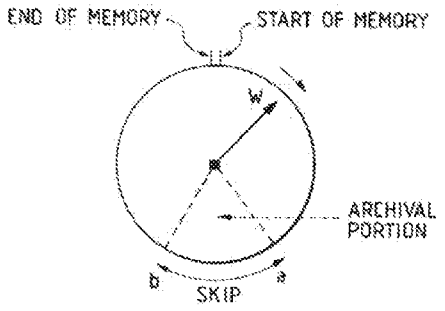
(74) Representative : **Beresford, Keith Denis Lewis et al**
BERESFORD & Co. 2-5 Warwick Court High Holborn
London WC1R 5DJ (GB)

(54) An image memorizing device.

(57) A memory capable of memorizing a video signal has part of its address area into which an information signal is inhibited from being written. A writing address controller for cyclically specifying writing addresses of the memory cyclically specifies writing addresses in the remaining address area except for the part of address area to allow a plurality of different moving picture scenes to be memorized in the one and same memory.

For according to a large capacity main memory, a sub-memory is interposed to access to the main memory with a predetermined information amount being as the unit, thereby facilitating address management of the main memory as well as improving a utilizing effeciency of the main memory.

FIG. 4



EP 0 510 968 A2

Motorola v. Stellar
Motorola Exhibit 1032
Page 066

BACKGROUND OF THE INVENTION

Field of the Invention

The present invention relates to an image memorizing device, and more particularly, to an image memorizing device for processing a large amount of image data such as moving pictures by using large capacity memories.

Related Background Art

There have been known a kind of memory which is adapted to cyclically memorize data its storage area by linking the end address of the storage area to the start address of the same and an addressing control therefor as a so-called ring memory, and an image memorizing device for storing image signals in such a ring memory has been also known.

In the ring memory, previously memorized information cannot be protected from being overwritten by next information due to the nature of its addressing control. For example, when moving pictures are to be memorized, a previously memorized image is lost by overwriting the next image, so that non-sequential images in terms of time cannot be obtained.

Incidentally, such an image memory tends to have a larger capacity and now becomes sufficiently usable as a recording medium for moving pictures. If a solid state memory such as a dynamic random access memory is used as a recording medium for moving pictures, there are advantages, e.g., a search can be performed at a high speed; data can be readily rearranged in the memory; and data can be recorded and reproduced at an arbitrary speed.

Generally, in an image signal processing circuit for processing moving pictures by using such a large capacity image memory, a digital video signal digitally converted from an analog signal, as it is, is written into an image memory by one frame portion or a plural-frame portion. Addressing of the image memory is controlled by a timing of a synchronous signal of an image signal to be written thereinto.

Conventionally, since an addressing control of an image memory is defined by a synchronizing timing of a synchronous signal, quite a few unused portion, as indicated by hatching in Fig. I, is produced and left useless. This unused portion may occupy an unneglectable amount depending upon the number of horizontal pixels and the number of horizontal lines.

Specifically, a memory capacity assigned to one frame portion is, for example, a capacity for ($2^n \times 2^m$) pixels, as shown in Fig. I, which has 2^n kinds of horizontal and vertical addresses, respectively. The number of scanning lines is 525 in the case of an NTSC signal and 625 in the case of a PAL signal, so that approximately 700 - 800 of horizontal pixels are required. Therefore, substituting I0 for n, approximately I024 (= 2^{10}) addresses are required for the horizontal pixels.

Further, in the case of a high vision signal, substituting II for n, 2048 addresses are required for each of the horizontal and vertical addresses.

Thus, the unused portions as shown in Fig. I include an extremely large amount of address, thereby exhibiting a quite low memory using efficiency. However, unless the address is reset in the horizontal scanning line units or frame units, management of the address in a large capacity memory becomes extremely difficult.

SUMMARY OF THE INVENTION

In view of the above-mentioned background, it is an object of the present invention to provide an image memorizing apparatus which is capable of writing a new moving image into a single large capacity memory while preserving a desired portion of moving images which have previously been written in the same memory.

To achieve the above object, according to one embodiment of the present invention, there is provided an image memorizing device comprising:

(a) input means for inputting a video signal;

(b) a memory into which the video signal inputted from the input means can be written;

(c) writing address control means for cyclically specifying a writing address of the memory; and

(d) inhibiting means for inhibiting a video signal from being written into part of address area of the memory,

wherein the writing address control means cyclically specifies writing addresses for the remaining address area except for the part of address area when the inhibiting means inhibits a video signal from being written into the part of address area.

It is another object of the present invention to provide an image memorizing device which is capable of largely improving a using efficiency of a memory capacity in spite of relatively easy addressing management.

To achieve the above object, according to another embodiment of the present invention, there is provided an image memorizing apparatus comprising:

(a) a main memory capable of memorizing a video signal;

(b) access means for accessing the main memory to the outside; and

(c) a sub-memory connected between the access means and the main memory, the sub-memory adapted to supply the main memory with a predetermined information amount of a video signal from the access means as the unit, the predetermined information amount being less than one frame portion of the video signal from the access

Motorola v. Stellar
Motorola Exhibit 1032
Page 067

means.

Objects other than those described above and features of the present invention will become apparent from the following detailed description of embodiments with reference to accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a diagram used for explaining an ordinary memory using situation;

Fig. 2 is a block diagram showing the structure of an image memorizing apparatus as an embodiment of the present invention;

Fig. 3 is a diagram used for explaining the operation of a memory shown in Fig. 2;

Fig. 4 is a diagram used for explaining the operation of the memory in Fig. 2 when a writing inhibited area is set therein;

Fig. 5 is a block diagram showing the structure of an image memorizing device as another embodiment of the present invention;

Fig. 6 is a block diagram showing the structure of an image memorizing device as a further embodiment of the present invention;

Fig. 7 is a block diagram showing the structure of an image memorizing device as a further embodiment of the present invention;

Fig. 8 is a diagram used for explaining another using manner of the memory in each embodiment;

Fig. 9 is a block diagram showing the structure of an image memorizing device as another embodiment of the present invention; and

Fig. 10 is a diagram showing a using situation of a memory in the device of the embodiment shown in Fig. 9.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Embodiments of the present invention will hereinafter be described with reference to the accompanying drawings.

Fig. 2 is a block diagram showing the structure of an image memorizing device according to an embodiment of the present invention which is applied to output processing of a video camera. Reference numeral 10 designates a video camera; 12 an analog-to-digital (A/D) convertor for digitizing a video signal outputted from the video camera 10; and 14 a multi-port random access memory for memorizing a digital video signal outputted from the A/D convertor 12. In the present embodiment, the memory 14 may have a capacity of memorizing a several-second to approximately 50-second portion of video signals.

Reference numeral 16 designates a writing address counter for generating a writing address of the memory 14 in response to a synchronous signal multiplexed with the video signal outputted from the video camera 10; 18 a read-out counter for generating a read-out address of the memory 14; 20 a digital-to-analog (D/A) convertor for converting video data read from the memory 14 to an analog signal; and 22 an output terminal.

Also, reference numeral 24 designates a memory managing circuit for controlling the writhing address counter 16 and the read-out address counter 18 in accordance with a writing inhibited area registered in the memory 14. The user can select through an operation unit 26 and register in the memory managing circuit 24 a writing inhibited area in the memory 14, that is, an arbitrary number of images to be preserved.

Next, the operation of the above-mentioned image memorizing device will be described. A video signal outputted from the video camera 10 is digitized by the A/D convertor 12 and written into addresses indicated by the writing address counter 16. The address of the writing address counter 16 is incremented by the synchronous signal multiplexed with the video signal. The writing address counter 16 returns to the start address of the memory 14 by an increment after the end address of the memory 14 has reached. Thus, the memory 14 operates as a ring memory. Fig. 3 schematically illustrates the writing addresses of the memory 14. A writing position is represented as a vector W which rotates at an angular velocity ω.

If there is a scene to be preserved during making a film, the operation unit 26 is operated to specify a portion to be preserved immediately after the scene has been written into the memory 14. With this operation, the memory managing circuit 24 instructs a writing inhibition to addresses in the memory 14 corresponding to the portion to be preserved. In this event, an arbitrary address area of the memory 14 can be specified, and the size of the area can be arbitrarily set.

After completing the registration (setting), filmmaking is resumed. The writting address counter 16 skips writing addresses for the address area registered in the memory managing circuit 24. For example, if it is assumed that an area between point a and b shown in Fig. 4 is registered as a writing inhibited area, the writting vector W, when reaching the point a, skips the area between the point a and b, and then writes data at the point b. Thus, video data memorized in the area between the point a and b is preserved.

Next, description will be made as to another embodiment where the present invention is applied to processing of an n-times speed video signal. Fig. 5 shows the structure of the embodiment in a block form. The constituents identical to those in Fig. 2 are designated the same reference numerals. Reference numeral 30 designates a video camera which is capable of making a film at a field frequency n times that of a standard television signal, the output video signal of which is written into a memory 14 by an A/D convertor 12, a writting address counter 16 and a memory

Motorola v. Stellar
Motorola Exhibit 1032
Page 068

managing circuit 24, similarly to the device shown in Fig. 2. A slow reproduction control circuit 32 controls a read-out address counter 34 to read data from the memory I4 at an arbitrary speed and converts the read data to a standard television signal by a D/A converting and system converting circuit 36. More specifically, in the present embodiment one field portion of a video signal is read out in one field period of a standard television signal, however, in a 1/n slow reproduction mode, a read-out field address is updated once per field period.

In a normal reproduction mode, a field address read out once per field period is advanced by n fields. Further, in a 1/2n slow reproduction mode, a signal in the one and same field is repeatedly read out twice over two field periods, and a read-out field address is updated once per two field periods. By thus constructing the device, a video signal can be outputted at an arbitrary speed.

As described above, according to the device of the present invention disclosed in Figs. 2 to 5, by setting a particular address area of a memory as a writing inhibited area, it is possible to memorize two or more kinds of different moving images in a single memory and read them therefrom.

Next, another embodiment of the present invention will be described.

Fig. 6 is a block diagram showing the structure of an image memorizing device as another embodiment of the present invention, wherein constituents similar to those in Fig. 5 are designated the same reference numeral, and explanation thereof will be omitted.

Reference numeral I9 designates a reproduction speed control circuit for controlling a read-out speed (that is, an output speed of a read-out image) from a memory I4; 34a a read-out address counter for generating a read-out address of the memory I4 under the control of the reproduction speed control circuit I9; 36a a D/A and system converting circuit for converting video data read from the memory I4 by the read-out address counter 34A to to an analog signal and further converting the analog signal to a video signal according to a predetermined system; and 25 an output terminal.

Also, reference numeral 27 designates a video tape recorder (VTR) for recording an image to be preserved; 25 a memory managing circuit for reading out an image to be preserved to have the VTR 27 record the same and for inhibiting writing into a recording area in which the image to be preserved is memorized for a necessary period; 34b a read-out address counter for generating a read-out address of the memory I4 under the control of the memory managing circuit 26; and 36b a D/A and system converting circuit for converting video data read from the memory I4 by the read-out address counter 34b to an analog signal and further converting the analog signal to a video signal according to a predetermined system. An output from the D/A and system converting circuit 36b is supplied to the VTR 27.

For re-loading a video signal recorded by the VTR 27 to the memory I4, a video signal output reproduced by the VTR 27 is applied to the A/D convertor I2, while a synchronous signal multiplexed with the reproduced video signal is applied to the writing address counter I6.

Next, the operation of the device shown in Fig. 6 will be described. Reference numeral II designates a video input terminal to which a video signal is inputted from a video camera. The operation for writing a video signal from the video input terminal II into the memory I4 is entirely the same as the operation for memorizing a video signal from the video camera I0 into the memory I4 of Fig. 2.

The memory I4, as described above, is handled as a ring memory. If a writing inhibited area is not set therein, the memory I4 stores a video signal of a past period T from the current time, wherein reference letter T represents a recordable period of the memory I4.

The whole recording area of the memory I4 is divided into n blocks in arbitrary sizes, and the memory managing circuit 25 holds this division information. The memory managing circuit 25 controls writing by the writing address counter I6, and read-out by the read-out address counters 20, 30 in this block unit.

For example, if the area between the points a and b shown in Fig. 4 is designated a block #l and the remaining area block #2 by an operation unit 26, and if the block #l is specified as a writing inhibited area, a writing vector W of the writing address counter I6, when reaching the point a, skips the area between the points a and b and indicates the address at the point b. Thus, video data memorized in the area between a and b is preserved. Also, with respect to read-out, read-out is permitted or inhibited in the specified block unit.

Next, a back-up operation will be described. Assume that video data is being written into a certain block, in the manner described above. Data is read from a writing inhibited block (a block in which an image to be preserved is recorded) other than the block into which video data is being written by the read-out address counter 34b, and converted to an analog signal and further to a signal according to the standard system by the D/A and system converting circuit 36b. Then, in association with an output operation of the D/A and system converting circuit 36b, the VTR 27 is operated to record the video signal converted to the standard system. Specifically, the D/A and system converting circuit 36b controls the VTR 27 to start and stop the recording. By these operations, the video signal to be preserved can be backed up on a recording medium by the VTR 27.

After the video signal has been backed up the VTR 27, when the read-out address counter 34b supplies the memory managing circuit 25 with a signal in-

Motorola v. Stellar
Motorola Exhibit 1032
Page 069

dicative of the termination of this back-up operation, the memory managing circuit 25 permits writing into the writing inhibited block from which the video signal has been read.

Since a video signal memorized in the memory l4 need to be backed up, a video signal read from the D/A and system converting circuit 36b is preferably a video signal at a standard speed. In the device shown in Fig. 6, since a video signal written into the memory l4 is a standard video signal, a field address is updated by the counter 34b once per field period of this standard video signal, whereby a normal reproduction can be performed.

On the other hand, a video signal may be outputted to an output terminal 29 at one of various speeds as the user desires. Specifically, the reproduction speed control circuit l9 can vary the updated period of the field address of the counter 34a via the operation unit 26. For example, when a slow motion reproduction is to be performed, the field address is updated once per several field periods, and video signals at the same field addresses are repeatedly read out during these several fields. Also, when a high speed search is to be performed, the field address may be advanced by several fields once per field period.

Fig. 7 is a block diagram showing the structure of a second embodiment of the present invention. Constituents having functions similar or analogous to those in Fig. 6 are designated the same reference numerals. As an image source, there is connected a high speed camera 40 which outputs a video signal at a field frequency n times that of the standard television system, and a high speed buffer memory 42 is connected between a multi-port memory l4 and a D/A and system converting circuit 36b. A transfer speed from the memory l4 to the buffer memory 42 is the same as a speed at which data is written into the memory l4, that is, n times a transfer speed from the D/A and system converting circuit 36b to a VTR 26. The D/A and system converting circuit 36b sequentially converts video data from the buffer memory 42 to a standard video signal which in turn is recorded on a video tape by the VTR 27.

Thus, even a high speed video signal can be backed up at a high speed, and accordingly the memory can be highly efficiently utilized.

Although in the above-mentioned embodiment, the memory l4 is divided into two blocks respectively having a different size from each other and managed, it may be divided into m banks of a fixed length (for example eight banks l - 8 in Fig. 8), and the presence or absence of back-up may be managed in the bank units. For example, if an area between points a and b is to be preserved in Fig. 8, writing addresses of banks #2, #3 including that area are skipped, and images recorded therein are backed up on a video tape. Such banks of a fixed length can alleviate the load of a memory managing circuit 25.

As will be readily understood from the above explanation, according to the device described in connection with Figs. 6 - 8, an important image memorized in a solid-state memory device can be preserved or backed up on a separate recording medium without being erased by a subsequent image. This back-up operation allows an efficient utilization of a memory capacity of the solid-state memory device. Further, since writing and read-out are simultaneously performed, data can be preserved on a separate recording medium at a high speed.

Fig. 9 is a block diagram showing the structure of a further embodiment of the present invention. Reference numeral l00 designates an input terminal to which an image signal (moving pictures or a still image) is fed from a video camera or a video reproducing apparatus; l02 an input circuit comprising an A/D convertor for digitizing an image from the input terminal l00; l04 an FIFO (First-In First-Out) memory (buffer memory) for a synchronously supplying an output of the input circuit l02 to a bus l06; l08 an image memory; and l20 an address generating circuit for generating an address of the image memory l08. The bus l06 comprises a data bus, a plurality of control signal lines and a clock line.

Reference numerals l22, l24 designate FIFO memories for supplying respective output circuits l26, l28 with image data read from the image memory l08 and inputted through the bus l06. The output circuits l26, l28 respectively comprise, for example, a D/A convertor. Reference numerals l30, l32 designate output terminals for connecting to a monitor or a video recording apparatus.

Reference numerals l34, l36, l38 designates pulse generating circuits for generating a clock and control signals necessary to transfer data between the input and output circuits l02, l26, l28 and the FIFO memories l04, l22, l24 and to transfer data between the FIFO memories l04, l22, l24 and the image memory l08 via the bus l06; l40, l42, l44 trigger generating circuits for generating a request for transferring every predetermined amount of data between the input and output circuits l02, l26, l28 and the FIFO memories l04, l22, l24; and l46, l48, l50 trigger counters for counting the numbers of triggers generated by the trigger generating circuits l40, l42, l44, respectively.

Reference numeral l52 designates a memory control circuit for arbitrating a request for data transfer between the respective input and output circuits l02, l26, l28 and controlling data transfer between the image memory l08 and the FIFO memories l04, l22, l24; and l54 an operation unit for inputting an indication of an operation mode for the whole device.

Next, the operation of the present embodiment will be described in connection with a case where an image signal inputted to the input terminal l00 is stored in the image memory l08, by way of example.

The user indicates from the operation unit l54 the

Motorola v. Stellar
Motorola Exhibit 1032
Page 070

memory control circuit I52 to store input image data to the image memory II8. The memory control circuit I52 instructs the pulse generating circuit I34 of writing an output of the input circuit II2 into the FIFO memory II4. The pulse generating circuit I34 generates a control signal for writing into the FIFO memory II4 in synchronism with a synchronous signal of an image signal inputted from the input terminal II0. The trigger generating circuit I40 in turn transmits a trigger signal to the trigger counter I46 and the memory control circuit I52 every time a predetermined amount of image data less than one frame portion of image (hereinafter referred to the memory unit) is written into the FIFO memory II4. The trigger counter I46 counts this trigger signal and supplies the memory control circuit 52 with the number of counted trigger signals.

The memory control circuit I52, in response to the trigger signal from the trigger generating circuit I40, has the trigger counter I46 output the number of counted trigger signals to the address generating circuit I20 and simultaneously transfer the number of counted trigger signals to the image memory II8 via the bus II6. The address generating circuit I20 generates an address for each of data in the memory unit, at which image data from the FIFO memory II4 is written into the image memory II8. Assuming here that the foregoing predetermined amount is equal to 2^n pixels, a memory using situation is as shown in Fig. I0.

By the above operations, image data is close-packed in the image memory II8, whereby unused portions are left only in hatched areas shown in Fig. I0. Thus, the unused portion can be largely reduced. Incidentally, blocks #I, #2, #3 respectively indicate image data of one frame portion.

Read-out of image data from the image memory II8 to the output circuits I26, I28 is similarly executed by generating a trigger signal for requesting data transfer in the memory units. However, data transfer between the image memory II8 and the FIFO memories I22, I24 is executed only with one of the FIFO memories at a time, so that the memory control circuit I52 arbitrates respective transfer requests so as to prevent the transfer requests from being simultaneously generated.

As will be readily understood from the above explanation, the embodiment of Fig. 9 provides an image memorizing device which can reduce unused portions, facilitate the address management of the memory II8, and present a high utilizating efficiency.

Claims

1. An image memorizing device, comprising:
   (a) input means for inputting a video singal;
   (b) a memory into which the video signal inputted from said input means can be written;
   (c) writing address control means for cyclically specifying a writing address of said memory; and
   (d) inhibiting means for inhibiting a video signal from being written into part of address area of said memory,
   wherein said writing address control means cyclically specifies writing addresses for the remaining address area except for said part of address area when said inhibiting means inhibits a video signal from being written into said part of address area.

2. A device according to claim 1, wherein said inhibiting means includes an operation member for specifying said part of address area.

3. A device according to claim 1, further comprising:
   read-out address control means for specifying a read-out address of said memory; and
   output means for outputting a video signal read from said memory.

4. A device according to claim 3, wherein said read-out address control means can switch an update period of said read-out address in the frame units of said video signal.

5. A device according to claim 3, wherein:
   when said read-out address control means specifies an address in said part of address area, while a video signal is being read from an address in said memory specified by said read-out address control means, said writing address control means cyclically specified addresses in the remaining address area except for said part of address area, and a video signal can be written into an address in said memory specified by said writing address control means.

6. A device according to claim 3, further comprising recording means for recording a video signal outputted from said output means on a recording medium.

7. A device according to claim 6, further comprising releasing means for responsively releasing writing inhibition set by said inhibiting means which inhibits a video signal from being written into said part of address area upon completing recording of a video signal read from said part of address area by said recording means.

8. A device according to claim 6, wherein said output means controls said recording means so as to operate said recording means while a video signal is being outputted.

9. A memorizing device comprising:

Motorola v. Stellar
Motorola Exhibit 1032
Page 071

(a) a memory capable of memorizing an information signal;
(b) writing means including writing address control means for cyclically specifying writing addresses of said memory; and
(c) memory control means for inhibiting said writing means from writing an information signal into part of address area of said memory and for controlling said writing address control means to cyclically specify writing addresses in the remaining address area except for said part of address area.

10. A device according to claim 9, wherein said memory control means includes an operation member for specifying said part of address area.

11. A method or device for storing input data in which data is stored in a ring memory and a portion of the ring memory can be designated to be skipped so that it is not overwritten.

12. A method or device for storing image data in which incoming image data is stored in units of blocks, a block being a different size from a line and smaller than a frame.

Motorola v. Stellar
Motorola Exhibit 1032
Page 072

FIG. 1

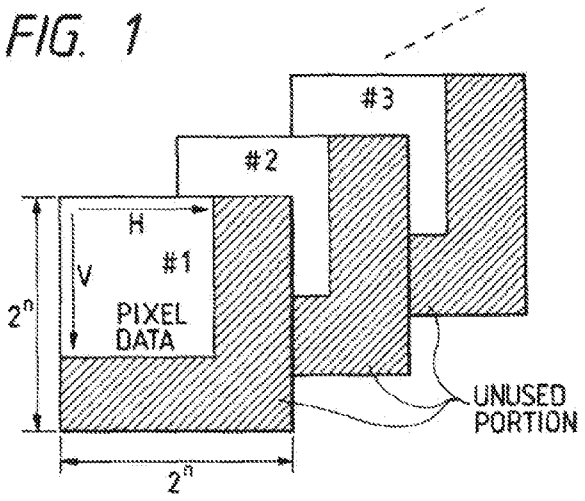
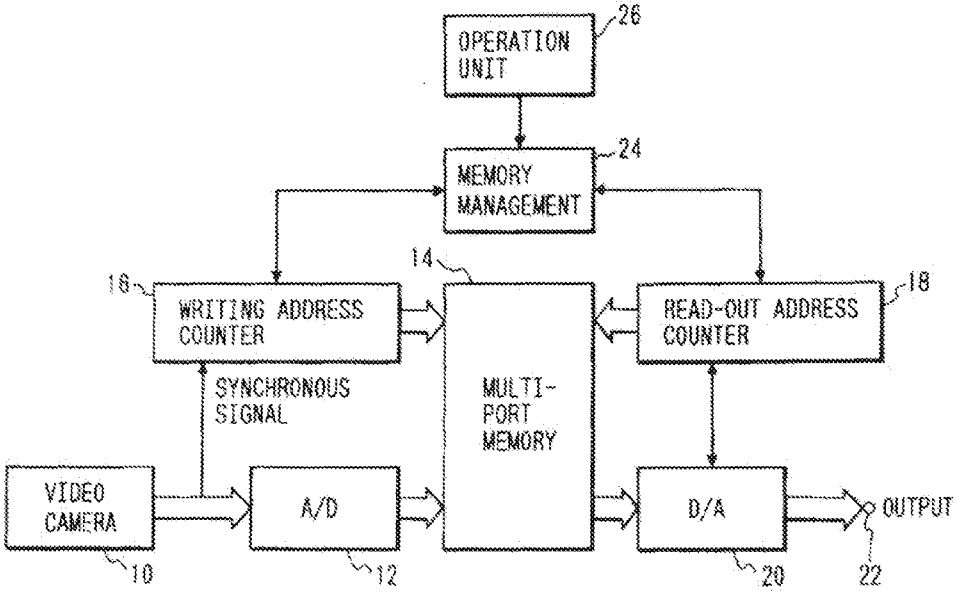


FIG. 2



Motorola v. Stellar
Motorola Exhibit 1032
Page 073

FIG. 3

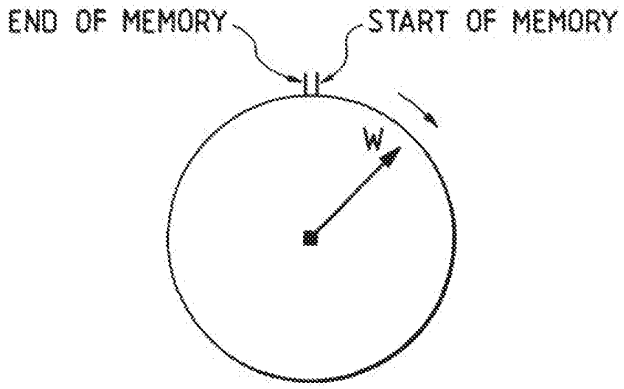
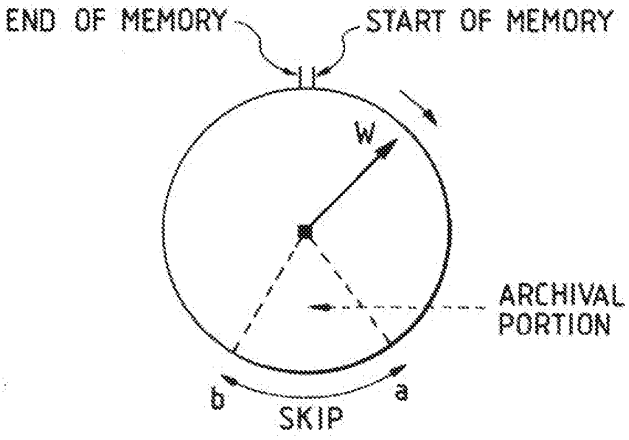
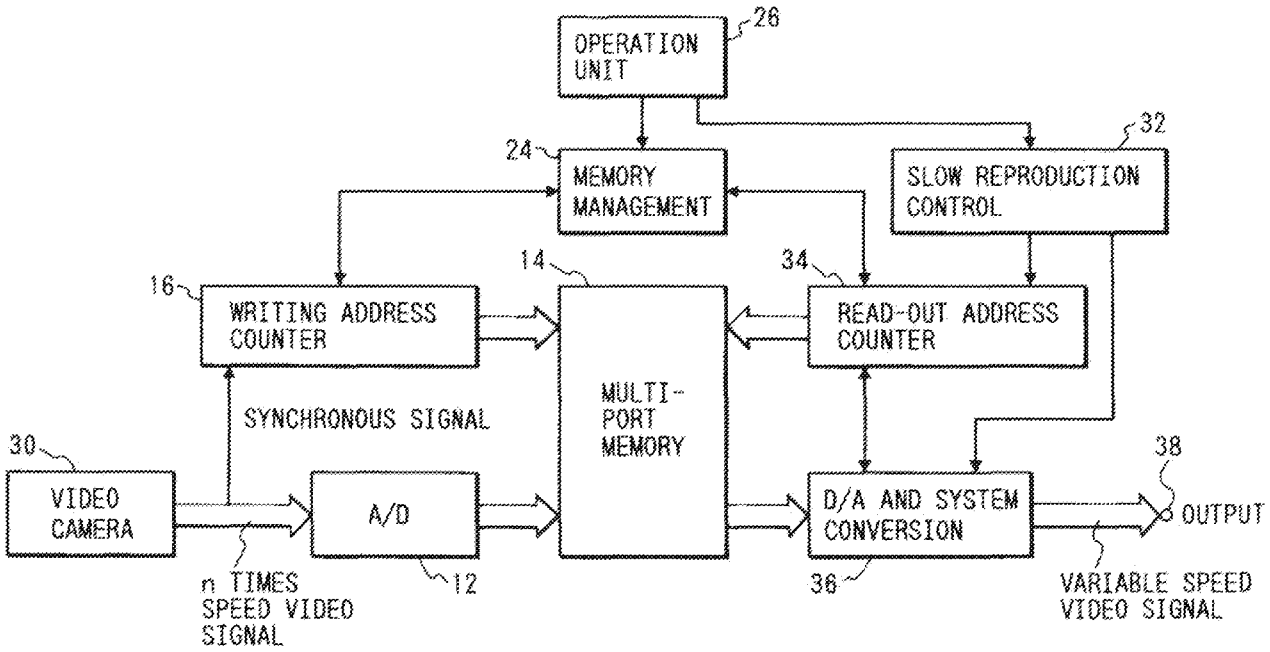


FIG. 4



Motorola v. Stellar
Motorola Exhibit 1032
Page 074

FIG. 5

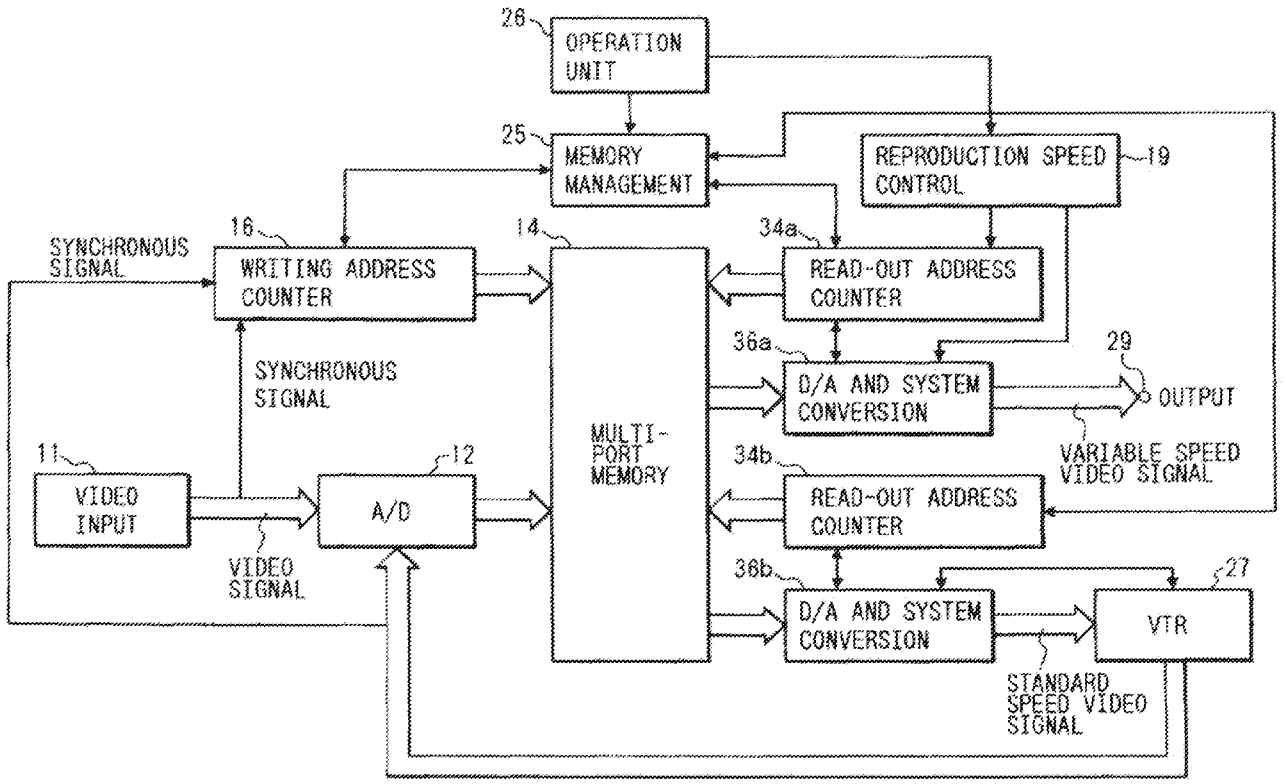


10

EP 0 510 968 A2

Motorola v. Stellar
Motorola Exhibit 1032
Page 075

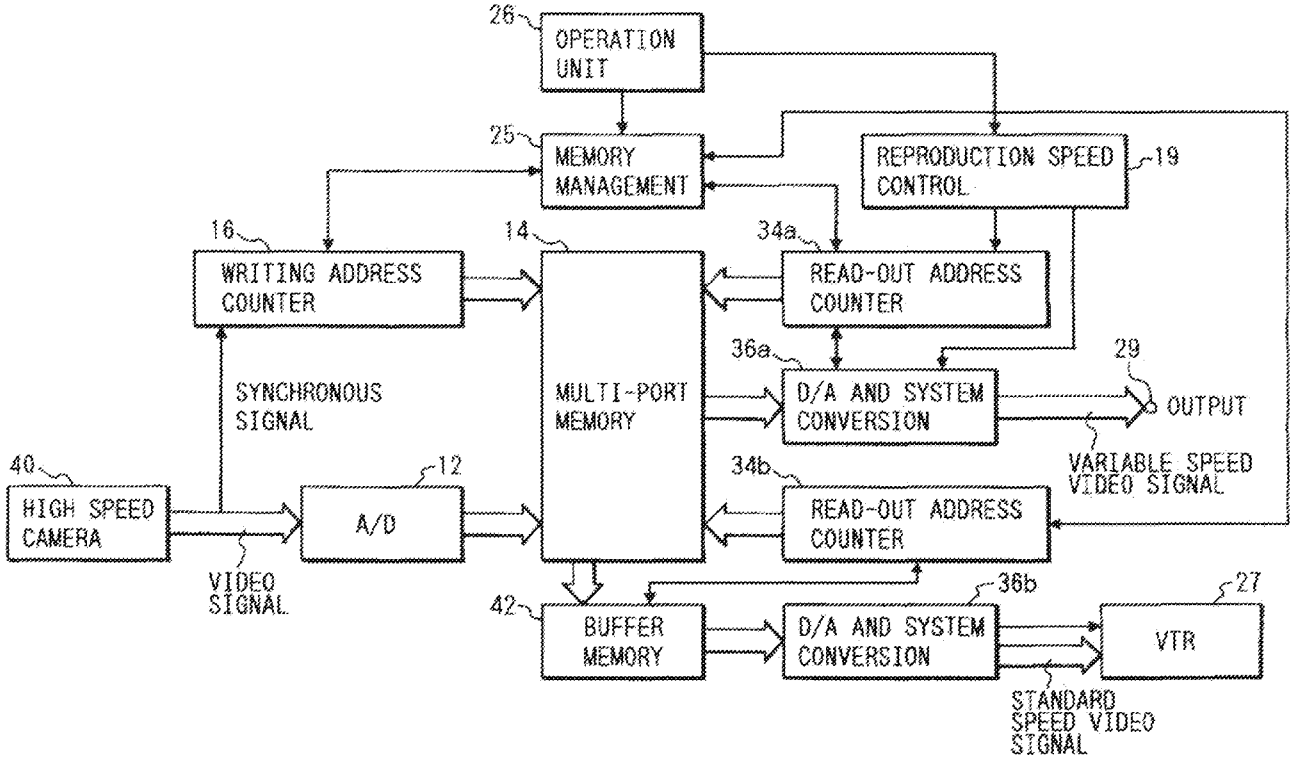
FIG. 6



EP 0 810 668 A2

Motorola v. Stellar
Motorola Exhibit 1032
Page 076

FIG. 7



EP 0 510 968 A2

Motorola v. Stellar
Motorola Exhibit 1032
Page 077

FIG. 8

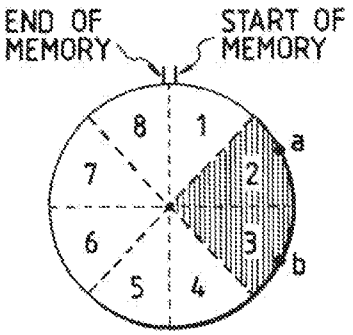
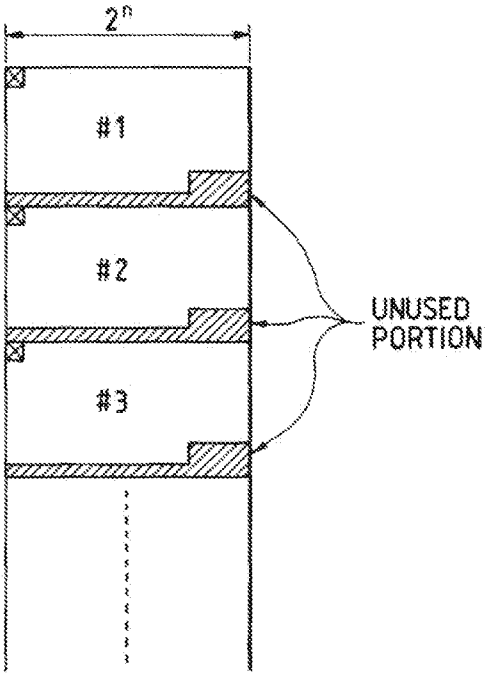
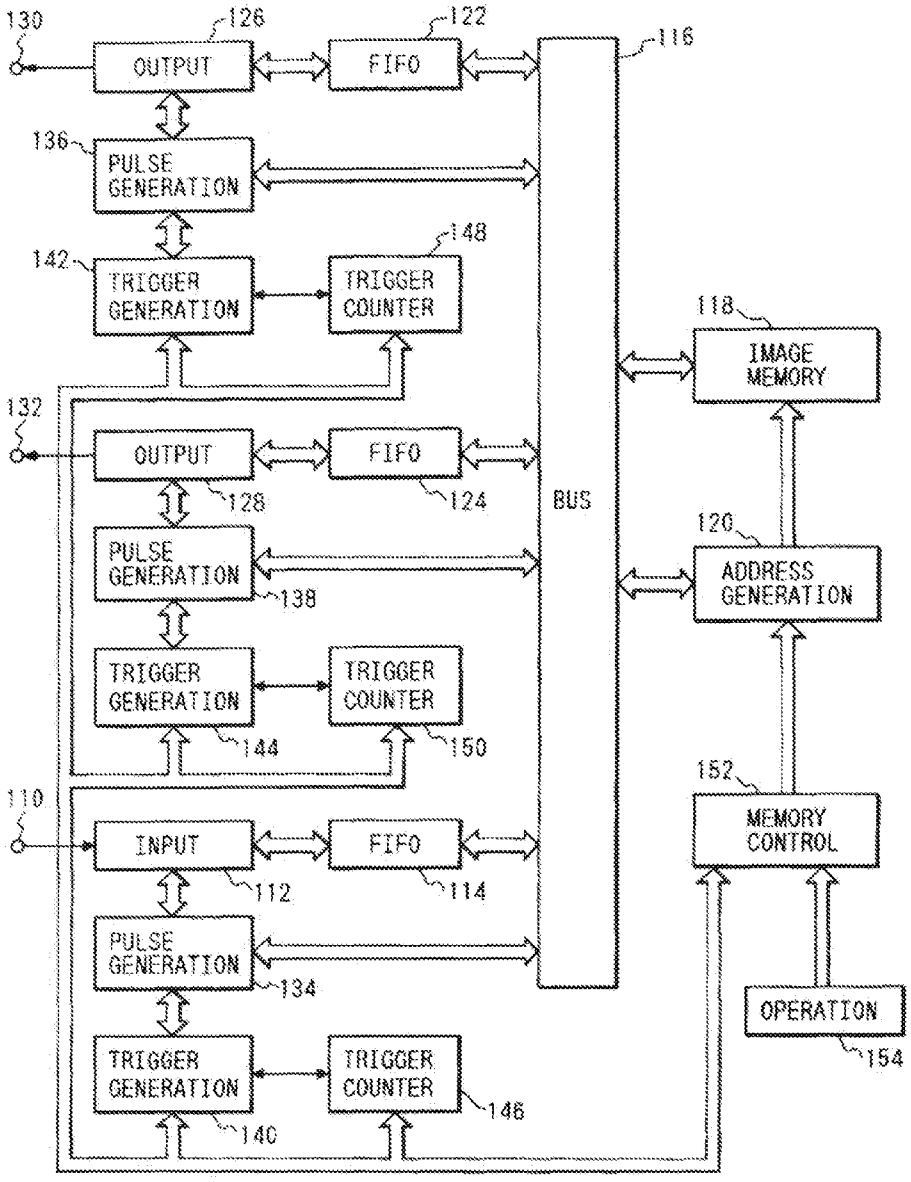


FIG. 10



Motorola v. Stellar
Motorola Exhibit 1032
Page 078

FIG. 9



Motorola v. Stellar
Motorola Exhibit 1032
Page 079

(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number : **0 510 968 A3**

(12) EUROPEAN PATENT APPLICATION

(21) Application number : **92303654.5**

(22) Date of filing : **23.04.92**

(51) Int. Cl.[5] : **H04N 5/91**, H04N 5/907, H04N 5/93

(30) Priority : **24.04.91 JP 94487/91**
24.04.91 JP 94488/91
24.04.91 JP 94489/91

(43) Date of publication of application :
28.10.92 Bulletin 92/44

(84) Designated Contracting States :
DE ES FR GB IT NL

(88) Date of deferred publication of search report :
15.09.93 Bulletin 93/37

(71) Applicant : **CANON KABUSHIKI KAISHA**
30-2, 3-chome, Shimomaruko, Ohta-ku
Tokyo (JP)

(72) Inventor : **Hattori, Yuichiro, c/o Canon Kabushiki Kaisha**
30-2, 3-chome, Shimomaruko
Ohta-ku, Tokyo (JP)
Inventor : **Nakaya, Akira, c/o Canon Kabushiki Kaisha**
30-2, 3-chome, Shimomaruko
Ohta-ku, Tokyo (JP)
Inventor : **Yamazaki, Tatsuro, c/o Canon Kabushiki Kaisha**
30-2, 3-chome, Shimomaruko
Ohta-ku, Tokyo (JP)

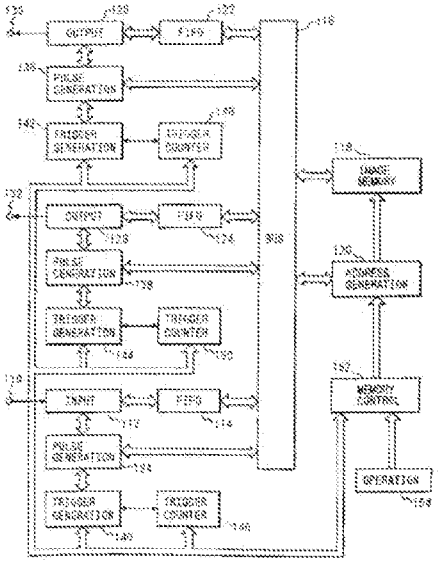
(74) Representative : **Beresford, Keith Denis Lewis et al**
BERESFORD & Co. 2-5 Warwick Court High Holborn
London WC1R 5DJ (GB)

(54) An image memorizing device.

(57) A memory capable of memorizing a video signal has part of its address area into which an information signal is inhibited from being written. A writing address controller for cyclically specifying writing addresses of the memory cyclically specifies writing addresses in the remaining address area except for the part of address area to allow a plurality of different moving picture scenes to be memorized in the one and same memory.

For according to a large capacity main memory, a sub-memory (114,122,124) is interposed to access to the main memory (118) with a predetermined information amount being as the unit, thereby facilitating address management of the main memory as well as improving a utilizing effeciency of the main memory.

FIG 9



EP 0 510 968 A3

Motorola v. Stellar
Motorola Exhibit 1032
Page 080

European Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 92 30 3654

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
X	INTERNATIONAL BROADCASTING CONVENTION 1988 September 1988, LONDON, UK pages 422 - 424 , XP232985 J.R. CROOK ET AL 'Solid state video recorder' * the whole document *	1-6,8-11	H 04 N 5/91 H 04 N 5/907 H 04 N 5/93
A	US-A-3 585 610 (BARTLETT) 15 June 1971 * abstract *	7	
A	EP-A-0 213 374 (SIEMENS) 11 March 1987 * abstract *	1,9,11	
A	SYMPOSIUM RECORD BROADCAST SESSIONS June 1989, MONTREUX, CH pages 289 - 295 , XP41124 WOODHAM ET AL 'A solid state "action replay" recorder' * introduction *	1,9,11	
A	NATIONAL AEROSPACE AND ELECTRONICS CONFERENCE 1984 May 1984, NEW YORK, US pages 62 - 67 P. OBERBECK 'Design and application of a solid-state video disk system'	1,9,11	TECHNICAL FIELDS SEARCHED (Int. Cl.5) H 04 N G 11 C
A	SMPTE JOURNAL vol. 100, no. 1, January 1991, SCARSDALE, NY US pages 10 - 13 , XP173301 KLINGELHOFER ET AL 'HDTV digital frame recorder'	1,9,11	

[redacted]

Place of search	Date of completion of the search	Examiner
THE HAGUE	09-03-1993	DOCKHORN H S A

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P0401)

Motorola v. Stellar
Motorola Exhibit 1032
Page 081

European Patent Office

CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing more than ten claims.

- ☐ All claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for all claims.
- ☐ Only part of the claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims and for those claims for which claims fees have been paid, namely claims:
- ☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirement of unity of invention and relates to several inventions or groups of inventions, namely:

See sheet -B-

- ☐ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.
- ☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:
- ☒ None of the further search fees has been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims: 1-11

Motorola v. Stellar
Motorola Exhibit 1032
Page 082

European Patent Office

EP 92 30 3654 -B-

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirement of unity of invention and relates to several inventions or groups of inventions, namely:

1. Claims 1-11 : Device/method for protecting data in a ring-memory.

2. Claim 12 : Block input for memory.

Motorola v. Stellar
Motorola Exhibit 1032
Page 083

(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 1 064 783 B1

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:
04.06.2003 Bulletin 2003/23

(21) Application number: **99908727.3**

(22) Date of filing: **25.03.1999**

(51) Int Cl.[7]: **H04N 5/232**, G06F 1/16

(86) International application number:
PCT/CA99/00249

(87) International publication number:
WO 99/049656 (30.09.1999 Gazette 1999/39)

(54) **WEARABLE CAMERA SYSTEM WITH VIEWFINDER MEANS**

TRAGBARES KAMERASYSTEM MIT VISIERMITTEL

SYSTEME DE CAMERA PORTABLE AVEC VISEUR

(84) Designated Contracting States:
AT BE CH DE FR GB IE IT LI SE

(30) Priority: **25.03.1998 CA 2233047**
15.10.1998 CA 2249976

(43) Date of publication of application:
03.01.2001 Bulletin 2001/01

(73) Proprietor: **Mann, W. Stephen G.**
Toronto, Ontario M5S 3G4 (CA)

(72) Inventor: **Mann, W. Stephen G.**
Toronto, Ontario M5S 3G4 (CA)

(74) Representative: **Kazi, Ilya et al**
Mathys & Squire,
100 Gray's Inn Road
London WC1X 8AL (GB)

(56) References cited:
EP-A- 0 665 686
EP-A- 0 827 337
WO-A-94/26061
WO-A-96/36271
WO-A-97/34411
DE-A- 4 436 528
DE-A- 19 547 166
DE-U- 9 217 643
US-A- 4 786 966
US-A- 5 550 585
US-A- 5 610 678

- **PATENT ABSTRACTS OF JAPAN vol. 096, no. 011, 29 November 1996 & JP 08 179223 A (CANON INC), 12 July 1996 & US 5 815 741 A (OKUYAMA ET AL.)**
- **25 - 32: "WEARABLE COMPUTING: A FIRST STEP TOWARD PERSONAL IMAGING" COMPUTER, vol. 30, no. 2, 1 February 1997, pages 25-32, XP000722152**

Remarks:
The file contains technical information submitted after the application was filed and not included in this specification

Note: Within nine months from the publication of the mention of the grant of the European patent, any person may give notice to the European Patent Office of opposition to the European patent granted. Notice of opposition shall be filed in a written reasoned statement. It shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).

Printed by Jouve, 75001 PARIS (FR)

EP 1 064 783 B1

Description

FIELD OF THE INVENTION

[0001] The present invention pertains generally to a new photographic or video means and apparatus comprising a body-worn portable electronic camera system with wearable viewfinder means.

BACKGROUND OF THE INVENTION

[0002] In photography (and in movie and video production), it is desirable to capture events in a natural manner with minimal intervention and disturbance. Current state-of-the-art photographic or video apparatus, even in its most simple "point and click" form, creates a visual disturbance to others and attracts considerable attention on account of the gesture of bringing the camera up to the eye. Even if the size of the camera could be reduced to the point of being negligible (e.g. no bigger than the eyecup of a typical camera viewfinder, for example), the very gesture of bringing a device up to the eye is unnatural and attracts considerable attention, especially in establishments such as gambling casinos or department stores where photography is often prohibited. Although there exist a variety of covert cameras such a camera concealed beneath the jewel of a necktie clip, cameras concealed in baseball caps, and cameras concealed in eyeglasses, these cameras tend to produce inferior images, not just because of the technical limitations imposed by their small size, but, more importantly because they lack a means of viewing the image. Because of the lack of a viewfinder, investigative video and photojournalism made with such cameras suffers from poor composition.

[0003] It appears that apart from large view cameras upon which the image is observed on a ground glass, most viewfinders present an erect image. See, for example, U.S. Pat. No. 5095326 entitled "Neppler-type erect image viewfinder and erecting prism". In contrast to this fact, it is well-known that one can become accustomed, through long-term psychophysical adaptation (as reported by George M. Stratton, in *Psychology Review,* in 1896 and 1897) to eyeglasses that present an upside-down image. After wearing upside-down glasses constantly, for eight days (keeping himself blindfolded when removing the glasses for bathing or sleeping) Stratton found that he could see normally through the glasses. More recent experiments, as conducted by and reported by Mann, in an MIT technical report *Mediated Reality,* medialab vismod TR-260, (1994), (the report is available in http://wearcam.org/mediated-reality/index.html) suggest that slight transformations such as rotation by a few degrees or small image displacements give rise to a reversed aftereffect that is more rapidly assimilated by the wearer, and that such effects can often have a more detrimental effect on performing other tasks through the camera as well as more detrimental flashbacks upon removal of the camera. These findings suggest that merely mounting a conventional camera such as a small 35mm rangefinder camera or a small video camcorder to a helmet, so that one can look through the viewfinder and use it it hands-free while performing other tasks, will result in poor performance at doing those tasks while looking through the camera viewfinder. Moreover, these findings suggest that doing tasks while looking through the viewfinder of a conventional camera, over a long period of time, may give rise to detrimental flashback effects that may persist even after the camera is removed. This is especially true when the tasks involve a great deal of hand-eye coordination, such as when one might, for example, wish to photograph, film, or make video recordings of the experience of eating or playing volleyball or the like, by doing the task while concentrating primarily on the eye that is looking through the camera viewfinder. Indeed, since known cameras were never intended to be used this way (to record events from a first-person-perspective while looking through the viewfinder) it is not surprising that performance is poor in this usage.

[0004] Part of the reason for poor performance associated with simply attaching a conventional camera to a helmet is the induced parallax and the failure to provide an orthoscopic view. Even viewfinders which correct for parallax, as described in U.S. Pat. No. 5692227 in which a rangefinder is coupled to a parallax error compensating mechanism, only correct for parallax between the viewfinder and the camera lens that is taking the picture, but do not correct for parallax between the viewfinder and the image that would be observed with the naked eye while not looking through the camera.

[0005] Traditional camera viewfinders often include the ability to overlay virtual objects, such as camera shutter speed, or the like, on top of reality, as described in U.S. Pat. No. 5664244 which describes a viewfinder with additional information display capability.

[0006] Open-air viewfinders are often used on extremely low cost cameras, as well as on some professional cameras for use at night when the light levels would be too low to tolerate any optical loss in the viewfinder. Examples of open-air viewfinders used on professional cameras, in addition to regular viewfinders, include those used on the Grafflex press cameras of the 1940s (which had three different kinds of viewfinders), as well as those used on some twin-lens reflex cameras. While such viewfinders, if used with a wearable camera system, would have the advantage of not inducing the problems such as flashback effects described above, they would fail to provide an electronically mediated reality. Moreover, although such open air viewfinders would eliminate the parallax between what is seen in the real world and what is seen in the real world looking through the viewfinder, they fail to eliminate the parallax error between the viewfinder and the camera.

[0007] A manner of using a plurality of pictures of the same scene or object, in which the pictures were taken

Motorola v. Stellar
Motorola Exhibit 1032
Page 085

using a camera with automatic exposure control, automatic gain control, or the like has been proposed in *'PENCIGRAPHY' WITH AGC: JOINT PARAMETER ESTIMATION IN BOTH DOMAIN AND RANGE OF FUNCTIONS IN SAME ORBIT OF THE* PROJECTIVE-WYCKOFF *GROUP*, published by S. Mann, in M.I.T. (medialab vismod) tech report TR-384, December, 1994, and later published also in Proceedings of the IEEE International Conference on Image Processing (ICIP-96), Lausanne, Switzerland, September 16-19, 1996, pages 193-196. (The report is also available on a world wide web site: http://wearcam.org/icip96/index.html as a hypertext document, along with related documents on http://wearcam.org.) This report relates to a manner of camera self-calibration in which the unknown nonlinear response function of the camera is determined up to a single unknown scalar constant. Therefore, once the camera is so understood, it may be used, within the context of the method, as a quantigraphic light measuring instrument. As each pixel of the camera then becomes a light measuring instrument, successive pictures in a video sequence become multiple estimates of the same quantity once the multiple images are registered and appropriately interpolated. The measurement from a plurality of - such estimates gives rise to knowledge about the scene sufficient to render pictures of increased dynamic range and tonal fidelity, as well as increased spatial resolution and extent. In this way a miniature video camera as may be concealed inside a pair of eyeglasses may be used to generate images of very high quality, sufficient for fine-arts work or other uses where good image quality is needed.

[0008] WO-A-97 34411 discloses a beamsplitter in front of an eye of a user, wherein the beamsplitter diverts some of the eyeward bound light to an electronic camera, and where the output of the camera is transmitted to a remote display. My article "Wearable Computing: A First Step Toward Personal Imaging" in IEEE Computer, Vol. 30, No. 2, published 1997 February 1, on pages 25-32, discusses a head-mounted camera and display system, in which the display is responsive to an output of the camera.

[0009] United States Patent 5,550,585 shows, in serial order, a lens, image sensor array, display, and a further lens, all four of these being directly in front of an eye of a user of the apparatus. The sensor output enters a processor, and the output of the processor enters the display. United States Patent 4,786,966 discloses a head-mounted video camera and a video display in front of the eyes of a user.

[0010] In DE-A-44 36 528, a camera and display are mounted to an eyeglass holder so that the display shoes an enlarged view of subject matter viewed by the camera.

[0011] In WO96/36721, video cameras are mounted at the sides of the head of a wearer and the cameras are oriented and focused based on eye tracking measurements. The cameras only capture an approximation of the natural vision of the wearer.

[0012] In U.S. Pat. No. 5,610,678, a head borne viewfinder is provided for a body worn camera.

SUMMARY OF THE INVENTION

[0013] It is an object of this invention to provide a method of positioning a camera in which both hands may be left free.

[0014] It is a further object of this invention to provide a means of exposing a film or acquiring a picture electronically where the spatial extent (field of view) of the image may be ascertained without having to hold any device up to the eye.

[0015] What is described is a wearable camera and viewfinder for capturing video of exceptionally high compositional and artistic calibre. In addition to the fact that covert versions of the apparatus can be used to create investigative documentary videos having very good composition. for everyday usage the device need not necessarily be covert. In fact, it may be manufactured as a fashionable device that serves as both a visible crime deterrent, as well as a self-explanatory (through its overt obviousness) tool for documentary videomakers and photojournalists.

[0016] Another feature of the invention is that the wearable camera has a viewfinder such that the image may be presented in a natural manner suitable for long-term usage patterns.

[0017] There are several reasons why it might be desired to wear the camera over a sustained period of time:

1. There is the notion of a personal visual diary of sorts.

2. There is the idea of being always ready. By constantly recording into a circular buffer, a retroactive record function, such as a button that instructs the device to "begin recording from five minutes ago" may be useful in personal safety (crime reduction) as well as in ordinary everyday usage, such as capturing a baby's first steps on video. With the prior art in photography and video, we spend so much time preparing the camera and searching for film, batteries, etc., or at the very least, just getting the camera out of its carrying case, that we often miss important moments like a baby's first steps, or a spontaneous facial expression during the opening of a gift.

3. There is the fact that the wearable camera system, after being worn for a long period of time, begins to behave as a true extension of the wearer's mind and body. As a result, the composition of video shot with the device is often impeccable without even the need for conscious thought or effort on the part of the user. Also, one can engage in other activities, and one is able to record the experience

Motorola v. Stellar
Motorola Exhibit 1032
Page 086

without the need to be encumbered by a camera, or even the need to remain aware, at a conscious level, of the camera's existance. This lack of the need for conscious thought or effort suggests a new genre of documentary video characterized by long-term psychophysical adaptation to the device. The result is a very natural first-person perspective documentary, whose artistic style is very much as if a recording could be made from a video tap of the optic nerve of the eye itself. Events that may be so recorded include involvement in activities such as horseback riding, climbing up a rope, or the like, that cannot normally be well recorded from a first-person perspective using cameras of the prior art. Moreover, a very natural first-person perspective genre of video results. For example, while Wearing an embodiment of the invention, it is possible to look through the eyepiece of a telescope or microscope and record this experience, including the approach toward the eyepiece. The experience is recorded, from the perspective of the participant.

4. A computational system, either built into the wearable camera, or worn on the body elsewhere and connected to the camera system, may be used to enhance images. This may be of value to the visually impaired. The computer may also perform other tasks such as object recognition. Because the device is worn constantly, it may also function as a photographic/videographic memory aid, e.g. to help in way-finding through the recall and display of previously captured imagery.

[0018] It is desired that the proposed viewfinder arrangement be suitable for long-term usage, such as when one may be wearing the camera for sixteen hours per day, looking through it all the while. Traditional viewfinders are only looked through on a shorter term basis. Thus there will be some important differences between the wearable camera system and traditional cameras. For example, when the wearable camera system comprises a zoom lens for the camera, it is desired that the viewfinder also comprise a zoom lens, so that when zooming into a scene, the image in the viewfinder can be made to subtend a lesser visual angle (appear to get smaller). It is also desired that the exact extent of this reduction in apparent visual angle be controlled to exactly cancel out the usual effect in which zooming in produces increased magnification. In this manner the wearable camera system provides the wearer with absolutely no apparent magnification, or change in apparent magnification, while looking through the viewfinder and exploring the full range of zoom adjustment.

[0019] Some viewfinders are equipped with a zoom capability, as, for example, is described in U.S. Pat. No. 5323264, so that their field of coverage (magnification) varies with the varying of a zoom lens. The reader will need to be careful not to confuse these zoom viewfinders of the prior art with the zoom viewfinder of the wearable camera invention in which viewing takes place through an electronic viewfinder where the decrease in visual angle subtended by the image of the viewfinder screen is coupled to the increase in focal length of the camera within the proposed invention. This coupling negates (cancels out) any increase in magnification that would otherwise result from zooming in on the scene. At first this lack of increase in apparent magnification with increase in lens focal-length may seem counter-intuitive, in the sense that we normally expect zooming in to produce an increase in apparent magnification as observed while looking through a camera viewfinder. This expectation is owing to known cameras. However, after using the wearable camera system for an extended period of time, one quickly grows accustomed to the unique characteristics of its viewfinder, and the much more seamless integration of its viewfinder with everyday life. This seamlessness is such that after time, the wearer will begin to operate the wearable camera invention without appreciable conscious thought or effort. With magnification, or changes in magnification, it is much more difficult to fully adapt to the presence of the camera.

[0020] An important aspect of the proposed invention is the capability of the apparatus to mediate (augment, diminish, or otherwise alter) the visual perception of reality.

[0021] The proposed camera viewfinder is related to the displays that are used in the field of Virtual Reality (VR) in the sense that both are wearable. However, an important difference is that the proposed invention allows the wearer to continue to see the real world, while VR displays block out the ability to see the real world.

[0022] It is possible with the invention to allow visual reality to be mediated in order to make certain that exposure is correct as well as to keep the wearer of the apparatus in the feedback loop of the photo compositional process by constantly providing the wearer with a video stream. Moreover, it is desired that the apparatus will allow the wearer to experience a computationally mediated visual reality, and for that experience to be shared through wireless communications networks so that the wearer may receive additional visual information, as well as be aware of modifications to visual reality that might arise, for example, as part of a communications process in a shared virtual environment. For such compositional and interactional capabilities, a simple air-based viewfinder is inadequate.

[0023] It is possible with this invention to provide such a method of exposing a film or acquiring a picture electronically where the tonal characteristics of the picture may be ascertained without having to hold any device up to the eye.

[0024] It is possible with this invention to provide such a method of exposing a film or acquiring a picture electronically where no apparent difference in body movement or gesture between when a picture is being taken

Motorola v. Stellar
Motorola Exhibit 1032
Page 087

and when no picture is being taken is detectable by others.

[0025] It is possible with this invention to provide the user with a means of determining the composition of the picture from a display device that is located such that only the user can see the display device, and so that the user can ascertain the composition of a picture or take a picture or video and transmit image(s) to one or more remote locations without the knowledge of others in the immediate environment.

[0026] It is possible with this invention to provide the user with a means of determining the composition of the picture from a display device that is located such that only the user can see the display device, as well as an optional additional display device that the user can show to others if and when the user desires to do so.

[0027] It is possible with this invention to provide the user with a means of determining the composition of the picture from a display device that is located such that both the user as well as others can see it, if the user should so desire.

[0028] It is possible with this invention to provide a wearable camera viewfinder means in which video is displayed on a viewfinder in such a way that all rays of light from the viewfinder that enter the eye appear to emanate from essentially the same direction as they would have had the apparatus not been worn.

[0029] It is possible with this invention to provide a means for a user to experience additional information overlaid on top of his or her visual field of view such that the information is relevant to the imagery being viewed.

[0030] It is possible with this invention to provide a means and apparatus for a user to capture a plurality of images of the same scene or objects, in a natural process of simply looking around, and then have these images combined together into a single image of increased spatial extent, spatial resolution, dynamic range, or tonal fidelity.

[0031] It is possible with this invention to provide a viewfinder means in which the viewfinder has a focusing mechanism that is coupled to a focusing mechanism of a camera system, so that when the camera is focused on a particular object the viewfinder also presents that object in a manner such that when the apparatus moves relative to the user's eye, the object appears to neither move with or against the movement of the eye, so that the rays of light entering the eye are approximately the same in direction as if the apparatus were not present.

[0032] It is possible with this invention to provide a viewfinder means in which the viewfinder has a focusing mechanism that is coupled to a focusing mechanism of a camera system, so that when the camera is focused on a particular object the viewfinder also presents that object in the same focal depth plane as the object would appear to the user with the apparatus removed.

[0033] It is possible with this invention to provide a viewfinder means in which the viewfinder has a focusing mechanism that is controlled by an automatic focusing mechanism of a camera system.

[0034] It is possible with this invention to provide a stereo viewfinder means in which the viewfinder system has camera focusing, camera vergence, display focusing, and display vergence control where all four are linked together so that there is only need for a single control.

[0035] It is possible with this invention to provide a stereo viewfinder means in which the viewfinder has focusing and vergence control mechanisms that are controlled by an automatic focusing mechanism of a camera system.

[0036] It is possible with this invention to provide a viewfinder means in which the viewfinder has a focusing mechanism that is controlled by an automatic focusing mechanism of a camera system, and in which the apparatus comprises an eye-tracking mechanism that causes the focus of the camera to be based on where the user is looking, and therefore the focus of the viewfinder mechanism to be also focused in such a manner that the convergence of light rays from whatever object happens to be within the foveal region of the eye's view also produces rays of light that have the same focal distance as they would have had with the apparatus removed from the user.

[0037] The proposed invention facilitates a new form of visual art, in which the artist may capture, with relatively little effort, a visual experience as viewed from his or her own perspective. With some practice, it is possible to develop a very steady body posture and mode of movement that best produces video of the genre pertaining to this invention. Because the apparatus may be lightweight and close to the head, there is not the protrusion associated with carrying a hand-held camera. Also because components of the proposed invention are mounted very close to the head, in a manner that balances the weight distribution. Mounting close to the head minimizes the moment of inertia about the rotational axis of the neck, so that the head can be turned quickly while wearing the apparatus. This arrangement allows one to record the experiences of ordinary day-today activities from a first-person perspective. Moreover, because both hands are free, much better balance and posture is possible while using the apparatus. Anyone skilled in the arts of body movement control as is learned in the martial arts such as karate, as well as in dance, most notably ballet, will have little difficulty capturing exceptionally high quality video using the apparatus of this invention.

[0038] With known video or movie cameras, the best operators tend to be very large people who have trained for many years in the art of smooth control of the cumbersome video or motion picture film cameras used. In addition to requiring a very large person to optimally operate such cameras, various stabilization devices are often used, which make the apparatus even more cumbersome. The apparatus of the invention may be optimally operated by people of any size. Even young chil-

Motorola v. Stellar
Motorola Exhibit 1032
Page 088

dren can become quite proficient in the use of the wearable camera system.

[0039] A typical embodiment of the invention comprises one or two spatial light modulators or other display means built into a pair of eyeglasses together with one or more sensor arrays. Typically one or more CCD (charge coupled device) image sensor arrays and appropriate optical elements comprise the camera portion of the invention. Typically a beamsplitter or a mirror silvered on both sides is used to combine the image of the viewfinder with the apparent position of the camera. The viewfinder is simply a means of determining the extent of coverage of the camera in a natural manner, and may comprise either of:

- A reticle, graticule, rectangle, or other marking that appears to float within a portion of the field of view.
- A display device that shows a video image, or some other dynamic information perhaps related to the video image coming from the camera.

[0040] One aspect of the invention allows a photographer or videographer to wear the apparatus continuously and therefore always end up with the ability to produce a picture from something that was seen a couple of minutes ago. This may be useful to everyone in the sense that we may not want to miss a great photo opportunity, and often great photo opportunities only become known to us after we have had time to think about something we previously saw.

[0041] Such an apparatus might also be of use in personal safety. Although there are a growing number of video surveillance cameras installed in the environment allegedly for "public safety", there have been recent questions as to the true benefit of such centralized surveillance infrastructures. Most notably there have been several examples in which such centralized infrastructure has been abused by the owners of it (as in roundups and detainment of peaceful demonstrators). Moreover, "public safety" systems may fail to protect individuals against crimes committed by the organizations that installed the systems. The apparatus of this invention allows the storage and retrieval of images by transmitting and recording images at one or more remote locations. Images may be transmitted and recorded in different countries, so that they would be difficult to destroy, in the event that the perpetrator of a crime might wish to do so.

[0042] The apparatus of the invention allows images to be captured in a natural manner, without giving an unusual appearance to others (such as a potential assailant).

[0043] Moreover, as an artistic tool of personal expression, the apparatus allows the user to record, from a first-person-perspective, experiences that have been difficult to so record in the past. For example, a user might be able to record the experience of looking through binoculars while riding horseback, or the experience of waterskiing, rope climbing, or the like. Such experiences captured from a first-person perspective provide a new genre of video by way of a wearable camera system with viewfinder means that goes beyond current state-of-the-art point of view sports videos (such as created by cameras mounted in sports helmets which have no viewfinder means).

[0044] A typical embodiment of the invention comprises a wearable viewfinder system which is fitted with a motorized focusing mechanism. A camera also fitted with a motorized focusing mechanism is positioned upon one side of a mirror that is silvered on both sides, so that the viewfinder can be positioned on the other side and provide a view that is focused to whatever the camera is focused on. Such an apparatus allows the user to record a portion of his or her eye's visual field of view. With the correct design, the device will tend to cause the wearer to want to place the recording zone over top of whatever is most interesting in the scene. This tendency arises from the enhancement of the imagery in this zone. In much the same way that people tend to look at a TV set in a darkened room, regardless of what is playing (even if the TV is tuned to a blank station and just playing "snow"), there is a tendency when wearing the invention to look at the recording/display/viewfinder zone. Therefore, there is a tendency to try to put the recording zone on top that which is of most interest. Therefore using the apparatus, after time, does not require conscious thought or effort. It was once said that television is more real than real life, and in much the same way, the wearer of the apparatus becomes a cybernetic organism (cyborg) in a true synergy of human and camera. This is particularly true with a low vision system in which one can actually see better through the viewfinder than in real life (e.g. at night when an image intensifier provides enhanced vision). In this case, the tendency of the wearer to want to become an organism that seeks best picture is very pronounced.

[0045] Accordingly, the present invention in one aspect comprises headgear having an electronic camera borne by said headgear and an electronic display borne by said headgear, said electronic display responsive to an output from said electronic camera, wherein the improvement comprises: reflective optics arranged for, at least partially, reflecting light such that a first pencil of light which would otherwise converge at a first point outside a lens assembly of said camera is at least partially reflected to a second pencil of light directed at an optical center of said lens assembly of said camera, said lens assembly comprising at least one lens, wherein said reflective optics is further for reflecting light from said display such that said reflected light from said display forms a third pencil of light approximating said first pencil of light, in order to provide substantial exact registration of what would have been seen at said first point due to said first pencil of light, in the absence of said headgear, with what, in the presence of said headgear, is seen at said

Motorola v. Stellar
Motorola Exhibit 1032
Page 089

first point due to said third pencil of light.

[0046] According to another aspect of the present invention, there is provided headgear having a sensor borne by said headgear, a display borne by said headgear, said display situated for being visible to a wearer of said headgear when said headgear is worn, an output from said sensor for a processor, and an input to said display for accepting input from said processor, wherein the improvement comprises: reflective optics arranged for reflecting light such that at least a portion of at least some rays of light which would otherwise, in the absence of said reflective optics, not be measured by said sensor, is reflected to be measured by said sensor, said processor for determining a quantity of light in each of said at least some rays of light, said processor for controlling said display to provide outgoing rays of light each one being collinear with, and responsive to, one of said at least some rays of light.

BRIEF DESCRIPTION OF THE DRAWINGS

[0047] The invention will now be described in more detail, by way of examples which in no way are meant to limit the scope of the invention, but, rather, these examples will serve to illustrate the invention with reference to the accompanying drawings, in which:

FIG. **1** is a diagram of a simple embodiment of the invention in which there are two cameras, a wide-angle camera concealed in the nose bridge of a pair of sunglasses, a telecamera concealed in the top part of the frame of the sunglasses, and combined by way of a beamsplitter with the wide-camera, as well as a viewfinder means concealed in the left temple side-piece of the glasses with optics concealed in or behind the glass of the left lens. FIG 1A is an exploded view of a portion of FIG 1. FIG 1B is a detail view of a portion of FIG 1. FIG 1C and FIG 1D illustrate aspects of the operation of the embodiment of FIG 1.

FIG. **2** is a diagram of the wearable camera system with an improvement in which the viewfinder is constructed so that when other people look at the wearer of the apparatus they can see both of the wearer's eyes in such a way that they do not notice any unusual magnification of the wearer's left eye which might otherwise look unusual or become a problem in making normal eye contact with the wearer.

FIG. **3** illustrates the principle of a camera viewfinder which replaces a portion of the visual field of view with the view from a camera, yet allows the wearer to see through the apparatus without experiencing any psychophysical adaptation or coordinate transformation.

FIG. **4** illustrates a version of the apparatus similar to that in FIG. 1, except where a portion of the visual field of view is only partially replaced, owing to the use of polarizers to prevent video feedback, as well as a beamsplitter rather than a double-sided mirror.

FIG. **5** shows an embodiment of the invention in which there are two televisions of different sizes which are each superimposed upon exactly the field of view that corresponds to each of two cameras, one being wide-angle and the other being tele.

FIG. **6** shows an embodiment of the wearable camera invention in which the viewfinder contains considerable magnification, yet allows other people to see both of the wearer's eyes except for a slight amount of blocked vision which may be concealed by making the glasses look like bifocal glasses.

FIG. **7** shows an embodiment of the invention where there is coupling between camera focus and viewfinder focus.

FIG. **8** shows an embodiment of the invention where there is a zoom capability, and where the virtual light principle is preserved regardless of zoom setting.

FIG. **9** shows a stereo embodiment of the invention where both cameras are focused by the left camera, and where the left camera also controls the focus of both viewfinders and the vergence of the entire system.

FIG. **10** shows an embodiment of the invention where an eye tracker is used to set the stereo camera focus, the stereo viewfinder focus, and the vergence, to all correspond with the object. the wearer is looking at.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0048] While the invention shall now be described with reference to the preferred embodiments shown in the drawings, it should be understood that the intention is not to limit the invention only to the particular embodiments shown but rather to cover all alterations, modifications and equivalent arrangements possible within the scope of appended claims.

[0049] In all aspects of the present invention, references to "camera" mean any device or collection of devices capable of simultaneously determining a quantity of light arriving from a plurality of directions and or at a plurality of locations, or determining some other attribute of light arriving from a plurality of directions and or at a plurality of locations. Similarly references to "display", "television", or the like, shall not be limited to just television monitors or traditional televisions used for the display of video from a camera near or distant, but shall also include computer data display means, computer data monitors, other video display devices, still picture display devices, ASCII text display devices, terminals, systems that directly scan light onto the retina of the eye to form the perception of an image, direct electrical stimulation through a device implanted into the back of the brain (as might create the sensation of vision in a blind person), and the like.

[0050] With respect to both the cameras and displays,

Motorola v. Stellar
Motorola Exhibit 1032
Page 090

as broadly defined above, the term "zoom" shall be used in a broad sense to mean any lens of variable focal length, any apparatus of adjustable magnification, or any digital, computational, or electronic means of achieving a change in apparent magnification. Thus, for example, a zoom viewfinder, zoom television, zoom display, or the like, shall be taken to include the ability to display a picture upon a computer monitor in various sizes through a process of image interpolation as may be implemented on a body-worn computer system.

[0051] References to "processor", or "computer" shall include sequential instruction, parallel instruction, and special purpose architectures such as digital signal processing hardware, Field Programmable Gate Arrays (FPGAs), programmable logic devices, as well as analog signal processing devices.

[0052] References to "transceiver" shall include various combinations of radio transmitters and receivers, connected to a computer by way of a Terminal Node Controller (TNC), comprising, for example, a modem and a High Level Datalink Controller (HDLCs), to establish a connection to the Internet, but shall not be limited to this form of communication. Accordingly, "transceiver" may also include analog transmission and reception of video signals on different frequencies, or hybrid systems that are partly analog and partly digital. The term "transceiver" shall not be limited to electromagnetic radiation in the frequence bands normally associated with radio, and may therefore include infrared or other optical frequencies. Moreover, the signal need not be electromagnetic, and "transceiver" may include gravity waves, or other means of establishing a communications channel.

[0053] While the architecture illustrated shows a connection from the headgear, through a computer, to the transceiver, it will be understood that the connection may be direct, bypassing the computer, if desired, and that a remote computer may be used by way of a video communications channel (for example a full-duplex analog video communications link) so that there may be no need for the computer to be worn on the body of the user.

[0054] The term "headgear" shall include helmets, baseball caps, eyeglasses, and any other means of affixing an object to the head, and shall also include implants, whether these implants be apparatus imbedded inside the skull, inserted into the back of the brain, or simply attached to the outside of the head by way of registration pins implanted into the skull. Thus "headgear" refers to any object on, around, upon, or in the head, in whole or in part.

[0055] When it is said that object "A" is "borne" by object "B", this shall include the possibilities that A is attached to B, that A is part of B, that A is built into B, or that A is B.

[0056] Fig 1 shows an embodiment of the invention built into eyeglass frames 100, typically containing two eyeglass lenses 105. An electronic wide-angle camera 110 is typically concealed within the nose bridge of the eyeglass frames 100. In what follows, the wide-angle camera 110 may be simply referred to as the "wide-camera", or as "wide-angle camera". In this embodiment of the wearable camera, a second camera, 120, is also concealed in the eyeglass frames 100. This second camera is one which has been fitted with a lens of longer focal length, and will be referred to as a "narrow-angle camera", or simply a "narrow-camera" in what follows. The wide-camera 110 faces forward looking through a beamsplitter 130. The narrow-camera 120 faces sideways looking through the beamsplitter. For clarity, the beamsplitter 130 and camera 110 are shown separated in Fig 1a, while in actual construction, the beamsplitter is cemented between the two cameras as shown in Fig 1. The beamsplitter 130 is typically mounted at a 45 degree angle, and the optical axes of the two cameras are typically at 90 degree angles to each other. The optical axes of the two cameras should intersect and thus share a common viewpoint. Thus the narrow camera 120 may have exactly the same field of view as the wide-camera 110. Typically eyeglasses with black frames are selected, and a CCD sensor array for wide-camera 110 is concealed in a cavity which is also used as a nose bridge support, so that the eyeglasses have a normal appearance. Typically, the body of the wide-camera is formed from epoxy, which sets it permanently in good register with the beamsplitter and the narrow-camera 120. During setting of the epoxy, the cameras are manipulated into an exact position, to ensure exact collinearity of the two effective optical axes. The wide-camera 110 is typically fitted with a lens having a diameter of approximately 1/32 inch (less than one millimeter) — small enough that it cannot be easily seen by someone at close conversational distance to the person wearing the eyeglasses. The narrow-camera 120 is typically concealed in the upper portion of the eyeglass frames. The narrow-camera 120 is preferably custom-made, like the wide-camera, by encapsulating a CCD sensor array, or the like, in an epoxy housing together with the appropriate lens, so that cameras 110 and 120 are both bonded to beamsplitter 130, and all three are in turn bonded to the eyeglass frame. A satisfactory narrow-camera, for use in small-production runs of the invention (where it is difficult to construct the housing from epoxy) is an Elmo (TM) model QN42H camera, owing to its long and very slender (7mm diameter) construction. In mass-production, a custom-made narrow-camera could be built directly into the eyeglass frames. Since the narrow-camera 120 is typically built into the top of the eyeglass frames, the wide-camera 110 should also be mounted near the top of the frames, so the two optical axes can be made to intersect at right angles, making the effective optical axes (e.g. that of camera 120 as reflected in beamsplitter 130) collinear.

[0057] Preferably, a complete camera system providing NTSC video is not installed directly in the eyeglasses. Instead, wires 125 from the camera sensor arrays

Motorola v. Stellar
Motorola Exhibit 1032
Page 091

are concealed inside the eyeglass frames and run inside a hollow eyeglass safety strap 126. A satisfactory eyeglass safety strap is the safety strap that is sold under the trademark "Croakies". Eyeglass safety strap 126 typically extends to a cloth-wrapped cable harness 127 typically made of the same kind of hollow cloth material from which safety strap 126 is made. There is typically a connection between cable harness 127 and a wiring harness 180, where wiring harness 180 is typically not wrapped in cloth. Wiring harness 180 and cable harness 127 are connected together by connection 175. Connection 175 typically includes a strain relief clip or the like that clips to the inside of the wearer's shirt, at the back of the neck, so that wiring harness 180 will not pull on cable harness 127. In this way, cable harness 127 is slack, and allows safety strap 126 to fall slack and thus have an appearance that it just happened to fall down partially inside the wearer's shirt.

[0058] Wires 125 are run down to a belt pack or to a body-worn pack 128, often comprising a computer as part of processor 182, powered by battery pack 181 which also powers the portions of the camera and display system located in the headgear. The processor 182, if it includes a computer, preferably contains also a nonvolatile storage device or network connection. Alternatively, or in addition to the connection to processor 182, there is often another kind of recording device, or connection to a transmitting device 186. The transmitter 186, if present, is typically powered by the same battery pack 181 that powers the processor. In some embodiments, a minimal amount of circuitry may be concealed in the eyeglass frames so that the wires 125 may be driven with a buffered signal in order to reduce signal loss. In or behind one or both of the eyeglass lenses 105, there is typically an optical system 150. This optical system provides a magnified view of an electronic display in the nature of a miniature television screen 160 in which the viewing area is typically less than one inch (or less than 25 millimeters) on the diagonal. The electronic display acts as a viewfinder screen. The viewfinder screen may comprise a 1/4 inch (approx. 6mm) television screen comprising an LCD spatial light modulator with a field-sequenced LED backlight. Preferably custom-built circuitry is used. However, a satisfactory embodiment of the invention may be constructed by having the television screen be driven by a coaxial cable carrying a video signal similar to an NTSC RS-170 signal. In this case the coaxial cable and additional wires to power it are concealed inside the eyeglass safety-strap and run down to a belt pack or other body-worn equipment by wiring harness 180.

[0059] In some embodiments, television 160 contains a television tuner so that a single coaxial cable may provide both signal and power. In other embodiments the majority of the electronic components needed to construct the video signal are worn on the body, and the eyeglasses contain only a minimal amount of circuitry, perhaps only a spatial light modulator, LCD flat panel, or the like, with termination resistors and backlight. In this case, there are a greater number of wires 170. In some embodiments of the invention the television screen 160 is a VGA computer display, or another form of computer monitor display, connected to a computer system worn on the body of the wearer of the eyeglasses.

[0060] Wearable display devices have been described, such as in U.S. Pat. No. 5546099, Head mounted display system with light blocking structure, by Jessica L. Quint and Joel W. Robinson, Aug. 13, 1996, as well as in U.S. Pat. No. 5708449, Binocular Head Mounted Display System by Gregory Lee Heacock and Gordon B. Kuenster, Jan. 13, 1998. (Both of these two patents are assigned to Virtual Vision (TM), a well-known manufacturer of head-mounted displays). A "personal liquid crystal image display" has been described U.S. Pat. No. 4636866, by Noboru Hattori, Jan. 13, 1987. Any of these head-mounted displays of the prior art may be modified into a form such that they will function in place of television display 160.

[0061] In typical operation of the system of Fig 1, light enters the eyeglasses and is absorbed and quantified by one or more cameras. By virtue of a connection through wiring harness 180, information about the light entering the eyeglasses is available to the body-worn computer system previously described. The computer system may calculate the actual quantity of light, up to a single unknown scalar constant, arriving at the glasses from each of a plurality of directions corresponding to the location of each pixel of the camera with respect to the camera's center of projection. This calculation may be done using photoquantigraphic image processing. In some embodiments of the invention the narrow-camera 120, is used to provide a more dense array of such photoquanta estimates. This increase in density toward the center of the visual field of view matches the characteristics of the human visual system in which there is a central foveal region of increased visual acuity. Video from one or both cameras is possibly processed by the body-worn computer 182 and recorded or transmitted to one or more remote locations by a body-worn video transmitter 186 or body-worn Internet connection, such as a standard WA4DSY 56 kbps RF link with a KISS 56 eprom running TCP/IP over an AX25 connection to the serial port of the body-worn computer. The possibly processed video signal is sent back up into the eyeglasses through wiring harness 180 and appears on viewfinder screen 160, viewed through optical elements 150.

[0062] Typically, rather than displaying raw video on display 160, processed video is displayed thereupon, with reference also to FIG 1b (a close-up detail view of processor 182), as follows: The video outputs from cameras 110 and 120 pass through wiring harness 180 into vision analysis processor 183. Vision analysis processor 183 typically uses the output of the wide-camera for head-tracking. This head-tracking determines the rela-

Motorola v. Stellar
Motorola Exhibit 1032
Page 092

tive orientation (yaw, pitch, and roll) of the head based on the visual location of objects in the field of view of camera 110. Vision analysis processor 183 may also perform some 3-D object recognition or parameter estimation, or construct a 3-D scene representation. Information processor 184 takes this visual information, and decides which virtual objects, if any, to insert into the viewfinder. Graphics synthesis processor 185 creates a computer-graphics rendering of a portion of the 3-D scene specified by the information processor 184, and presents this computer-graphics rendering by way of wires in wiring harness 180 to television screen 160. Typically the objects displayed are synthetic (virtual) objects overlaid in the same position as some of the real objects from the scene. Typically the virtual objects displayed on television 160 correspond to real objects within the field of view of narrow-camera 120. In this way, narrow camera 120 provides vision analysis processor 183 with extra details about the scene so that the analysis is more accurate in this foveal region, while wide-camera 110 provides both an anticipatory role and a head-tracking role. In the anticipatory role, vision analysis processor 183 is already making crude estimates of identity or parameters of objects outside the field of view of the viewfinder screen 160, with the possible expectation that the wearer may at any time turn his or her head to include some of these objects, or that some of these objects may move into the field of view of viewfinder 160 and narrow camera 120. With this operation, synthetic objects overlaid on real objects in the viewfinder provide the wearer with enhanced information of the real objects as compared with the view the wearer has of these objects outside of the viewfinder.

[0063] Thus even though television viewfinder screen 160 may only have 240 lines of resolution, a virtual television screen, of extremely high resolution, wrapping around the wearer, may be implemented by virtue of the head-tracker, so that the wearer may view very high resolution pictures through what appears to be a small window that pans back and forth across the picture by the head-movements of the wearer. Optionally, in addition to overlaying synthetic objects on real objects to enhance real objects, graphics synthesis processor 182 (FIG 1b may cause the display of other synthetic objects on the virtual television screen. For example, FIG 1c illustrates a virtual television screen with some virtual (synthetic) objects such as an Emacs Buffer upon an xterm (text window in the commonly-used X-windows graphical user-interface). The graphics synthesis processor 182 causes the viewfinder screen 160 (FIG 1) to display a reticle seen in the viewfinder window at 192. Typically viewfinder screen 160 has 640 pixels across and 480 down, which is only enough resolution to display one xterm window since an xterm window is typically also 640 pixels across and 480 down (sufficient size for 24 rows of 80 characters of text). Thus the wearer can, by turning the head to look back and forth, position viewfinder reticle 192 on top of any of a number of xterms 194 that appear to hover in space above various real objects 198. The real objects themselves, when positioned inside the mediation zone established by the viewfinder, may also be visually enhanced as seen through the viewfinder. Suppose the wearer is in a department store and, after picking up a $7 item for purchase, the wearer approaches the cashier, hands the cashier a $20 dollar bill, but only receives change for a $10 bill (e.g. only receives $3 change from $20). Upon realizing this fact a minute or so later, the wearer locates a fresh available, (e.g. one that has no programs running in it so that it can accept commands) xterm 196. The wearer makes this window active by head movement up and to the right, as shown in Fig 1d. Thus the camera functions also as a head tracker, and it is by orienting the head (and hence the camera) that the cursor may be positioned. Making a window active in the X-windows system is normally done by placing the mouse cursor on the window and possibly clicking on it. However, having a mouse on a wearable camera/computer system is difficult owing to the fact that it requires a great deal of dexterity to position a cursor while walking around. With the invention described here, the viewfinder is the mouse/cursor: the wearer's head is the mouse, and the center of the viewfinder is the cursor. In Fig 1c and Fig 1d, windows outside the viewfinder are depicted in dashed lines, because they are not actually visible to the wearer. The wearer can see real objects outside the field of view of the viewfinder (either through the remaining eye, or because the viewfinder permits one to see around it). However, only xterms in the viewfinder are visible. Portions of the xterms within the viewfinder are shown with solid lines, as this is all that the wearer will see.

[0064] Once the wearer selects window 196 by looking at it, then the wearer presses the letter "d" to begin "recorDing", as indicated on window 196. Note that the letter "d" is pressed for "recorD", because the letter "r" means "Recall" (in some ways equivalent to "Rewind" on a traditional video cassette recorder). Letters are typically selected by way of a small number of belt-mounted switches that can be operated with one hand, in a manner similar to the manner that courtroom stenographers use to form letters of the alphabet by pressing various combinations of pushbutton switches. Such devices are commonly known as "chording keyboards" and are well known in the prior art. Also note that the wearer did not need to look right into all of window 196: the window accepts commands as long as it is active, and doesn't need to be wholly visible to accept commands.

[0065] Recording is typically retroactive, in the sense that the wearable camera system, by default, always records into a 5-minute circular buffer, so that pressing "d" begins recording starting from 5 minutes ago, e.g. starting from 5 minutes before "d" is pressed. This means that if the wearer presses "d" within a couple of minutes of realizing that the cashier short-changed the wearer, then the transaction will have been sucessfully

Motorola v. Stellar
Motorola Exhibit 1032
Page 093

recorded. The customer can then see back into the past 5 minutes, and can assert with confidence (through perfect photographic/videographic memory Recall, e.g. by pressing "r") to the cashier that a $20 bill was given. The extra degree of personal confidence afforded by the invention typically makes it unnecessary to actually present the video record (e.g. to a supervisor) in order to correct the situation. Of course, if there was a belief that the cashier was dishonest, the customer could file a report or notify authorities while at the same time submitting the recording as evidence. Typically the recording is also transmitted by way of transmitter 186 so that the cashier or other representatives of the department store (such as a department store security guard who might be a close personal friend of the cashier) cannot sieze and destroy the storage medium upon which the recording was made.

[0066] Note that here the drawings depict objects moved translationally (e.g. the group of translations specified by two scalar parameters) while in actual practice, virtual objects undergo a projective coordinate transformation in two dimensions, governed by eight scalar parameters, or objects undergo three dimensional coordinate transformations. When the virtual objects are flat, such as text windows, such a user-interface is called a "Reality Window Manager" (RWM).

[0067] In using the invention, typically various windows appear to hover above various real objects, and regardless of the orientation of the wearer's head (position of the viewfinder), the system sustains the illusion that the virtual objects 194 (in this example, xterms) are attached to real objects 198. The act of panning the head back-and forth in order to navigate around the space of virtual objects also may cause an extremely high-resolution picture to be acquired through appropriate processing of a plurality of pictures captured on narrow-camera 120. This action mimicks the function of the human eye, where saccades are replaced with head movements to sweep out the scene using the camera's light-measurement ability as is typical of photoquantigraphic image processing. Thus head movements are used to direct the camera to scan out a scene in the same way that eyeball movements normally orient the eye to scan out a scene.

[0068] Processor 182 is typically responsible for ensuring that the view rendered in graphics processor 185 matches the viewing position of the eye in front of optics 150, and not the original position from which the video was presented from cameras 110 and 120 to vision processor 183. Thus there is a change of viewing angle, in the rendering, so as to compensate for the difference in position (parallax) between the cameras and the view afforded by the display.

[0069] Some homographic and quantigraphic image analysis embodiments do not require a 3-D scene analysis, and instead use 2-D projective coordinate transformations of a flat object or flat surface of an object, in order to effect the parallax correction between virtual objects and the view of the scene as it would appear with the glasses removed from the wearer.

[0070] A drawback of the apparatus depicted in Fig 1 is that the optical elements 150 block the eye(s) of the wearer. The wearer may be able to adapt to this condition, or at least compensate for it through the display of video from the wearable camera to create an illusion of transparency, in the same way that a hand-held camcorder creates an illusion of transparency when it is on and running even though it would function as a vision-blocking eye patch when turned off. However, because of the parallax between cameras 110 and 120 and the actual eye position given by viewfinder optics 150, creating the illusion of transparency requires passing all objects through the analysis processor 183, followed by the synthesis processor 185, and this may present processor 182 with a formidable task. Moreover, the fact that the eye of the wearer is blocked means that others cannot make eye-contact with the wearer. In social situations this creates an unnatural form of interaction. Although the lenses of the glasses may be made sufficiently dark that the viewfinder optics are concealed, it is preferable that the viewfinder optics may be concealed in eyeglasses that allow others to see both of the wearer's eyes. A beamsplitter may be used for this purpose, but it is preferable that there be a strong lens directly in front of the eye of the wearer to provide for a wide field of view. While a special contact lens might be worn for this purpose, there are limitations on how short the focal length of a contact lens can be, and such a solution is inconvenient for other reasons.

[0071] Accordingly, a viewfinder system is depicted in Fig 2 in which an optical path 200 brings light from a viewfinder screen 210, through a first relay mirror 220, along a cavity inside the left temple-side piece of the glasses formed by an opaque side shield 230, or simply by hollowing out a temple side-shield. Light travels to a second relay mirror 240 and is combined with light from the outside environment as seen through diverging lens 250. The light from the outside and from the viewfinder is combined by way of beamsplitter 260. The rest of the eyeglass lenses 261 are typically tinted slightly to match the beamsplitter 260 so that other people looking at the wearer's eyes do not see a dark patch where the beamsplitter is. Converging lens 270 magnifies the image from the viewfinder screen 210, while canceling the effect of the diverging lens 250. The result is that others can look into the wearer's eyes and see both eyes at normal magnification, while at the same time, the wearer can see the camera viewfinder at increased magnification. The rest of the system of Fig 2 is similar to that of Fig 1 (and like parts have been given like reference numerals in their last two digits), except that the video transmitter 186 shown in Fig 1 has been replaced with a data communications transceiver 286. Transceiver 286 along with appropriate instructions loaded into computer 282 provides a camera system allowing collaboration between the user of the apparatus and one or

Motorola v. Stellar
Motorola Exhibit 1032
Page 094

more other persons at remote locations. This collaboration may be facilitated through the manipulation of shared virtual objects such as cursors, or computer graphics renderings displayed upon the camera viewfinder(s) of one or more users.

[0072] Similarly, transceiver 286, with appropriate instructions executed in computer 282, allows multiple users of the invention, whether at remote locations or side-by-side, or in the same room within each other's field of view, to interact with one another through the collaborative capabilities of the apparatus. This also allows multiple users, at remote locations, to collaborate in such a way that a virtual environment is shared in which camera-based head-tracking of each user results in acquisition of video and subsequent generation of virtual information being made available to the other(s).

[0073] Multiple users, at the same location, may also collaborate in such a way that multiple camera viewpoints may be shared among the users so that they can advise each other on matters such as composition, or so that one or more viewers at remote locations can advise one or more of the users on matters such as composition or camera angle.

[0074] Multiple users, at different locations, may also collaborate on an effort that may not pertain to photography or videography directly, but an effort nevertheless that is enhanced by the ability for each person to experience the viewpoint of another.

[0075] It is also possible for one or more remote participants at conventional desktop computers or the like to interact with one or more users of the camera system, at one or more other locations, to collaborate on an effort that may not pertain to photography or videography directly, but an effort nevertheless that is enhanced by the ability for one or more users of the camera system to either provide or obtain advice from or to another individual at a remote location.

[0076] The embodiments of the wearable camera system depicted in Fig 1 and Fig 2 give rise to a small displacement between the actual location of the camera, and the location of the virtual image of the viewfinder. Therefore, either the parallax must be corrected by a vision system 183, followed by 3-D coordinate transformation (e.g. in processor 184), followed by re-rendering (e.g. in processor 185), or if the video is fed through directly, the wearer must learn to make this compensation mentally. When this mental task is imposed upon the wearer, when performing tasks at close range, such as looking into a microscope while wearing the glasses, there is a discrepancy that is difficult to learn, and may also give rise to unpleasant psychophysical effects such as nausea or "flashbacks". Initially when wearing the glasses, the tendency is to put the microscope eyepiece up to one eye, rather than the camera 110 which is right between the eyes. As a result, the apparatus fails to record exactly the wearer's experience, until the wearer can learn that the effective eye position is right in the middle. Locating the cameras elsewhere does not help appreciably, as there will always be some error. It is preferred that the apparatus will record exactly the wearer's experience. Thus if the wearer looks into a microscope, the glasses should record that experience for others to observe vicariously through the wearer's eye. Although the wearer can learn the difference between the camera position and the eye position, it is preferable that this not be required, for otherwise, as previously described, long-term usage may lead to undesirable flashback effects.

[0077] Accordingly, Fig 3 illustrates a system whereby rays of light spanning a visual angle from ray 310 to ray 320 enter the apparatus and are intercepted by a two-sided mirror 315, typically mounted at a 45 degree angle with respect to the optical axis of a camera 330. These rays of light enter camera 330. Camera 330 may be a camera that is completely (only) electronic, or it may be a hybrid camera comprising photographic emulsion (film) together with a video tap, electronic previewer, or other manner of electronic output, so that a film may be exposed and the composition may also be determined by monitoring an electronic output signal. Such a camera that provides an electronic output signal from which photographic, videographic, or the like, composition can be judged, will be called an "electronic camera" regardless of whether it may also contain other storage media such as photographic film. The video output of the camera 330 is displayed upon television screen 340 possibly after having been processed on a body-worn computer system or the like. A reflection of television screen 340 is seen in the other side of mirror 315, so that the television image of ray 310 appears as virtual ray 360 and the television image of ray 320 appears as ray 370. Since the camera 330 records an image that is backwards, a backwards image is displayed on the television screen 340. Since the television 340 is observed in a mirror, the image is reversed again so that the view seen at pencil of light rays 390 is not backwards. In this way a portion of the wearer's visual field of view is replaced by the exact same subject matter, in perfect spatial register with the real world as it would appear if the apparatus were absent. Thus the portion of the field of view spanned by rays 310 to 320 which emerges as virtual light, will align with the surrounding view that is not mediated by the apparatus, such as rays 311 and 321 which pass through the apparatus and enter directly into the eye without being deflected by two-sided mirror 315. The image could, in principle also be registered in tonal range, using the photoquantigraphic image processing framework for estimating the unknown nonlinear response of the camera, and also estimating the response of the display, and compensating for both. So far focus has been ignored, and infinite depth-of-field has been assumed. In practice, a viewfinder with a focus adjustment is used, and the focus adjustment is driven by a servo mechanism controlled by an autofocus camera. Thus camera 330 automatically focuses on the subject matter of interest, and controls the focus of viewfinder

Motorola v. Stellar
Motorola Exhibit 1032
Page 095

330 so that the apparent distance to the object is the same while looking through the apparatus as with the apparatus removed.

[0078] It is desirable that embodiments of the wearable camera system comprising manual focus cameras have the focus of the camera linked to the focus of the viewfinder so that both may be adjusted together with a single knob. Moreover, a camera with zoom lens may be used together with a viewfinder having zoom lens. The zoom mechanisms are linked in such a way that the viewfinder image magnification is reduced as the camera magnification is increased. Through this appropriate linkage, any increase in magnification by the camera is negated exactly by decreasing the apparent size of the viewfinder image.

[0079] The calibration of the autofocus zoom camera and the zoom viewfinder may be done by temporarily removing the mirror 315 and adjusting the focus and zoom of the viewfinder to maximize video feedback. This must be done for each zoom setting, so that the zoom of the viewfinder will properly track the zoom of the camera. By using video feedback as a calibration tool, a computer system may monitor the video output of the camera while adjusting the viewfinder and generating a lookup table for the viewfinder settings corresponding to each camera setting. In this way, calibration may be automated during manufacture of the wearable camera system.

[0080] The apparatus of Fig 3 does not permit others to make full eye-contact with the wearer. Accordingly, Fig 4 depicts a similar apparatus in which only a portion of the rays of the leftmost ray of light 310 is deflected by beamsplitter 415 which is installed in place of mirror 315. The visual angle subtended by incoming light ray 310 to light ray 320 is deflected by way of beamsplitter 415 into camera 330. Output from this camera is displayed on television 340, possibly after processing on a body-worn computer or processing at one or more remote sites, or a combination of local and remote image processing or the like. A partial reflection of television 340 is visible to the eye of the wearer by way of beamsplitter 415. The leftmost ray of light 460 of the partial view of television 340 is aligned with the direct view of the leftmost ray of light 310 from the original scene. Thus the wearer sees a superposition of whatever real object is located in front of ray 310 and the television picture of the same real object at the same location. The rightmost ray of light 320 is similarly visible through the beamsplitter 415 in register with the rightmost virtual ray reflected off the beamsplitter 415.

[0081] Note that the partial transparency of beamsplitter 415 allows one to see beyond the screen, so it is not necessary to carefully cut beamsplitter 415 to fit exactly the field of view defined by television 340, or to have the degree of silvering feather out to zero at the edges beyond the field of view defined by television 340.

[0082] Rays 460 and 470 differ from rays 360 and 370 in that 460 and 470 present the viewer with a combination of virtual light and real light. In order to prevent video feedback, in which light from the television screen would shine into the camera, a polarizer 480 is positioned in front of the camera. The polarization axis of the polarizer is aligned at right angles to the polarization axis of the polarizer inside the television, assuming the television already has a built-in polarizer as is typical of small battery powered LCD televisions, LCD camcorder viewfinders, and LCD computer monitors. If the television does not have a built in polarizer, a polarizer is added in front of the television. Thus video feedback is prevented by virtue of the two crossed polarizers in the path between the television 340 and the camera 330. Alternatively, instead of using explicit polarizers, a beamsplitter with polarization properties may be used for beamsplitter 415. Although many beamsplitters will exhibit some polarization properties, on account of being somewhat near the Brewster angle (functioning somewhat like a Brewster plate), certain kinds of beamsplitters, such as dichroic beamsplitters, exhibit very strong polarization characteristics. For example, beamsplitter 415 may comprise a dichroic beamsplitter cube.

[0083] The pencil of rays of light 490 will provide a mixture of direct light from the scene, and virtual light from the television display 340. The pencil of rays 490 thus differs from the pencil of rays 390 (FIG 3) in that 490 is a superposition of the virtual light as in 390 with real light from the scene.

[0084] In describing this invention, the term "pencil" of rays shall be taken to mean rays that intersect at a point in arbitrary dimensions (e.g. 3D as well as 2D) even though the term "pencil" usually only so-applies to 2D in common usage. This will simplify matters (rather than having to use the word "bundle" in 3D and "pencil" in 2D).

[0085] It is desired that both the real light and virtual light be in perfect or near perfect registration. However, in order that the viewfinder provide a distinct view of the world, it may be desirable that the virtual light from the television be made different in color or the like from the real light from the scene. For example, simply using a black and white television, or a black and red television, or the like, or placing a colored filter over the television, will give rise to a unique appearance of the region of the wearer's visual field of view by virtue of a difference in color between the television image and the real world upon which it is exactly superimposed. Even with such chromatic mediation of the television view of the world, it may still be difficult for the wearer to discern whether or not video is correctly exposed. Accordingly, a pseudocolor image may be displayed, or unique patterns may be used to indicate areas of over exposure or under exposure. Once the wearer becomes aware of areas of improper exposure (such as when an automatic exposure algorithm is failing), the parameters of the automatic exposure algorithm (such as setting of program mode to "backlight", "high contrast", "sports mode" or the like) may be changed, or the automatic exposure may be

Motorola v. Stellar
Motorola Exhibit 1032
Page 096

overridden.

[0086] Television 340 may also be fitted with a focusing lens so that it may be focused to the same apparent depth as the real objects in front of the apparatus. A single manual focus adjustment may be used for both camera 330 and television 340 to adjust them both together. Alternatively, an autofocus camera 330 may control the focus of television 340. Similarly, if a varifocal or zoom camera is used, a varifocal lens in front of television 340 should be used, and should be linked to the camera lens, so that a single knob may be used to adjust the zoom setting for both.

[0087] The apparatus of Fig 4 may be calibrated by temporarily removing the polarizer, and then adjusting the focal length of the lens in front of television 340 to maximize video feedback for each zoom setting of camera 330. This process may be automated if desired, for example, using video feedback to generate a lookup table used in the calibration of a servo mechanism controlling the zoom and focus of television 340.

[0088] The entire apparatus is typically concealed in eyeglass frames in which the beamsplitter is either embedded in one or both glass lenses of the eyeglasses, or behind one or both lenses. In the case in which a monocular version of the apparatus is being used, the apparatus is built into one lens, and a dummy version of the beamsplitter portion of apparatus may be positioned in the other lens for visual symmetry. These beamsplitters may be integrated into the lenses in such a manner to have the appearance of ordinary lenses in ordinary bifocal eyeglasses. Moreover, magnification may be unobtrusively introduced by virtue of the bifocal characteristics of such eyeglasses. Typically the entire eyeglass lens is tinted to match the density of the beamsplitter portion of the lens, so there is no visual discontinuity introduced by the beamsplitter.

[0089] Fig 5 depicts a foveated embodiment of the invention in which incoming light 500 and 501 is intercepted from the direct visual path through the eyeglasses and directed instead, by double-sided mirror 510 to beamsplitter 520. A portion of this light passes through beamsplitter 520 and is absorbed and quantified by wide-camera 530. A portion of this incoming light is also reflected by beamsplitter 520 and directed to narrow-camera 540. The image from the wide-camera 530 is displayed on a large screen television 550, typically of size 0.7 inches (approx. 18mm) on the diagonal, forming a wide-field-of-view image of virtual light 551 from the wide-camera. The image from the narrow-camera 540 is displayed on a small screen television 560, typically of screen size 1/4 inch (approx. 6mm) on the diagonal, forming a virtual image of the narrow-camera as virtual light 561.

[0090] Real rays of light in the periphery of the mediation zone formed by the apparatus emerge as virtual rays from television 550 only. For example, real ray 500 emerges as virtual ray 551.

[0091] Real rays near the central (foveal) region of the mediation zone emerge as virtual rays from both televisions (e.g. they also emerge as virtual rays from television 560). Television 560 subtends a smaller visual angle, and typically has the same total number of scanlines or same total number of pixels as television 550, so the image is sharper in the central (foveal) region. Thus television 560 is visually more dominant in that region, and the viewer can ignore television 550 in this region (e.g. the blurry image and the sharp image superimposed appear as a sharp image in the central region).

[0092] Thus, for example, unlike the real light ray 500 which emerges as virtual light from only one of the two televisions (from only television 550), the real light ray 501 emerges as virtual light from both televisions. Only one of the virtual rays collinear with real ray 501 is shown, in order to emphasize the fact that this virtual ray is primarily associated with television 560 (hence the break between where the solid line 501 is diverted by mirror 510 and where the collinear portion continues after mirror 570). This portion of the dotted line between mirror 510 and mirror 570 that is collinear with real light ray 510 has been omitted to emphasize the visual dominance of television 560 over television 550 within the central (foveal) field of view,

[0093] In this foveal region, it is the virtual light from television 560 that is of interest, as this virtual light will be perceived as more pronounced, since the image of television 560 will be sharper (owing to its more closely packed pixel array or scanlines). Thus even though real light ray 501 emerges as two virtual rays, only one of these, 561, is shown: the one corresponding to television 560.

[0094] A smaller television screen is typically used to display the image from the narrow-camera in order to negate the increased magnification that the narrow-camera would otherwise provide, when equal magnification lenses are used for both. In this manner, there is no magnification, and both images appear as if the rays of light were passing through the apparatus, so that the virtual light rays align with the real light rays were they not intercepted by the double-sided mirror 510. Television 550 is viewed as a reflection in mirror 510, while television 560 is viewed as a reflection in beamsplitter 570. Note also that the distance between the two televisions 550 and 560 should equal the distance between double-sided mirror 510 and beamsplitter 570 as measured in a direction perpendicular to the optical axes of the cameras. In this way, the apparent distance to both televisions will be the same, so that the wearer experiences a view of the two televisions superimposed upon one-another in the same depth plane. Alternatively, the televisions may be equipped with lenses to adjust their magnifications so that the television displaying the image from the tele camera 540 subtends a smaller visual angle than the television displaying the image from wide camera 530, and so that these visual angles match the visual angles of the incoming rays of light 500. In this way, two television screens of equal size may be used,

Motorola v. Stellar
Motorola Exhibit 1032
Page 097

which simplifies manufacture of the apparatus. Typically, the entire apparatus is built within the frames 590 of a pair of eyeglasses, where cameras 530 and 540, as well as televisions 550 and 560 are concealed within the frames 590 of the glasses, while double-sided mirror 510 and beamsplitter 570 are mounted in, behind, or in front of the lens of the eyeglasses. In some embodiments, mirror 510 is mounted to the front of the eyeglass lens, while beamsplitter 570 is mounted behind the lens. In other embodiments, one or both of mirror 510 and beamsplitter 570 are actually embedded in the glass of the eyeglass lens.

[0095] Two-sided mirror 510 may instead be a beamsplitter, or may be fully silvered in places (to make a partial beamsplitter and partial fully silvered two-sided mirror). For example, it may be silvered more densely in the center, where the visual acuity is higher, owing to the second television screen. It may also be feathered out, so that it slowly fades to totally transparent around the edges, so there is not an abrupt discontinuity between the real world view and the portion that has been replaced by virtual light. In this case, it is often desirable to insert the appropriate polarizer(s) to prevent video feedback around the edges, or to use appropriate polarizing beamsplitters, such as dichroic beamsplitter materials.

[0096] Fig 6 depicts an alternate embodiment of the wearable camera invention depicted in Fig 4 in which both the camera and television are concealed within the left temple side-piece of the eyeglass frames. A first beamsplitter 610 intercepts a portion of the incoming light and directs it to a second beamsplitter 620 where some of the incoming light is directed to camera 630 and some is wasted illuminating the television screen 640. However, the screen 640, when presented with a video signal from camera 630 (possibly after being processed by a body-worn computer, or remotely by way of wireless communications, or the like) directs light back through beamsplitter 620, where some is wasted but is absorbed by the eyeglass frame to ensure concealment of the apparatus, and some is directed to beamsplitter 610. Some of this light is directed away from the glasses and would be visible by others, and some is directed to the curved mirror 650 where it is magnified and directed back toward beamsplitter 610. The portion that is reflected off of beamsplitter 610 is viewed by the wearer, while the portion that continues back toward beamsplitter 620 must be blocked by a polarizer 660 to prevent video feedback. Implicit in the use of polarizer 660 is the notion that the television produces a polarized output. This is true of LCD televisions which comprise a liquid crystal display between crossed polaroids. If the television is of a type that does not already produce a polarized output, an additional polarizer should be inserted in front of television 640. Finally, if it is desired that the apparatus be unobtrusive, an additional polarizer or polarizing beamsplitter should be used so that the television 640 is not visible to others by way of its reflection in beamsplitter 610. Beamsplitter 610 may, for example, be a dichroic cube beamsplitter that has polarization properties. Alternatively, in certain situations it may actually be desirable to make the display visible to others. For example when the system is used for conducting interviews, it might be desirable that the person being interviewed see himself or herself upon the screen. This may be facilitated by exposing beamsplitter 620 to view, or allowing the reflection of the television to be seen in beamsplitter 610. Alternatively, another television may be mounted to the glasses, facing outwards. Therefore, just as the wearer of an embodiment of the invention may see the image captured by the camera, along with additional information such as text of a teleprompter, the interviewee(s) may also be presented with an image of themselves so that they appear to be looking into an electronic mirror, or may be teleprompted by this outward-facing display, or both. In some embodiments of the invention, the use of two separate screens was useful for facilitation of an interview, in which the same image was presented to both the inward-facing television and the outward-facing television, but the images were mixed with different text. In this way the wearer was teleprompted with one stream of text, while the interviewee was prompted with a different stream of text.

[0097] While the optical elements of the camera system of the described embodiments are embedded in eyeglasses, equally these elements may be embedded in other headgear such as a helmet.

[0098] The beamsplitter 415 of figure 4 and 610 of figure 6 could conveniently be implemented as a metallisation within a lens of the eyeglasses. These beamsplitters and diverging lens 250 of figure 2 may be embedded within the eyeglass lens below the main optical axis of the eye in its normal position so that the embedded elements may appear to be a feature of bifocal eyeglasses.

[0099] Fig 7 depicts a wearable camera system with automatic focus. While the system depicted in Fig 3 may operate with a fixed focus camera 330, so long as it has sufficient depth of field, there is still the question of at what focus depth television 340 will appear. Ideally the apparent depth of the display would match that of objects seen around the display, as represented by rays of light 311, 321, which are beyond two-sided mirror 315. This may be achieved if display medium 340 is such that it has nearly infinite depth of field, for example, by using a scanning laser ophthalmoscope (SLO), or other device which displays an image directly onto the retina of the eye, for display 340, or if display 340 were a holographic video display.

[0100] A lower-cost alternative is to use a variable focus display. The primary object(s) of interest, 700 are imaged by lens assembly 710 which is electronically focusable by way of a servo mechanism 720 linked to camera 730 to provide automatic focus. Automatic focus cameras are well known in the prior art, so the details of automatic focus mechanisms will not be explained

Motorola v. Stellar
Motorola Exhibit 1032
Page 098

here. A signal, 750, from the automatic focus camera is derived by way of reading out the position of the servo 720, and this signal 750 is conveyed to a display focus controller (viewfinder focus controller) 760. Viewfinder focus controller 760 drives, by way of focus control signal 770, a servo mechanism 780 which adjusts the focus of viewfinder optics 790. The arrangement of signals and control systems is such that the apparent depth of television screen 340 is the same as the apparent depth at which the primary object(s) of interest in the real scene would appear without the wearable camera apparatus.

[0101] Other objects, 701, located in different depth planes, will not be in focus in camera 730, and will thus appear blurry on screen 340. They may appear slightly misaligned with where they would have appeared in the absence of the wearable camera system. The degree of misalignment will depend on eye position - the misalignment may or may not be present, or may be quite small. However, because the objects are out of focus, and are not the primary details of the scene, a small possible misalignment will not be particularly objectionable to the wearer of the apparatus.

[0102] In this example, rays 310 and 311 are both in the depth plane of the central object of interest, so that there is no discontinuity between emergent virtual light 360 and real light 311. Thus there is no discontinuity in perceived depth at the leftmost edge of two-sided mirror 315. There is, however, a difference in depth between virtual ray 370 of real ray 320 and almost adjacent real ray 321, because virtual ray 370 is in the same depth plane as 310, 311, and 360, while real ray 321 is in a more distant depth plane owing to the more distant facing surface of objects 701. However, because the eye will be focused on the depth plane of 310, 311, and 360, ray 311 from the real world will be out of focus by virtue of the limited depth of focus of the human eye itself. Thus the real objects will appear blurry, and a discontinuity between these real objects and their blurry image on screen 340 will not be appreciably perceptible.

[0103] Fig 8 depicts an embodiment of the wearable camera system having a zoom lens. Rays of light, for example, rays 500 and 501, enter the wearable camera system and emerge from display 840 as virtual light rays 800 and 801 respectively. In this process of going from light input to virtual light output, two-sided mirror 510 serves to deflect light to autofocus camera 730. Autofocus camera 730 comprises lens 810 and servo mechanism 820 configured in such a manner as to function as a conventional automatic focus camera functions, except that there is, provided to the rest of the system, a signal 750 that indicates the focus setting of the camera 730 and its lens 810 as selected by the camera's control system and servo mechanism 820, and that the camera is also a zoom camera in which the zoom setting can be controlled remotely by zoom signal input 850. Zoom signal input 850 controls, by way of servo 820, the relative position of various optical elements 810, so that, in addition to automatic focus, the camera can be given a desired focal length (field of view). The focus signal 750 goes into a focus and zoom controller 860 which accepts a zoom control signal input, 852, from the user, and directs this zoom control signal to the camera by way of signal 850, and also directs an appropriately processed version of this zoom control signal 851 to display controller 861. In this embodiment, display zoom is achieved as an electronic zoom. While camera zoom is achieved optically, display zoom is achieved electronically, by way of display controller 861 and display signal 870. The camera zooms in by adjustment of lens 810 for longer focal length, increasing the focal distance from the lens to the sensor array in camera 730, resulting in increased magnification. This increase in magnification is acompanied by a decrease, by operation of display controller 861, of the image size displayed on television 840. Television 840 may differ from television 340 (of FIG 7) in the sense that television 840 is optimized for display of resampled (electronically resized) images. This reduction in image size cancels out what would otherwise be an increase in magnification when zooming in with camera 730. It is this precicely controlled cancellation of any magnification that ensures that rays of light entering the apparatus are collinear with rays of virtual light emerging from the other side of the apparatus.

[0104] Fig. 9 depicts a stereo embodiment of the wearable camera system. An eyeglass frame comprising left temple side-piece 910 and right temple side-piece 911 contains two complete assemblies, 920 and 921, each one similar to the entire assembly depicted in Fig 7 or Fig 8.

[0105] Rays of light, for example, ray 320, enter the left eye assembly 920, and emerge as rays of virtual light, for example, 370. As a result, a focus of autofocus camera 730 results, by virtue of the main object of interest before assembly 920. The autofocus camera 730 includes a servo mechanism 720, and the control voltage that the camera feeds to this servo mechanism to keep the camera in focus is also sent outside assembly 920 to focus controller 930. Focus controller 930 drives camera 731 inside the right eye assembly 921. Camera 731 is not an autofocus camera, but, instead is a remotely focusable camera. By remotely focusable, what is meant is that rather than having its servo mechanism 721 driven by the camera itself, as it hunts for best focus, the servo mechanism is instead driven by an external signal. This external signal comes from the camera 730 in the left eye assembly 920. The reason for not having two independently automatically focusing cameras is that it is desired that both cameras will focus in the same depth plane irrespective of slight errors that might be present in the focus of either one.

[0106] Focus controller 930 also sets the focus of both left and right viewfinders by controlling left viewfinder lens servo 780 and right viewfinder lens servo 781. Moreover, focus controller 930 sends a signal to ver-

Motorola v. Stellar
Motorola Exhibit 1032
Page 099

gence controller 940 which drives servo mechanism 950 to adjust the vergence of left eye assembly 920 and servo mechanism 951 to adjust the vergence of right eye assembly 921.

[0107] In this embodiment, the focus of both cameras, the focus of both displays, and the vergence of both assemblies are all controlled by the focus of the left camera, so that whatever object the left camera focuses itself onto, will define the depth plane perceived by both eyes looking at their respective displays. This depth plane will also correspond to the vergence of the displays, so that depth and disparity will match at all times.

[0108] Fig. 10 depicts the left eye portion of an embodiment of the wearable camera system where the camera focus and vergence are driven by the output of an eyetracker. Eyetracker assembly 1010 (comprising camera and infrared light sources) illuminates and observes the eyeball by way of rays of light 1011 that partially reflect off beamsplitter 1020. Beamsplitter 1020 also allows the wearer to see straight through to mirror 315 and thus see virtual light from viewfinder 340. The eyetracker 1010 reports the direction of eye gaze and conveys this information as a signal 1012 to eye tracker processor 1030 which converts this direction into "X" and "Y" coordinates that correspond to the screen coordinates of viewfinder screen 340. These "X" and "Y" coordinates, which are expressed as signal 1031, indicate where on the viewfinder screen 340 the wearer is looking. Signal 1031 and the video output 1032 of camera 730 are both passed to focus analyzer 1040. Focus analyzer 1040 selects a portion of the video signal 1032 in the neighbourhood around the coordinates specified by signal 1031. In this way, focus analyzer 1040 ignores video except in the vicinity of where the wearer of the apparatus is looking. Because the coordinates of the camera match the coordinates of the display (by way of the virtual light principle), the portion of video analyzed by focus analyzer 1040 corresponds to where the wearer is looking. The focus analyzer 1040 examines the high-frequency content of the video in the neighbourhood of where the wearer is looking, to derive an estimate of how well focused that portion of the picture is. This degree of focus is conveyed by way of focus sharpness signal 1041 to focus controller 1050 which drives, by way of focus signal 1051, the servo mechanism 720 of camera 730. Focus controller 1050 is such that it causes the servo mechanism 720 to hunt around until it sharpness signal 1041 reaches a global or local maximum.

[0109] The focus analyzer 1040 and focus controller 1050 thus create a feedback control system around camera 730 so that it tends to focus on whatever object (s) is (are) in the vicinity of camera and screen coordinates 1031. Thus camera 730 acts as an automatic focus camera, but instead of always focusing on whatever is in the center of its viewfinder, it focuses on whatever is being looked at by the left eye of the wearer.

[0110] In addition to driving the focus of the left camera 730, focus controller 1050 also provides a control voltage 1052 identical to the control voltage of 1051. Control signal 1052 drives servo mechanism 780 of lens 790, so that the apparent depth of the entire screen 340 appears focused at the same depth as whatever object the wearer is looking at. In this way, all objects in the viewfinder appear in the depth plane of the one the wearer is looking at.

[0111] Focus controller 1050 provides further control voltages, 1053 and 1054 for the right eye camera and right eye viewfinder, where these signals 1053 and 1054 are identical to that of 1051. Moreover, focus controller 1050 provides the same control voltage to the vergence controller 940 so that it can provide the control signal to angle the left and right assemblies inward by the correct amount, so that all focus and vergence controls are based on the depth of the object the left eye is looking at. It is assumed left and right eyes are looking at the same object, as is normal for any properly functioning human visual system.

[0112] In other embodiments of the invention, it may be desired to know which object is of interest when there are multiple objects in the same direction of gaze, as might happen when the wearer is looking through a dirty glass window. In this case there are three possible objects of interest: the object beyond the window, the object reflected in the glass, and the dirt on the window. All three may be at different depth planes but in the same gaze direction.

[0113] An embodiment of the wearable camera system with a human-driven autofocus camera (e.g. driven by eye focus), could be made from an eye tracker that would measure the focus of the wearer's left eye. Preferably, however, two eyetrackers may be used, one on the left eye, and one on the right eye, in order to attempt to independently track each eye, and attempt to obtain a better estimate of the desired focus by way of the vergence of the wearer's eyes.

[0114] A reality window manager (RWM), similar to that depicted in Fig 1c and Fig 1d, may also be driven by the eyetracker, so that there can be an independent head position (framing) and cursor position (where looking), rather than always having the cursor in the center of the viewfinder. This arangement would also facilitate movement of the cursor without moving the head, which may reduce head movements that appeal unnatural to others watching the user of the wearable camera system.

[0115] The apparatus of this invention allows the wearer to experience the camera over a long period of time. For example, after wearing the apparatus sixteen hours per day for several weeks, it begins to function as a true extension of the mind and body. In this way, photographic composition is much more optimal, because the act of taking pictures or shooting video no longer requires conscious thought or effort. Moreover, the intentionality of the picture-taking process is not evident to others, because picture-taking is not preceeded by a

Motorola v. Stellar
Motorola Exhibit 1032
Page 100

gesture such as holding a viewfinder object up to the eye. The wearable viewfinder is an important element of the wearable camera invention allowing the wearer to experience everyday life through a screen, and therefore be always ready to capture anything that might happen, or even anything that might have happened previously by virtue of the retroactive record capability of the invention. Moreover, additional information beyond just exposure and shutter speed may be displayed in the camera viewfinder. For example, the camera allows the wearer to augment, diminish, or otherwise alter his or her perception of visual reality. This mediated-reality experience may be shared. The wearer may allow others to alter his or her perception of reality. In this way the invention is useful as a new communications medium, in the context of collaborative photography, collaborative videography, and telepresence. Moreover, the invention may perform other useful tasks such as functioning as a personal safety device and crime deterrent by virtue of its ability to maintain a video diary transmitted and recorded at multiple remote locations. As a tool for photojournalists and reporters, the invention has clear advantages over other competing technologies.

[0116] From the foregoing description, it will thus be evident that the present invention provides a design for a wearable camera with a viewfinder. As various changes can be made in the above embodiments and operating methods without departing from the spirit or scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawings should be interpreted as illustrative and not in a limiting sense.

[0117] Variations or modifications to the design and construction of this invention, within the scope of the invention as defined by the claims, may occur to those skilled in the art upon reviewing the disclosure herein.

Claims

1. Headgear (100) having an electronic camera (330, 530, 540) borne by said headgear and an electronic display (340) borne by said headgear, said electronic display responsive to an output from said electronic camera, wherein the improvement comprises: reflective optics (314, 415, 510, 610, 620, 650) arranged for, at least partially, reflecting light such that a first pencil of light which would otherwise converge at a first point outside a lens assembly (710, 720; 810, 820) of said camera is at least partially reflected to a second pencil of light directed at an optical center of said lens assembly of said camera, said lens assembly comprising at least one lens, wherein said reflective optics is further for reflecting light from said display such that said reflected light from said display forms a third pencil of light approximating said first pencil of light, in order to provide substantial exact registration of what would have been seen at said first point due to said first pencil of light, in the absence of said headgear, with what, in the presence of said headgear, is seen at said first point due to said third pencil of light.

2. The headgear of claim 1 arranged such that, in use, said first point (390, 490) is at an eye of a wearer of said headgear.

3. The headgear of claim 3 (was 2) wherein said electronic camera comprises a first camera and wherein said headgear further includes an electronic second camera (330, 530, 540) borne by said headgear, one of said first camera and said second camera comprising a wide angle camera and another of said first camera and said second camera comprising a narrow angle camera.

4. The headgear of claim 2 wherein said electronic camera comprises a narrow angle camera (540) and wherein said headgear further includes an electronic wide angle camera (530) borne by said headgear, and wherein said electronic display is responsive to an output from said narrow angle camera for providing a viewfinder for said narrow angle camera and said wide angle camera.

5. The headgear of claim 2 wherein said electronic camera comprises a wide angle camera and wherein said headgear further includes an electronic narrow angle camera borne by said headgear, and wherein said electronic display is a first electronic display and including a second electronic display (560) responsive to an output of said narrow angle camera and including optics (570) for directing light from said second electronic display to said eye of said wearer in order to provide a viewfinder for said narrow angle camera.

6. The headgear of claim 3 wherein said optics is first optics and including second optics (520) directing incoming light so that a center of a field of view of said first camera is collinear with a center of a field of view of said second camera.

7. The headgear of claim 6 wherein said second optics comprises a beamsplitter.

8. The headgear of claim 7 wherein said second optics further comprises a mirror directing incoming light to said beamsplitter.

9. The headgear of claim 1 wherein said optics comprises at least one of:

   - a mirror;
   - a beamsplitter.

Motorola v. Stellar
Motorola Exhibit 1032
Page 101

10. The headgear of claim 1 wherein said optics comprises an optical element which is one of:

- a mirror;
- a beamsplitter,

said optical element arranged for reflecting light such that at least said portion of said first pencil of light which would otherwise converge at said first point outside said lens assembly of said camera is reflected to said second pencil of light directed at said optical center of said lens assembly of said camera, wherein said optical element is further for reflecting light from said display such that said reflected light from said display forms a pencil of light approximating said first pencil of light.

11. The headgear of claim 10 wherein light enters said camera from one side of said optical element, and wherein light reaches said first point from an opposite side of said optical element.

12. The headgear of claim 2 wherein said optics comprises at least one mirror for directing light from said electronic display to a beamsplitter in front of an eye of a wearer.

13. The headgear of claim 1 including optics arranged for reflecting light which would otherwise enter an eye of a wearer to said camera and for reflecting light from said display to said eye of a wearer such that reflected light from said display is collinear with said light which would otherwise enter said eye of said wearer.

14. The headgear of claim 13 wherein said camera and said display are opposite one another so as to have aligned optical axes and said optics comprises an optical element positioned so as to be in front of an eye of a wearer and between said camera and said electronic display.

15. The headgear of claim 14 wherein said optical element comprises a two-sided mirror making a 45 degree angle with said optical axes.

16. The headgear of claim 15, wherein the effective distance between an optical center of said lens assembly of said camera and an optical center of said two-sided mirror is equal to the effective distance between an optical center of said two-sided mirror and said eye.

17. The headgear of claim 14 wherein said optical element comprises a beamsplitter making a 45 degree angle with said optical axes and wherein said electronic display incorporates a polarizer and wherein said headgear includes a further polarizer in front of said camera oriented to block polarized light from said display.

18. The headgear of claim 17, wherein the effective distance between an optical center of said lens assembly of said camera and an optical center of said beamsplitter is equal to the effective distance between an optical center of said beamsplitter and said eye.

19. The headgear of claim 13 wherein said optics comprises a mirror and including a beamsplitter, said beamsplitter positioned between said mirror and an eye of a wearer.

20. The headgear of claim 19 wherein said beamsplitter comprises a first beamsplitter, an optical axis of said camera is perpendicular to an optical axis of said display, and said electronic display incorporates a polarizer and including a second beamsplitter interposed along said optical axes and making a 45 degree angle with said optical axes; a polarizer in front of said camera oriented to block polarised light from said display.

21. The headgear of claim 4 further including head tracking means input with an electronic output signal of said wide angle camera.

22. The headgear of claim 21 including a processor (182; 183, 184, 185) for providing a reality window manager (192, 194, 196, 198) said processor outputting to said electronic display such that said display provides a virtual window as well as providing a viewfinder for said narrow-angle electronic camera.

23. The headgear of claim 2 including means for (i) directing incoming rays of light that would enter an eye of a wearer in an absence of said means into said camera and (ii) directing rays of light from said display into said eye of a wearer, each directed ray of light being approximately collinear with an incoming ray of light from which said each directed ray of light was derived, prior to direction of said incoming ray of light into said camera.

24. The headgear of claim 9 where said optics comprises a two sided mirror.

25. The headgear of claim 24 where said mirror comprises a flat transparent surface with a metallic coating on one side, and where said one side faces toward said camera.

26. The headgear of claim 13 where said optics includes a beamsplitter and where said optics further

Motorola v. Stellar
Motorola Exhibit 1032
Page 102

includes a concave reflective material discontinuity.

27. The headgear of claim 13 where said optics includes a beamsplitter and where light from said display passes through said beamsplitter at least once before travelling away from said beamsplitter and then back toward said beamsplitter and being reflected off of said beamsplitter toward an eye of said wearer.

28. The headgear of claim 27 where said display includes a polarizer.

29. The headgear of claim 27 where said display beamsplitter comprises a dichroic beamsplitter which has polarization properties.

30. The headgear of any of claims 1 to claim 29, where said headgear is eyeglasses (590, 910, 911).

31. The eyeglasses of claim 30 said optics for directing light from said electronic display to an eye of a wearer of said eyeglasses.

32. The eyeglasses of claim 30 said optics arranged for reflecting a pencil of light which would otherwise enter an eye of a wearer to an optical center of said lens assembly of said camera and for reflecting light from said display to said eye of a wearer such that said reflected light from said display is collinear with said light which would otherwise enter said eye of said wearer.

33. The eyeglasses of claim 30 wherein said optics comprises a beamsplitter implemented as a metallisation in a lens of said eyeglasses.

34. The headgear of claim 1 including a transmitter for transmitting camera signals.

35. The headgear of claim 1 wherein said headgear comprises eyeglasses having a safety strap said strap receiving an output wire from said camera and including a body pack receiving a recorder fed with said camera output wire from said strap.

36. The headgear of any of claims 1 to claim 29 including a focusable camera and focusable display means where said focusable camera and focusable display means are such that they may be operated by a single control that focuses real light going to said camera and virtual light coming from said display onto the same depth plane.

37. The headgear of any of claims 1 to claim 29 including a camera with zoom and display means with zoom where a zoom setting of both said camera and said display means may be operated by a single control so that a virtual light principle is maintained for all zoom settings.

38. The headgear of any of claims 1 to claim 29 including an autofocus camera and remotely focusable display means where said autofocus camera drives a focus of said focusable display means.

39. The headgear of any of claims 1 to claim 29 where said camera is a left camera, said display is a left display, and said optics are left optics, and further including a right camera, right display, and right optics, similarly arranged, except that one of said cameras is an automatic focus camera and the other is a remotely focusable camera, where said automatic focus camera provides a focus output to said remotely focusable camera.

40. The headgear of claim 39 where said left display and said right display are remotely focusable displays and where said automatic camera also provides outputs to focus both of said remotely focusable displays onto the same depth plane as an object onto which said automatic focus camera is focussed.

41. The headgear of any of claims 1 to claim 29 including an automatic focus camera providing a signal to automatically adjust vergence of at least two cameras so that the optical axes of said at least two cameras intersect in the vicinity of an object to which they are focussed.

42. Headgear (100) having a sensor (330) borne by said headgear, a display (340) borne by said headgear, said display situated for being visible to a wearer of said headgear when said headgear is worn, an output from said sensor for a processor (182; 183, 184, 185), and an input to said display for accepting input from said processor, wherein the improvement comprises:

- reflective optics (314, 415) arranged for reflecting light such that at least a portion of at least some rays of light which would otherwise, in the absence of said reflective optics, not be measured by said sensor, is reflected to be measured by said sensor,

said processor for determining a quantity of light in each of said at least some rays of light, said processor for controlling said display to provide outgoing rays of light each one being collinear with, and responsive to, one of said at least some rays of light.

43. The headgear of claim 42 said optics for reflecting light which would otherwise enter an eye of a wearer to said headgear and for reflecting light from said

Motorola v. Stellar
Motorola Exhibit 1032
Page 103

display to said eye of said wearer such that said reflected light from said display is collinear with said light which would otherwise enter said eye of said wearer.

44. The headgear of claim 42 wherein said processor comprises a computer wirelessly connected to a computer network.

45. The headgear of claim 42 wherein said headgear comprises eyeglasses having a safety strap said strap receiving an output wire from said camera and including a body pack receiving a recorder fed with said camera output wire from said strap.

46. The headgear of claim 42 where said processor comprises a vision analysis processor and a graphics synthesis processor.

47. The headgear of claim 46 where-said processor includes a machine vision process, and a computer graphics rendering process.

48. The headgear of claim 42 wherein said sensor comprises a first camera and wherein said headgear further includes an electronic second camera borne by said headgear, one of said first camera and said second camera comprising a wide angle camera and another of said first camera and said second camera comprising a narrow angle camera.

49. The headgear of claim 42 wherein said sensor comprises a narrow angle camera and wherein said headgear further includes an electronic wide angle camera borne by said headgear, and wherein said electronic display is responsive to an output from said narrow angle camera for providing a viewfinder for said narrow angle camera and said wide angle camera.

50. The headgear of claim 42 wherein said sensor comprises a wide angle camera and wherein said headgear further includes an electronic narrow angle camera borne by said headgear, and wherein said electronic display is a first electronic display and including a second electronic display responsive to an output of said narrow angle camera and including optics for directing light from said second electronic display to said eye of said wearer in order to provide a viewfinder for said narrow angle camera.

51. The headgear of claim claim 48, 49, or 50, including optics for directing incoming light so that a center of a field of view of said first camera is collinear with a center of a field of view of said second camera.

52. The headgear of claim 51 wherein said second optics comprises a beamsplitter.

53. The headgear of claim 48, 49, or 50, further including head tracking means input with an electronic output signal of said wide angle camera.

54. The headgear of claim 53 including a processor for providing a reality window manager, said processor outputting to said electronic display such that said display provides a virtual window as well as providing a viewfinder for said electronic camera.

55. The headgear of claim 42 said processor (182) for providing a view rendered in a graphics processor (185) matches the viewing position of an eye viewing said display, said viewing position not being the original viewing position of said camera (110; 120).

56. The headgear of claim 42 said processor (182) for providing a change of viewing angle, in rendering, to compensate for a difference in position between said sensor and a view afforded by said display.

57. The headgear of claim 55 or 56, said processor (182) for providing a homographic or quantigraphic image analysis not requiring a three dimensional scene analysis.

58. The headgear of claim 42 said means for compensating including the use of a 2-D projective coordinate transformation of a flat object or fiat surface of an object.

59. The headgear of claim 42 said means for compensating effecting a parallax correction between virtual objects and a view of a scene as it would appear with said headgear removed from a wearer of said headgear.

Patentansprüche

1. Kopfgestell (100), das eine elektronische Kamera (330,530,540), die durch das Kopfgestell getragen wird, und eine elektronische Anzeige (340) aufweist, die durch das Kopfgestell getragen wird, wobei die elektronische Anzeige auf eine Ausgabe aus der elektronischen Kamera anspricht, wobei die Verbesserung aufweist: eine reflektierende Optik (314, 415, 510, 610, 620, 650), die mindestens teilweise dazu angeordnet ist, Licht so zu reflektieren, daß ein erstes Lichtbüschel, das andernfalls an einen ersten Punkt außerhalb eines Objektivaufbaus (710, 720; 810, 820) der Kamera konvergieren würde, mindestens teilweise zu einem zweiten Lichtbüschel reflektiert wird, das auf ein optisches Zentrum des Objektivaufbaus der Kamera gerichtet ist, wobei der Linsenaufbau mindestens eine Linse aufweist, wobei die reflektierende Optik ferner dazu dient. Licht von der Anzeige so zu reflektieren, daß

Motorola v. Stellar
Motorola Exhibit 1032
Page 104

das reflektierte Licht von der Anzeige ein drittes Lichtbüschel formt, das sich dem ersten Lichtbüschel nähert, um eine im wesentlichen genaue Dekkung dessen, was an dem ersten Punkt infolge des ersten Lichtbüschels beim Fehlen des Kopfgestells gesehen worden wäre, mit dem bereitzustellen, was beim Vorhandensein des Kopfgestells am ersten Punkt infolge des dritten Lichtbüschels gesehen wird.

2. Kopfgestell nach Anspruch 1, das so angeordnet ist, daß sich im Gebrauch der erste Punkt (390, 490) an einem Auge eines Trägers des Kopfgestells befindet.

3. Kopfgestell nach Anspruch 3 (war 2), wobei die elektronische Kamera eine erste Kamera aufweist und wobei das Kopfgestell ferner eine elektronische zweite Kamera (330, 530, 540) aufweist, die durch das Kopfgestell getragen wird, wobei eine der ersten Kamera und der zweiten Kamera eine Weitwinkelkamera ist und eine andere der ersten Kamera und der zweiten Kamera eine Engwinkelkamera ist.

4. Kopfgestell nach Anspruch 2, wobei die elektronische Kamera eine Engwinkelkamera (540) aufweist und wobei das Kopfgestell femer eine elektronische Weitwinkelkamera (530) aufweist, die durch das Kopfgestell getragen wird, und wobei die elektronische Anzeige auf einer Ausgabe aus der Engwinkelkamera anspricht, um einen Sucher für die Engwinkelkamera und die Weitwinkelkamera bereitzustellen.

5. Kopfgestell nach Anspruch 2, wobei die elektronische Kamera eine Weitwinkelkamera aufweist und wobei das Kopfgestell femer eine elektronische Engwinkelkamera aufweist, die durch das Kopfgestell getragen wird, und wobei die elektronische Anzeige eine erste elektronische Anzeige ist und eine zweite elektronische Anzeige (560) aufweist, die auf eine Ausgabe der Engwinkelkamera anspricht und eine Optik (570) aufweist, um Licht von der zweiten elektronischen Anzeige zum Auge des Trägers zu leiten, um einen Sucher für die Engwinkelkamera bereitzustellen.

6. Kopfgestell nach Anspruch 3, wobei die Optik eine erste Optik ist und eine zweite Optik (520) aufweist, die einfallendes Licht so richtet, daß ein Zentrum eines Gesichtsfelds der ersten Kamera kollinear mit einem Zentrum eines Gesichtsfelds der zweiten Kamera ist.

7. Kopfgestell nach Anspruch 6, wobei die zweite Optik einen Strahlteiler aufweist.

8. Kopfgestell nach Anspruch 7, wobei die zweite Optik femer einen Spiegel aufweist, der einfallendes Licht auf den Strahlteiler richtet.

9. Kopfgestell nach Anspruch 1, wobei die Optik mindestens einen aufweist aus:

einem Spiegel;
einem Strahlteiler.

10. Kopfgestell nach Anspruch 1, wobei die Optik ein optisches Element aufweist, das eines aus
einem Spiegel;
einem Strahlteiler.
ist, wobei das optische Element angeordnet ist, um Licht so zu reflektieren, daß mindestens der Anteil des ersten Lichtbüschels, das sonst an dem ersten Punkt außerhalb des Linsenaufbaus der Kamera konvergieren würde, zu dem zweiten Lichtbüschel reflektiert wird, das auf das optische Zentrum des Linsenaufbaus der Kamera gerichtet ist, wobei das optische Element femer dazu dient, Licht von der Anzeige so zu reflektieren, daß das reflektierte Licht von der Anzeige ein Lichtbüschel bildet, das sich dem ersten Lichtbüschel nähert.

11. Kopfgestell nach Anspruch 10, wobei das Licht in die Kamera von einer Seite des optischen Elements eintritt, und wobei Licht den ersten Punkt von einer entgegengesetzten Seite des optischen Element erreicht.

12. Kopfgestell nach Anspruch 2, wobei die Optik mindestens einen Spiegel aufweist, um Licht von der elektronischen Anzeige zu einem Strahlteiler vor einem Auge eines Trägers zu richten.

13. Kopfgestell nach Anspruch 1, das eine Optik aufweist, die angeordnet ist, um Licht, das sonst in ein Auge eines Trägers eintreten würde, zur Kamera zu reflektieren und um Licht von der Anzeige so zum Auge eines Trägers zu reflektieren, daß reflektiertes Licht von der Anzeige mit dem Licht kollinear ist, das sonst in das Auge des Trägers eintreten würde.

14. Kopfgestell nach Anspruch 13, wobei die Kamera und die Anzeige einander gegenüberliegen, so daß sie ausgerichtete optische Achsen aufweisen, und die Optik ein optisches Element aufweist, das so angeordnet ist, daß es sich vor einem Auge eines Trägers und zwischen der Kamera und der elektronischen Anzeige befindet.

15. Kopfgestell nach Anspruch 14, wobei das optische Element einen doppelseitigen Spiegel aufweist, der einen Winkel von 45 Grad mit den optischen Achsen bildet.

Motorola v. Stellar
Motorola Exhibit 1032
Page 105

16. Kopfgestell nach Anspruch 15, wobei der effektive Abstand zwischen einem optischen Zentrum des Linsenaufbaus der Kamera und einem optischen Zentrum des doppelseitigen Spiegels gleich dem effektiven Abstand zwischen einem optischen Zentrum des doppelseitigen Spiegels und dem Auge ist.

17. Kopfgestell nach Anspruch 14, wobei das optische Element einen Strahlteiler aufweist, der einen Winkel von 45 Grad mit den optischen Achsen bildet, und wobei die elektronische Anzeige einen Polarisator enthält und wobei das Kopfgestell einen weiteren Polarisator vor der Kamera aufweist, der so orientiert ist, daß er polarisiertes Licht von der Anzeige sperrt.

18. Kopfgestell nach Anspruch 17, wobei der effektive Abstand zwischen einem optischen Zentrum des Linsenaufbaus der Kamera und einem optischen Zentrum des Strahlteilers gleich dem effektiven Abstand zwischen einem optischen Zentrum des Strahlteilers und dem Auge ist.

19. Kopfgestell nach Anspruch 13, wobei die Optik einen Spiegel aufweist und einen Strahlteiler aufweist, wobei der Strahlteiler zwischen dem Spiegel und einem Auge eines Trägers angeordnet ist.

20. Kopfgestell nach Anspruch 19, wobei der Strahlteiler einen ersten Strahlteiler aufweist, eine optische Achse der Kamera senkrecht zu einer optischen Achse der Anzeige ist, und die elektronische Anzeige einen Polarisator enthalt und einen zweiten Strahlteiler aufweist, der längs der optischen Achsen dazwischen angeordnet ist und einen Winkel von 45 Grad mit den optischen Achsen bildet; wobei ein Polarisator vor der Kamera so orientiert ist, daß er polarisiertes Licht von der Anzeige sperrt.

21. Kopfgestell nach Anspruch 4, das ferner eine Kopfverfolgungseinrichtung aufweist, in die ein elektronisches Ausgangssignal der Weitwinkelkamera eingegeben wird.

22. Kopfgestell nach Anspruch 21, das einen Prozessor (182; 183, 184, 185) aufweist, um einen Realitätsfensterverwalter (192, 194, 196, 198) bereitzustellen, wobei der Prozessor so Daten an die elektronische Anzeige ausgibt, daß die Anzeige ebenso ein virtuelles Fenster wie auch einen Sucher für die elektronische Engwinkelkamera bereitstellt.

23. Kopfgestell nach Anspruch 2, das eine Einrichtung aufweist, um (i) einfallende Lichtstrahlen, die beim Fehlen der Einrichtung in ein Auge eines Trägers eintreten würden, in die Kamera zu richten und (ii) Lichtstrahlen aus der Anzeige in das Auge eines Trägers zu richten, wobei jeder gerichtete Lichtstrahl annähemd kollinear mit einem einfallenden Lichtstrahl ist, von dem der gerichtete Lichtstrahl vor der Richtung des einfallenden Lichtstrahls in die Kamera abgeleitet wurde.

24. Kopfgestell nach Anspruch 9, wobei die Optik einen doppelseitigen Spiegel aufweist.

25. Kopfgestell nach Anspruch 24, wobei der Spiegel eine ebene transparente Oberfläche mit einer Metallbeachichtung auf einer Seite aufweist, und wobei die eine Seite zur Kamera weist.

26. Kopfgestell nach Anspruch 13, wobei die Optik einen Strahlteiler aufweist und wobei die Optik ferner eine konkave reflektierende Materialdiskontinuität aufweist.

27. Kopfgestell nach Anspruch 13, wobei die Optik einen Strahlteiler aufweist und wobei Licht von der Anzeige mindestens einmal durch den Strahlteiler geht, bevor er vom Strahlteiler weg und dann zurück zum Strahlteiler geht und vom Strahlteiler weg zu einem Auge des Trägers reflektiert wird.

28. Kopfgestell nach Anspruch 27, wobei die Anzeige einen Polarisator aufweist.

29. Kopfgestell nach Anspruch 27, wobei der Anzeigenstrahlteiler einen dichroltischen Strahlteiler aufweist, der Polarisationseigenschaften aufweist.

30. Kopfgestell nach einem der Ansprüche 1 bis 29, wobei das Kopfgestell eine Brille (590, 910, 911) ist.

31. Brille nach Anspruch 30, wobei die Optik angenordnet ist, um Licht von der elektronischen Anzeige auf ein Auge eines Träger der Brille zu richten.

32. Brille nach Anspruch 30, wobei die Optik angeordnet ist, um ein Lichtbüschel, das sonst in ein Auge eines Trägers eintreten würde, auf ein optisches Zentrum des Linsenaufbaus der Kamera zu reflektieren und um Licht von der Anzeige so zum Auge eines Trägers zu reflektieren, daß das reflektierte Licht von der Anzeige kollinear mit dem Licht ist, das sonst in das Auge des Tragers eintreten würde.

33. Brille nach Anspruch 30, wobei die Optik einen Strahlteiler aufweist, der als eine Metallisierung in einer Linse der Brille implementiert ist.

34. Kopfgestell nach Anspruch 1, das einen Sender zum Senden von Kamerasignalen aufweist.

35. Kopfgestell nach Anspruch 1, wobei das Kopfgestell eine Brille ausweist, die ein Sicherheitsband

Motorola v. Stellar
Motorola Exhibit 1032
Page 106

aufweist, wobei das Band eine Ausgangsleitung von der Kamera aufnimmt, und ein Körperpack aufweist, das einen Recorder aufnimmt, der mit der Kameraausgangsteitung von dem Band versorgt wird.

36. Kopfgestell nach einem der Anspruche 1 bis 29, das eine fokussierbare Kamera und fokussierbare Anzeigeeinrichtung aufweist, wobei die fokussierbare Kamera und die fokussierbare Anzeigeeinrichtung so gestaltet sind, daß sie durch eine einzelne Steuerung betrieben werden können, die reales Licht, das zur Kamera geht, und virtuelles Licht, das von der Anzeige kommt, auf dieselbe Tiefenebene fokussiert.

37. Kopfgestell nach einem der Ansprüche 1 bis 29, das eine Kamera mit Zoom und eine Anzeigeeinrichtung mit Zoom aufweist, wobei eine Zoomeinstellung sowohl der Kamera und als auch der Anzeigeeinrichtung durch eine einzelne Steuerung betrieben werden kann, so daß eine virtuelle Lichtgrundlage für alle Zoomeinstellungen erhalten wird.

38. Kopfgestell nach einem der Ansprüche 1 bis 29, das eine Kamera mit selbsttätiger Scharfeinstellung und eine femfokussierbare Anzeigeeinrichtung aufweist, wobei die Kamera mit selbsttätiger Scharfeinstellung eine Scharfeinstellung der fokussierbaren Anzeigeeinrichtung betreibt.

39. Kopfgestell nach einem der Ansprüche 1 bis 29, wobei die Kamera eine linke Kamera ist, die Anzeige eine linke Anzeige ist und die Optik eine linke Optik ist, und ferner eine rechte Kamera, eine rechte Anzeige und eine rechte Optik aufweist, die entsprechend angeordnet sind, außer daß eine der Kameras eine automatisch fokussierende Kamera ist und die andere eine fernfokussierbare Kamera ist, wobei die automatisch fokussierende Kamera eine Fokussierausgabe an die fernfokussierbare Kamera bereitstellt.

40. Kopfgestell nach Anspruch 39, wobei die linke Anzeige und die rechte Anzeige femfokussierbare Anzeigen sind und wobei die automatische Kamera auch Ausgaben bereitstellt, um beide fernfokussierbaren Anzeigen auf dieselbe Tiefenebene wie ein Gegenstand zu fokussieren, auf den die automatisch fokussierende Kamera fokussiert ist.

41. Kopfgestell nach einem der Ansprüche 1 bis 29, das eine automatisch fokussierende Kamera aufweist, die ein Signal bereitstellt, um automatisch die Vergenz mindestens zweier Kameras einzustellen, so daß sich die optischen Achsen der mindestens zwei Kameras in der Nähe eines Objekts schneiden, auf die sie fokussiert sind.

42. Kopfgestell (100), das aufweist: einen Sensor (330, der durch das Kopfgestell getragen wird, eine Anzeige (340), die durch das Kopfgestell getragen wird, wobei die Anzeige so angeordnet ist, daß sie für einen Träger des Kopfgestells sichtbar ist, wenn das Kopfgestell getragen wird, einen Ausgang von dem Sensor für einen Prozessor (182; 183, 184, 185), und einen Eingang in die Anzeige zur Aufnahme des Eingangs vom Prozessor, wobei die Verbesserung aufweist:

eine reflektierende Optik (314, 415), die angeordnet ist, um Licht so zu reflektieren, daß mindestens ein Anteil mindestens einiger Lichtstrahlen, die beim Fehlen der reflektierenden Optik sonst durch den Sensor nicht gemessen würden, reflektiert wird, um durch den Sensor gemessen zu werden,

wobei der Prozessor angeordnet ist, um eine Lichtmenge in jedem der mindestens einigen Lichtstrahlen zu bestimmen, der Prozessor angeordnet ist, um die Anzeige zu steuern, um abgehende Lichtstrahlen bereitzustellen, die jeweils mit mindestens einigen Lichtstrahlen kollinear sind und auf sie ansprechen.

43. Kopfgestell nach Anspruch 42, wobei die Optik angeordnet ist, um Licht zu reflektieren, das sonst in ein Auge eines Trägers des Kopfgestells eintreten würde, und um Licht von der Anzeige zum Auge des Trägers zu reflektieren, so daß das reflektierte Licht von der Anzeige kollinear mit dem Licht ist, das sonst in das Auge des Trägers eintreten würde.

44. Kopfgestell nach Anspruch 42, wobei der Prozessor einen Computer aufweist, der drahtlos mit einem Computarnetzwerk verbunden ist.

45. Kopfgestell nach Anspruch 42, wobei das Kopfgestell eine Brille aufweist, die ein Sicherheitsband aufweist, wobei das Band eine Ausgangsleitung von der Kamera aufnimmt, und ein Körperpack aufweist, das einen Recorder aufnimmt, der mit der Kameraausgangsleitung aus dem Band versorgt wird.

46. Kopfgestell nach Anspruch 42, wobei der Prozessor einen Bildanalyse-Prozessor und eine Graphiksynthese-Prozessor aufweist.

47. Kopfgestell nach Anspruch 46, wobei der Prozessor einen maschinellen Bilderkennungsprozeß und einen Computergraphikbilderzeugungsprozeß aufweist.

48. Kopfgestell nach Anspruch 42, wobei der Sensor eine erste Kamera aufweist und wobei das Kopfgestell ferner eine elektronische zweite Kamera auf-

Motorola v. Stellar
Motorola Exhibit 1032
Page 107

weist, die durch das Kopfgestell getragen wird, wobei eine der ersten Kamera und der zweiten Kamera eine Weitwinkelkamera aufweist und eine andere der ersten Kamera und der zweiten Kamera eine Engwinkelkamera aufweist.

49. Kopfgestell nach Anspruch 42, wobei der Sensor eine Engwinkelkamera aufweist und wobei das Kopfgestell ferner eine elektronische Weitwinkelkamera aufweist, die durch das Kopfgestell getragen wird, und wobei die elektronische Anzeige auf eine Ausgabe der Engwinkelkamera anspricht, um einen Sucher für die Engwinkelkamera und die Weitwinkelkamera bereitzustellen.

50. Kopfgestell nach Anspruch 42, wobei der Sensor eine Weitwinkelkamera aufweist, wobei das Kopfgestell ferner eine elektronische Engwinkelkamera aufweist, die durch das Kopfgestell getragen wird, und wobei die elektronische Anzeige eine erste elektronische Anzeige ist und eine zweite elektronische Anzeige aufweist, die auf eine Ausgabe der Engwinkelkamera anspricht und eine Optik aufweist, um Licht von der zweiten elektronischen Anzeige auf das Auge des Trägers zu richten, um einen Sucher für die Engwinkelkamera bereitzustellen.

51. Kopfgestell nach Anspruch 48, 49 oder 50, das eine Optik aufweist, um einfallendes Licht so zu richten, daß ein Zentrum eines Gesichtsfelds der ersten Kamera kollinear mit einem Zentrum eines Gesichtsfelds der zweiten Kamera ist.

52. Kopfgestell nach Anspruch 51, wobei die zweite Optik einen Strahlteiler aufweist.

53. Kopfgestell nach Anspruch 48, 49 oder 50, das ferner eine Kopfverfolgungseinrichtung aufweist, in die ein elektronisches Ausgangssignal der Weitwinkelkamera eingegeben wird.

54. Kopfgestell nach Anspruch 53, das einen Prozessor aufweist, um einen Realitätsfensterverwalter bereitzustellen, wobei der Prozessor so Daten an die elektronische Anzeige ausgibt, daß die Anzeige ebenso ein virtuelles Fenster wie auch einen Sucher für die elektronische Kamera bereitstellt.

55. Kopfgestell nach Anspruch 42, wobei der Prozessor (182) zur Bereitstellung einer Ansicht, die in einem Graphikprozessor (185) erzeugt wird, die Betrachtungsposition eines Auges anpaßt, das die Anzeige betrachtet, wobei die Betrachtungsposition nicht die ursprüngliche Betrachtungsposition der Kamera (110; 120) ist.

56. Kopfgestell nach Anspruch 42, wobei der Prozessor (182) angeordnet ist, um bei der Bilderzeugung eine Änderung des Betrachtungswinkels bereitzustellen, um eine Positionsdifferenz zwischen dem Sensor und einer Ansicht zu kompensieren, die durch die Anzeige geboten wird.

57. Kopfgestell nach Anspruch 55 oder 56, wobei der Prozessor (182) angeordnet ist, um eine homographische oder quantigraphische Bildanalyse bereitzustellen, die keine dreidimensionale Szenenanalyse benötigt.

58. Kopfgestell nach Anspruch 42, wobei die Einrichtung zur Kompensation die Verwendung einer projektiven 2-D-Koordinatentransformation eines ebenen Objekts oder einer ebenen Oberfläche eines Objekts aufweist.

59. Kopfgestell nach Anspruch 42, wobei die Einrichtung zur Kompensation eine Parallaxenkorrektur zwischen virtuellen Objekten und einer Ansicht einer Szene bewirkt, wie sie erscheinen würde, wenn das Kopfgestell vom Träger des Kopfgestells entfernt würde.

Revendications

1. Équipement de tête (100) ayant une caméra électronique (330, 530, 540) portée par ledit équipement de tête et un afficheur électronique (340) porté par ledit équipement de tête, ledit afficheur électronique réagissant à une sortie de ladite caméra électronique, dans lequel l'amélioration comprend : une optique réfléchissante (314, 415, 510, 610, 620, 650) agencée pour, au moins partiellement, réfléchir la lumière de telle façon qu'un premier pinceau de lumière qui autrement convergerait en un premier point à l'extérieur d'un ensemble de lentilles (710, 720 ; 810, 820) de ladite caméra est au moins partiellement réfléchi vers un deuxième pinceau de lumière dirigé sur un centre optique dudit ensemble de lentilles de ladite caméra, ledit ensemble de lentilles comprenant au moins une lentille, dans lequel ladite optique réfléchissante est en outre destinée à réfléchir la lumière provenant dudit afficheur de telle façon que ladite lumière réfléchie provenant dudit afficheur forme un troisième pinceau de lumière approchant ledit premier pinceau de lumière, afin de fournir une correspondance sensiblement exacte de ce qui aurait été observé au dit premier point du fait dudit premier pinceau de lumière, en l'absence dudit équipement de tête, avec ce qui, en présence dudit équipement de tête, est observé au dit premier point du fait dudit troisième pinceau de lumière.

2. Equipement de tête selon la revendication 1, agen-

Motorola v. Stellar
Motorola Exhibit 1032
Page 108

cé de telle façon qu'à l'utilisation, ledit premier point (390, 490) se situe au niveau d'un oeil d'un porteur dudit équipement de tête.

3. Équipement de tête selon la revendication 3 (anciennement 2), dans lequel ladite caméra électronique comprend une première caméra et dans lequel ledit équipement de tête comprend en outre une deuxième caméra électronique (330, 530, 540) portée par ledit équipement de tête, l'une de ladite première caméra et de ladite deuxième caméra comprenant une caméra grand-angulaire et une autre de ladite première caméra et de ladite deuxième caméra comprenant une caméra petit-angulaire.

4. Équipement de tête selon la revendication 2, dans lequel ladite caméra électronique comprend une caméra petit-angulaire (540) et dans lequel ledit équipement de tête comprend en outre une caméra électronique grand-angulaire (530) portée par ledit équipement de tête, et dans lequel ledit afficheur électronique réagit à une sortie provenant de ladite caméra petit-angulaire afin de produire un viseur pour ladite caméra petit-angulaire et ladite caméra grand-angulaire.

5. Équipement de tête selon la revendication 2, dans lequel ladite caméra électronique comprend une caméra grand-angulaire et dans lequel ledit équipement de tête comprend en outre une caméra électronique petit-angulaire portée par ledit équipement de tête, et dans lequel ledit afficheur électronique est un premier afficheur électronique et comprenant un deuxième afficheur électronique (560) réagissant à une sortie de ladite caméra petit-angulaire et comprenant une optique (570) destinée à diriger la lumière provenant dudit deuxième afficheur électronique vers ledit oeil dudit porteur afin de produire un viseur pour ladite caméra petit-angulaire.

6. Equipement de tête selon la revendication 3, dans lequel ladite optique est un première optique et comprenant une deuxième optique (520) dirigeant la lumière entrante de telle façon qu'un centre du champ de vision de ladite première caméra est colinéaire avec un centre d'un champ de vision de ladite deuxième caméra.

7. Équipement de tête selon la revendication 6, dans lequel ladite deuxième optique comprend un séparateur de faisceaux.

8. Équipement de tête selon la revendication 7, dans lequel ladite deuxième optique comprend en outre un miroir dirigeant la lumière entrante vers ledit séparateur de faisceaux.

9. Équipement de tête selon la revendication 1, dans lequel ladite optique comprend au moins un élément parmi :

un miroir ;
un séparateur de faisceaux.

10. Equipement de tête selon la revendication 1, dans lequel ladite optique comprend un élément optique qui est un élément parmi :

un miroir ;
un séparateur de faisceaux,
ledit élément optique étant agencé pour réfléchir la lumière de telle façon qu'au moins ladite partie dudit premier pinceau de lumière qui autrement convergerait en ledit premier point à l'extérieur dudit ensemble de lentilles de ladite caméra est réfléchie vers ledit deuxième pinceau de lumière dirigé sur ledit centre optique dudit ensemble de lentilles de ladite caméra, dans lequel ledit élément optique est en outre destiné à réfléchir la lumière provenant dudit afficheur de telle façon que ladite lumière réfléchie provenant dudit afficheur forme un pinceau de lumière approchant ledit premier pinceau de lumière.

11. Équipement de tête selon la revendication 10, dans lequel la lumière entre dans ladite caméra à partir d'un côté dudit élément optique, et dans lequel la lumière atteint ledit premier point à partir d'un côté opposé dudit élément optique.

12. Équipement de tête selon la revendication 2, dans lequel ladite optique comprend au moins un miroir pour diriger la lumière provenant dudit afficheur électronique vers un séparateur de faisceaux en face d'un oeil d'un porteur.

13. Equipement de tête selon la revendication 1, comprenant une optique agencée pour réfléchir la lumière qui autrement pénétrerait dans un oeil d'un porteur vers ladite caméra et pour réfléchir la lumière provenant dudit afficheur vers ledit oeil d'un porteur de telle façon que la lumière réfléchie provenant dudit afficheur est colinéaire avec ladite lumière qui autrement pénétrerait dans ledit oeil dudit porteur.

14. Equipement de tête selon la revendication 13, dans lequel ladite caméra et ledit afficheur sont opposés l'un à l'autre de façon à avoir des axes optiques alignés et ladite optique comprend un élément optique positionné de façon à être en face d'un oeil d'un porteur et entre ladite caméra et ledit afficheur électronique.

Motorola v. Stellar
Motorola Exhibit 1032
Page 109

15. Équipement de tête selon la revendication 14, dans lequel ledit élément optique comprend un miroir à deux faces faisant un angle de 45 degrés avec lesdits axes optiques.

16. Équipement de tête selon la revendication 15, dans lequel la distance effective entre un centre optique dudit ensemble de lentilles de ladite caméra et un centre optique dudit miroir à deux faces est égale à la distance effective entre un centre optique dudit miroir à deux faces et ledit oeil.

17. Equipement de tête selon la revendication 14, dans lequel ledit élément optique comprend un séparateur de faisceaux faisant un angle de 45 degrés avec lesdits axes optiques et dans lequel ledit afficheur électronique intègre un polariseur et dans lequel ledit équipement de tête comprend un autre polariseur en face de ladite caméra orienté de façon à bloquer la lumière polarisée provenant dudit afficheur.

18. Equipement de tête selon la revendication 17, dans lequel la distance effective entre un centre optique dudit ensemble de lentilles de ladite caméra et un centre optique dudit séparateur de faisceaux est égale à la distance effective entre un centre optique dudit séparateur de faisceaux et ledit oeil.

19. Equipement de tête selon la revendication 13, dans lequel ladite optique comprend un miroir et comprenant un séparateur de faisceaux, ledit séparateur de faisceaux étant positionné entre ledit miroir et un oeil d'un porteur.

20. Equipement de tête selon la revendication 19, dans lequel ledit séparateur de faisceaux comprend un premier séparateur de faisceaux, un axe optique de ladite caméra est perpendiculaire à un axe optique dudit afficheur et ledit afficheur électronique intègre un polariseur, et comprenant un deuxième séparateur de faisceaux interposé le long desdits axes optiques et faisant un angle de 45 degrés avec lesdits axes optiques ; un polariseur en face de ladite caméra étant orienté de façon à bloquer la lumière polarisée provenant dudit afficheur.

21. Equipement de tête selon la revendication 4, comprenant en outre des moyens de poursuite de tête recevant un signal de sortie électronique de ladite caméra grand-angulaire.

22. Equipement de tête selon la revendication 21, comprenant un processeur (182 ; 183, 184, 185) destiné à fournir un gestionnaire de fenêtres de réalité (192, 194, 196, 198), ledit processeur délivrant des signaux au dit afficheur électronique de telle façon que ledit afficheur fournit une fenêtre virtuelle ainsi qu'un viseur pour ladite caméra électronique petit-angulaire.

23. Equipement de tête selon la revendication 2, comprenant des moyens destinés (i) à diriger des rayons de lumière entrants qui pénétreraient dans un oeil d'un porteur en l'absence desdits moyens dans ladite caméra et (ii) à diriger des rayons de lumière provenant dudit afficheur dans ledit oeil d'un porteur, chaque rayon de lumière dirigé étant approximativement colinéaire avec un rayon de lumière entrant à partir duquel ledit chaque rayon de lumière dirigé a été dérivé, avant que ledit rayon de lumière entrant soit dirigé dans ladite caméra.

24. Equipement de tête selon la revendication 9, où ladite optique comprend un miroir à deux faces.

25. Equipement de tête selon la revendication 24, où ledit miroir comprend une surface plane transparente dotée d'un revêtement métallique sur un côté, et dans lequel ledit un côté est orienté vers ladite caméra.

26. Equipement de tête selon la revendication 13, où ladite optique comprend un séparateur de faisceaux et où ladite optique comprend en outre une discontinuité matérielle réfléchissante concave.

27. Équipement de tête selon la revendication 13, où ladite optique comprend un séparateur de faisceaux et où la lumière provenant dudit afficheur traverse ledit séparateur de faisceaux au moins une fois avant de s'éloigner dudit séparateur de faisceaux, puis de revenir vers ledit séparateur de faisceaux et d'être réfléchi par ledit séparateur de faisceaux vers un oeil dudit porteur.

28. Équipement de tête selon la revendication 27, où ledit afficheur comprend un polariseur.

29. Equipement de tête selon la revendication 27, où ledit séparateur de faisceaux de l'afficheur comprend un séparateur de faisceaux dichroique ayant des propriétés de polarisation.

30. Équipement de tête selon l'une quelconque des revendications 1 à 29, où ledit équipement de tête est des lunettes (590, 910, 911).

31. Lunettes selon la revendication 30, ladite optique étant destinée à diriger la lumière provenant dudit afficheur électronique vers un oeil d'un porteur desdites lunettes.

32. Lunettes selon la revendication 30, ladite optique étant agencée pour réfléchir un pinceau de lumière qui autrement pénétrerait dans un oeil d'un porteur

Motorola v. Stellar
Motorola Exhibit 1032
Page 110

vers un centre optique dudit ensemble de lentilles de ladite caméra et pour réfléchir la lumière provenant dudit afficheur vers ledit oeil d'un porteur de telle façon que ladite lumière réfléchie provenant dudit afficheur est colinéaire avec ladite lumière qui autrement pénétrerait dans ledit oeil dudit porteur.

33. Lunettes selon la revendication 30, dans lesquelles ladite optique comprend un séparateur de faisceaux se présentant comme une métallisation sur une lentille desdites lunettes.

34. Equipement de tête selon la revendication 1, comprenant un transmetteur pour transmettre des signaux de caméra.

35. Equipement de tête selon la revendication 1, dans lequel ledit équipement de tête comprend des lunettes ayant une sangle de sécurité, ladite sangle recevant un fil de sortie venant de ladite caméra et comprenant un boîtier recevant un enregistreur alimenté par le fil de sortie de ladite caméra à partir de ladite sangle.

36. Équipement de tête selon l'une quelconque des revendications 1 à 29, comprenant une caméra focalisable et des moyens d'affichage focalisables, où ladite caméra focalisable et les moyens d'affichage focalisables sont tels qu'ils peuvent être pilotés par une seule commande qui focalise la lumière réelle allant vers ladite caméra et la lumière virtuelle venant dudit afficheur sur le même plan de profondeur.

37. Équipement de tête selon l'une quelconque des revendications 1 à 29, comprenant une caméra avec zoom et des moyens d'affichage avec zoom, où un réglage de zoom de ladite caméra et desdits moyens d'affichage peut être piloté par une seule commande de telle façon qu'un principe de lumière virtuelle est conservé pour tous les réglages de zoom.

38. Équipement de tête selon l'une quelconque des revendications 1 à 29, comprenant une caméra à focalisation automatique et des moyens d'affichage focalisables à distance, où ladite caméra à focalisation automatique commande un foyer desdits moyens d'affichage focalisables.

39. Équipement de tête selon l'une quelconque des revendications 1 à 29, où ladite caméra est une caméra gauche, ledit afficheur est un afficheur gauche et ladite optique est une optique gauche, et comprenant en outre une caméra droite, un afficheur droit et une optique droite, agencés d'une façon similaire, si ce n'est que l'une desdites caméras est une caméra à focalisation automatique et l'autre est une caméra focalisable à distance, où ladite caméra à focalisation automatique délivre une sortie de focalisation à ladite caméra focalisable à distance.

40. Équipement de tête selon la revendication 39, où ledit afficheur gauche et ledit afficheur droit sont des afficheurs focalisables à distance et où ladite caméra automatique délivre aussi des sorties pour focaliser l'un et l'autre desdits afficheurs focalisables à distance sur le même plan de profondeur qu'un objet sur lequel ladite caméra à focalisation automatique est focalisée.

41. Equipement de tête selon l'une quelconque des revendications 1 à 29, comprenant une caméra à focalisation automatique délivrant un signal pour ajuster automatiquement la vergence d'au moins deux caméras de telle façon que les axes optiques desdites au moins deux caméras se coupent au voisinage d'un objet sur lequel elles sont focalisées.

42. Équipement de tête (100) ayant un capteur (330) porté par ledit équipement de tête, un afficheur (340) porté par ledit équipement de tête, ledit afficheur étant situé pour être visible par un porteur dudit équipement de tête quand ledit équipement de tête est porté, une sortie dudit capteur pour un processeur (182 ; 183, 184, 185), et une entrée dudit afficheur pour accepter l'entrée venant dudit processeur, dans lequel l'amélioration comprend :

une optique réfléchissante (314, 415) agencée pour réfléchir la lumière de telle façon qu'au moins une partie d'au moins certains rayons de lumière qui autrement, en l'absence de ladite optique réfléchissante, ne serait pas mesurée par ledit capteur, est réfléchie pour être mesurée par ledit capteur,
ledit processeur étant destiné à déterminer une quantité de lumière dans chacun desdits au moins certains rayons de lumière, ledit processeur étant destiné à commander ledit afficheur pour fournir des rayons de lumière sortants, chacun étant colinéaire avec, et réagissant à, l'un desdits au moins certains rayons de lumière.

43. Equipement de tête selon la revendication 42, ladite optique étant destinée à réfléchir la lumière qui autrement pénétrerait dans un oeil d'un porteur vers ledit équipement de tête et à réfléchir la lumière provenant dudit afficheur vers ledit oeil dudit porteur de telle façon que ladite lumière réfléchie provenant dudit afficheur est colinéaire avec ladite lumière qui autrement pénétrerait dans ledit oeil dudit porteur.

44. Equipement de tête selon la revendication 42, dans lequel ledit processeur comprend un ordinateur relié par une liaison sans fil à un réseau d'ordinateurs.

Motorola v. Stellar
Motorola Exhibit 1032
Page 111

45. Equipement de tête selon la revendication 42, dans lequel ledit équipement de tête comprend des lunettes ayant une sangle de sécurité, ladite sangle recevant un fil de sortie venant de ladite caméra et comprenant un boîtier recevant un enregistreur alimenté par le fil de sortie de ladite caméra à partir de ladite sangle.

46. Equipement de tête selon la revendication 42, où ledit processeur comprend un processeur d'analyse de vision et un processeur de synthèse graphique.

47. Equipement de tête selon la revendication 46, où ledit processeur intègre un processus de vision artificielle et un processus de rendu de graphismes informatiques.

48. Equipement de tête selon la revendication 42, dans lequel ledit capteur comprend une première caméra et dans lequel ledit équipement de tête comprend en outre une deuxième caméra électronique portée par ledit équipement de tête, l'une de ladite première caméra et de ladite deuxième caméra comprenant une caméra grand-angulaire et une autre de ladite première caméra et de ladite deuxième caméra comprenant une caméra petit-angulaire.

49. Equipement de tête selon la revendication 42, dans lequel ledit capteur comprend une caméra petit-angulaire et dans lequel ledit équipement de tête comprend en outre une caméra électronique grand-angulaire portée par ledit équipement de tête, et dans lequel ledit afficheur électronique réagit à une sortie provenant de ladite caméra petit-angulaire afin de fournir un viseur pour ladite caméra petit-angulaire et ladite caméra grand-angulaire.

50. Équipement de tête selon la revendication 42, dans lequel ledit capteur comprend une caméra grand-angulaire et dans lequel ledit équipement de tête comprend en outre une caméra électronique petit-angulaire portée par ledit équipement de tête, et dans lequel ledit afficheur électronique est un premier afficheur électronique et comprenant un deuxième afficheur électronique réagissant à une sortie de ladite caméra petit-angulaire et comprenant une optique pour diriger la lumière provenant dudit deuxième afficheur électronique vers ledit oeil dudit porteur afin de fournir un viseur pour ladite caméra petit-angulaire.

51. Equipement de tête selon la revendication 48, 49 ou 50, comprenant une optique pour diriger la lumière entrante de telle façon qu'un centre d'un champ de vision de ladite première caméra est colinéaire avec un centre d'un champ de vision de ladite deuxième caméra.

52. Équipement de tête selon la revendication 51, dans lequel ladite deuxième optique comprend un séparateur de faisceaux.

53. Equipement de tête selon la revendication 48, 49 ou 50, comprenant en outre des moyens de poursuite de tête recevant un signal de sortie électronique de ladite caméra grand-angulaire.

54. Equipement de tête selon la revendication 53, comprenant un processeur destiné à fournir un gestionnaire de fenêtres de réalité, ledit processeur délivrant des signaux au dit afficheur électronique de telle façon que ledit afficheur fournit une fenêtre virtuelle ainsi qu'un viseur pour ladite caméra électronique.

55. Equipement de tête selon la revendication 42, dans lequel ledit processeur (182) destiné à fournir une vue rendue dans un processeur graphique (185) adapte la position de vision d'un oeil observant ledit afficheur, ladite position de vision n'étant pas la position de vision originale de ladite caméra (110 ; 120).

56. Equipement de tête selon la revendication 42, ledit processeur (182) étant destiné à fournir un changement de l'angle de vision, lors du rendu, pour compenser une différence de position entre ledit capteur et une vue fournie par ledit afficheur.

57. Equipement de tête selon la revendication 55 ou 56, ledit processeur (182) étant destiné à fournir une analyse d'image homographique ou quantigraphique ne nécessitant pas une analyse de scène en trois dimensions.

58. Equipement de tête selon la revendication 42, lesdits moyens pour compenser comprenant l'utilisation d'une transformation de coordonnées de projection en 2 dimensions d'un objet plan ou d'une surface plane d'un objet.

59. Equipement de tête selon la revendication 42, lesdits moyens pour compenser effectuant une correction de parallaxe entre des objets virtuels et une vue d'une scène telle qu'elle apparaîtrait quand ledit équipement de tête est retiré d'un porteur dudit équipement de tête.

Motorola v. Stellar
Motorola Exhibit 1032
Page 112

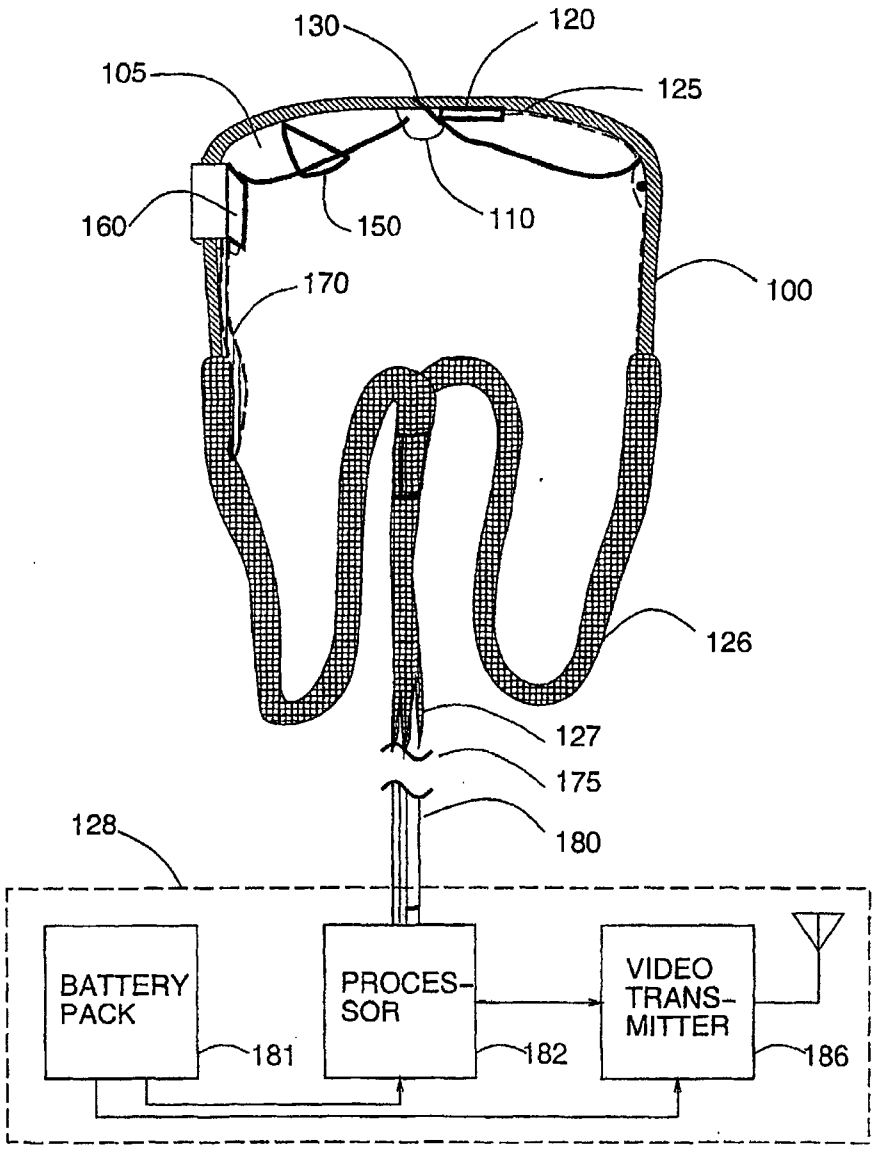


FIG. 1 – FOVEATED EMBODIMENT OF WEARABLE CAMERA SYSTEM

Motorola v. Stellar
Motorola Exhibit 1032
Page 113

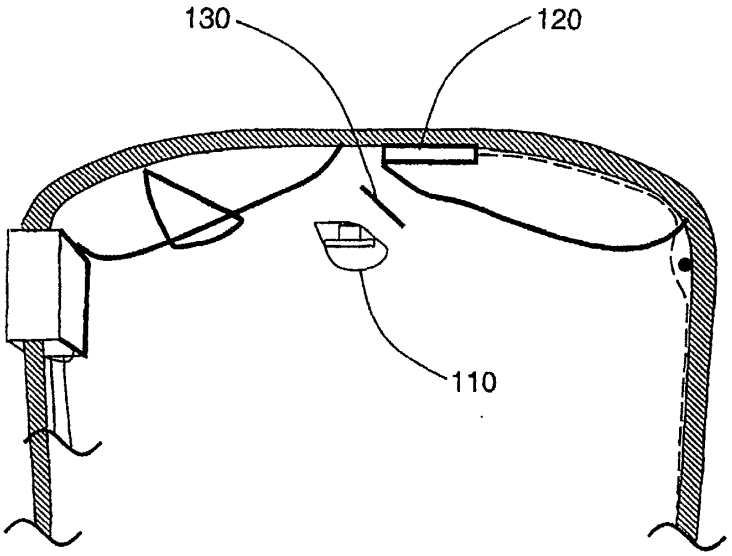


FIG. 1a – FOVEATED EMBODIMENT OF WEARABLE CAMERA SYSTEM – DETAIL OF BEAMSPLITTER

Motorola v. Stellar
Motorola Exhibit 1032
Page 114

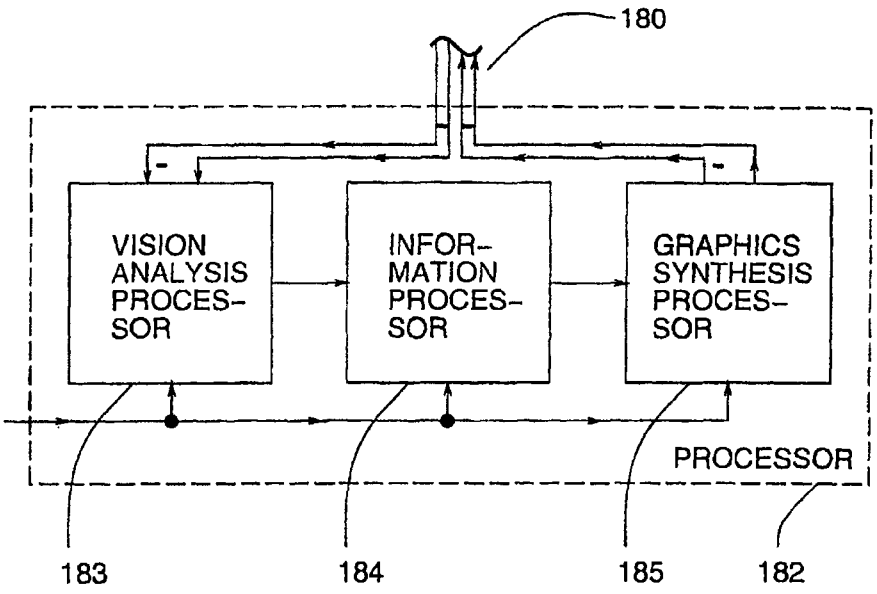


FIG. 1b – FOVEATED EMBODIMENT OF WEARABLE CAMERA SYSTEM – DETAIL OF PROCESSOR

Motorola v. Stellar
Motorola Exhibit 1032
Page 115

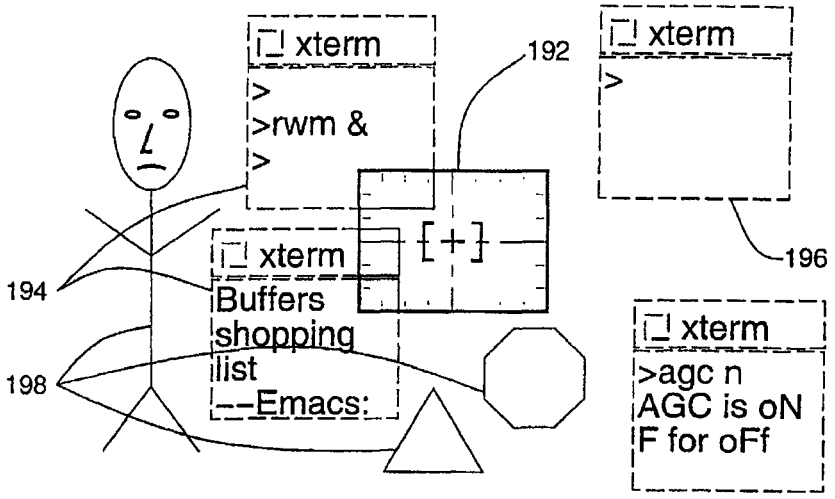


FIG. 1c – FOVEATED EMBODIMENT OF WEARABLE CAMERA SYSTEM – AS SEEN WHILE LOOKING THROUGH VIEWFINDER

Motorola v. Stellar
Motorola Exhibit 1032
Page 116

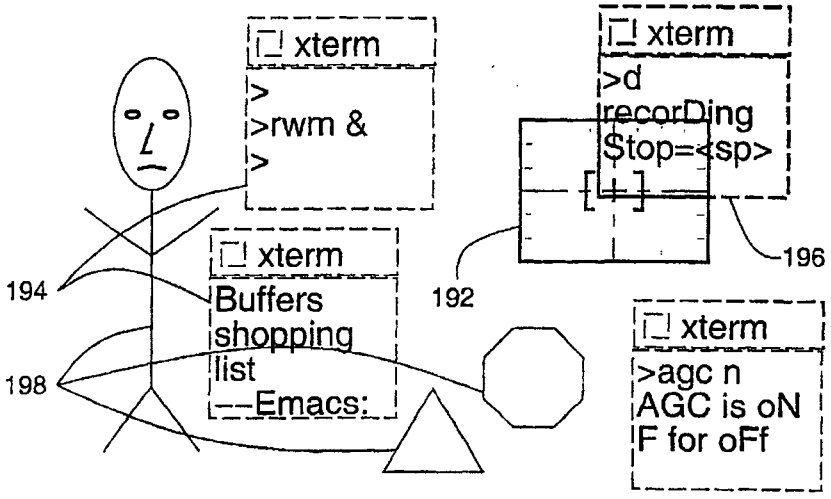


FIG. 1d – FOVEATED EMBODIMENT OF WEARABLE CAMERA SYSTEM – AS SEEN WHILE LOOKING THROUGH VIEWFINDER

Motorola v. Stellar
Motorola Exhibit 1032
Page 117

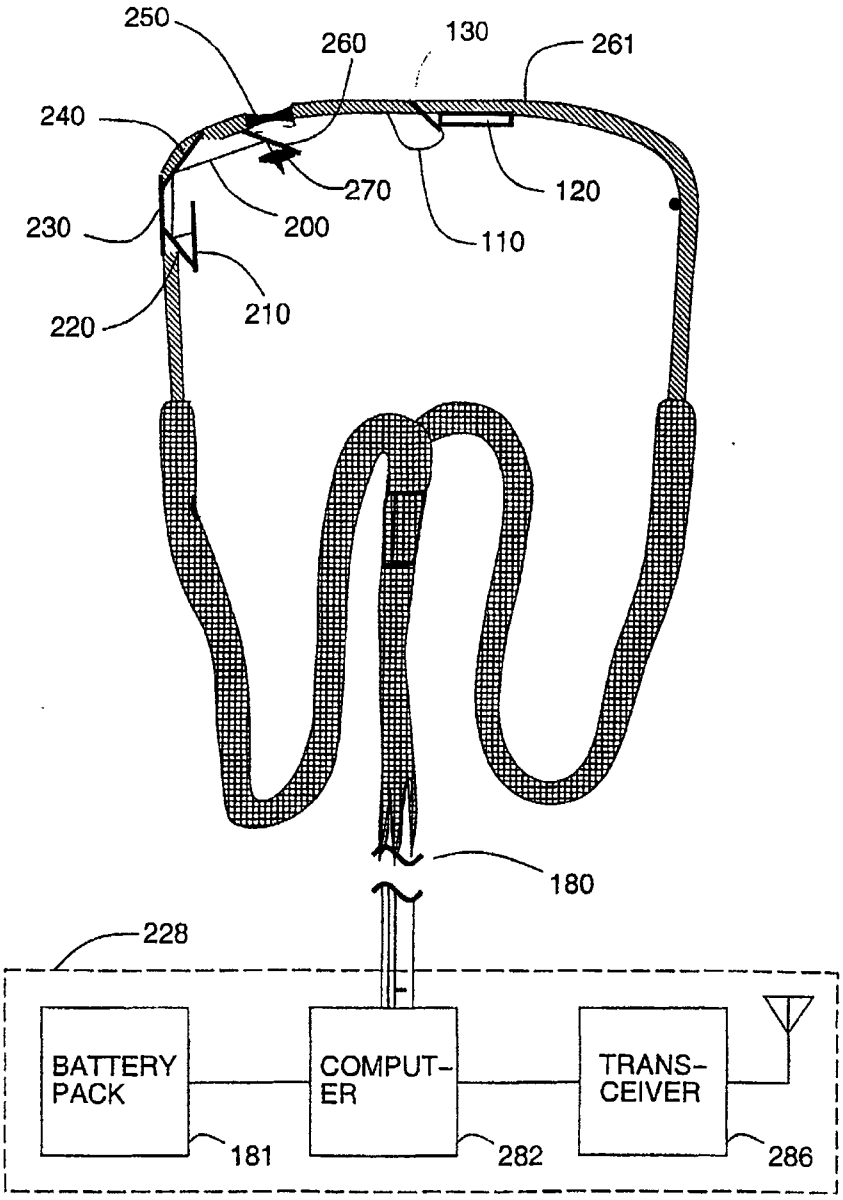


FIG. 2 – EMBODIMENT OF WEARABLE CAMERA SYSTEM WITH BOTH EYES VISIBLE TO OTHERS

Motorola v. Stellar
Motorola Exhibit 1032
Page 118

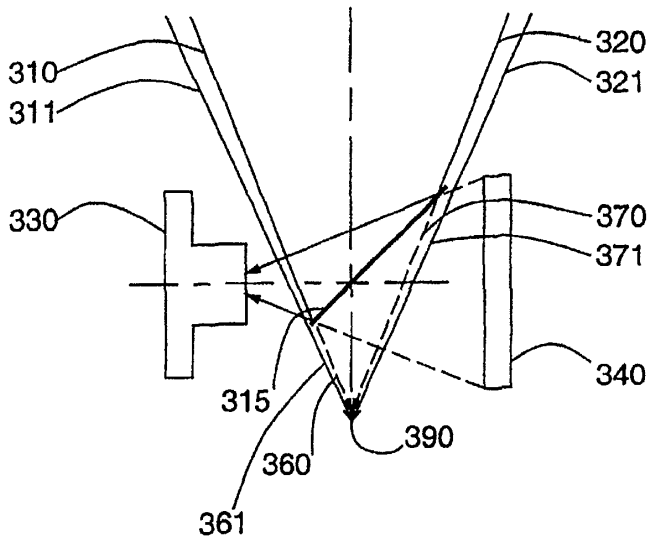


FIG. 3 – VIRTUAL LIGHT

Motorola v. Stellar
Motorola Exhibit 1032
Page 119

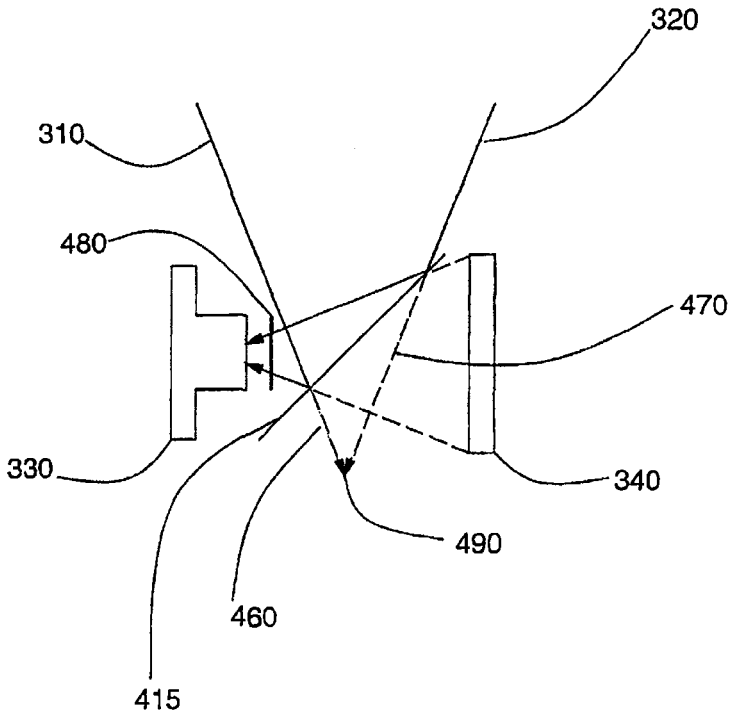


FIG. 4 – PARTIAL VIRTUAL LIGHT WITH VIDEO FEEDBACK PREVENTION MEANS

Motorola v. Stellar
Motorola Exhibit 1032
Page 120

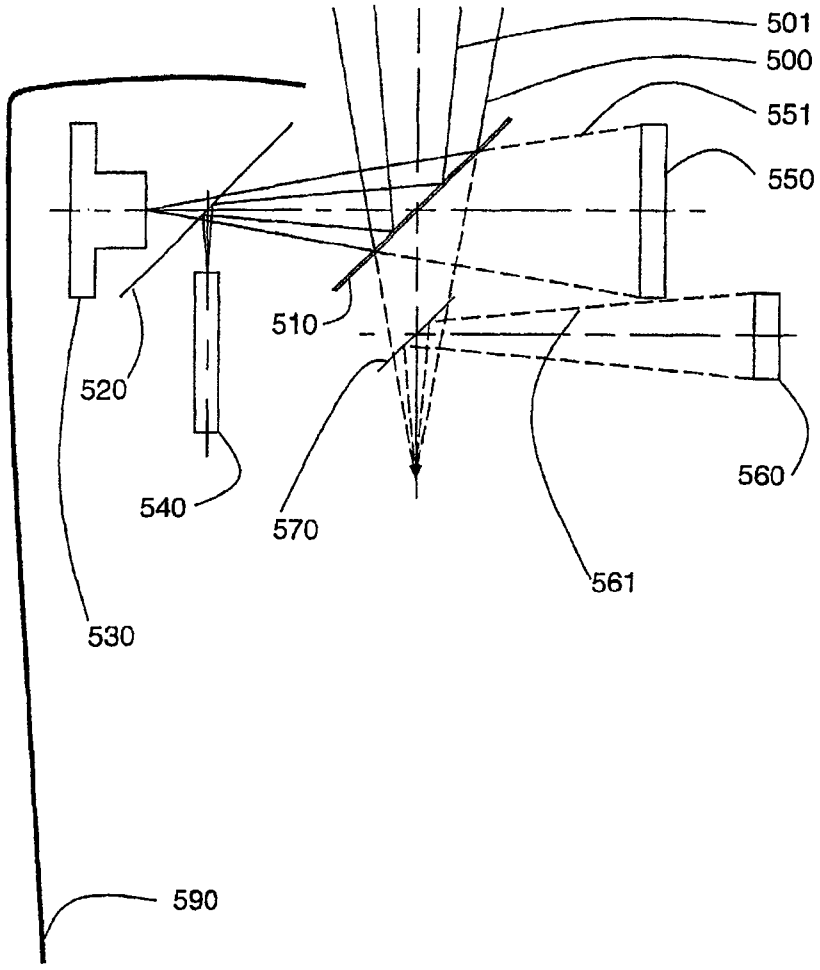


FIG. 5 – FOVEATED WEARABLE CAMERA WITH FOVEATED VIEWFINDER MEANS

Motorola v. Stellar
Motorola Exhibit 1032
Page 121

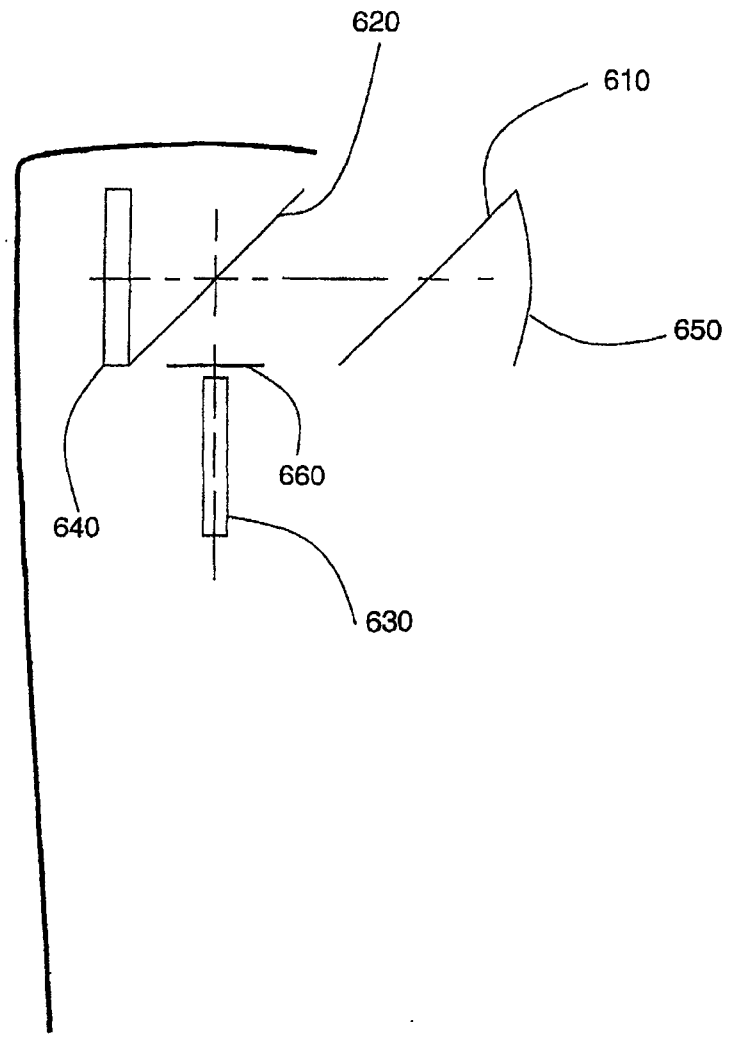


FIG. 6 – WEARABLE CAMERA SYSTEM WITH VIEWFINDER ALLOWING OTHERS TO SEE BOTH OF WEARER'S EYES

Motorola v. Stellar
Motorola Exhibit 1032
Page 122

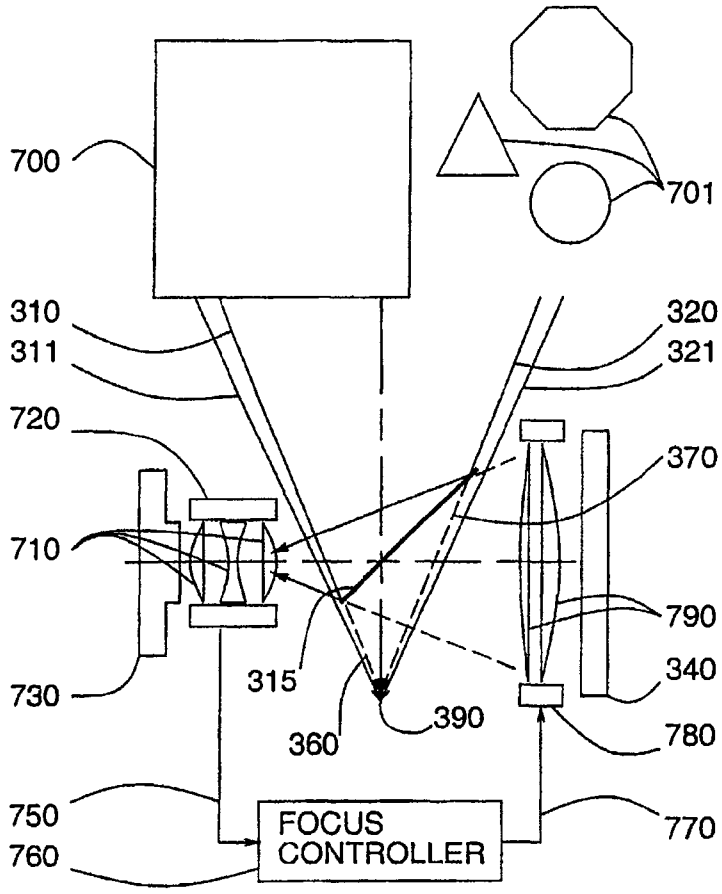


FIG. 7 – VIRTUAL LIGHT WITH FOCUS COUPLING

Motorola v. Stellar
Motorola Exhibit 1032
Page 123

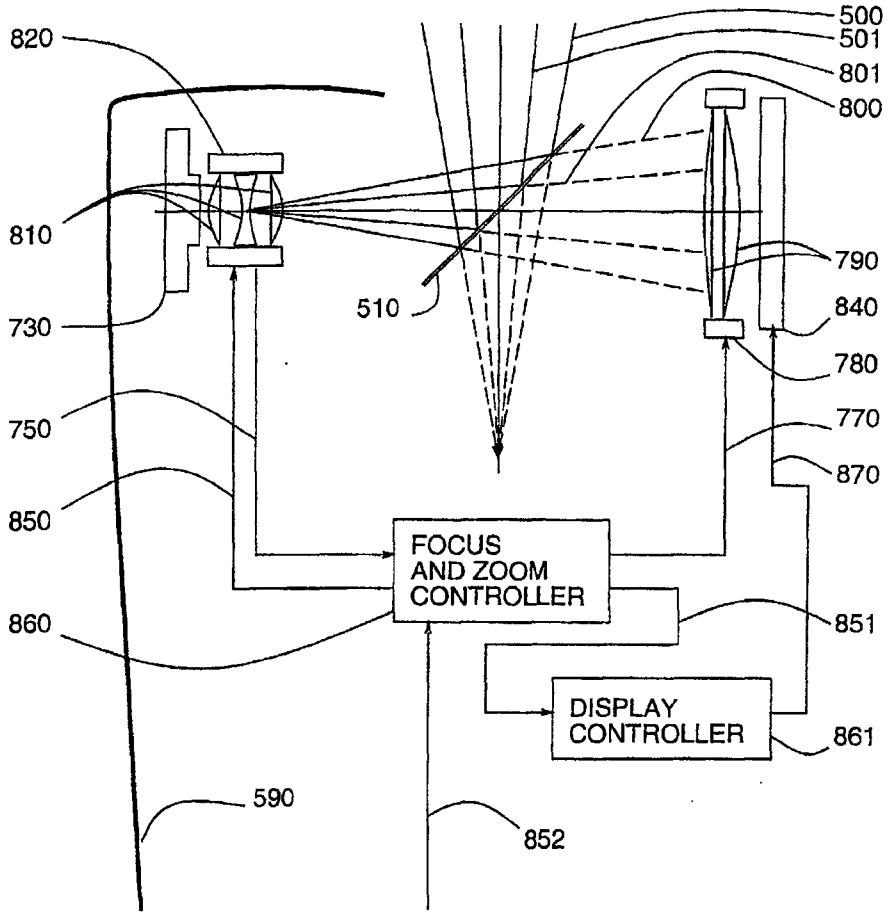


FIG. 8 – WEARABLE CAMERA SYSTEM WITH ZOOM LENS

Motorola v. Stellar
Motorola Exhibit 1032
Page 124

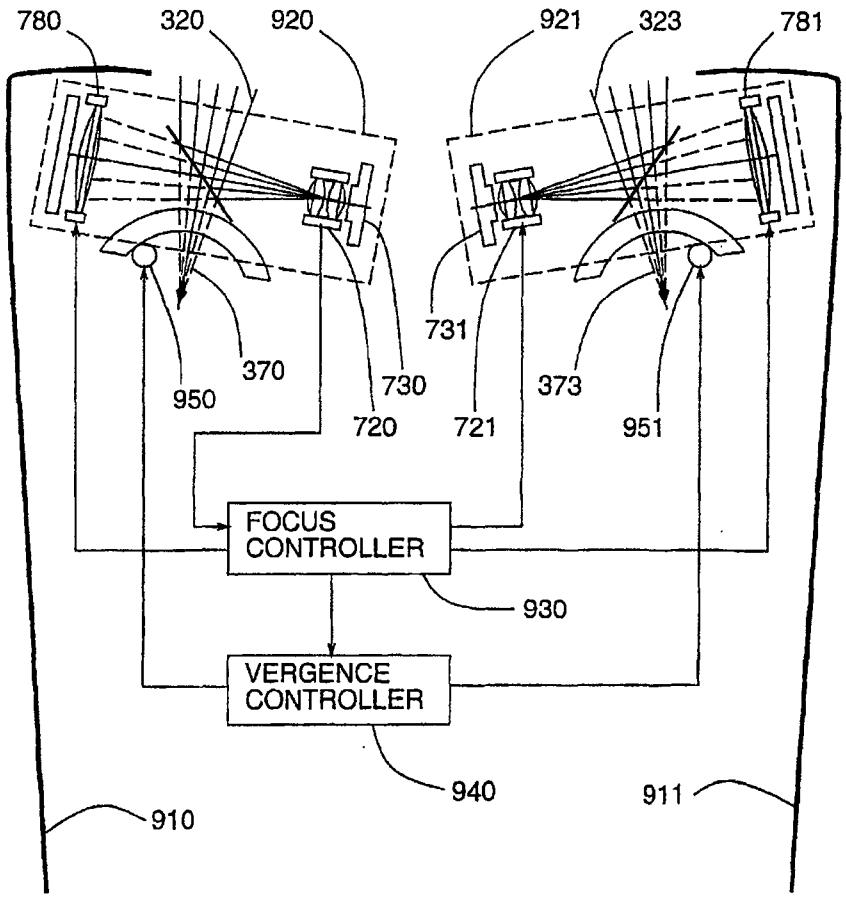


FIG. 9 – STEREO WEARABLE CAMERA SYSTEM

Motorola v. Stellar
Motorola Exhibit 1032
Page 125

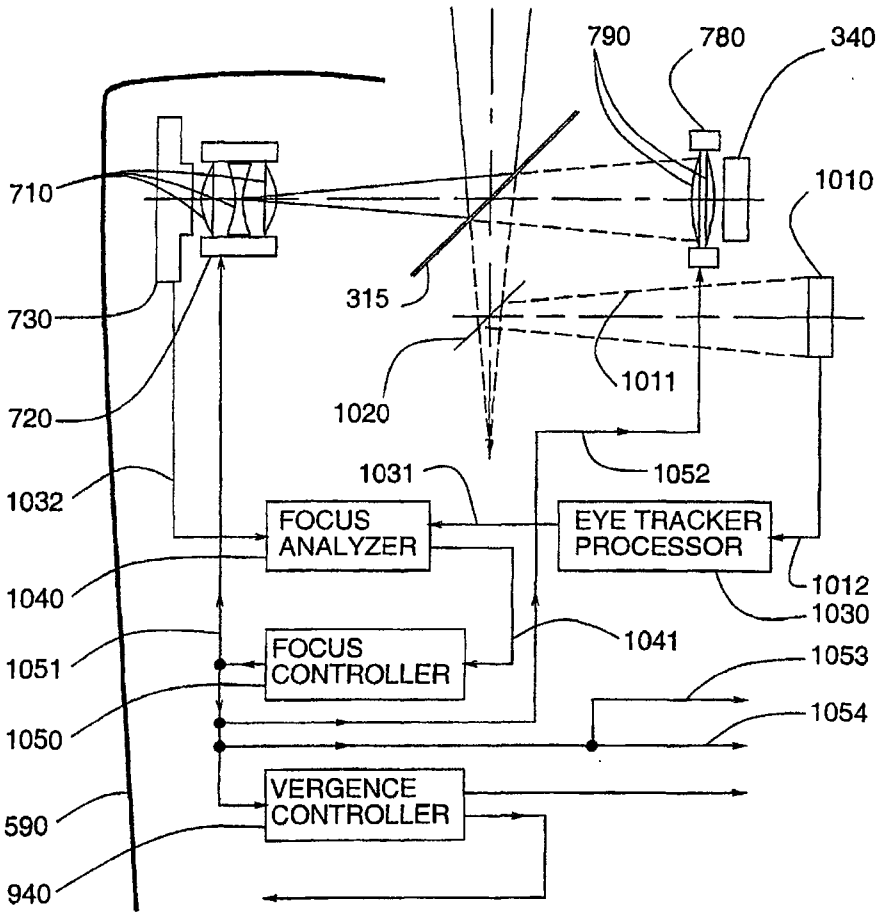


FIG. 10 – WEARABLE CAMERA SYSTEM WITH AUTOFOCUS AND VERGENCE DRIVEN BY EYETRACKER

Motorola v. Stellar
Motorola Exhibit 1032
Page 126

PCT WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 5 :
H04N 5/781, H04H 1/02, 7/00

A2

(11) International Publication Number: **WO 92/22983**

(43) International Publication Date: 23 December 1992 (23.12.92)

(21) International Application Number: PCT/US92/04573

(22) International Filing Date: 9 June 1992 (09.06.92)

(30) Priority data:
713,142 11 June 1991 (11.06.91) US

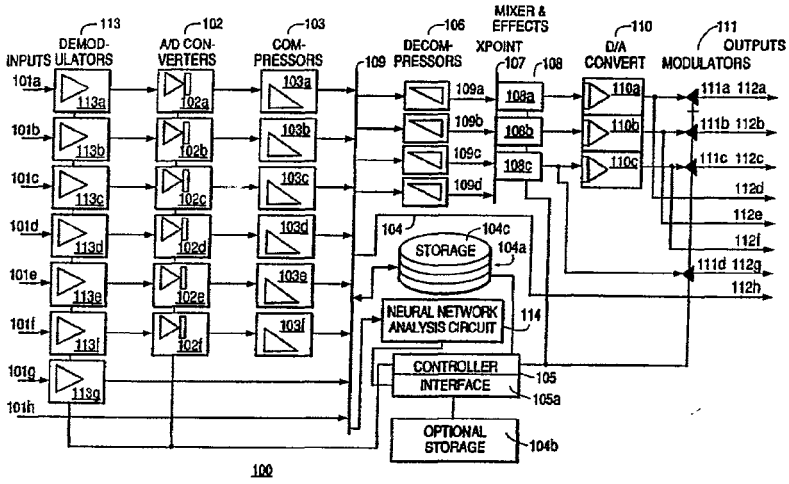
(71)(72) Applicants and Inventors: BROWNE, H., Lee [US/US]; Two Soundview Drive, Greenwich, CT 06830 (US). YURT, Paul [US/US]; 446 W 47th St., Apt. 5D, New York City, NY 10036-2337 (US).

(74) Agents: TURNER, John, B. et al.; Finnegan, Henderson, Farabow, Garrett & Dunner, 1300 I Street, N.W., Washington, DC 20005-3315 (US).

(81) Designated States: AT (European patent), BE (European patent), CA, CH (European patent), DE (European patent), DK (European patent), ES (European patent), FR (European patent), GB (European patent), GR (European patent), IT (European patent), JP, KR, LU (European patent), MC (European patent), NL (European patent), SE (European patent).

Published
Without international search report and to be republished upon receipt of that report.

(54) Title: LARGE CAPACITY, RANDOM ACCESS, MULTI-SOURCE RECORDER PLAYER



(57) Abstract

An audio/video recorder system receives a plurality of transmission signals each containing program information and simultaneously stores the received transmission signals. The system can be controlled by user input to allow for automatic recording of selected programs simultaneously input from multiple sources, reconfiguration of stored programs, and routing of stored programs to selected outputs.

FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AT	Austria	FI	Finland	ML	Mali
AU	Australia	FR	France	MN	Mongolia
BB	Barbados	GA	Gabon	MR	Mauritania
BE	Belgium	GB	United Kingdom	MW	Malawi
BF	Burkina Faso	GN	Guinea	NL	Netherlands
BG	Bulgaria	GR	Greece	NO	Norway
BJ	Benin	HU	Hungary	PL	Poland
BR	Brazil	IE	Ireland	RO	Romania
CA	Canada	IT	Italy	RU	Russian Federation
CF	Central African Republic	JP	Japan	SD	Sudan
CG	Congo	KP	Democratic People's Republic of Korea	SE	Sweden
CH	Switzerland			SN	Senegal
CI	Côte d'Ivoire	KR	Republic of Korea	SU	Soviet Union
CM	Cameroon	LI	Liechtenstein	TD	Chad
CS	Czechoslovakia	LK	Sri Lanka	TG	Togo
DE	Germany	LU	Luxembourg	US	United States of America
DK	Denmark	MC	Monaco		
ES	Spain	MG	Madagascar		

LARGE CAPACITY, RANDOM ACCESS, MULTI-SOURCE RECORDER PLAYER

Background of the Present Invention

The present invention relates generally to a large capacity, random access, multi-source audio and video recorder player which is capable of receiving a plurality of simultaneous input signals and which allows a user to view and/or to record selected ones of the plurality of input signals.

Currently, television viewers for the most part have little flexibility with regard to when broadcast programming may be viewed. The broadcaster's schedule is the user's schedule. The video cassette recorder (VCR) is the only device which allows a user to control the recording of programs and the time of viewing programs, by replaying recorded programs. The VCR allows the user to pre-set recording for a specific program by selecting the specific date, time, and channel that the program is broadcast. Such features allow the user to record without being present and to replay the recorded material at another time.

However, current VCRs have limited storage capacity and only single source capability and therefore do not provide the user with a great degree of flexibility and control over program recording. Moreover, conventional VCRs require constant attention for selection and recording of each program. Furthermore, a conventional VCR can only record one program at a time, while a typical household can receive many programs from multiple sources simultaneously.

It is therefore an object of the present invention to provide large capacity multiple source recording with random access, thus affording the user greater flexibility and control over the recording and replaying of programs.

It is a further object of the present invention to provide a large capacity recorder player which allows continuous recording of a program with automatic erasure, such that the material recorded first is automatically erased first when the multi-source recorder player storage reaches capacity. This feature greatly reduces the need for constant user attention and provides multiple viewing options.

Another object of the present invention is to allow the user to record from multiple channels individually, serially, or simultaneously.

Another object of the present invention is to allow the user to view programs while simultaneously recording one or more other programs.

Yet another object of the present invention is to provide a multi-source recorder player whereby the user can modify stored programs.

Another object of the present invention is to allow the user to record from multiple channels and from multiple distribution sources simultaneously.

Still another object of the present invention is to allow the recorder to adapt to the viewing habits of the user by analyzing selected criteria.

A further object of the present invention is to record material continuously to allow random retention of chosen program segments.

Yet another object of the present invention is to permit the user to mix multiple stored programs into a composite form.

Additional objects and advantages of the invention will be set forth in the description which follows, and in part will be obvious from the description, or may be learned by practice of the invention. The objects and advantages of the invention may be realized and obtained by means of the instrumentalities and combinations particularly pointed out in the appended claims.

Summary of the Invention

To achieve the objects in accordance with the purposes of the present invention, as embodied and described herein, the audio/video recorder system of the present invention comprises input port means for receiving a plurality of transmission signals each containing program information, and storage means, coupled to the input port means, for simultaneously storing the plurality of received transmission signals.

The present invention further comprises an audio/video recorder system comprising input port means for receiving a plurality of transmission signals each containing program information; storage processing means, coupled to the input port means, for storing the program information in the plurality of received transmission signals; and playback means, coupled to the storage means, for retrieving and playing desired program information from the stored received transmission signals, for playing program information simultaneously with the storing of program information by the storage processing means, and for playing different program information simultaneously.

The present invention further comprises an audio/video recording device for simultaneously storing information from a plurality of sources, the recorder comprising input

port means for receiving a plurality of transmission signals, and storage means, coupled to the input port means, for simultaneously storing the received transmission signals.

The present invention additionally comprises an audio/video routing device comprising input port means for receiving a plurality of transmission signals; demodulator and a/d conversion means, coupled to the input port means, for transforming the received transmission signals into digital signals each corresponding to a different one of the received transmission signals; and routing means for controlling the forwarding of the digital signals.

Brief Description of the Drawings

The accompanying drawings, which are incorporated in and constitute a part of the specification, illustrate the presently preferred apparatus and method of the invention and, together with the general description given above and the detailed description of the preferred embodiment given below, serve to explain the principles of the invention. In the drawings:

Fig. 1 is a block diagram of a preferred embodiment of the multi-source recorder player of the present invention;

Fig. 2 is a diagram of the main menu control screen of the user control section of the multi-source recorder player;

Fig. 3 is a diagram of the setup page screen option selected from the main menu control screen;

Figs. 4A-4C are diagrams illustrating the calendar screen option selected from the main menu control screen;

Figs. 5A-5E are diagrams illustrating the program selection option screen selected from the main menu control screen;

Fig. 6 is a diagram of the stored program list option screen selected from the main menu control screen;

Fig. 7 is a diagram of the routing controller option selected from the main menu control screen;

Fig. 8 is a diagram of the special effects screen option selected from the main menu control screen;

Fig. 9 is a diagram of the mix control screen selected from the special effects screen;

Fig. 10 is a diagram of the wipe control screen selected from the special effects screen;

Fig. 11 is a diagram of the database access option selected from the main menu control screen;

Fig. 12 is a block diagram of a preferred voice control system of the present invention;

Fig. 13 is a flowchart of a preferred method of recording of the present invention; and

Fig. 14 is a drawing of the remote control panel of the present invention.

Detailed Description of the Preferred Embodiments

Reference will now be made in detail to the construction and operation of preferred embodiments of the present invention which are illustrated in the accompanying drawings. In those drawings, like elements and operations are designated with the same reference characters.

In the following description, the preferred embodiments described are examples of the present invention. The present invention, however, is not limited to these examples, but may be realized in other embodiments.

Fig. 1 is a block diagram of a preferred embodiment of the multi-source recorder player 100 of the present invention. With the multi-source recorder player 100, a plurality of programs, consisting of audio and/or video signals, may be received simultaneously from a plurality of sources.

The multi-source recorder player 100 preferably has multiple input connections, each of which may receive an input signal 101a-101f from air and ground based broadcast sources, cable feeds, or digital distribution sources. Further, the multi-source recorder player 100 can preferably receive and process compressed digital signals 101g and 101h. Receiving compressed signals expands the signal handling and storage capacity of the multi-source recorder player 100. Once signals are input, the multi-source recorder player 100 can simultaneously record, process, route, and display the plurality of input video and/or audio signals.

The multi-source recorder player 100 preferably includes enough storage such that twenty or more hours of video with audio programming may be stored in a storage section 104. If audio only or video only programming is being retained, the storage times will increase correspondingly. The storage of audio and video only programming will utilize less storage than combined video and audio programming. The number of hours of recording which may be recorded, however, is not critical to this invention. To output the recorded programs, the multi-source recorder player 100 preferably includes a plurality of output connections including multiple rf, and digital and analog video and audio for outputting output signals 112a-112h to receiving devices, such as televisions and video recorders. Additionally, some of the output signals 112a-112h may include control signals for recording and viewing control of external devices. These devices will be controlled by controller 105 via the corresponding output connection. Setup for the control output is achieved from the output setup section 302 of the setup page control screen 300.

The multi-source recorder player 100 also preferably includes routing and compositing abilities affording a user control over the form and the destinations of the input signals 101a-101h. The multi-source recorder player 100 may optionally include signal analysis circuitry, preferably in the form of a neural network analysis circuit 114, for assisting the viewer in storing and retrieving desired programs and portions of desired programs.

Users of the multi-source recorder player 100 optionally have selectively filtered programming because a plurality of programs are received simultaneously, buffered in a temporary program FIFO buffer 104c, and scanned and selectively stored by the neural network analysis circuit 114. The system preferably filters the incoming programming by scanning the input programs on bus 109, overwriting undesired programs, and retaining only desired programs. Such a feature is particularly useful in this era of increased channel capacity from cable, satellite, and digital distribution channels.

Additionally, a portion of the storage section 104 of the multi-source recorder player 100 can be cycled. Memory is cycled when the multi-source recorder player 100 is set to operate a FIFO buffer for auto recording storage allocation 104c in the storage section 104. The auto recording storage allocation FIFO buffer 104c temporarily caches programs from a selection of channels on a FIFO basis and preferably retains certain of those programs as selected by the user, or as selected by the user's viewing patterns recognized by neural network analysis circuit 114. After user or neural network selection, the program is retained by being added to the stored program list 600. In this way data is retained by multi-source recorder-player into storage section 104. The memory is cycled because the FIFO

buffer 104c causes only selected desired programming to be stored in storage section 104 and listed in the stored program list 600. Preferably, all unchosen programs are overwritten by the next auto recording storage allocation FIFO pass.

Programs are not actually moved from the FIFO buffer 104c to storage section 104 but rather the reference to them is added to the stored program list 600. The user or neural network decision determines the program starting point. When the first program buffered in the storage section 104 has been either stored or discarded, the next program becomes the first program. Additionally, programs may be erased from storage section 104 and new programs added from the FIFO buffer 104c.

With auto-recording storage allocation enabled , the selection of a program for storage listing and retention can be performed some time after the programs or portions of the programs are received. For example, a user can select a program for storage listing and retention after viewing the program, or the choice can be made while the program is being viewed. Alternatively, selection can be made automatically by the neural network analysis circuit 114.

The multi-source recorder player 100 can also preferably access databases of compressed and non-compressed audio and video data. The multi-source recorder player 100 can access databases through one or more of the input ports. For example, controller 105 can operate a communication session with a remote computer via signal path 101g of the multi-source recorder player 100. The remote computer can be connected via an ISDN network connection, for example. The selected remote program data can be input to the multi-source recorder player 100 and stored in the

storage section 104. This transfer process can preferably occur concurrently with other activities in the multi-source recorder player 100.

In a preferred embodiment of the present invention, the multi-source recorder player 100 preferably includes input demodulator section 113. In the preferred embodiment, input demodulator section 113 includes a plurality of input demodulators 113a-113g. The number of input demodulators 113a-113g corresponds directly to the number of modulated input signals 101a-101g which are received by the multi-source recorder player 100 and which may be simultaneously demodulated. The number of input demodulators 113a-113g may vary but there should be at least two. The input demodulators 113a-113g are preferably chosen to receive signals from one or more of the following: a VHF antenna input, an FM antenna input, an AM antenna input, a cable television input, a Direct Broadcast Satellite input, a digital signal input, and an audio and video direct input.

The input demodulators 113a-113g demodulate signals from the following sources: VHF TV broadcasting, UHF TV broadcasting, FM radio broadcasting, AM radio broadcasting, cable television, satellite broadcasting, ISDN or other digital distribution sources and a VCR or audio recorder. Moreover, of the plurality of input demodulators 113a-113g, more than one may preferably receive the same type of signal. Thus, for example, a plurality of cable television input signals may be received simultaneously by the multi-source recorder player 100.

Each of the plurality of input demodulators 113a-113g respectively receives an input signal 101a-101g comprising audio and/or video information. The signals are received

via an input connector located on the rear of the multi-source recorder player 100. Input signals 101a-101g are demodulated separately by each of the plurality of demodulators 113a-113g. After demodulation by input demodulators 113a-113g, the audio and video signals are separately converted to digital signals by analog to digital (a/d) conversion section 102. Conversion section 102 preferably comprises a plurality of a/d converters 102a-102f. In the preferred embodiment shown in Fig. 1, input signals 101a-101f are analog signals. Therefore, there is one a/d converter 102a-102f for each simultaneously viewable and recordable analog input signal 101a-101f.

Once the signals are a/d converted, they are passed to digital compression section 103 for data reduction. Digital compression section 103 preferably includes a plurality of compressors 103a-103f. There is one compressor 103a-103f for each non-compressed input signal 101a-101f which may be input to the multi-source recorder player 100. Compression may be performed simultaneously in each of the compressors 103a-103f. The data quantities in the converted signals are preferably reduced by a factor of approximately 200 for video signals, and a by factor of approximately 8 for audio signals. Compression performed by compressors 103a-103f increases the storage capacity and the signal handling capacity of the multi-source recorder player 100. By routing and storing signals in their compressed form, the multi-source recorder player 100 can store and distribute large quantities of programming simultaneously.

Once compressed in compression section 103, the data is preferably input to storage section 104 via bus 109. The storage section 104 preferably employs high speed,

large capacity random access devices which may include optical and magnetic disks, RAM memory, and very high density floppy disks. The storage section 104 may also be configured to include a primary storage section 104a, and an optional storage section 104b, which may be connected to the multi-source recorder player 100 via a high speed digital connection using interface 105a. The optional storage section 104b may include removable media for long term storage of compressed data. With optional storage section 104b, users have control over the total amount of "on-line" storage capacity of the multi-source recorder player 100.

Alternatively, certain input signals, such as signals 101g and 101h, may be pre-compressed. For example, the multi-source recorder player 100 may receive digital ISDN data as input signal 101g, which is digitally modulated and distributed in a compressed format. The input signal 101g is passed directly to the demodulator section 113 and bypasses the converter section 102 and compression section 103. Multi-source recorder player 100 may also receive demodulated compressed data as input signal 101h, which is passed directly to storage section 104.

It is desirable to permit direct storage of pre-compressed data because compressed program distribution is becoming more common. Compression is especially desired when distributing high information content signals such as high definition television (HDTV) signals and improved definition television (IDTV).

Once an input signal reaches bus 109, certain predetermined criteria of the input signal may be assessed, if this option is chosen. Analysis is controlled by the user and will be discussed in greater detail below with respect to the user control section, shown and described with respect to Figs. 2-11. Such analysis is preferably performed

by a neural network analysis circuit 114. The neural network analysis circuit 114 is connected by the bus 109 and the controller 105. The controller 105 selects which of the input signals 101a-101h are input to the neural network analysis circuit 114. With this configuration the neural network analysis circuit 114 may scan one or more of the input signals 101a-101h.

The neural network analysis circuit 114 is designed to "learn" the user's preferences for programs by analyzing the user's viewing patterns. Neural network analysis circuit 114 operates recognition processing operations on the compressed data output from compressors 103a-103f and is configured to recognize program segments of interest to users of the multi-source recorder player 100. To do so, a user, by viewing program segments, automatically "teaches" the neural network analysis circuit 114 program elements which are of interest to that user.

Additionally, a user may manually assist the neural network "learning" by selecting the "interesting" button 1411 or "uninteresting" button 1412 on the remote control panel 1400, shown in Fig. 14. The "interesting" button 1411 and "uninteresting" button 1412 aid the neural network analysis circuit 114 in quickly learning the viewing interests of a user. If the neural network analysis circuit 114 finds programing with patterns of interest to the user, the programing will be stored in storage section 104 for future playback. Thus, with the neural network analysis circuit 114, the user can maximize the storage capacity of storage section 104 by teaching the multi-source recorder player 100 which programs are of interest and which are not of interest so that only programs of interest are automatically retained for future viewing and scanning.

Further, with automated recording, described below with respect to the user control section in Figs. 2-11, the neural network analysis circuit 114 can use the learned criteria to scan any number of channels and to retain any program which meets the learned criteria. This capability, combined with continuous FIFO buffering of incoming programing in FIFO buffer 104c, allows for retention of programs analyzed to be of interest after analysis is performed. The analysis preformed by the neural network analysis circuit is optional.

Program viewing typically involves retrieving a program stored in the storage section 104 and/or viewing an incoming program from sources 101a-101h. The user of the multi-source recorder player 100 communicates with controller 105 in order to control the multi-source recorder player 100 and to retrieve data, stored as programs, in storage section 104.

Controller 105 is a microprocessor which preferably runs a user control program and allows a user to access and control the multi-source recorder player 100. The user control section, which is described in greater detail with respect to Figs. 2-11, preferably acts similarly to the graphical interface provided by the Windows product sold by Microsoft, Inc. Selections are made via a remote control with a cursor positioning device such as a mouse or trackball.

The controller 105 generates a virtual control screen which may be placed on any screen to control of any one or more playback or recording processes. If a user wishes to view programs on several monitors simultaneously, the controller 105 can either operate multiple virtual control screens, one or more for each output monitor, or for each program window. Alternatively, the user may control all

screens from one controller, portions of which may be dragged between screens, such as in an Apple Macintosh computer with multiple screens. The user control program preferably includes a stored program list, shown in Fig. 6. The stored program list contains a index of programs stored in storage section 104, and held in the memory of the controller 105. The controller 105 can thereby address a desired program and output it to decompression section 106.

Decompression section 106 preferably comprises a plurality of decompressors 106a-106d wherein one of the decompressors 106a-106d decompresses a selected stored program. Storage section 104 can output a plurality of programs stored therein simultaneously, each to a respective one of decompressors 106a-106d. The number of decompressors corresponds to the number of simultaneously viewable programs. With four decompressors 106a-106d, it is possible to view four simultaneous programs at one or more of the outputs 112a-112h.

The decompressed data from decompressors 106a-106d is input to the digital crosspoint 107. The digital crosspoint 107 comprises a high speed data bus with decoding logic allowing any source to be connected to any destination. The digital crosspoint 107 routes the decompressed digital data to the mixing and effects processing section 108.

Mixing and effects processing section 108 preferably contains high speed video and audio processors which perform digital signal processing. Fig. 1 shows three separate processors 108a-108c corresponding to three possible separate output signals simultaneously available. Processors 108a-108c may preferably operate on one or more signals. The mixing and effects processing section 108 allows

a plurality of input signals to be added, subtracted, dissolved, faded, zoomed, windowed, panned, tilted, and swept, for example. The mixing and effects processing performed in the mixing and effects processing section 108 is controlled by the user and will be discussed in greater detail below with respect to the user control section.

After data is processed in the mixing and effects processing section 108, the data is output to d/a converter section 110. The d/a converter section 110 preferably comprises d/a converters 110a-110c. The d/a converters 110a-110c preferably include audio and video converters and buffering amplifiers which follow the converters and are used for driving the modulators.

After d/a converting, the data is sent to modulation section 111. The modulation section 111 preferably includes modulators 111a-11d. Although Fig. 1 shows four modulators, there is preferably one modulator for each modulated output signal.

After modulation in the modulation section 111, signals may be output to various receivers. The multi-source recorder player 100 preferably has a plurality of outputs, shown as 112a-112h in Fig. 1. With multiple outputs 112a-112h, different users can be playing the same program from the multi-source recorder player 100 at different receivers. Multiple outputs also make it possible to off-load one program to a VCR, while other programs stored in storage section 104 are being scanned.

Each of outputs 112a-112h preferably includes a separate audio and video output. In Fig. 1, the multi-source recorder player 100 may have eight video and eight stereo audio outputs. In the preferred embodiment of the invention shown in Fig. 1, outputs 112a-112h preferably include analog baseband modulated and rf modulated outputs. Output

112a is a rf modulated version of the same signal available at output 112d as a baseband signal, and baseband outputs 112b and 112c correspond to rf modulated outputs 112e and 112f, respectively, as shown in Fig. 1. There are two digital outputs 112g and 112h. Output 112g may be used for sending decompressed digital data, for example, to a digital television receiver. Output 112h may be used to output modulated or non-modulated compressed program data, for example, to a remote location via common carrier channels, such as the telephone or ISDN networks, or to any receiver with decompression circuitry. The three primary outputs include external device control connectors and signals, thus allowing controller 105 to control external devices such as VCRs.

Of the three analog outputs, output 112a may be set by default in the setup page 300, shown in Fig. 3, to receive the control screens which are described below with respect to the user control section shown in Figs. 2-11. Control screens are used to set the desired functions of the multi-source recorder player 100. The remaining analog outputs, output 112b and output 112c, may be set in the setup page 300 to receive programs from storage section 104 without overlapping control screens. Output 112a may preferably be sent to a primary monitor device, and outputs 112b and 112c are preferably connected to one or more audio/video recorders or secondary monitors. The control screen output may be changed by the user to output 112b or 112c.

Each video output from outputs 112a-112h is capable of outputting multiple programs simultaneously. In order to output multiple programs simultaneously, the user selects the format of the output. The output format is controlled by controller 105 and is performed in the mixing and effects processing section 108. For example, a plurality

of programs may be output on output 112a in tiled or overlapping windows. Alternatively, multiple programs may be mixed into a composite image in the mixing and effects processing section 108 and output on a single output. The format of the output data is selected in the setup page 300, described with respect to Fig. 3.

Audio program data is handled in much the same way as video program data, except that effects, such as wipe and zoom, cannot be performed on audio data. However, the user can control the output of audio data via controller 105 in the mixing and effects processing section 108. Such control allows the user to perform audio fades, mixing, and routing. Voice control signals, also described below with respect to the user control section, may also be mixed with the audio data and output by default to output 112a.

In another embodiment of the present invention, the plurality of outputs 112a-112c of the multi-source recorder player 100 can each be connected to multiple televisions. With multiple televisions connected, it is possible to view several input programs at one or more locations simultaneously. The outputs 112a-112c of the multi-source recorder player 100 may also be used to send incoming programs to one or more destinations. The multi-source recorder player 100 can then be used for multi-user program distribution applications. In a multi-user application, multiple controllers 105 preferably respond to and interact with several users simultaneously via multiple control screens. Moreover, in an embodiment of the present invention which does not include storage section 104, the multi-source recorder play 100 can be used as a router and controller of the input signals and external recorders.

As indicated above, the multi-source recorder player 100 is controlled by controller 105. Preferably, controller 105 is accessed by the user from the control screen output on output 112a and the remote control panel 1400 shown in Fig. 14. Figs. 2-11 are sample control screens used to control the multi-source recorder player 100. The user control section is available to the user as an option and makes it possible for a user of the multi-source recorder player 100 to select program source, channel, recording time, erasure, and output settings. If the user control screens shown in Figs. 2-11 are not desired, the user can operate the multi-source recorder player 100 with buttons, not shown, as in a conventional VCR.

Fig. 2 is a diagram illustrating a main menu control screen 200. Control screen 200 will preferably appear on at least a portion of the output monitor screen of the user, which may be attached to output 112a, when the user wants to implement a function of the multi-source recorder player 100. The user can preferably choose from a plurality of options appearing on the main menu control screen 200 including program recording option 202, stored program list option 203, database access option 206, routing control option 204, special effects option 205, and setup page option 201. User choice of the available options may be performed by an on-screen display with auditory prompts, a wired or wireless controller with a cursor positioning device, track ball, a voice sampler, or a plurality of front panel switches.

When the user selects the setup page option 201 from the main menu control screen 200, setup page screen 300, shown in Fig. 3, appears. The setup page screen 300 allows the user a plurality of control options including selection of program erasure section 301. Program erasure section

301 allows a user to set how stored programs will be saved in the storage section 104. Preferably, programs are handled as continuous blocks of sequentially received data, for example, a one hour block of time or a ten second block of time.

Programs may be stored in storage section 104 and erased when storage capacity is reached in a first-in/ first-out (FIFO) mode, if selection of FIFO option 301a is made from program erasure section 301. In the FIFO mode, if additional storage is required, then the oldest available program in storage section 104 is erased and a new program is stored in this storage space. If the locking option described below is selected, and if the oldest stored program is locked, the next oldest unlocked program is preferably overwritten when recording occurs. Thus, the FIFO mode causes the oldest stored program, or oldest stored unlocked program, to be automatically erased when the storage capacity of storage section 104 is reached.

Alternatively, program erasure may be selected by choosing erasure section 301. By selecting previously viewed option 301b, only programs which have been viewed will be automatically erased. The erasure of the stored viewed programs will preferably be performed on a FIFO basis. Thus, having selected this option, unviewed programs are automatically saved. And, alternatively, program erasure may be set in program erasure section 301 to be executed only at the command of the user by selecting the command erasure option 310c. In this mode, automatic erasure will not occur at all, and programs will only be erased at the command of the user.

Setup page screen 300 also preferably includes output setup section 302. Output setup section 302 allows the user to connect selected outputs, for example, outputs

112a-112c shown in Fig. 1, to a desired receiving device. For example, as shown in Fig. 3, output 112a may be connected to a television 312, output 112b may be connected to a VCR 322, and output 112c may be connected to a third control device 332. The setting determines the control protocol. The user can thus send control signals for devices along with the programs to the receiving devices. This allows controller 104 to control the connected receiving device. Control signals are useful, for example, when choosing to download programs to remote video recorders. With control signals as well as video and audio signals available at each output, it is possible to automate the offloading of programs to an external VCR or other recording device. Output setup section 302 makes it possible to connect and control many different video and audio recorders.

Setup page screen 300 also preferably includes set recording criteria section 303. This allows the user to control the neural network analysis circuit 114. With selection of monitor viewer option 303a, the neural network analysis circuit 114 will learn desired programs from the viewing patterns of the user. With watch selection of buttons option 303b, the neural network analysis circuit 114 will be trained from "interesting" button 1411 and "uninteresting" button 1412 on the control panel 1400. With off selection option 303c, the neural network analysis network 114 will be disabled.

The auto recording storage allocation section 305 of setup page 300 allows the user to allocate a fixed portion of storage 104 for continuous FIFO buffering, as described above. The portion of storage allocated is designated as a percentage of all storage available in storage section 104,

and as shown in bar 305a. The storage allocation section 305 also preferably displays the allocation numerically at 305b.

Setup page screen 300 also preferably includes display mode section 304. The display mode section 304 allows outputs 112a-112c to display multiple programs on one screen and also to display identical programs in different ways. If window option 304a is selected, the user can cause the output of selected ones of the outputs 112a-112c to be windowed. That is, the user can send a signal from one of the outputs 112a-112h to a receiver such that it appears as a window in another signal output to that receiver. Alternatively, the user can choose tiled windows, where the output appears as a series of equally sized windows, by selection of the tile window option 304b. Finally, the user can simply choose the full screen mode with the full screen option 304c.

As an example, after making a selection, output 112a can preferably output a single program on a full screen in a non-windowed mode. Output 112b could output the same program in a window located at the top left of the screen of the connected output device with selection of the window option 304a for output 112b. Output 112c could output four programs in four tiled, adjoining windows if the tile window option 304b is selected for this output.

The overlapping windows selected by window option 304a and the tiled windows selected by tile window option 304b can preferably be dynamically moved with the aid of a menu bar. Location of such a menu bar and control of the tiled or overlapping windows is preferably accomplished by the

mixer and effects processing section 108. If the user activates the display mode option 304, the mixer and effects processing section 108 causes an overlap of a control window on top of the displayed program screen.

After the user selects the setup criteria from the setup page screen 300, the multi-source recorder player 100 can be set to record. To record desired programs, the user selects the program recording option 202 from the main menu control screen 200 shown in Fig. 2. After selection of program recording option 202, a Gregorian calendar screen 400, illustrated in Figs. 4A-4C, appears on the screen. The calendar screen 400 is used to set the record-time of a desired program.

The Gregorian calendar screen 400 includes a month screen 401 shown in Fig. 4A. The month screen 401 includes each month of the year. After the user selects the desired month, such as June, as shown in Fig. 4A, the date screen 402, shown in Fig. 4B, appears. The user then selects the desired date, shown in Fig. 4B as June 5. The time screen 403, shown in Fig. 4C, then appears and the user selects the time when the multi-source recorder player 100 should be set to record.

The series of calendar screens shown in Figs. 4A-4C, like the other control screens, is generated on screen by controller 105 and is mixed at the crosspoint 107 and mixer and effects processing section 108. The calendar is displayed on the control screen which preferably appears as a floating window on the selected output. Controller 105 retains data entered into the calendar program, from screens 4A-4C, in RAM memory for future control of the multi-source recorder player 100.

After the user sets the time of recording, he or she preferably next selects what is to be recorded. Figs. 5A-5E show the control screens which appear on the output screen for selection of the program to be recorded.

Fig. 5A shows the enter channel screen 501 which prompts the user to enter the channel of the program to be recorded. Upon entering the channel, the user is prompted from source screen 502, shown in Fig. 5B, to enter the source from which the multi-source recorder player 100 should record the desired program. The user can select from, for example, cable, VHF antenna, UHF antenna, FM radio, AM radio, satellite, DBS, or ISDN digital from source screen 502. Next, frequency and title screen 507 appears as shown in Fig. 5C. From this screen, the user can optionally enter the program title into the title section 503. Although the source and channel comprise sufficient data for specifying a specific program to be recorded, the user may optionally enter the program title at this time.

Following the optional entry of the program name, the user can preferably enter the recording frequency from the recording frequency section 504, shown in Fig. 5D. The user can select from, for example, hourly, daily, weekly, bi-weekly, monthly, or other recording frequencies from frequency section 504. For example, if the user selects daily recording, the multi-source recorder player 100 will record the program which airs at the time and date selected in Figs. 4A-4C every day from the selected channel until it is programmed to stop recording. The "other" recording option will allow for recording special events on specific dates, for example.

Alternatively, if program codes representing the program, the source, or the recording time are available, then these codes could be entered instead of entering the program name, data, time, etc. Program codes are numbers which are associated with a particular program. If program codes are available, for example, in the local newspaper and TV guide, the user can set the multi-source recorder player 100 for recording by entering only these codes in the program recording option 202. This makes programming much easier. If program codes are available, then a different version of the user interface will be available to the user.

After all required selections are made from screens 5A-5D, start screen 507 appears as shown in Fig. 5E. The multi-source recorder player 100 is set to record by selection of the OK option 505. Alternatively, the record operation can be aborted by pressing cancel option 506.

Recorded programs are stored in storage section 104. A list of the programs stored and set for storing in storage section 104 may be viewed by choosing the stored program list option 203 from the main user control menu 200 shown in Fig. 2. When this option is selected, a stored program list screen 600 is output by controller 105 to output 112a.

The stored program list screen 600, shown in Fig. 6, may preferably include a list of all stored programs. This list may also include information such as title, source, channel, time of recording, the length of the program, and the date the program was recorded or is set to be recorded. The user may optionally enter any notes to be associated with the program when the stored program list 600 is output. The stored program list 600 may also preferably indicate whether the listed program has been recorded or has

previously been viewed, and may indicate how much, if any, storage space remains in storage section 104.

The stored program list 600 is linked to the program data in storage section 104. If data is removed from the storage section, then the stored program list 600 is updated to reflect this removal. If compressed data is reinstalled, for example when a removable media device is reinstalled, then the stored program list 600 will be updated by controller 105. The user may preferably update the stored program list 600. The user has a keypad on the control panel for text entry into the multi-source recorder player 100.

Alternatively, if titles or other information for programs are broadcast with the program or from a different source, then the controller 105 of the multi-source recorder-player 100 will automatically update the stored program list 600 from the broadcast information if this information is stored in storage section 104. The user thus only needs to input a minimum of information to setup a recording sequence. If more detailed notes and title information are desired, then they can be input by the user at any time, from the keypad when selecting the appropriate entry in the stored program list 600.

When the stored program list 600 is displayed, the user may lock certain of the listed stored programs. Locking a program involves selecting a program from the list and marking it as locked. A locked program will not be erased regardless of the program storage mode selected in the program storage option 301 selected in setup page 300, shown in Fig. 3. When inadequate unlocked storage in storage section 104 is reached, the multi-source recorder player 100 preferably alerts the user and presents a list of locked stored programs, preferably in a format similar

to stored program list 600, which are causing the storage capacity condition. The user must unlock the necessary amount of storage in storage section 104 before further recording requests may be accommodated.

The user can also set a filter on the stored program list, for example, to restrict the list of programs output on the stored program list 600 to those of interest to a single viewer. If there are two users of the multi-source recorder player 100, it is possible for each to view only his or her own listings and not those of the other person. This can be performed by incorporating a user password. Users of the multi-source recorder player 100 who do not know available passwords will be unable to access programs which are password-protected. The multi-source recorder player 100 can preferably handle a plurality of passwords and support multiple stored program lists for multiple users.

The multi-source recorder player 100, when operated as a multi-user device, will ask the user his or her password before making any menus or screens available. Once the password is received the multi-source recorder player 100 will interface with the user in the same way as described above, the only difference being that the listings of programs retained for this user will not include any listings for other users unless they are considered "shared" programs. Secondly, the neural network analysis circuit 114 will perform analysis for each user individually. The resulting analysis determining desired programs will thus be appropriate for each user.

In addition to viewing a list of stored programs, the user may also preferably select the routing controller option 204 shown on the main menu control screen 200 shown in Fig. 2. If the user chooses the routing controller option

204, the routing controller screen 700, shown in Fig. 7, is output from controller 105. When the routing controller screen 700 appears, the user first selects the output to which the signals are to be sent. The user selects, for example, one of outputs 112a-112c from the output selection 701. Output selection is not limited to outputs 112a-112c, but may be any of the outputs 112a-112h of the multi-source recorder player 100. The user then selects from the signal selection section 702 the types of signals which will be output by the output selected from output selection 701.

The routing controller option may be used to display signals without prior storage. With this option, the user sends incoming video and/or audio signals to the outputs, thus setting up connections between compression section 103 and decompression section 106, thereby bypassing the storage section 104.

In addition to routing the signals in the multi-source recorder player 100, the user can form composite images to be sent to the outputs. Composite images may be formed when the special effects option 205 is selected from the main menu control screen 200, shown in Fig. 2. With special effects screen 800, shown in Fig. 8, the user can select special video and audio effects. In a preferred embodiment of the present invention, composite images and programs can be formed since the multi-source recorder player 100 can output a plurality of programs on each of the outputs 112a-112h. This is useful, for example, for making original material from a collection of audio and video sources.

Special effects screen 800 includes effects section 801. With the effects section 801, the user can wipe or mix input signals. Particularly, mix option 802 may be selected which causes mix control screen to appear.

Mix control screen 900 allows a user to set the levels for video and/or audio signals. To operate the mix control screen 900 the user selects the program of choice by positioning the cursor and clicking on its picture. Once selected the user moves the slider 901a. This controls the mixing and effects processing section 108 causing a corresponding change at output section 112. This in turn allows the user to combine images and sounds dynamically. Thus, production of original material from the material stored in storage section 104 is possible with the multisource recorder player 100. By selecting one channel from channel selectors 902, the mixing and effects processing section 108 can be separately set for each channel, thus allowing mixing and panning of audio and video.

From special effects screen 800, the user can also preferably select wipe option 803, which will cause wipe control screen 1000, shown in Fig. 10, to appear. The wipe control screen 1000 displays a list of available effects in wipe effect section 1010. The individual wipe effects 1010a-1010f allow the user to perform transitions between individual programs and between programs and backgrounds. The user preferably selects a desired wipe effect by choosing one of the wipe effect options 1010a-1010f.

The wipe control section 1011 allows the user to choose which programs and the portions of selected programs that will be wiped. First, the user selects which program or programs will be wiped from program selection option 1014. The user selects the desired program by moving the cursor over the program window and pressing select to set the controller 105 for effecting that program. Mix control screen 900 represents a virtual mix controller. Slider 901a and 901b allow for setting levels of audio or video signals thus controlling the mixing and effects process.

The user selects which program is being controlled by clicking on its picture, and then which of its channels are being effected by selecting one or more of the buttons for audio left or right 902a and 902b and video 902c.

If a particular wiping effect requires two programs, the user selects the first by selecting select program 1 option 1014a and then selects the second program by selecting select program 2 option 1014b. Program selections can be revised at any time simply by clicking on another program window.

The user can preferably choose to wipe between the two selected programs by selecting "wipe between programs" option 1013b from the wiping mix section 1013. Alternatively, the user can preferably choose to wipe between the program selected from select program 1 option 1014a and a background color by selecting "wipe to color" option 1013a. Selection of the "wipe to color" option will cause a screen with a list of colors to appear from which the user can preferably choose the background color.

The user preferably selects the portion of the selected program or programs to be wiped from frame section 1012. Program times are typically displayed in groups of frames each with a frame number. The beginning of the wipe is selected by entering the appropriate wipe start in the wipe start section 1012a. The end of the wipe may be indicated by entering the frame number where the wipe is to terminate in wipe end section 1012b.

Alternatively, if frame numbers are not known, the user can preferably mark the starting and ending times of wiping by using graphical display section 1015. The beginning point of the wipe is displayed as a graphical image in the graphical display section 1015a. The point where the wipe is to end is displayed as a graphical image in the

graphical display section 1015b. This is very much like selecting points on a visual based editor such as from the Video F/X video editing system which runs on Macintosh computers sold by Apple Computers, Inc.

In addition to special effects, the user may also select database access from the main menu control screen 200 by choosing database option 206, shown in Fig. 2. Database access screen 1100, shown in Fig. 11, is displayed by controller 105 as a result of the user selecting this option.

The user can employ screen 1100 to search for desired programming by entering a search query. The user enters textual information via a keyboard which is preferably part of the controller 105. Searching is controlled by a database server working in conjunction with the multi-source recorder player 100. If the database server has a larger number of fields then the lookup screen may differ from that shown in Fig. 11. For example, the screen may contain more fields with labels or it may contain a series of questions to be answered for assisting the search.

The results of the search are output in output section 1120 as a series of pictures. The picture displayed for each result will be provided by the database server. Once downloaded from the database server to the multi-source recorder player 100, the programs found as a result of the search will be handled in the same way as other programs which are available from the stored program list 600 shown in Fig. 6.

User interaction, as described above with respect to Figs. 2-11, may preferably be accomplished by keys, or by vocalizing a command to a voice interactive control system. Key commands involve using a mouse and associated software. The user directs a pointer to a graphic display and clicks on desired options in the programming process. The voice

interactive control system senses voiced commands and produces corresponding resulting control signals and responses. Both mouse and voice control can operate the user options shown on main menu control screen 200, shown in Fig. 2.

Fig. 12 is a block diagram of the voice control system 1200 of the present invention. The voice control system 1200 includes vocal interface 1201. Vocal interface 1201 may preferably be a microphone which receives and amplifies voice commands from the user. The voice signals amplified by vocal interface 1201 are input to analog to digital converter 1202. The converted signal is output to waveform monitor and pattern comparator 1203.

Voice recognition and control circuitry is currently commercially available and is preferably interfaced to control the multi-source recorder player 100. Voice recognition controllers allow a user to voice requests rather than pressing keystrokes and selecting menu options with a cursor controller. The combination of vocal interface 1201, a/d converter 1202, and waveform monitor and pattern comparator 1203 convert sound pressure into signals which control the recording and other processing performed by the multi-source recorder player 100.

In addition, a voice response output may be mixed with program data stored in program storage 104 in mixing and effects section 108, and output to the audio output of one of outputs 112a-112h of the multi-source recorder player 100. When using the voice control system, the user may preferably voice desired selections, hear previously stored voice segments, and hear synthesized voice messages.

By using the user controls described with respect to Figs. 2-11, a program or plurality of programs may be formatted and recorded. In order to perform recording, the

user preferably follows the steps shown in the flowchart of Fig. 13.

The user first selects the record program mode (step 1310) to specify what to record and how often to record it. Once the decision is made, a Gregorian calendar is displayed and the user chooses the month (step 1320), day (step 1330) and then the time (step 1340) to record. The selection from the calendars corresponds with the calendar screens shown in Figs. 4A-4C.

The user next selects the program channel to be recorded (step 1350) and the source connection for the program (step 1360). In the source connection step 1360, the user selects the type of input signal which is to be recorded so that it is input correctly to the demodulator section 101 of the multi-source recorder player 100.

Next, the user provides the name of the program to be recorded (step 1370) in either textual or voiced format. The user then enters the frequency with which the program is to be recorded (step 1380). The program which was programmed to be recorded is recorded until the user indicates otherwise (step 1390).

Fig. 14 shows a remote control panel 1400 which can be for multi-source recorder player 100. While viewing live video, the user can press the record button on a control panel 1400 and immediate recording will take place. If the auto recording storage allocation section 305, shown in Fig. 3, is set, the material recorded can precede the record request of the user. In this way, an entire program can be retained when the choice to record the program is made after viewing it. The chosen program is then retained from the cycling FIFO.

The user then selects the specific signals to be output to the selected output from select output section 703. After this selection, VHF Channel 2, VHF Channel 4, and Cable Channel 21 may be simultaneously output to output 112a, for example. Once selected, sliding the controllers 901a or 901b will set a level or balance for the chosen channels of audio and or video. If two programs are being effected then the user selects twice, once for each program before making the adjustments.

If a program is not currently on screen the user can select it for the program list. Once selecting the program the user may start the program by pressing the play button 1405c on the remote control panel 1400.

Remote control panel 1400 allows the user to position the cursor with section 1408. Once the cursor is positioned over a chosen program and select button 1408a is pressed, the user may use playback control section 1405 or routing section 1401-1403 to control the program.

When names and textual input are required, panel 1407 is used. The "interesting" and "uninteresting" buttons 1411 and 1412 are used to help teach the neural network analysis circuit 114 the user's preferences. The program list button 1403b is used to display the program list on the control monitor. The source and output buttons 1401 and 1402 are used in conjunction with the connect button 1403a to arrange program routing.

Accordingly, the multi-source recorder player of the present invention can receive a plurality of different types of input signals. The user has a great deal of control over the signals that are input and can output the signals to one or more receivers. Input signals may be stored in a storage section for later playback or manipulation.

Other embodiments of the invention will be apparent to those skilled in the art from consideration of the specification and practice of the invention disclosed herein. It is intended that the specification and examples be considered as exemplary only, with the true scope and spirit of the invention being indicated by the following claims.

WHAT IS CLAIMED IS:

1. An audio/video recorder system comprising:

input port means for receiving a plurality of transmission signals each containing program information; and

storage means, coupled to the input port means, for simultaneously storing the plurality of received transmission signals.

2. The audio/video recorder system of claim 1 further including demodulator means, coupled to the input port means, for transforming the received signals into digital signals each corresponding to a different set of program information.

3. The audio/video recorder system of claim 2 wherein the demodulator means further includes:

receiver means for forming baseband signals each corresponding to a different one of the received signals; and

analog/digital converter means, coupled to the receiver means, for forming the digital signals from the baseband signals.

4. The audio/video recorder system of claim 1 wherein the storage means includes data compression means for compressing each of the acceptable received signals prior to storage.

5. The audio/video recorder system of claim 1 further comprising analysis means, coupled to the input port means, for assessing predetermined criteria of each of the received signals to determine acceptable ones of the plurality of received transmission signals.

6. The audio/video recorder system of claim 5 further including means for causing the storage means to implement recurring recording.

7. The audio/video recorder system of claim 1 further including a data manager, coupled to the storage means, for managing the stored program information.

8. The audio/video recorder system of claim 1 wherein the storage means includes means for erasing from the storage means stored program information according to a predetermined priority.

9. The audio/video recorder system of claim 8 wherein the means for erasing includes means for erasing stored program information in a first-in/first-out order.

10. The audio/video recorder system of claim 8 further including override means for disabling the means for erasing.

11. The audio/video recorder system of claim 10 wherein the override means includes means for disabling the means for erasing selected stored program information.

12. The audio/video recorder system of claim 8 further including means for retaining programs prior to selection on one or more channels of incoming programs.

13. An audio/video recorder system comprising:

input port means for receiving a plurality of transmission signals each containing program information;

storage processing means, coupled to the input port means, for storing the program information in the plurality of received transmission signals; and

playback means, coupled to the storage means, for retrieving and playing desired program information from the stored received transmission signals, for playing program information simultaneously with the storing of program information by the storage processing means, and for playing different program information simultaneously.

14. The audio/video recorder system of claim 13 wherein the storage processing means includes:

data compression means for compressing each of the received transmission signals prior to storage; and

wherein the playback means includes:

data retrieval means for retrieving program information; and

decompression means for decompressing the retrieved program information.

15. The audio/video recorder system of claim 13 wherein the playback means includes a display device to display the retrieved program information.

16. The audio/video recorder/playback system of claim 13 wherein the playback means includes an audio amplifier to play the retrieved program information.

17. The audio/video recorder system of claim 13 wherein the input port means includes:

means for receiving a plurality of transmission signals; and

wherein the storage processing means includes means for simultaneously storing the received transmission signals.

18. The audio/video recorder system of claim 13 further including analysis means, coupled to the input port means, for assessing predetermined criteria of each of the received signals to determine acceptable ones of the received signals.

19. An audio/video recording device for simultaneously storing information from a plurality of sources, the recorder comprising:

input port means for receiving a plurality of transmission signals; and

storage means, coupled to the input port means, for simultaneously storing the received transmission signals.

20. The audio/video recording device of claim 19 further including analysis means, coupled to the input port means, for assessing predetermined criteria of each of the received signals to determine acceptable ones of the received signals.

21. The audio/video recording device of claim 19 wherein the storage means includes data compression means for compressing, prior to storage, each of the acceptable received signals.

22. The audio/video recording device of claim 19 wherein the plurality of transmission signals may have different formats, and wherein the device further includes demodulator means, coupled to the input port means, for transforming the received transmission signals of each different format into digital signals each corresponding to a different one of the received transmission signals.

23. The audio/video recording device of claim 22 wherein the demodulator means further includes audio/video demodulator means for separately extracting the video and audio signals from each of the received transmission signals.

24. The audio/video recording device of claim 22 wherein the demodulator means further includes:

receiver means for forming baseband signals each corresponding to a different one of the received transmission signals; and

analog/digital converter means, coupled to the receiver means, for forming the digital signals from the baseband signals.

25. The audio/video recording device of claim 23 wherein the audio/video demodulator means further includes:

video receiver means for forming baseband video signals for each of the received transmission signals;

audio receiver means for forming baseband audio signals for each of the received transmission signals;

video analog/digital converter means, coupled to the video receiver means, for forming video ones of the digital signals from the baseband video signals; and

audio analog/digital converter means, coupled to the audio receiver means, for forming audio ones of the digital signals from the baseband audio signals.

26. The audio/video recording device of claim 19 further including means for causing the storage means to implement periodic recording.

27. The audio/video recording device of claim 19 further including a data manager, coupled to the storage means, for managing the stored transmission signals.

28. The audio/video recording device of claim 27 wherein the data manager includes control means for outputting a list of predetermined ones of the received transmission signals stored in the storage means upon entry of a user password.

29. The audio/video recording device of claim 19 wherein the storage means includes means for erasing from the storage means stored transmission signals according to a predetermined priority.

30. The audio/video recording device of claim 29 wherein the means for erasing includes means for erasing stored transmission signals in a first in/first out order.

31. The audio/video recording device of claim 29 further including override means for disabling the means for erasing.

32. The audio/video recording device of claim 31 wherein the override means includes means for disabling the means for erasing selected stored transmission signals.

33. An audio/video routing device comprising:

input port means for receiving a plurality of transmission signals;

demodulator means, coupled to the input port means, for transforming the received transmission signals into digital signals each corresponding to a different one of the received transmission signals; and

routing means for controlling the forwarding of the digital signals.

34. The audio/video routing device of claim 33 wherein the transmission signals include program information, and wherein the routing device further includes playback means, coupled to the routing means, for playing at least some of the program information in the received transmission signals.

35. The audio/video routing device of claim 34 wherein the playback means includes means for simultaneously playing a plurality of the program information in the received transmission signals.

36. The audio/video routing device of claim 33 further including remote control means for controlling the operation of said routing device from a position remote from the device.

37. The audio/video routing device of claim 33 further including an output port, wherein the routing means includes means for routing the digital signals to the output port.

38. The audio/video routing device of claim 37 wherein the routing means includes voice activation means for controlling the routing means.

39. An audio/video recorder system comprising:

input port means for receiving a transmission signal containing program information;

storage means, coupled to the input port means, for simultaneously storing the plurality of received transmission signals; and

analysis means, coupled to the input port means, for assessing predetermined criteria of each of the received signals to determine acceptable ones of the plurality of received transmission signals.

FIG. 1

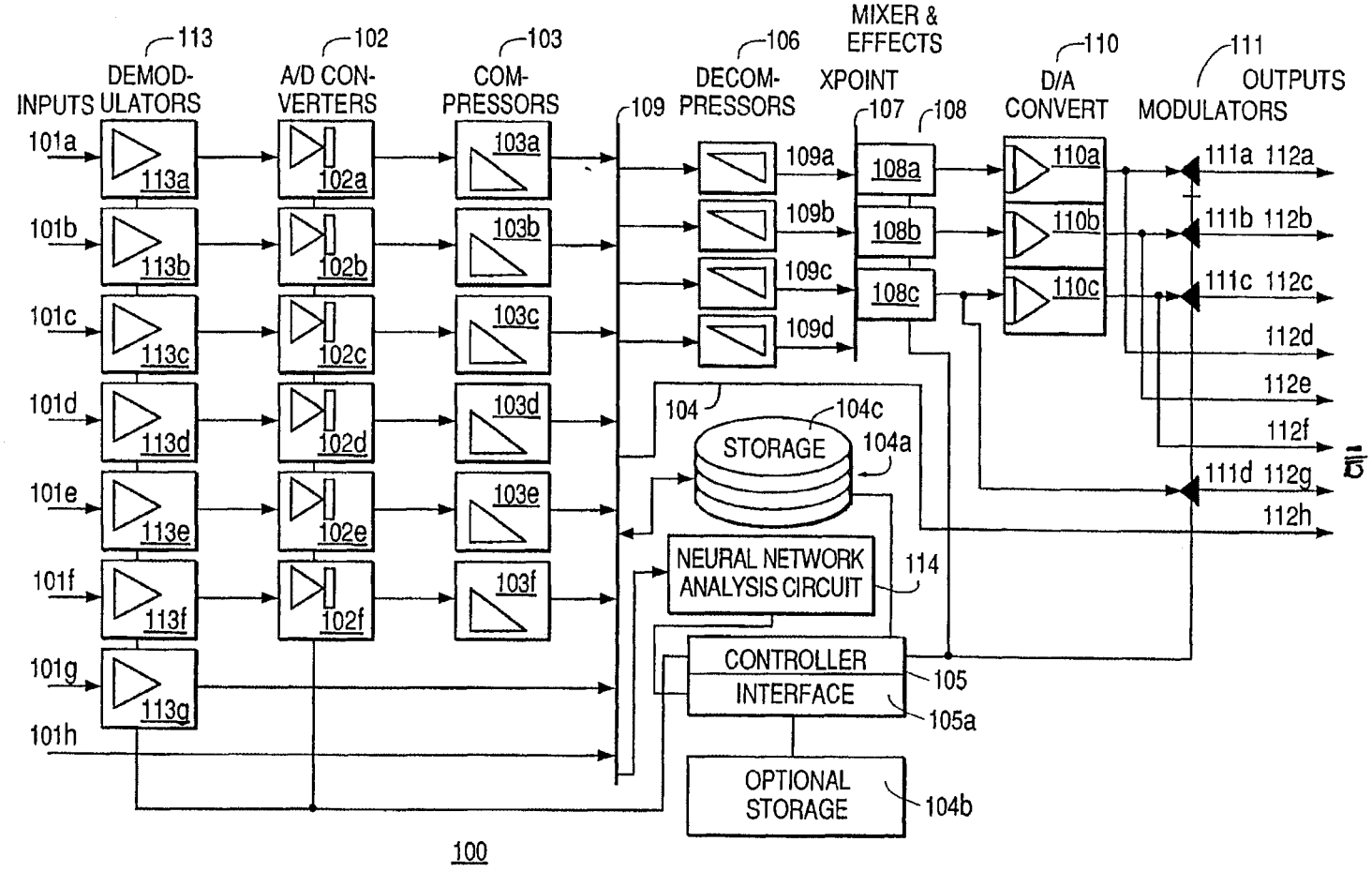

INPUTS
DEMOD-ULATORS
A/D CON-VERTERS
COM-PRESSORS
DECOM-PRESSORS
MIXER & EFFECTS XPOINT
D/A CONVERT
OUTPUTS MODULATORS
113
102
103
106
109
107
108
110
111
101a
101b
101c
101d
101e
101f
101g
101h
113a
113b
113c
113d
113e
113f
113g
102a
102b
102c
102d
102e
102f
103a
103b
103c
103d
103e
103f
109a
109b
109c
109d
108a
108b
108c
110a
110b
110c
111a 112a
111b 112b
111c 112c
112d
112e
112f
111d 112g
112h
104
104c
104a
STORAGE
NEURAL NETWORK ANALYSIS CIRCUIT
114
CONTROLLER INTERFACE
105
105a
OPTIONAL STORAGE
104b
100

FIG. 2

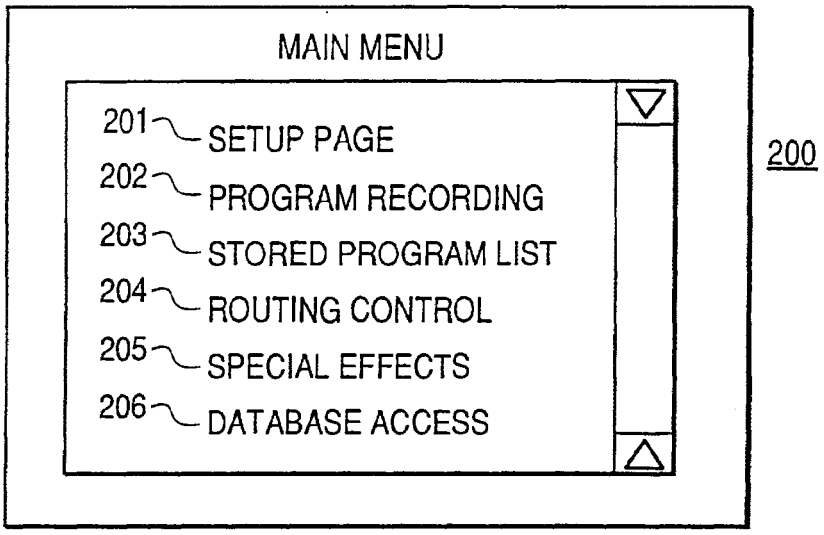
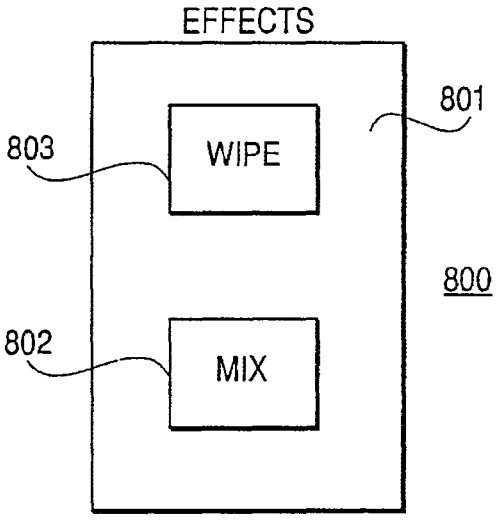


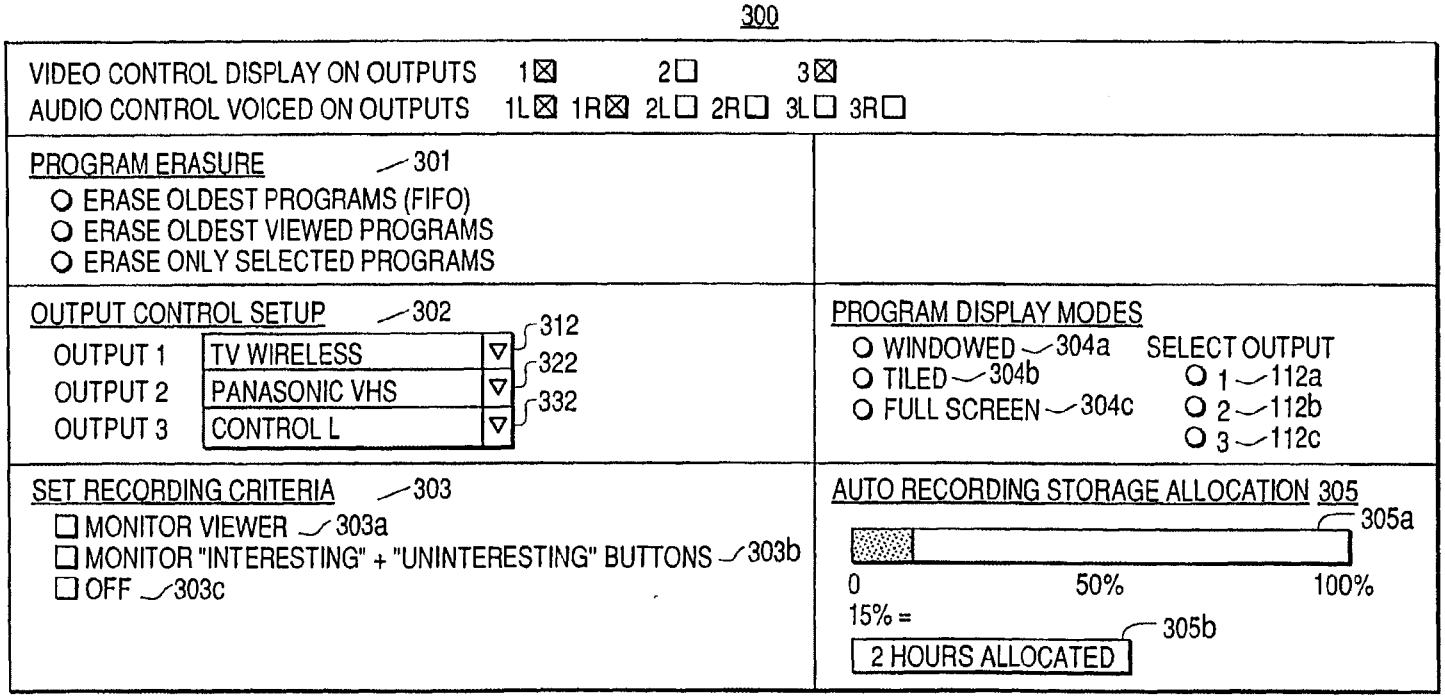
FIG. 8



Motorola v. Stellar
Motorola Exhibit 1032
Page 171

SUBSTITUTE SHEET

FIG. 3



4/11a

FIG. 4B

JUNE							
SUN	MON	TUE	WED	THU	FRI	SAT	
	1	2	3	4	5	6	
7	8	9	10	11	12	13	
14	15	16	17	18	19	20	
21	22	23	24	25	26	27	
28	29	30					

400

402

FIG. 4A

1990			
JAN	FEB	MAR	
APR	MAY	JUN	
JUL	AUG	SEP	

401

FIG. 4C

SAT JUNE 5th	
AM	
1	
2	
3	
4	
5	
6	
7	
8	
9.0	
PM	
1	
2	
3	
4	
5	
6	
7	
8	

403

SUBSTITUTE SHEET

FIG. 5A



FIG. 5B

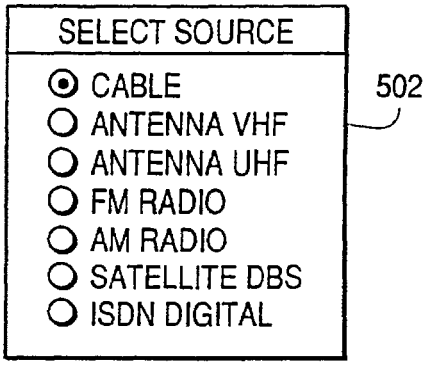


FIG. 5C

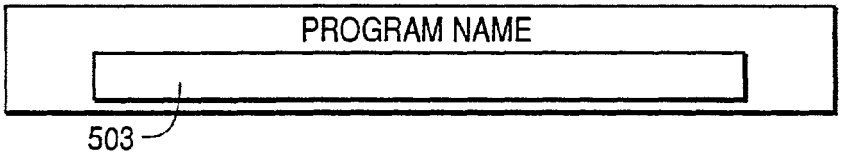


FIG. 5D

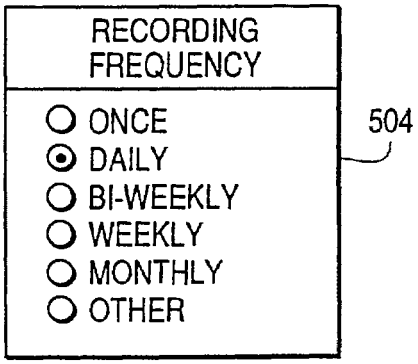
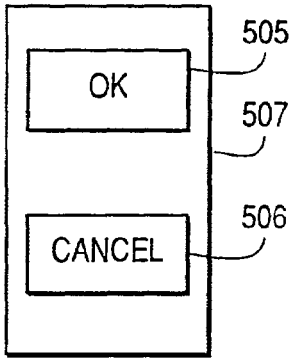


FIG. 5E



Motorola v. Stellar
Motorola Exhibit 1032
Page 174

SUBSTITUTE SHEET

FIG. 6

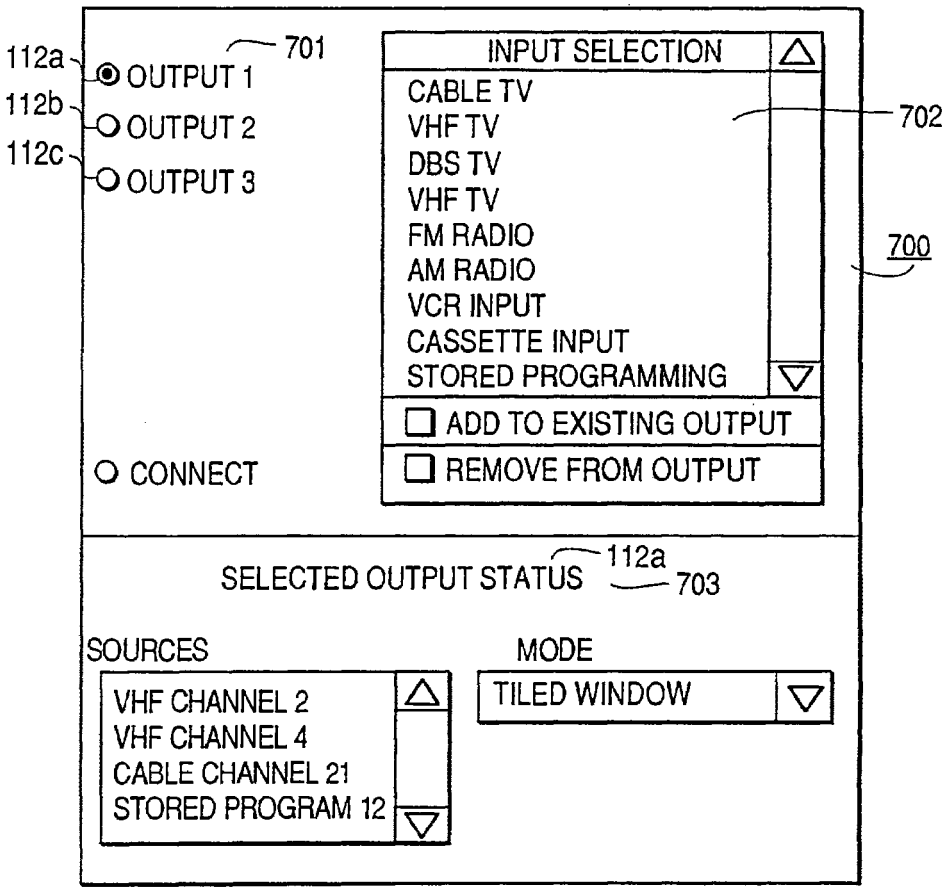
600

FREE PROGRAM MEMORY	4.75 HRS

#	LOCKED	TITLE	SOURCE	CHANNEL	TIME	DATE	LENGTH	NOTES	VIEWED
1	☐	- - NOT YET - -	VHF	4	4:00 - 4:30	MAY 17, 1991	0.5	NOT YET RECORDED	☐
2	☐	- -	FM	99.5	1:12 - 1:20	MAY 15, 1991	0.12		☒
3	☐	NIGHTLY NEWS	VHF #	4	6:00 - 8:00	MAY 13, 1991	2.0		☐
4	☒	BATMAN	CABLE	29	8:00 - 10:00	DEC 28, 1990	2.0	KEEP FOR WENDY	☐
5	☐	THE ASTRONOMERS	VHF	13	6:30 - 7:30	MAY 13, 1991	1.0		☐

7/12

FIG. 7



Motorola v. Stellar
Motorola Exhibit 1032
Page 176

FIG. 9

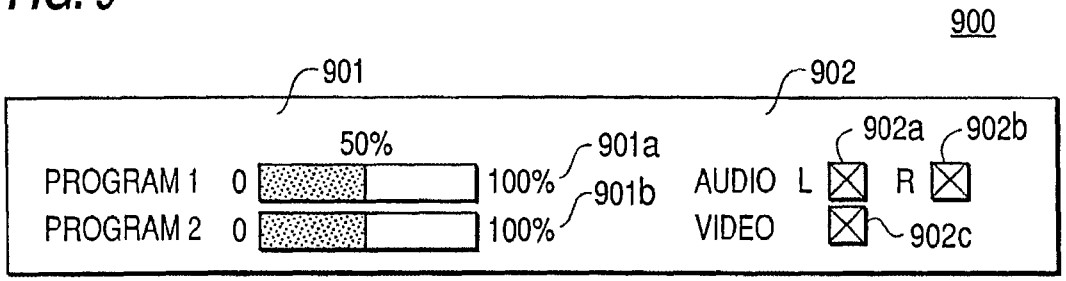
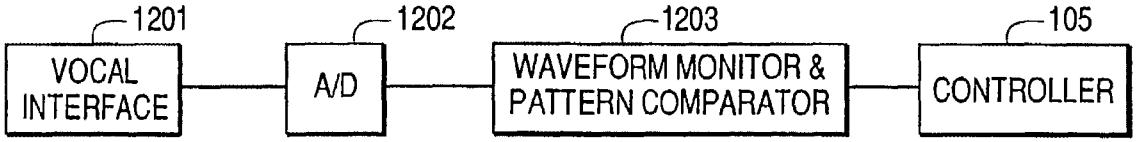

900
901
902
50%
901a
902a
902b
PROGRAM 1
0
100%
AUDIO
L
R
901b
PROGRAM 2
0
100%
VIDEO
902c

FIG. 12


1201
VOCAL INTERFACE
1202
A/D
1203
WAVEFORM MONITOR & PATTERN COMPARATOR
105
CONTROLLER

9/12

FIG. 10A

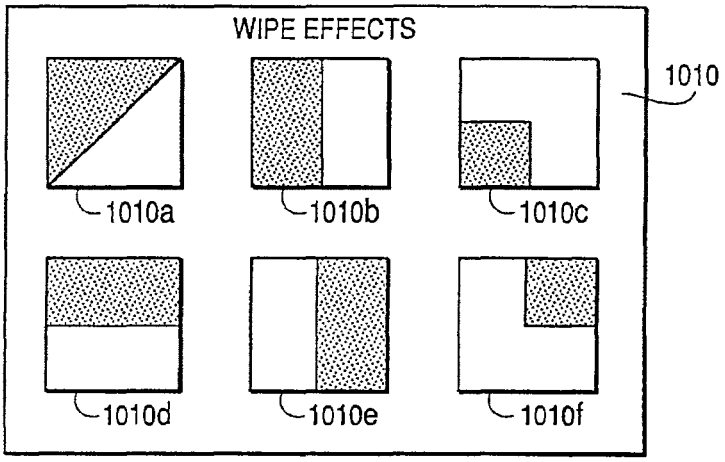
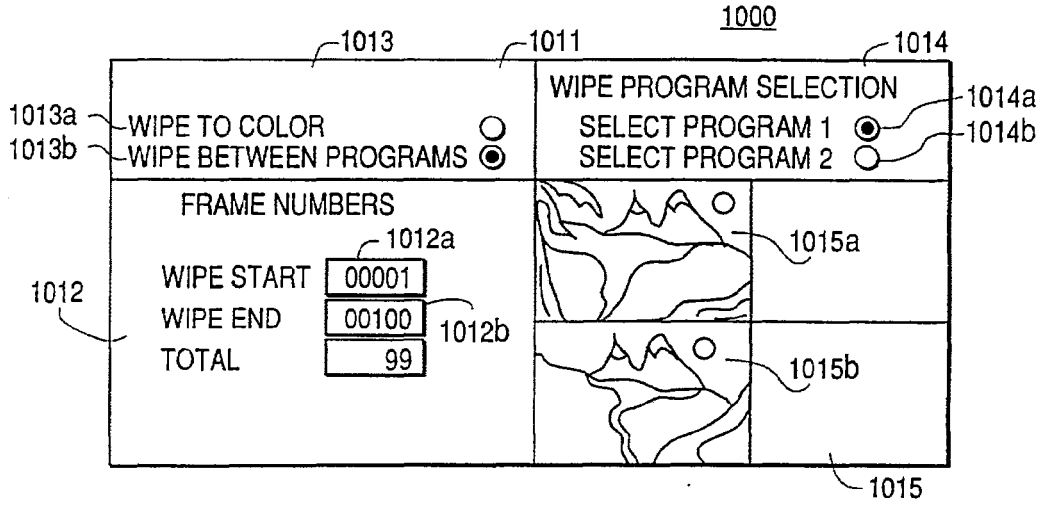


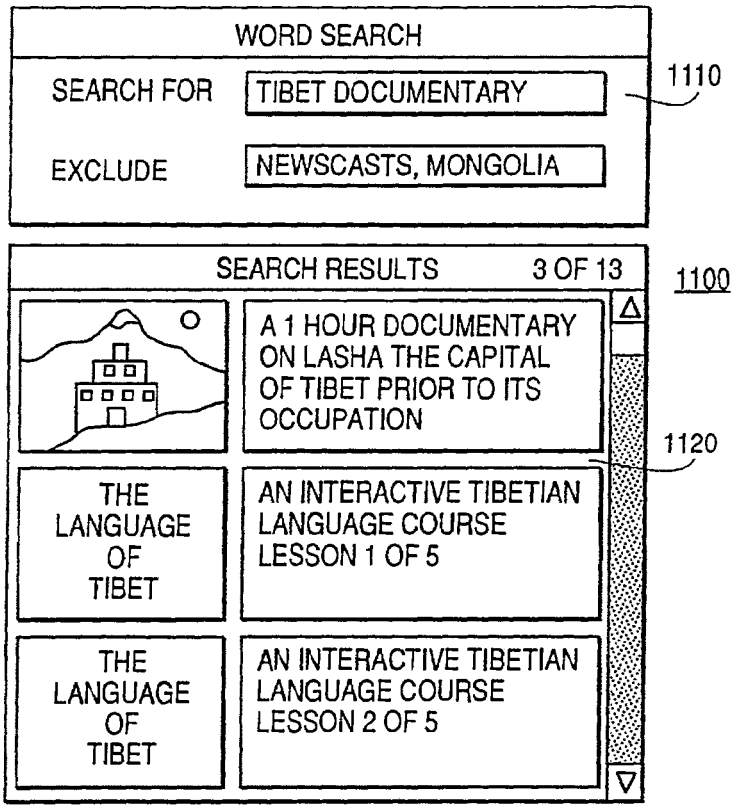
FIG. 10B



SUBSTITUTE SHEET

10/12

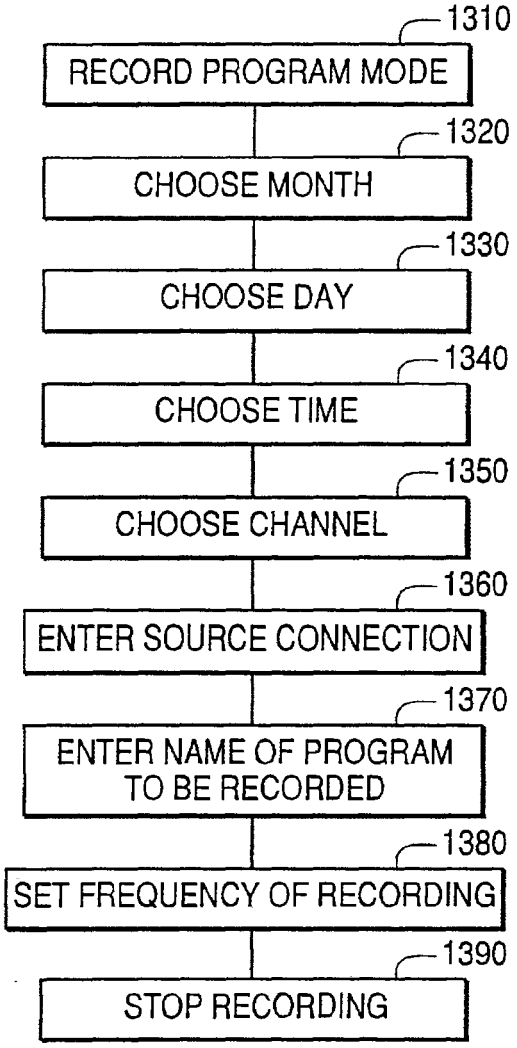
FIG. 11



Motorola v. Stellar
Motorola Exhibit 1032
Page 179

11/12

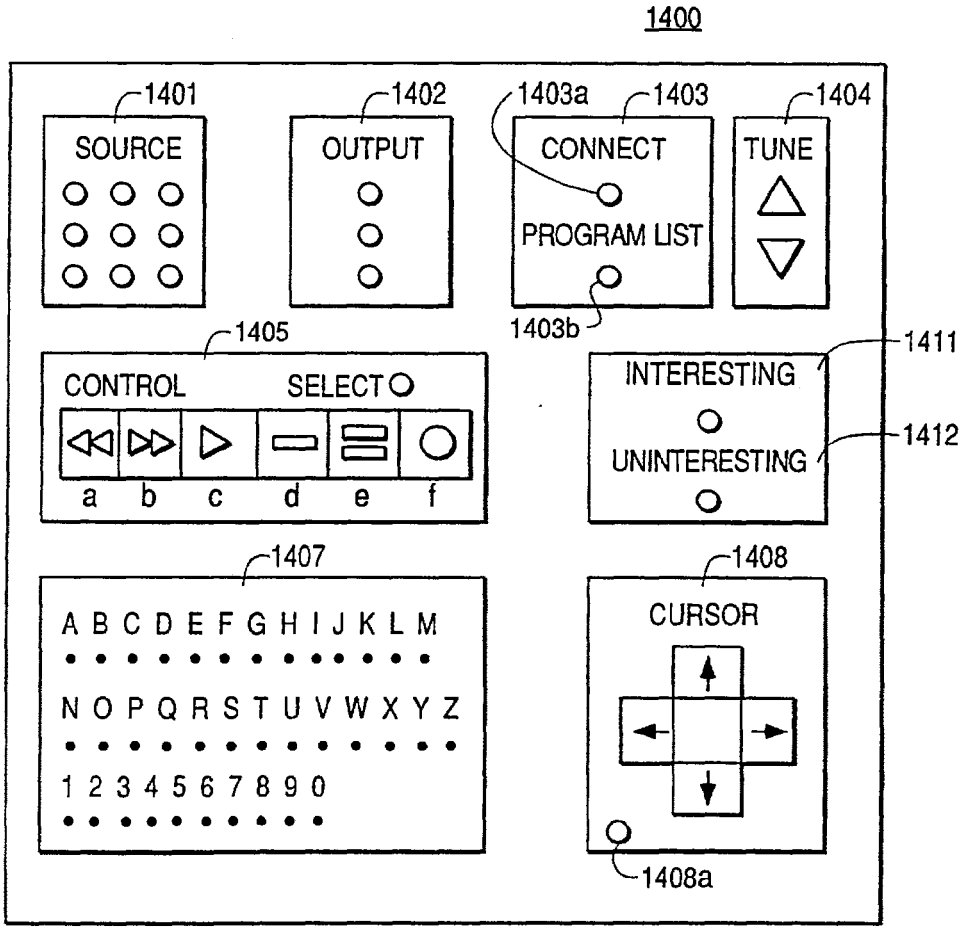
FIG. 13



Motorola v. Stellar
Motorola Exhibit 1032
Page 180

12/12

FIG. 14



Motorola v. Stellar
Motorola Exhibit 1032
Page 181

PCT WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 6 :
H04N 5/232, G06F 1/16

A1

(11) International Publication Number: **WO 99/49656**

(43) International Publication Date: 30 September 1999 (30.09.99)

(21) International Application Number: PCT/CA99/00249

(22) International Filing Date: 25 March 1999 (25.03.99)

(30) Priority Data:

2,233,047	25 March 1998 (25.03.98)	CA
2,249,976	15 October 1998 (15.10.98)	CA

(71)(72) **Applicant and Inventor:** MANN, W., Stephen, G. [CA/CA]; N1NLF, University of Toronto, Dept. of E.C.E., Room 2001, 10 Kings College Road, Toronto, Ontario M5S 3G4 (CA).

(74) **Agent:** FAGGETTER, Ronald, D.; Smart & Biggar, Suite 1500, 438 University Avenue, Box 111, Toronto, Ontario M5G 2K8 (CA).

(81) **Designated States:** AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published
With international search report.

(54) **Title:** WEARABLE CAMERA SYSTEM WITH VIEWFINDER MEANS

(57) **Abstract**

A novel means and apparatus for a new kind of photography and videography is described. In particular, a wearable camera with a viewfinder suitable for long-term use is introduced. The system, in effect, absorbs and quantifies rays of light and processes this quantigraphic information on a small wearable computer system, then the processed information is re-constituted into light rays emerging to reconstruct the virtual image of objects at nearly the same position in space, or at a coordinate transformed position, as viewed by the wearer of the apparatus. The wearer of the apparatus becomes, after adaptation, an entity that seeks, without conscious thought or effort, an optimal point of vantage and cameral orientation. Because of the wearer's ability to constantly see the world through the apparatus, which may also function as an image enhancement device, the apparatus behaves as a true extension of the wearer's mind and body, giving rise to a new genre of documentary video.

FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AL	Albania	**ES**	Spain	**LS**	Lesotho	**SI**	Slovenia
AM	Armenia	**FI**	Finland	**LT**	Lithuania	**SK**	Slovakia
AT	Austria	**FR**	France	**LU**	Luxembourg	**SN**	Senegal
AU	Australia	**GA**	Gabon	**LV**	Latvia	**SZ**	Swaziland
AZ	Azerbaijan	**GB**	United Kingdom	**MC**	Monaco	**TD**	Chad
BA	Bosnia and Herzegovina	**GE**	Georgia	**MD**	Republic of Moldova	**TG**	Togo
BB	Barbados	**GH**	Ghana	**MG**	Madagascar	**TJ**	Tajikistan
BE	Belgium	**GN**	Guinea	**MK**	The former Yugoslav Republic of Macedonia	**TM**	Turkmenistan
BF	Burkina Faso	**GR**	Greece			**TR**	Turkey
BG	Bulgaria	**HU**	Hungary	**ML**	Mali	**TT**	Trinidad and Tobago
BJ	Benin	**IE**	Ireland	**MN**	Mongolia	**UA**	Ukraine
BR	Brazil	**IL**	Israel	**MR**	Mauritania	**UG**	Uganda
BY	Belarus	**IS**	Iceland	**MW**	Malawi	**US**	United States of America
CA	Canada	**IT**	Italy	**MX**	Mexico	**UZ**	Uzbekistan
CF	Central African Republic	**JP**	Japan	**NE**	Niger	**VN**	Viet Nam
CG	Congo	**KE**	Kenya	**NL**	Netherlands	**YU**	Yugoslavia
CH	Switzerland	**KG**	Kyrgyzstan	**NO**	Norway	**ZW**	Zimbabwe
CI	Côte d'Ivoire	**KP**	Democratic People's Republic of Korea	**NZ**	New Zealand		
CM	Cameroon			**PL**	Poland		
CN	China	**KR**	Republic of Korea	**PT**	Portugal		
CU	Cuba	**KZ**	Kazakstan	**RO**	Romania		
CZ	Czech Republic	**LC**	Saint Lucia	**RU**	Russian Federation		
DE	Germany	**LI**	Liechtenstein	**SD**	Sudan		
DK	Denmark	**LK**	Sri Lanka	**SE**	Sweden		
EE	Estonia	**LR**	Liberia	**SG**	Singapore		

WEARABLE CAMERA SYSTEM WITH VIEWFINDER MEANS

FIELD OF THE INVENTION

The present invention pertains generally to a new photographic or video means and apparatus comprising a body-worn portable electronic camera system with wearable viewfinder means.

BACKGROUND OF THE INVENTION

In photography (and in movie and video production), it is desirable to capture events in a natural manner with minimal intervention and disturbance. Current state-of-the-art photographic or video apparatus, even in its most simple "point and click" form, creates a visual disturbance to others and attracts considerable attention on account of the gesture of bringing the camera up to the eye. Even if the size of the camera could be reduced to the point of being negligible (e.g. no bigger than the eyecup of a typical camera viewfinder, for example), the very gesture of bringing a device up to the eye is unnatural and attracts considerable attention, especially in establishments such as gambling casinos or department stores where photography is often prohibited. Although there exist a variety of covert cameras such a camera concealed beneath the jewel of a necktie clip, cameras concealed in baseball caps, and cameras concealed in eyeglasses, these cameras tend to produce inferior images, not just because of the technical limitations imposed by their small size, but, more importantly because they lack a means of viewing the image. Because of the lack of a viewfinder, investigative video and photojournalism made with such cameras suffers from poor composition.

It appears that apart from large view cameras upon which the image is observed on a ground glass, most viewfinders present an erect image. See, for example, U.S. Pat. No. 5095326 entitled "Keppler-type erect image viewfinder and erecting prism". In

Motorola v. Stellar
Motorola Exhibit 1032
Page 184

contrast to this fact, it is well–known that one can become accustomed, through long–term psychophysical adaptation (as reported by George M. Stratton, in *Psychology Review*, in 1896 and 1897) to eyeglasses that present an upside–down image. After wearing upside–down glasses constantly, for eight days (keeping himself blindfolded when removing the glasses for bathing or sleeping) Stratton found that he could see normally through the glasses. More recent experiments, as conducted by and reported by Mann, in an MIT technical report *Mediated Reality*, medialab vismod TR–260, (1994), (the report is available in http://wearcam.org/mediated-reality/index.html) suggest that slight transformations such as rotation by a few degrees or small image displacements give rise to a reversed aftereffect that is more rapidly assimilated by the wearer, and that such effects can often have a more detrimental effect on performing other tasks through the camera as well as more detrimental flashbacks upon removal of the camera. These findings suggest that merely mounting a conventional camera such as a small 35mm rangefinder camera or a small video camcorder to a helmet, so that one can look through the viewfinder and use it it hands–free while performing other tasks, will result in poor performance at doing those tasks while looking through the camera viewfinder. Moreover, these findings suggest that doing tasks while looking through the viewfinder of a conventional camera, over a long period of time, may give rise to detrimental flashback effects that may persist even after the camera is removed. This is especially true when the tasks involve a great deal of hand–eye coordination, such as when one might, for example, wish to photograph, film, or make video recordings of the experience of eating or playing volleyball or the like, by doing the task while concentrating primarily on the eye that is looking through the camera viewfinder. Indeed, since known cameras were never intended to be used this way (to record events from a first–person–perspective while looking through the viewfinder) it is not surprising that performance is poor in this usage.

Part of the reason for poor performance associated with simply attaching a conventional camera to a helmet is the induced parallax and the failure to provide an

Motorola v. Stellar
Motorola Exhibit 1032
Page 185

orthoscopic view. Even viewfinders which correct for parallax, as described in U.S. Pat. No. 5692227 in which a rangefinder is coupled to a parallax error compensating mechanism, only correct for parallax between the viewfinder and the camera lens that is taking the picture, but do not correct for parallax between the viewfinder and the image that would be observed with the naked eye while not looking through the camera.

Traditional camera viewfinders often include the ability to overlay virtual objects, such as camera shutter speed, or the like, on top of reality, as described in U.S. Pat. No. 5664244 which describes a viewfinder with additional information display capability.

Open-air viewfinders are often used on extremely low cost cameras, as well as on some professional cameras for use at night when the light levels would be too low to tolerate any optical loss in the viewfinder. Examples of open-air viewfinders used on professional cameras, in addition to regular viewfinders, include those used on the Grafflex press cameras of the 1940s (which had three different kinds of viewfinders), as well as those used on some twin-lens reflex cameras. While such viewfinders, if used with a wearable camera system, would have the advantage of not inducing the problems such as flashback effects described above, they would fail to provide an electronically mediated reality. Moreover, although such open air viewfinders would eliminate the parallax between what is seen in the real world and what is seen in the real world looking through the viewfinder, they fail to eliminate the parallax error between the viewfinder and the camera.

A manner of using a plurality of pictures of the same scene or object, in which the pictures were taken using a camera with automatic exposure control, automatic gain control, or the like has been proposed in *'PENCIGRAPHY' WITH AGC: JOINT PARAMETER ESTIMATION IN BOTH DOMAIN AND RANGE OF FUNCTIONS IN SAME ORBIT OF THE PROJECTIVE-WYCKOFF GROUP*, published by S. Mann, in M.I.T. (medialab vismod) tech report TR-384, December, 1994, and later

Motorola v. Stellar
Motorola Exhibit 1032
Page 186

published also in Proceedings of the IEEE International Conference on Image Processing (ICIP–96), Lausanne, Switzerland, September 16–19, 1996, pages 193–196. (The report is also available on a world wide web site: http://wearcam.org/icip96/index.html as a hypertext document, along with related documents on http://wearcam.org.) This report relates to a manner of camera self–calibration in which the unknown nonlinear response function of the camera is determined up to a single unknown scalar constant. Therefore, once the camera is so understood, it may be used, within the context of the method, as a quantigraphic light measuring instrument. As each pixel of the camera then becomes a light measuring instrument, successive pictures in a video sequence become multiple estimates of the same quantity once the multiple images are registered and appropriately interpolated. The measurement from a plurality of such estimates gives rise to knowledge about the scene sufficient to render pictures of increased dynamic range and tonal fidelity, as well as increased spatial resolution and extent. In this way a miniature video camera as may be concealed inside a pair of eyeglasses may be used to generate images of very high quality, sufficient for fine–arts work or other uses where good image quality is needed.

SUMMARY OF THE INVENTION

It is an object of this invention to provide a method of positioning a camera in which both hands may be left free.

It is a further object of this invention to provide a means of exposing a film or acquiring a picture electronically where the spatial extent (field of view) of the image may be ascertained without having to hold any device up to the eye.

What is described is a wearable camera and viewfinder for capturing video of exceptionally high compositional and artistic calibre. In addition to the fact that covert versions of the apparatus can be used to create investigative documentary videos having very good composition, for everyday usage the device need not necessarily be covert. In fact, it may be manufactured as a fashionable device that serves

Motorola v. Stellar
Motorola Exhibit 1032
Page 187

as both a visible crime deterrent, as well as a self–explanatory (through its overt obviousness) tool for documentary videomakers and photojournalists.

Another feature of the invention is that the wearable camera has a viewfinder such that the image may be presented in a natural manner suitable for long–term usage patterns.

There are several reasons why it might be desired to wear the camera over a sustained period of time:

1. There is the notion of a personal visual diary of sorts.

2. There is the idea of being always ready. By constantly recording into a circular buffer, a retroactive record function, such as a button that instructs the device to "begin recording from five minutes ago" may be useful in personal safety (crime reduction) as well as in ordinary everyday usage, such as capturing a baby's first steps on video. With the prior art in photography and video, we spend so much time preparing the camera and searching for film, batteries, etc., or at the very least, just getting the camera out of its carrying case, that we often miss important moments like a baby's first steps, or a spontaneous facial expression during the opening of a gift.

3. There is the fact that the wearable camera system, after being worn for a long period of time, begins to behave as a true extension of the wearer's mind and body. As a result, the composition of video shot with the device is often impeccable without even the need for conscious thought or effort on the part of the user. Also, one can engage in other activities, and one is able to record the experience without the need to be encumbered by a camera, or even the need to remain aware, at a conscious level, of the camera's existance. This lack of the need for conscious thought or effort suggests a new genre of documentary video characterized by long–term psychophysical adaptation to the device. The result is a very natural first–person perspective documentary, whose artistic style is

Motorola v. Stellar
Motorola Exhibit 1032
Page 188

very much as if a recording could be made from a video tap of the optic nerve of the eye itself. Events that may be so recorded include involvement in activities such as horseback riding, climbing up a rope, or the like, that cannot normally be well recorded from a first-person perspective using cameras of the prior art. Moreover, a very natural first-person perspective genre of video results. For example, while wearing an embodiment of the invention, it is possible to look through the eyepiece of a telescope or microscope and record this experience, including the approach toward the eyepiece. The experience is recorded, from the perspective of the participant.

4. A computational system, either built into the wearable camera, or worn on the body elsewhere and connected to the camera system, may be used to enhance images. This may be of value to the visually impaired. The computer may also perform other tasks such as object recognition. Because the device is worn constantly, it may also function as a photographic/videographic memory aid, e.g. to help in way-finding through the recall and display of previously captured imagery.

It is desired that the proposed viewfinder arrangement be suitable for long-term usage, such as when one may be wearing the camera for sixteen hours per day, looking through it all the while. Traditional viewfinders are only looked through on a shorter term basis. Thus there will be some important differences between the wearable camera system and traditional cameras. For example, when the wearable camera system comprises a zoom lens for the camera, it is desired that the viewfinder also comprise a zoom lens, so that when zooming into a scene, the image in the viewfinder can be made to subtend a lesser visual angle (appear to get smaller). It is also desired that the exact extent of this reduction in apparent visual angle be controlled to exactly cancel out the usual effect in which zooming in produces increased magnification. In this manner the wearable camera system provides the wearer with absolutely no apparent magnification, or change in apparent magnification, while looking through

Motorola v. Stellar
Motorola Exhibit 1032
Page 189

the viewfinder and exploring the full range of zoom adjustment.

Some viewfinders are equipped with a zoom capability, as, for example, is described in U.S. Pat. No. 5323264, so that their field of coverage (magnification) varies with the varying of a zoom lens. The reader will need to be careful not to confuse these zoom viewfinders of the prior art with the zoom viewfinder of the wearable camera invention in which viewing takes place through an electronic viewfinder where the decrease in visual angle subtended by the image of the viewfinder screen is coupled to the increase in focal length of the camera within the proposed invention. This coupling negates (cancels out) any increase in magnification that would otherwise result from zooming in on the scene. At first this lack of increase in apparent magnification with increase in lens focal-length may seem counter-intuitive, in the sense that we normally expect zooming in to produce an increase in apparent magnification as observed while looking through a camera viewfinder. This expectation is owing to known cameras. However, after using the wearable camera system for an extended period of time, one quickly grows accustomed to the unique characteristics of its viewfinder, and the much more seamless integration of its viewfinder with everyday life. This seamlessness is such that after time, the wearer will begin to operate the wearable camera invention without appreciable conscious thought or effort. With magnification, or changes in magnification, it is much more difficult to fully adapt to the presence of the camera.

An important aspect of the proposed invention is the capability of the apparatus to mediate (augment, diminish, or otherwise alter) the visual perception of reality.

The proposed camera viewfinder is related to the displays that are used in the field of Virtual Reality (VR) in the sense that both are wearable. However, an important difference is that the proposed invention allows the wearer to continue to see the real world, while VR displays block out the ability to see the real world.

It is possible with the invention to allow visual reality to be mediated in order to make certain that exposure is correct as well as to keep the wearer of the apparatus

Motorola v. Stellar
Motorola Exhibit 1032
Page 190

in the feedback loop of the photo compositional process by constantly providing the wearer with a video stream. Moreover, it is desired that the apparatus will allow the wearer to experience a computationally mediated visual reality, and for that experience to be shared through wireless communications networks so that the wearer may receive additional visual information, as well as be aware of modifications to visual reality that might arise, for example, as part of a communications process in a shared virtual environment. For such compositional and interactional capabilities, a simple air–based viewfinder is inadequate.

It is possible with this invention to provide such a method of exposing a film or acquiring a picture electronically where the tonal characteristics of the picture may be ascertained without having to hold any device up to the eye.

It is possible with this invention to provide such a method of exposing a film or acquiring a picture electronically where no apparent difference in body movement or gesture between when a picture is being taken and when no picture is being taken is detectable by others.

It is possible with this invention to provide the user with a means of determining the composition of the picture from a display device that is located such that only the user can see the display device, and so that the user can ascertain the composition of a picture or take a picture or video and transmit image(s) to one or more remote locations without the knowledge of others in the immediate environment.

It is possible with this invention to provide the user with a means of determining the composition of the picture from a display device that is located such that only the user can see the display device, as well as an optional additional display device that the user can show to others if and when the user desires to do so.

It is possible with this invention to provide the user with a means of determining the composition of the picture from a display device that is located such that both the user as well as others can see it, if the user should so desire.

It is possible with this invention to provide a wearable camera viewfinder means in

Motorola v. Stellar
Motorola Exhibit 1032
Page 191

which video is displayed on a viewfinder in such a way that all rays of light from the viewfinder that enter the eye appear to emanate from essentially the same direction as they would have had the apparatus not been worn.

It is possible with this invention to provide a means for a user to experience additional information overlaid on top of his or her visual field of view such that the information is relevant to the imagery being viewed.

It is possible with this invention to provide a means and apparatus for a user to capture a plurality of images of the same scene or objects, in a natural process of simply looking around, and then have these images combined together into a single image of increased spatial extent, spatial resolution, dynamic range, or tonal fidelity.

It is possible with this invention to provide a viewfinder means in which the viewfinder has a focusing mechanism that is coupled to a focusing mechanism of a camera system, so that when the camera is focused on a particular object the viewfinder also presents that object in a manner such that when the apparatus moves relative to the user's eye, the object appears to neither move with or against the movement of the eye, so that the rays of light entering the eye are approximately the same in direction as if the apparatus were not present.

It is possible with this invention to provide a viewfinder means in which the viewfinder has a focusing mechanism that is coupled to a focusing mechanism of a camera system, so that when the camera is focused on a particular object the viewfinder also presents that object in the same focal depth plane as the object would appear to the user with the apparatus removed.

It is possible with this invention to provide a viewfinder means in which the viewfinder has a focusing mechanism that is controlled by an automatic focusing mechanism of a camera system.

It is possible with this invention to provide a stereo viewfinder means in which the viewfinder system has camera focusing, camera vergence, display focusing, and display vergence control where all four are linked together so that there is only need

Motorola v. Stellar
Motorola Exhibit 1032
Page 192

for a single control.

It is possible with this invention to provide a stereo viewfinder means in which the viewfinder has focusing and vergence control mechanisms that are controlled by an automatic focusing mechanism of a camera system.

It is possible with this invention to provide a viewfinder means in which the viewfinder has a focusing mechanism that is controlled by an automatic focusing mechanism of a camera system, and in which the apparatus comprises an eye-tracking mechanism that causes the focus of the camera to be based on where the user is looking, and therefore the focus of the viewfinder mechanism to be also focused in such a manner that the convergence of light rays from whatever object happens to be within the foveal region of the eye's view also produces rays of light that have the same focal distance as they would have had with the apparatus removed from the user.

The proposed invention facilitates a new form of visual art, in which the artist may capture, with relatively little effort, a visual experience as viewed from his or her own perspective. With some practice, it is possible to develop a very steady body posture and mode of movement that best produces video of the genre pertaining to this invention. Because the apparatus may be lightweight and close to the head, there is not the protrusion associated with carrying a hand-held camera. Also because components of the proposed invention are mounted very close to the head, in a manner that balances the weight distribution. Mounting close to the head minimizes the moment of inertia about the rotational axis of the neck, so that the head can be turned quickly while wearing the apparatus. This arrangement allows one to record the experiences of ordinary day-to-day activities from a first-person perspective. Moreover, because both hands are free, much better balance and posture is possible while using the apparatus. Anyone skilled in the arts of body movement control as is learned in the martial arts such as karate, as well as in dance, most notably ballet, will have little difficulty capturing exceptionally high quality video using the apparatus

Motorola v. Stellar
Motorola Exhibit 1032
Page 193

of this invention.

With known video or movie cameras, the best operators tend to be very large people who have trained for many years in the art of smooth control of the cumbersome video or motion picture film cameras used. In addition to requiring a very large person to optimally operate such cameras, various stabilization devices are often used, which make the apparatus even more cumbersome. The apparatus of the invention may be optimally operated by people of any size. Even young children can become quite proficient in the use of the wearable camera system.

A typical embodiment of the invention comprises one or two spatial light modulators or other display means built into a pair of eyeglasses together with one or more sensor arrays. Typically one or more CCD (charge coupled device) image sensor arrays and appropriate optical elements comprise the camera portion of the invention. Typically a beamsplitter or a mirror silvered on both sides is used to combine the image of the viewfinder with the apparent position of the camera. The viewfinder is simply a means of determining the extent of coverage of the camera in a natural manner, and may comprise either of:

- A reticle, graticule, rectangle, or other marking that appears to float within a portion of the field of view.
- A display device that shows a video image, or some other dynamic information perhaps related to the video image coming from the camera.

One aspect of the invention allows a photographer or videographer to wear the apparatus continuously and therefore always end up with the ability to produce a picture from something that was seen a couple of minutes ago. This may be useful to everyone in the sense that we may not want to miss a great photo opportunity, and often great photo opportunities only become known to us after we have had time to think about something we previously saw.

Such an apparatus might also be of use in personal safety. Although there are a

Motorola v. Stellar
Motorola Exhibit 1032
Page 194

growing number of video surveillance cameras installed in the environment allegedly for "public safety", there have been recent questions as to the true benefit of such centralized surveillance infrastructures. Most notably there have been several examples in which such centralized infrastructure has been abused by the owners of it (as in roundups and detainment of peaceful demonstrators). Moreover, "public safety" systems may fail to protect individuals against crimes committed by the organizations that installed the systems. The apparatus of this invention allows the storage and retrieval of images by transmitting and recording images at one or more remote locations. Images may be transmitted and recorded in different countries, so that they would be difficult to destroy, in the event that the perpetrator of a crime might wish to do so.

The apparatus of the invention allows images to be captured in a natural manner, without giving an unusual appearance to others (such as a potential assailant).

Moreover, as an artistic tool of personal expression, the apparatus allows the user to record, from a first–person–perspective, experiences that have been difficult to so record in the past. For example, a user might be able to record the experience of looking through binoculars while riding horseback, or the experience of waterskiing, rope climbing, or the like. Such experiences captured from a first–person perspective provide a new genre of video by way of a wearable camera system with viewfinder means that goes beyond current state–of–the–art point of view sports videos (such as created by cameras mounted in sports helmets which have no viewfinder means).

A typical embodiment of the invention comprises a wearable viewfinder system which is fitted with a motorized focusing mechanism. A camera also fitted with a motorized focusing mechanism is positioned upon one side of a mirror that is silvered on both sides, so that the viewfinder can be positioned on the other side and provide a view that is focused to whatever the camera is focused on. Such an apparatus allows the user to record a portion of his or her eye's visual field of view. With the correct design, the device will tend to cause the wearer to want to place the recording zone

Motorola v. Stellar
Motorola Exhibit 1032
Page 195

over top of whatever is most interesting in the scene. This tendency arises from the enhancement of the imagery in this zone. In much the same way that people tend to look at a TV set in a darkened room, regardless of what is playing (even if the TV is tuned to a blank station and just playing "snow"), there is a tendency when wearing the invention to look at the recording/display/viewfinder zone. Therefore, there is a tendency to try to put the recording zone on top that which is of most interest. Therefore using the apparatus, after time, does not require conscious thought or effort. In was once said that television is more real than real life, and in much the same way, the wearer of the apparatus becomes a cybernetic organism (cyborg) in a true synergy of human and camera. This is particularly true with a low vision system in which one can actually see better through the viewfinder than in real life (e.g. at night when an image intensifier provides enhanced vision). In this case, the tendency of the wearer to want to become an organism that seeks best picture is very pronounced.

Accordingly, the present invention in one aspect comprises camera bearing headgear with electronic display responsive to an electronic output from the camera so that the electronic display may function as a viewfinder for the camera. Preferably, the optical arrangement of the camera and viewfinder display are such that each ray of light is absorbed and quantified by the camera and that the viewfinder results in a synthesis of the rays of light that are collinear to the rays of light entering the camera. In this way, rays of light pass through the apparatus to provide the wearer with an electronically mediated experience but without otherwise distorting the spatial arrangement, focus, or appearance of the scene viewed through the apparatus.

According to another aspect of the invention, there is provided an eyeglass based wearable camera system with eyeglass based viewfinder. Preferably, the optical arrangement of the camera and viewfinder display are such that each ray of light is absorbed and quantified by the camera and that the viewfinder results in a synthesis of the rays of light that are collinear to the rays of light entering the camera. In this

Motorola v. Stellar
Motorola Exhibit 1032
Page 196

way, rays of light pass through the apparatus to provide the wearer with an electronically mediated experience but without otherwise distorting the spatial arrangement, focus, or appearance of the scene viewed through the apparatus.

According to another aspect of the invention, there is provided camera bearing headgear with viewfinder based on a display device of a body–worn computer system. Preferably, the optical arrangement of the camera and viewfinder display are such that each ray of light is absorbed and quantified by the camera and that the viewfinder results in a synthesis of the rays of light that are collinear to the rays of light entering the camera. In this way, rays of light pass through the apparatus to provide the wearer with an computer mediated experience but without otherwise distorting the spatial arrangement, focus, or appearance of the scene viewed through the apparatus.

According to another aspect of the invention, there is provided a wearable camera system with virtual–light viewfinder, so that a portion of the light that provides a field of view to the wearer is diverted by converting the incoming light into a numerical representation, processing that numerical representation, and then taking that processed numerical representation and forming it back into rays of light approximately collinear with those rays of light that entered the apparatus.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will now be described in more detail, by way of examples which in no way are meant to limit the scope of the invention, but, rather, these examples will serve to illustrate the invention with reference to the accompanying drawings, in which:

FIG. **1** is a diagram of a simple embodiment of the invention in which there are two cameras, a wide–angle camera concealed in the nose bridge of a pair of sunglasses, a tele–camera concealed in the top part of the frame of the sunglasses, and combined by way of a beamsplitter with the wide–camera, as well as a viewfinder means concealed in the left temple side–piece of the glasses with optics concealed in or behind the glass

Motorola v. Stellar
Motorola Exhibit 1032
Page 197

of the left lens. FIG 1A is an exploded view of a portion of FIG 1. FIG 1B is a detail view of a portion of FIG 1. FIG 1C and FIG 1D illustrate aspects of the operation of the embodiment of FIG 1.

FIG. **2** is a diagram of the wearable camera system with an improvement in which the viewfinder is constructed so that when other people look at the wearer of the apparatus they can see both of the wearer's eyes in such a way that they do not notice any unusual magnification of the wearer's left eye which might otherwise look unusual or become a problem in making normal eye contact with the wearer.

FIG. **3** illustrates the principle of a camera viewfinder which replaces a portion of the visual field of view with the view from a camera, yet allows the wearer to see through the apparatus without experiencing any psychophysical adaptation or coordinate transformation.

FIG. **4** illustrates a version of the apparatus similar to that in FIG. **1**, except where a portion of the visual field of view is only partially replaced, owing to the use of polarizers to prevent video feedback, as well as a beamsplitter rather than a double-sided mirror.

FIG. **5** shows an embodiment of the invention in which there are two televisions of different sizes which are each superimposed upon exactly the field of view that corresponds to each of two cameras, one being wide-angle and the other being tele.

FIG. **6** shows an embodiment of the wearable camera invention in which the viewfinder contains considerable magnification, yet allows other people to see both of the wearer's eyes except for a slight amount of blocked vision which may be concealed by making the glasses look like bifocal glasses.

FIG. **7** shows an embodiment of the invention where there is coupling between camera focus and viewfinder focus.

FIG. **8** shows an embodiment of the invention where there is a zoom capability, and where the virtual light principle is preserved regardless of zoom setting.

FIG. **9** shows a stereo embodiment of the invention where both cameras are fo-

Motorola v. Stellar
Motorola Exhibit 1032
Page 198

cused by the left camera, and where the left camera also controls the focus of both viewfinders and the vergence of the entire system.

FIG. 10 shows an embodiment of the invention where an eye tracker is used to set the stereo camera focus, the stereo viewfinder focus, and the vergence, to all correspond with the object. the wearer is looking at.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

While the invention shall now be described with reference to the preferred embodiments shown in the drawings, it should be understood that the intention is not to limit the invention only to the particular embodiments shown but rather to cover all alterations, modifications and equivalent arrangements possible within the scope of appended claims.

In all aspects of the present invention, references to "camera" mean any device or collection of devices capable of simultaneously determining a quantity of light arriving from a plurality of directions and or at a plurality of locations, or determining some other attribute of light arriving from a plurality of directions and or at a plurality of locations. Similarly references to "display", "television", or the like, shall not be limited to just television monitors or traditional televisions used for the display of video from a camera near or distant, but shall also include computer data display means, computer data monitors, other video display devices, still picture display devices, ASCII text display devices, terminals, systems that directly scan light onto the retina of the eye to form the perception of an image, direct electrical stimulation through a device implanted into the back of the brain (as might create the sensation of vision in a blind person), and the like.

With respect to both the cameras and displays, as broadly defined above, the term "zoom" shall be used in a broad sense to mean any lens of variable focal length, any apparatus of adjustable magnification, or any digital, computational, or electronic means of achieving a change in apparent magnification. Thus, for example, a zoom

Motorola v. Stellar
Motorola Exhibit 1032
Page 199

viewfinder, zoom television, zoom display, or the like, shall be taken to include the ability to display a picture upon a computer monitor in various sizes through a process of image interpolation as may be implemented on a body–worn computer system.

References to "processor", or "computer" shall include sequential instruction, parallel instruction, and special purpose architectures such as digital signal processing hardware, Field Programmable Gate Arrays (FPGAs), programmable logic devices, as well as analog signal processing devices.

References to "transceiver" shall include various combinations of radio transmitters and receivers, connected to a computer by way of a Terminal Node Controller (TNC), comprising, for example, a modem and a High Level Datalink Controller (HDLCs), to establish a connection to the Internet, but shall not be limited to this form of communication. Accordingly, "transceiver" may also include analog transmission and reception of video signals on different frequencies, or hybrid systems that are partly analog and partly digital. The term "transceiver" shall not be limited to electromagnetic radiation in the frequence bands normally associated with radio, and may therefore include infrared or other optical frequencies. Moreover, the signal need not be electromagnetic, and "transceiver" may include gravity waves, or other means of establishing a communications channel.

While the architecture illustrated shows a connection from the headgear, through a computer, to the transceiver, it will be understood that the connection may be direct, bypassing the computer, if desired, and that a remote computer may be used by way of a video communications channel (for example a full–duplex analog video communications link) so that there may be no need for the computer to be worn on the body of the user.

The term "headgear" shall include helmets, baseball caps, eyeglasses, and any other means of affixing an object to the head, and shall also include implants, whether these implants be apparatus imbedded inside the skull, inserted into the back of the brain, or simply attached to the outside of the head by way of registration pins

Motorola v. Stellar
Motorola Exhibit 1032
Page 200

implanted into the skull. Thus "headgear" refers to any object on, around, upon, or in the head, in whole or in part.

When it is said that object "A" is "borne" by object "B", this shall include the possibilities that A is attached to B, that A is part of B, that A is built into B, or that A is B.

Fig 1 shows an embodiment of the invention built into eyeglass frames 100, typically containing two eyeglass lenses 105. An electronic wide-angle camera 110 is typically concealed within the nose bridge of the eyeglass frames 100. In what follows, the wide-angle camera 110 may be simply referred to as the "wide-camera", or as "wide-angle camera". In this embodiment of the wearable camera, a second camera, 120, is also concealed in the eyeglass frames 100. This second camera is one which has been fitted with a lens of longer focal length, and will be referred to as a "narrow-angle camera", or simply a "narrow-camera" in what follows. The wide-camera 110 faces forward looking through a beamsplitter 130. The narrow-camera 120 faces sideways looking through the beamsplitter. For clarity, the beamsplitter 130 and camera 110 are shown separated in Fig 1a, while in actual construction, the beamsplitter is cemented between the two cameras as shown in Fig 1. The beamsplitter 130 is typically mounted at a 45 degree angle, and the optical axes of the two cameras are typically at 90 degree angles to each other. The optical axes of the two cameras should intersect and thus share a common viewpoint. Thus the narrow camera 120 may have exactly the same field of view as the wide-camera 110. Typically eyeglasses with black frames are selected, and a CCD sensor array for wide-camera 110 is concealed in a cavity which is also used as a nose bridge support, so that the eyeglasses have a normal appearance. Typically, the body of the wide-camera is formed from epoxy, which sets it permanently in good register with the beamsplitter and the narrow-camera 120. During setting of the epoxy, the cameras are manipulated into an exact position, to ensure exact collinearity of the two effective optical axes. The wide-camera 110 is typically fitted with a lens having a diameter of approximately

Motorola v. Stellar
Motorola Exhibit 1032
Page 201

1/32 inch (less than one millimeter) — small enough that it cannot be easily seen by someone at close conversational distance to the person wearing the eyeglasses. The narrow–camera 120 is typically concealed in the upper portion of the eyeglass frames. The narrow–camera 120 is preferably custom–made, like the wide–camera, by encapsulating a CCD sensor array, or the like, in an epoxy housing together with the appropriate lens, so that cameras 110 and 120 are both bonded to beamsplitter 130, and all three are in turn bonded to the eyeglass frame. A satisfactory narrow–camera, for use in small–production runs of the invention (where it is difficult to construct the housing from epoxy) is an Elmo (TM) model QN42H camera, owing to its long and very slender (7mm diameter) construction. In mass–production, a custom–made narrow–camera could be built directly into the eyeglass frames. Since the narrow–camera 120 is typically built into the top of the eyeglass frames, the wide–camera 110 should also be mounted near the top of the frames, so the two optical axes can be made to intersect at right angles, making the effective optical axes (e.g. that of camera 120 as reflected in beamsplitter 130) collinear.

Preferably, a complete camera system providing NTSC video is not installed directly in the eyeglasses. Instead, wires 125 from the camera sensor arrays are concealed inside the eyeglass frames and run inside a hollow eyeglass safety strap 126. A satisfactory eyeglass safety strap is the safety strap that is sold under the trademark "Croakies". Eyeglass safety strap 126 typically extends to a cloth–wrapped cable harness 127 typically made of the same kind of hollow cloth material from which safety strap 126 is made. There is typically a connection between cable harness 127 and a wiring harness 180, where wiring harness 180 is typically not wrapped in cloth. Wiring harness 180 and cable harness 127 are connected together by connection 175. Connection 175 typically includes a strain relief clip or the like that clips to the inside of the wearer's shirt, at the back of the neck, so that wiring harness 180 will not pull on cable harness 127. In this way, cable harness 127 is slack, and allows safety strap 126 to fall slack and thus have an appearance that it just happened to fall down

Motorola v. Stellar
Motorola Exhibit 1032
Page 202

partially inside the wearer's shirt.

Wires 125 are run down to a belt pack or to a body–worn pack 128, often comprising a computer as part of processor 182, powered by battery pack 181 which also powers the portions of the camera and display system located in the headgear. The processor 182, if it includes a computer, preferably contains also a nonvolatile storage device or network connection. Alternatively, or in addition to the connection to processor 182, there is often another kind of recording device, or connection to a transmitting device 186. The transmitter 186, if present, is typically powered by the same battery pack 181 that powers the processor. In some embodiments, a minimal amount of circuitry may be concealed in the eyeglass frames so that the wires 125 may be driven with a buffered signal in order to reduce signal loss. In or behind one or both of the eyeglass lenses 105, there is typically an optical system 150. This optical system provides a magnified view of an electronic display in the nature of a miniature television screen 160 in which the viewing area is typically less than one inch (or less than 25 millimeters) on the diagonal. The electronic display acts as a viewfinder screen. The viewfinder screen may comprise a 1/4 inch (approx. 6mm) television screen comprising an LCD spatial light modulator with a field–sequenced LED backlight. Preferably custom–built circuitry is used. However, a satisfactory embodiment of the invention may be constructed by having the television screen be driven by a coaxial cable carrying a video signal similar to an NTSC RS–170 signal. In this case the coaxial cable and additional wires to power it are concealed inside the eyeglass safety–strap and run down to a belt pack or other body–worn equipment by wiring harness 180.

In some embodiments, television 160 contains a television tuner so that a single coaxial cable may provide both signal and power. In other embodiments the majority of the electronic components needed to construct the video signal are worn on the body, and the eyeglasses contain only a minimal amount of circuitry, perhaps only a spatial light modulator, LCD flat panel, or the like, with termination resistors and

Motorola v. Stellar
Motorola Exhibit 1032
Page 203

backlight. In this case, there are a greater number of wires 170. In some embodiments of the invention the television screen 160 is a VGA computer display, or another form of computer monitor display, connected to a computer system worn on the body of the wearer of the eyeglasses.

Wearable display devices have been described, such as in U.S. Pat. No. 5546099, Head mounted display system with light blocking structure, by Jessica L. Quint and Joel W. Robinson, Aug. 13, 1996, as well as in U.S. Pat. No. 5708449, Binocular Head Mounted Display System by Gregory Lee Heacock and Gordon B. Kuenster, Jan. 13, 1998. (Both of these two patents are assigned to Virtual Vision (TM), a well-known manufacturer of head-mounted displays). A "personal liquid crystal image display" has been described U.S. Pat. No. 4636866, by Noboru Hattori, Jan. 13, 1987. Any of these head-mounted displays of the prior art may be modified into a form such that they will function in place of television display 160.

In typical operation of the system of Fig 1, light enters the eyeglasses and is absorbed and quantified by one or more cameras. By virtue of a connection through wiring harness 180, information about the light entering the eyeglasses is available to the body-worn computer system previously described. The computer system may calculate the actual quantity of light, up to a single unknown scalar constant, arriving at the glasses from each of a plurality of directions corresponding to the location of each pixel of the camera with respect to the camera's center of projection. This calculation may be done using photoquantigraphic image processing. In some embodiments of the invention the narrow-camera 120, is used to provide a more dense array of such photoquanta estimates. This increase in density toward the center of the visual field of view matches the characteristics of the human visual system in which there is a central foveal region of increased visual acuity. Video from one or both cameras is possibly processed by the body-worn computer 182 and recorded or transmitted to one or more remote locations by a body-worn video transmitter 186 or body-worn Internet connection, such as a standard WA4DSY 56 kbps RF link with

Motorola v. Stellar
Motorola Exhibit 1032
Page 204

a KISS 56 eprom running TCP/IP over an AX25 connection to the serial port of the body-worn computer. The possibly processed video signal is sent back up into the eyeglasses through wiring harness 180 and appears on viewfinder screen 160, viewed through optical elements 150.

Typically, rather than displaying raw video on display 160, processed video is displayed thereupon, with reference also to FIG 1b (a close-up detail view of processor 182), as follows: The video outputs from cameras 110 and 120 pass through wiring harness 180 into vision analysis processor 183. Vision analysis processor 183 typically uses the output of the wide-camera for head-tracking. This head-tracking determines the relative orientation (yaw, pitch, and roll) of the head based on the visual location of objects in the field of view of camera 110. Vision analysis processor 183 may also perform some 3-D object recognition or parameter estimation, or construct a 3-D scene representation. Information processor 184 takes this visual information, and decides which virtual objects, if any, to insert into the viewfinder. Graphics synthesis processor 185 creates a computer-graphics rendering of a portion of the 3-D scene specified by the information processor 184, and presents this computer-graphics rendering by way of wires in wiring harness 180 to television screen 160. Typically the objects displayed are synthetic (virtual) objects overlaid in the same position as some of the real objects from the scene. Typically the virtual objects displayed on television 160 correspond to real objects within the field of view of narrow-camera 120. In this way, narrow camera 120 provides vision analysis processor 183 with extra details about the scene so that the analysis is more accurate in this foveal region, while wide-camera 110 provides both an anticipatory role and a head-tracking role. In the anticipatory role, vision analysis processor 183 is already making crude estimates of identity or parameters of objects outside the field of view of the viewfinder screen 160, with the possible expectation that the wearer may at any time turn his or her head to include some of these objects, or that some of these objects may move into the field of view of viewfinder 160 and narrow camera 120. With this operation, synthetic

Motorola v. Stellar
Motorola Exhibit 1032
Page 205

objects overlaid on real objects in the viewfinder provide the wearer with enhanced information of the real objects as compared with the view the wearer has of these objects outside of the viewfinder.

Thus even though television viewfinder screen 160 may only have 240 lines of resolution, a virtual television screen, of extremely high resolution, wrapping around the wearer, may be implemented by virtue of the head-tracker, so that the wearer may view very high resolution pictures through what appears to be a small window that pans back and forth across the picture by the head-movements of the wearer. Optionally, in addition to overlaying synthetic objects on real objects to enhance real objects, graphics synthesis processor 182 (FIG 1b) may cause the display of other synthetic objects on the virtual television screen. For example, FIG 1c illustrates a virtual television screen with some virtual (synthetic) objects such as an Emacs Buffer upon an xterm (text window in the commonly-used X-windows graphical user-interface). The graphics synthesis processor 182 causes the viewfinder screen 160 (FIG 1) to display a reticle seen in the viewfinder window at 192. Typically viewfinder screen 160 has 640 pixels across and 480 down, which is only enough resolution to display one xterm window since an xterm window is typically also 640 pixels across and 480 down (sufficient size for 24 rows of 80 characters of text). Thus the wearer can, by turning the head to look back and forth, position viewfinder reticle 192 on top of any of a number of xterms 194 that appear to hover in space above various real objects 198. The real objects themselves, when positioned inside the mediation zone established by the viewfinder, may also be visually enhanced as seen through the viewfinder. Suppose the wearer is in a department store and, after picking up a $7 item for purchase, the wearer approaches the cashier, hands the cashier a $20 dollar bill, but only receives change for a $10 bill (e.g. only receives $3 change from $20). Upon realizing this fact a minute or so later, the wearer locates a fresh available, (e.g. one that has no programs running in it so that it can accept commands) xterm 196. The wearer makes this window active by head movement up and to the right,

Motorola v. Stellar
Motorola Exhibit 1032
Page 206

as shown in Fig 1d. Thus the camera functions also as a head tracker, and it is by orienting the head (and hence the camera) that the cursor may be positioned. Making a window active in the X-windows system is normally done by placing the mouse cursor on the window and possibly clicking on it. However, having a mouse on a wearable camera/computer system is difficult owing to the fact that it requires a great deal of dexterity to position a cursor while walking around. With the invention described here, the viewfinder is the mouse/cursor: the wearer's head is the mouse, and the center of the viewfinder is the cursor. In Fig 1c and Fig 1d, windows outside the viewfinder are depicted in dashed lines, because they are not actually visible to the wearer. The wearer can see real objects outside the field of view of the viewfinder (either through the remaining eye, or because the viewfinder permits one to see around it). However, only xterms in the viewfinder are visible. Portions of the xterms within the viewfinder are shown with solid lines, as this is all that the wearer will see.

Once the wearer selects window 196 by looking at it, then the wearer presses the letter "d" to begin "recorDing", as indicated on window 196. Note that the letter "d" is pressed for "recorD", because the letter "r" means "Recall" (in some ways equivalent to "Rewind" on a traditional video cassette recorder). Letters are typically selected by way of a small number of belt–mounted switches that can be operated with one hand, in a manner similar to the manner that courtroom stenographers use to form letters of the alphabet by pressing various combinations of pushbutton switches. Such devices are commonly known as "chording keyboards" and are well known in the prior art. Also note that the wearer did not need to look right into all of window 196: the window accepts commands as long as it is active, and doesn't need to be wholly visible to accept commands.

Recording is typically retroactive, in the sense that the wearable camera system, by default, always records into a 5–minute circular buffer, so that pressing "d" begins recording starting from 5 minutes ago, e.g. starting from 5 minutes before "d" is pressed. This means that if the wearer presses "d" within a couple of minutes of

Motorola v. Stellar
Motorola Exhibit 1032
Page 207

realizing that the cashier short-changed the wearer, then the transaction will have been sucessfully recorded. The customer can then see back into the past 5 minutes, and can assert with confidence (through perfect photographic/videographic memory Recall, e.g. by pressing "r") to the cashier that a $20 bill was given. The extra degree of personal confidence afforded by the invention typically makes it unnecessary to actually present the video record (e.g. to a supervisor) in order to correct the situation. Of course, if there was a belief that the cashier was dishonest, the customer could file a report or notify authorities while at the same time submitting the recording as evidence. Typically the recording is also transmitted by way of transmitter 186 so that the cashier or other representatives of the department store (such as a department store security guard who might be a close personal friend of the cashier) cannot sieze and destroy the storage medium upon which the recording was made.

Note that here the drawings depict objects moved translationally (e.g. the group of translations specified by two scalar parameters) while in actual practice, virtual objects undergo a projective coordinate transformation in two dimensions, governed by eight scalar parameters, or objects undergo three dimensional coordinate transformations. When the virtual objects are flat, such as text windows, such a user-interface is called a "Reality Window Manager" (RWM).

In using the invention, typically various windows appear to hover above various real objects, and regardless of the orientation of the wearer's head (position of the viewfinder), the system sustains the illusion that the virtual objects 194 (in this example, xterms) are attached to real objects 198. The act of panning the head back-and forth in order to navigate around the space of virtual objects also may cause an extremely high-resolution picture to be acquired through appropriate processing of a plurality of pictures captured on narrow-camera 120. This action mimicks the function of the human eye, where saccades are replaced with head movements to sweep out the scene using the camera's light-measurement ability as is typical of photoquantigraphic image processing. Thus head movements are used to direct the

Motorola v. Stellar
Motorola Exhibit 1032
Page 208

camera to scan out a scene in the same way that eyeball movements normally orient the eye to scan out a scene.

Processor 182 is typically responsible for ensuring that the view rendered in graphics processor 185 matches the viewing position of the eye in front of optics 150, and not the original position from which the video was presented from cameras 110 and 120 to vision processor 183. Thus there is a change of viewing angle, in the rendering, so as to compensate for the difference in position (parallax) between the cameras and the view afforded by the display.

Some homographic and quantigraphic image analysis embodiments do not require a 3-D scene analysis, and instead use 2-D projective coordinate transformations of a flat object or flat surface of an object, in order to effect the parallax correction between virtual objects and the view of the scene as it would appear with the glasses removed from the wearer.

A drawback of the apparatus depicted in Fig 1 is that the optical elements 150 block the eye(s) of the wearer. The wearer may be able to adapt to this condition, or at least compensate for it through the display of video from the wearable camera to create an illusion of transparency, in the same way that a hand-held camcorder creates an illusion of transparency when it is on and running even though it would function as a vision-blocking eye patch when turned off. However, because of the parallax between cameras 110 and 120 and the actual eye position given by viewfinder optics 150, creating the illusion of transparency requires passing all objects through the analysis processor 183, followed by the synthesis processor 185, and this may present processor 182 with a formidable task. Moreover, the fact that the eye of the wearer is blocked means that others cannot make eye-contact with the wearer. In social situations this creates an unnatural form of interaction. Although the lenses of the glasses may be made sufficiently dark that the viewfinder optics are concealed, it is preferable that the viewfinder optics may be concealed in eyeglasses that allow others to see both of the wearer's eyes. A beamsplitter may be used for this purpose, but it

Motorola v. Stellar
Motorola Exhibit 1032
Page 209

is preferable that there be a strong lens directly in front of the eye of the wearer to provide for a wide field of view. While a special contact lens might be worn for this purpose, there are limitations on how short the focal length of a contact lens can be, and such a solution is inconvenient for other reasons.

Accordingly, a viewfinder system is depicted in Fig 2 in which an optical path 200 brings light from a viewfinder screen 210, through a first relay mirror 220, along a cavity inside the left temple–side piece of the glasses formed by an opaque side shield 230, or simply by hollowing out a temple side–shield. Light travels to a second relay mirror 240 and is combined with light from the outside environment as seen through diverging lens 250. The light from the outside and from the viewfinder is combined by way of beamsplitter 260. The rest of the eyeglass lenses 261 are typically tinted slightly to match the beamsplitter 260 so that other people looking at the wearer's eyes do not see a dark patch where the beamsplitter is. Converging lens 270 magnifies the image from the viewfinder screen 210, while canceling the effect of the diverging lens 250. The result is that others can look into the wearer's eyes and see both eyes at normal magnification, while at the same time, the wearer can see the camera viewfinder at increased magnification. The rest of the system of Fig 2 is similar to that of Fig 1 (and like parts have been given like reference numerals in their last two digits), except that the video transmitter 186 shown in Fig 1 has been replaced with a data communications transceiver 286. Transceiver 286 along with appropriate instructions loaded into computer 282 provides a camera system allowing collaboration between the user of the apparatus and one or more other persons at remote locations. This collaboration may be facilitated through the manipulation of shared virtual objects such as cursors, or computer graphics renderings displayed upon the camera viewfinder(s) of one or more users.

Similarly, transceiver 286, with appropriate instructions executed in computer 282, allows multiple users of the invention, whether at remote locations or side–by–side, or in the same room within each other's field of view, to interact with one another

Motorola v. Stellar
Motorola Exhibit 1032
Page 210

through the collaborative capabilities of the apparatus. This also allows multiple users, at remote locations, to collaborate in such a way that a virtual environment is shared in which camera-based head-tracking of each user results in acquisition of video and subsequent generation of virtual information being made available to the other(s).

Multiple users, at the same location, may also collaborate in such a way that multiple camera viewpoints may be shared among the users so that they can advise each other on matters such as composition, or so that one or more viewers at remote locations can advise one or more of the users on matters such as composition or camera angle.

Multiple users, at different locations, may also collaborate on an effort that may not pertain to photography or videography directly, but an effort nevertheless that is enhanced by the ability for each person to experience the viewpoint of another.

It is also possible for one or more remote participants at conventional desktop computers or the like to interact with one or more users of the camera system, at one or more other locations, to collaborate on an effort that may not pertain to photography or videography directly, but an effort nevertheless that is enhanced by the ability for one or more users of the camera system to either provide or obtain advice from or to another individual at a remote location.

The embodiments of the wearable camera system depicted in Fig 1 and Fig 2 give rise to a small displacement between the actual location of the camera, and the location of the virtual image of the viewfinder. Therefore, either the parallax must be corrected by a vision system 183, followed by 3-D coordinate transformation (e.g. in processor 184), followed by re-rendering (e.g. in processor 185), or if the video is fed through directly, the wearer must learn to make this compensation mentally. When this mental task is imposed upon the wearer, when performing tasks at close range, such as looking into a microscope while wearing the glasses, there is a discrepancy that is difficult to learn, and may also give rise to unpleasant psychophysical effects

Motorola v. Stellar
Motorola Exhibit 1032
Page 211

such as nausea or "flashbacks". Initially when wearing the glasses, the tendency is to put the microscope eyepiece up to one eye, rather than the camera 110 which is right between the eyes. As a result, the apparatus fails to record exactly the wearer's experience, until the wearer can learn that the effective eye position is right in the middle. Locating the cameras elsewhere does not help appreciably, as there will always be some error. It is preferred that the apparatus will record exactly the wearer's experience. Thus if the wearer looks into a microscope, the glasses should record that experience for others to observe vicariously through the wearer's eye. Although the wearer can learn the difference between the camera position and the eye position, it is preferable that this not be required, for otherwise, as previously described, long-term usage may lead to undesirable flashback effects.

Accordingly, Fig 3 illustrates a system whereby rays of light spanning a visual angle from ray 310 to ray 320 enter the apparatus and are intercepted by a two-sided mirror 315, typically mounted at a 45 degree angle with respect to the optical axis of a camera 330. These rays of light enter camera 330. Camera 330 may be a camera that is completely (only) electronic, or it may be a hybrid camera comprising photographic emulsion (film) together with a video tap, electronic previewer, or other manner of electronic output, so that a film may be exposed and the composition may also be determined by monitoring an electronic output signal. Such a camera that provides an electronic output signal from which photographic, videographic, or the like, composition can be judged, will be called an "electronic camera" regardless of whether it may also contain other storage media such as photographic film. The video output of the camera 330 is displayed upon television screen 340 possibly after having been processed on a body-worn computer system or the like. A reflection of television screen 340 is seen in the other side of mirror 315, so that the television image of ray 310 appears as virtual ray 360 and the television image of ray 320 appears as ray 370. Since the camera 330 records an image that is backwards, a backwards image is displayed on the television screen 340. Since the television 340 is observed

Motorola v. Stellar
Motorola Exhibit 1032
Page 212

in a mirror, the image is reversed again so that the view seen at pencil of light rays 390 is not backwards. In this way a portion of the wearer's visual field of view is replaced by the exact same subject matter, in perfect spatial register with the real world as it would appear if the apparatus were absent. Thus the portion of the field of view spanned by rays 310 to 320 which emerges as virtual light, will align with the surrounding view that is not mediated by the apparatus, such as rays 311 and 321 which pass through the apparatus and enter directly into the eye without being deflected by two-sided mirror 315. The image could, in principle also be registered in tonal range, using the photoquantigraphic image processing framework for estimating the unknown nonlinear response of the camera, and also estimating the response of the display, and compensating for both. So far focus has been ignored, and infinite depth-of-field has been assumed. In practice, a viewfinder with a focus adjustment is used, and the focus adjustment is driven by a servo mechanism controlled by an autofocus camera. Thus camera 330 automatically focuses on the subject matter of interest, and controls the focus of viewfinder 330 so that the apparent distance to the object is the same while looking through the apparatus as with the apparatus removed.

It is desirable that embodiments of the wearable camera system comprising manual focus cameras have the focus of the camera linked to the focus of the viewfinder so that both may be adjusted together with a single knob. Moreover, a camera with zoom lens may be used together with a viewfinder having zoom lens. The zoom mechanisms are linked in such a way that the viewfinder image magnification is reduced as the camera magnification is increased. Through this appropriate linkage, any increase in magnification by the camera is negated exactly by decreasing the apparent size of the viewfinder image.

The calibration of the autofocus zoom camera and the zoom viewfinder may be done by temporarily removing the mirror 315 and adjusting the focus and zoom of the viewfinder to maximize video feedback. This must be done for each zoom setting,

Motorola v. Stellar
Motorola Exhibit 1032
Page 213

so that the zoom of the viewfinder will properly track the zoom of the camera. By using video feedback as a calibration tool, a computer system may monitor the video output of the camera while adjusting the viewfinder and generating a lookup table for the viewfinder settings corresponding to each camera setting. In this way, calibration may be automated during manufacture of the wearable camera system.

The apparatus of Fig 3 does not permit others to make full eye–contact with the wearer. Accordingly, Fig 4 depicts a similar apparatus in which only a portion of the rays of the leftmost ray of light 310 is deflected by beamsplitter 415 which is installed in place of mirror 315. The visual angle subtended by incoming light ray 310 to light ray 320 is deflected by way of beamsplitter 415 into camera 330. Output from this camera is displayed on television 340, possibly after processing on a body–worn computer or processing at one or more remote sites, or a combination of local and remote image processing or the like. A partial reflection of television 340 is visible to the eye of the wearer by way of beamsplitter 415. The leftmost ray of light 460 of the partial view of television 340 is aligned with the direct view of the leftmost ray of light 310 from the original scene. Thus the wearer sees a superposition of whatever real object is located in front of ray 310 and the television picture of the same real object at the same location. The rightmost ray of light 320 is similarly visible through the beamsplitter 415 in register with the rightmost virtual ray reflected off the beamsplitter 415.

Note that the partial transparency of beamsplitter 415 allows one to see beyond the screen, so it is not necessary to carefully cut beamsplitter 415 to fit exactly the field of view defined by television 340, or to have the degree of silvering feather out to zero at the edges beyond the field of view defined by television 340.

Rays 460 and 470 differ from rays 360 and 370 in that 460 and 470 present the viewer with a combination of virtual light and real light. In order to prevent video feedback, in which light from the television screen would shine into the camera, a polarizer 480 is positioned in front of the camera. The polarization axis of the polarizer

Motorola v. Stellar
Motorola Exhibit 1032
Page 214

is aligned at right angles to the polarization axis of the polarizer inside the television, assuming the television already has a built–in polarizer as is typical of small battery powered LCD televisions, LCD camcorder viewfinders, and LCD computer monitors. If the television does not have a built in polarizer, a polarizer is added in front of the television. Thus video feedback is prevented by virtue of the two crossed polarizers in the path between the television 340 and the camera 330. Alternatively, instead of using explicit polarizers, a beamsplitter with polarization properties may be used for beamsplitter 415. Although many beamsplitters will exhibit some polarization properties, on account of being somewhat near the Brewster angle (functioning somewhat like a Brewster plate), certain kinds of beamsplitters, such as dichroic beamsplitters, exhibit very strong polarization characteristics. For example, beamsplitter 415 may comprise a dichroic beamsplitter cube.

The pencil of rays of light 490 will provide a mixture of direct light from the scene, and virtual light from the television display 340. The pencil of rays 490 thus differs from the pencil of rays 390 (FIG 3) in that 490 is a superposition of the virtual light as in 390 with real light from the scene.

In describing this invention, the term "pencil" of rays shall be taken to mean rays that intersect at a point in arbitrary dimensions (e.g. 3D as well as 2D) even though the term "pencil" usually only so–applies to 2D in common usage. This will simplify matters (rather than having to use the word "bundle" in 3D and "pencil" in 2D).

It is desired that both the real light and virtual light be in perfect or near perfect registration. However, in order that the viewfinder provide a distinct view of the world, it may be desirable that the virtual light from the television be made different in color or the like from the real light from the scene. For example, simply using a black and white television, or a black and red television, or the like, or placing a colored filter over the television, will give rise to a unique appearance of the region of the wearer's visual field of view by virtue of a difference in color between the television image and the real world upon which it is exactly superimposed. Even with

Motorola v. Stellar
Motorola Exhibit 1032
Page 215

such chromatic mediation of the television view of the world, it may still be difficult for the wearer to discern whether or not video is correctly exposed. Accordingly, a pseudocolor image may be displayed, or unique patterns may be used to indicate areas of over exposure or under exposure. Once the wearer becomes aware of areas of improper exposure (such as when an automatic exposure algorithm is failing), the parameters of the automatic exposure algorithm (such as setting of program mode to "backlight", "high contrast", "sports mode" or the like) may be changed, or the automatic exposure may be overridden.

Television 340 may also be fitted with a focusing lens so that it may be focused to the same apparent depth as the real objects in front of the apparatus. A single manual focus adjustment may be used for both camera 330 and television 340 to adjust them both together. Alternatively, an autofocus camera 330 may control the focus of television 340. Similarly, if a varifocal or zoom camera is used, a varifocal lens in front of television 340 should be used, and should be linked to the camera lens, so that a single knob may be used to adjust the zoom setting for both.

The apparatus of Fig 4 may be calibrated by temporarily removing the polarizer, and then adjusting the focal length of the lens in front of television 340 to maximize video feedback for each zoom setting of camera 330. This process may be automated if desired, for example, using video feedback to generate a lookup table used in the calibration of a servo mechanism controlling the zoom and focus of television 340.

The entire apparatus is typically concealed in eyeglass frames in which the beamsplitter is either embedded in one or both glass lenses of the eyeglasses, or behind one or both lenses. In the case in which a monocular version of the apparatus is being used, the apparatus is built into one lens, and a dummy version of the beamsplitter portion of apparatus may be positioned in the other lens for visual symmetry. These beamsplitters may be integrated into the lenses in such a manner to have the appearance of ordinary lenses in ordinary bifocal eyeglasses. Moreover, magnification may be unobtrusively introduced by virtue of the bifocal characteristics of such eyeglasses.

Motorola v. Stellar
Motorola Exhibit 1032
Page 216

Typically the entire eyeglass lens is tinted to match the density of the beamsplitter portion of the lens, so there is no visual discontinuity introduced by the beamsplitter.

Fig 5 depicts a foveated embodiment of the invention in which incoming light 500 and 501 is intercepted from the direct visual path through the eyeglasses and directed instead, by double–sided mirror 510 to beamsplitter 520. A portion of this light passes through beamsplitter 520 and is absorbed and quantified by wide–camera 530. A portion of this incoming light is also reflected by beamsplitter 520 and directed to narrow–camera 540. The image from the wide–camera 530 is displayed on a large screen television 550, typically of size 0.7 inches (approx. 18mm) on the diagonal, forming a wide–field–of–view image of virtual light 551 from the wide–camera. The image from the narrow–camera 540 is displayed on a small screen television 560, typically of screen size 1/4 inch (approx. 6mm) on the diagonal, forming a virtual image of the narrow–camera as virtual light 561.

Real rays of light in the periphery of the mediation zone formed by the apparatus emerge as virtual rays from television 550 only. For example, real ray 500 emerges as virtual ray 551.

Real rays near the central (foveal) region of the mediation zone emerge as virtual rays from both televisions (e.g. they also emerge as virtual rays from television 560). Television 560 subtends a smaller visual angle, and typically has the same total number of scanlines or same total number of pixels as television 550, so the image is sharper in the central (foveal) region. Thus television 560 is visually more dominant in that region, and the viewer can ignore television 550 in this region (e.g. the blurry image and the sharp image superimposed appear as a sharp image in the central region).

Thus, for example, unlike the real light ray 500 which emerges as virtual light from only one of the two televisions (from only television 550), the real light ray 501 emerges as virtual light from both televisions. Only one of the virtual rays collinear with real ray 501 is shown, in order to emphasize the fact that this virtual ray is

Motorola v. Stellar
Motorola Exhibit 1032
Page 217

primarily associated with television 560 (hence the break between where the solid line 501 is diverted by mirror 510 and where the collinear portion continues after mirror 570). This portion of the dotted line between mirror 510 and mirror 570 that is collinear with real light ray 510 has been omitted to emphasize the visual dominance of television 560 over television 550 within the central (foveal) field of view,

In this foveal region, it is the virtual light from television 560 that is of interest, as this virtual light will be perceived as more pronounced, since the image of television 560 will be sharper (owing to its more closely packed pixel array or scanlines). Thus even though real light ray 501 emerges as two virtual rays, only one of these, 561, is shown: the one corresponding to television 560.

A smaller television screen is typically used to display the image from the narrow–camera in order to negate the increased magnification that the narrow–camera would otherwise provide, when equal magnification lenses are used for both. In this manner, there is no magnification, and both images appear as if the rays of light were passing through the apparatus, so that the virtual light rays align with the real light rays were they not intercepted by the double–sided mirror 510. Television 550 is viewed as a reflection in mirror 510, while television 560 is viewed as a reflection in beamsplitter 570. Note also that the distance between the two televisions 550 and 560 should equal the distance between double–sided mirror 510 and beamsplitter 570 as measured in a direction perpendicular to the optical axes of the cameras. In this way, the apparent distance to both televisions will be the same, so that the wearer experiences a view of the two televisions superimposed upon one–another in the same depth plane. Alternatively, the televisions may be equipped with lenses to adjust their magnifications so that the television displaying the image from the tele camera 540 subtends a smaller visual angle than the television displaying the image from wide camera 530, and so that these visual angles match the visual angles of the incoming rays of light 500. In this way, two television screens of equal size may be used, which simplifies manufacture of the apparatus. Typically, the entire apparatus is

Motorola v. Stellar
Motorola Exhibit 1032
Page 218

built within the frames 590 of a pair of eyeglasses, where cameras 530 and 540, as well as televisions 550 and 560 are concealed within the frames 590 of the glasses, while double–sided mirror 510 and beamsplitter 570 are mounted in, behind, or in front of the lens of the eyeglasses. In some embodiments, mirror 510 is mounted to the front of the eyeglass lens, while beamsplitter 570 is mounted behind the lens. In other embodiments, one or both of mirror 510 and beamsplitter 570 are actually embedded in the glass of the eyeglass lens.

Two–sided mirror 510 may instead be a beamsplitter, or may be fully silvered in places (to make a partial beamsplitter and partial fully silvered two–sided mirror). For example, it may be silvered more densely in the center, where the visual acuity is higher, owing to the second television screen. It may also be feathered out, so that it slowly fades to totally transparent around the edges, so there is not an abrupt discontinuity between the real world view and the portion that has been replaced by virtual light. In this case, it is often desirable to insert the appropriate polarizer(s) to prevent video feedback around the edges, or to use appropriate polarizing beamsplitters, such as dichroic beamsplitter materials.

Fig 6 depicts an alternate embodiment of the wearable camera invention depicted in Fig 4 in which both the camera and television are concealed within the left temple side–piece of the eyeglass frames. A first beamsplitter 610 intercepts a portion of the incoming light and directs it to a second beamsplitter 620 where some of the incoming light is directed to camera 630 and some is wasted illuminating the television screen 640. However, the screen 640, when presented with a video signal from camera 630 (possibly after being processed by a body–worn computer, or remotely by way of wireless communications, or the like) directs light back through beamsplitter 620, where some is wasted but is absorbed by the eyeglass frame to ensure concealment of the apparatus, and some is directed to beamsplitter 610. Some of this light is directed away from the glasses and would be visible by others, and some is directed to the curved mirror 650 where it is magnified and directed back toward

Motorola v. Stellar
Motorola Exhibit 1032
Page 219

beamsplitter 610. The portion that is reflected off of beamsplitter 610 is viewed by the wearer, while the portion that continues back toward beamsplitter 620 must be blocked by a polarizer 660 to prevent video feedback. Implicit in the use of polarizer 660 is the notion that the television produces a polarized output. This is true of LCD televisions which comprise a liquid crystal display between crossed polaroids. If the television is of a type that does not already produce a polarized output, an additional polarizer should be inserted in front of television 640. Finally, if it is desired that the apparatus be unobtrusive, an additional polarizer or polarizing beamsplitter should be used so that the television 640 is not visible to others by way of its reflection in beamsplitter 610. Beamsplitter 610 may, for example, be a dichroic cube beamsplitter that has polarization properties. Alternatively, in certain situations it may actually be desirable to make the display visible to others. For example when the system is used for conducting interviews, it might be desirable that the person being interviewed see himself or herself upon the screen. This may be facilitated by exposing beamsplitter 620 to view, or allowing the reflection of the television to be seen in beamsplitter 610. Alternatively, another television may be mounted to the glasses, facing outwards. Therefore, just as the wearer of an embodiment of the invention may see the image captured by the camera, along with additional information such as text of a teleprompter, the interviewee(s) may also be presented with an image of themselves so that they appear to be looking into an electronic mirror, or may be teleprompted by this outward–facing display, or both. In some embodiments of the invention, the use of two separate screens was useful for facilitation of an interview, in which the same image was presented to both the inward–facing television and the outward–facing television, but the images were mixed with different text. In this way the wearer was teleprompted with one stream of text, while the interviewee was prompted with a different stream of text.

While the optical elements of the camera system of the described embodiments are embedded in eyeglasses, equally these elements may be embedded in other headgear

Motorola v. Stellar
Motorola Exhibit 1032
Page 220

such as a helmet.

The beamsplitter 415 of figure 4 and 610 of figure 6 could conveniently be implemented as a metallisation within a lens of the eyeglasses. These beamsplitters and diverging lens 250 of figure 2 may be embedded within the eyeglass lens below the main optical axis of the eye in its normal position so that the embedded elements may appear to be a feature of bifocal eyeglasses.

Fig 7 depicts a wearable camera system with automatic focus. While the system depicted in Fig 3 may operate with a fixed focus camera 330, so long as it has sufficient depth of field, there is still the question of at what focus depth television 340 will appear. Ideally the apparent depth of the display would match that of objects seen around the display, as represented by rays of light 311, 321, which are beyond two–sided mirror 315. This may be achieved if display medium 340 is such that it has nearly infinite depth of field, for example, by using a scanning laser ophthalmoscope (SLO), or other device which displays an image directly onto the retina of the eye, for display 340, or if display 340 were a holographic video display.

A lower–cost alternative is to use a variable focus display. The primary object(s) of interest, 700 are imaged by lens assembly 710 which is electronically focusable by way of a servo mechanism 720 linked to camera 730 to provide automatic focus. Automatic focus cameras are well known in the prior art, so the details of automatic focus mechanisms will not be explained here. A signal, 750, from the automatic focus camera is derived by way of reading out the position of the servo 720, and this signal 750 is conveyed to a display focus controller (viewfinder focus controller) 760. Viewfinder focus controller 760 drives, by way of focus control signal 770, a servo mechanism 780 which adjusts the focus of viewfinder optics 790. The arrangement of signals and control systems is such that the apparent depth of television screen 340 is the same as the apparent depth at which the primary object(s) of interest in the real scene would appear without the wearable camera apparatus.

Other objects, 701, located in different depth planes, will not be in focus in camera

Motorola v. Stellar
Motorola Exhibit 1032
Page 221

730, and will thus appear blurry on screen 340. They may appear slightly misaligned with where they would have appeared in the absence of the wearable camera system. The degree of misalignment will depend on eye position — the misalignment may or may not be present, or may be quite small. However, because the objects are out of focus, and are not the primary details of the scene, a small possible misalignment will not be particularly objectionable to the wearer of the apparatus.

In this example, rays 310 and 311 are both in the depth plane of the central object of interest, so that there is no discontinuity between emergent virtual light 360 and real light 311. Thus there is no discontinuity in perceived depth at the leftmost edge of two–sided mirror 315. There is, however, a difference in depth between virtual ray 370 of real ray 320 and almost adjacent real ray 321, because virtual ray 370 is in the same depth plane as 310, 311, and 360, while real ray 321 is in a more distant depth plane owing to the more distant facing surface of objects 701. However, because the eye will be focused on the depth plane of 310, 311, and 360, ray 311 from the real world will be out of focus by virtue of the limited depth of focus of the human eye itself. Thus the real objects will appear blurry, and a discontinuity between these real objects and their blurry image on screen 340 will not be appreciably perceptible.

Fig 8 depicts an embodiment of the wearable camera system having a zoom lens. Rays of light, for example, rays 500 and 501, enter the wearable camera system and emerge from display 840 as virtual light rays 800 and 801 respectively. In this process of going from light input to virtual light output, two–sided mirror 510 serves to deflect light to autofocus camera 730. Autofocus camera 730 comprises lens 810 and servo mechanism 820 configured in such a manner as to function as a conventional automatic focus camera functions, except that there is, provided to the rest of the system, a signal 750 that indicates the focus setting of the camera 730 and its lens 810 as selected by the camera's control system and servo mechanism 820, and that the camera is also a zoom camera in which the zoom setting can be controlled remotely by zoom signal input 850. Zoom signal input 850 controls, by way of servo 820, the

Motorola v. Stellar
Motorola Exhibit 1032
Page 222

relative position of various optical elements 810, so that, in addition to automatic focus, the camera can be given a desired focal length (field of view). The focus signal 750 goes into a focus and zoom controller 860 which accepts a zoom control signal input, 852, from the user, and directs this zoom control signal to the camera by way of signal 850, and also directs an appropriately processed version of this zoom control signal 851 to display controller 861. In this embodiment, display zoom is achieved as an electronic zoom. While camera zoom is achieved optically, display zoom is achieved electronically, by way of display controller 861 and display signal 870. The camera zooms in by adjustment of lens 810 for longer focal length, increasing the focal distance from the lens to the sensor array in camera 730, resulting in increased magnification. This increase in magnification is acompanied by a decrease, by operation of display controller 861, of the image size displayed on television 840. Television 840 may differ from television 340 (of FIG 7) in the sense that television 840 is optimized for display of resampled (electronically resized) images. This reduction in image size cancels out what would otherwise be an increase in magnification when zooming in with camera 730. It is this precicely controlled cancellation of any magnification that ensures that rays of light entering the apparatus are collinear with rays of virtual light emerging from the other side of the apparatus.

Fig. 9 depicts a stereo embodiment of the wearable camera system. An eyeglass frame comprising left temple side–piece 910 and right temple side–piece 911 contains two complete assemblies, 920 and 921, each one similar to the entire assembly depicted in Fig 7 or Fig 8.

Rays of light, for example, ray 320, enter the left eye assembly 920, and emerge as rays of virtual light, for example, 370. As a result, a focus of autofocus camera 730 results, by virtue of the main object of interest before assembly 920. The autofocus camera 730 includes a servo mechanism 720, and the control voltage that the camera feeds to this servo mechanism to keep the camera in focus is also sent outside assembly 920 to focus controller 930. Focus controller 930 drives camera 731 inside the right

Motorola v. Stellar
Motorola Exhibit 1032
Page 223

eye assembly 921. Camera 731 is not an autofocus camera, but, instead is a remotely focusable camera. By remotely focusable, what is meant is that rather than having its servo mechanism 721 driven by the camera itself, as it hunts for best focus, the servo mechanism is instead driven by an external signal. This external signal comes from the camera 730 in the left eye assembly 920. The reason for not having two independently automatically focusing cameras is that it is desired that both cameras will focus in the same depth plane irrespective of slight errors that might be present in the focus of either one.

Focus controller 930 also sets the focus of both left and right viewfinders by controlling left viewfinder lens servo 780 and right viewfinder lens servo 781. Moreover, focus controller 930 sends a signal to vergence controller 940 which drives servo mechanism 950 to adjust the vergence of left eye assembly 920 and servo mechanism 951 to adjust the vergence of right eye assembly 921.

In this embodiment, the focus of both cameras, the focus of both displays, and the vergence of both assemblies are all controlled by the focus of the left camera, so that whatever object the left camera focuses itself onto, will define the depth plane perceived by both eyes looking at their respective displays. This depth plane will also correspond to the vergence of the displays, so that depth and disparity will match at all times.

Fig. 10 depicts the left eye portion of an embodiment of the wearable camera system where the camera focus and vergence are driven by the output of an eyetracker. Eyetracker assembly 1010 (comprising camera and infrared light sources) illuminates and observes the eyeball by way of rays of light 1011 that partially reflect off beamsplitter 1020. Beamsplitter 1020 also allows the wearer to see straight through to mirror 315 and thus see virtual light from viewfinder 340. The eyetracker 1010 reports the direction of eye gaze and conveys this information as a signal 1012 to eye tracker processor 1030 which converts this direction into "X" and "Y" coordinates that correspond to the screen coordinates of viewfinder screen 340. These "X" and

Motorola v. Stellar
Motorola Exhibit 1032
Page 224

"Y" coordinates, which are expressed as signal 1031, indicate where on the viewfinder screen 340 the wearer is looking. Signal 1031 and the video output 1032 of camera 730 are both passed to focus analyzer 1040. Focus analyzer 1040 selects a portion of the video signal 1032 in the neighbourhood around the coordinates specified by signal 1031. In this way, focus analyzer 1040 ignores video except in the vicinity of where the wearer of the apparatus is looking. Because the coordinates of the camera match the coordinates of the display (by way of the virtual light principle), the portion of video analyzed by focus analyzer 1040 corresponds to where the wearer is looking. The focus analyzer 1040 examines the high–frequency content of the video in the neighbourhood of where the wearer is looking, to derive an estimate of how well focused that portion of the picture is. This degree of focus is conveyed by way of focus sharpness signal 1041 to focus controller 1050 which drives, by way of focus signal 1051, the servo mechanism 720 of camera 730. Focus controller 1050 is such that it causes the servo mechanism 720 to hunt around until it sharpness signal 1041 reaches a global or local maximum.

The focus analyzer 1040 and focus controller 1050 thus create a feedback control system around camera 730 so that it tends to focus on whatever object(s) is (are) in the vicinity of camera and screen coordinates 1031. Thus camera 730 acts as an automatic focus camera, but instead of always focusing on whatever is in the center of its viewfinder, it focuses on whatever is being looked at by the left eye of the wearer.

In addition to driving the focus of the left camera 730, focus controller 1050 also provides a control voltage 1052 identical to the control voltage of 1051. Control signal 1052 drives servo mechanism 780 of lens 790, so that the apparent depth of the entire screen 340 appears focused at the same depth as whatever object the wearer is looking at. In this way, all objects in the viewfinder appear in the depth plane of the one the wearer is looking at.

Focus controller 1050 provides further control voltages, 1053 and 1054 for the right eye camera and right eye viewfinder, where these signals 1053 and 1054 are identical

Motorola v. Stellar
Motorola Exhibit 1032
Page 225

to that of 1051. Moreover, focus controller 1050 provides the same control voltage to the vergence controller 940 so that it can provide the control signal to angle the left and right assemblies inward by the correct amount, so that all focus and vergence controls are based on the depth of the object the left eye is looking at. It is assumed left and right eyes are looking at the same object, as is normal for any properly functioning human visual system.

In other embodiments of the invention, it may be desired to know which object is of interest when there are multiple objects in the same direction of gaze, as might happen when the wearer is looking through a dirty glass window. In this case there are three possible objects of interest: the object beyond the window, the object reflected in the glass, and the dirt on the window. All three may be at different depth planes but in the same gaze direction.

An embodiment of the wearable camera system with a human–driven autofocus camera (e.g. driven by eye focus), could be made from an eye tracker that would measure the focus of the wearer's left eye. Preferably, however, two eyetrackers may be used, one on the left eye, and one on the right eye, in order to attempt to independently track each eye, and attempt to obtain a better estimate of the desired focus by way of the vergence of the wearer's eyes.

A reality window manager (RWM), similar to that depicted in Fig 1c and Fig 1d, may also be driven by the eyetracker, so that there can be an independent head position (framing) and cursor position (where looking), rather than always having the cursor in the center of the viewfinder. This arangement would also facilitate movement of the cursor without moving the head, which may reduce head movements that appear unnatural to others watching the user of the wearable camera system.

The apparatus of this invention allows the wearer to experience the camera over a long period of time. For example, after wearing the apparatus sixteen hours per day for several weeks, it begins to function as a true extension of the mind and body. In this way, photographic composition is much more optimal, because the act

Motorola v. Stellar
Motorola Exhibit 1032
Page 226

of taking pictures or shooting video no longer requires conscious thought or effort. Moreover, the intentionality of the picture-taking process is not evident to others, because picture-taking is not preceeded by a gesture such as holding a viewfinder object up to the eye. The wearable viewfinder is an important element of the wearable camera invention allowing the wearer to experience everyday life through a screen, and therefore be always ready to capture anything that might happen, or even anything that might have happened previously by virtue of the retroactive record capability of the invention. Moreover, additional information beyond just exposure and shutter speed may be displayed in the camera viewfinder. For example, the camera allows the wearer to augment, diminish, or otherwise alter his or her perception of visual reality. This mediated-reality experience may be shared. The wearer may allow others to alter his or her perception of reality. In this way the invention is useful as a new communications medium, in the context of collaborative photography, collaborative videography, and telepresence. Moreover, the invention may perform other useful tasks such as functioning as a personal safety device and crime deterrent by virtue of its ability to maintain a video diary transmitted and recorded at multiple remote locations. As a tool for photojournalists and reporters, the invention has clear advantages over other competing technologies.

From the foregoing description, it will thus be evident that the present invention provides a design for a wearable camera with a viewfinder. As various changes can be made in the above embodiments and operating methods without departing from the spirit or scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawings should be interpreted as illustrative and not in a limiting sense.

Variations or modifications to the design and construction of this invention, within the scope of the invention, may occur to those skilled in the art upon reviewing the disclosure herein. Such variations or modifications, if within the spirit of this invention, are intended to be encompassed within the scope of any claims to patent

Motorola v. Stellar
Motorola Exhibit 1032
Page 227

protection issuing upon this invention.

Motorola v. Stellar
Motorola Exhibit 1032
Page 228

WHAT IS CLAIMED IS:

1. Camera bearing headgear, comprising:

an electronic camera borne by said headgear;

an electronic display responsive to an electronic output from said electronic camera, said electronic display borne by said headgear for providing a viewfinder for said electronic camera.

2. The headgear of claim 1 including optics for directing light emitted from said electronic display to an eye of a wearer of said headgear.

3. The headgear of claim 2 wherein said electronic camera comprises a first camera and wherein said headgear further includes an electronic second camera borne by said headgear, one of said first camera and said second camera comprising a wide angle camera and another of said first camera and said second camera comprising a narrow angle camera.

4. The headgear of claim 2 wherein said electronic camera comprises a narrow angle camera and wherein said headgear further includes an electronic wide angle camera borne by said headgear, and wherein said electronic display is responsive to an output from said narrow angle camera for providing a viewfinder for said narrow angle camera and said wide angle camera.

Motorola v. Stellar
Motorola Exhibit 1032
Page 229

5. The headgear of claim 2 wherein said electronic camera comprises a wide angle camera and wherein said headgear further includes an electronic narrow angle camera borne by said headgear, and wherein said electronic display is a first electronic display and including a second electronic display responsive to an output of said narrow angle camera and including optics for directing light emitted from said second electronic display to said eye of said wearer in order to provide a viewfinder for said narrow angle camera.

6. The headgear of claim 3 wherein said optics is first optics and including second optics directing incoming light so that a center of a field of view of said first camera is collinear with a center of a field of view of said second camera.

7. The headgear of claim 6 wherein said second optics comprises a beamsplitter.

8. The headgear of claim 7 wherein said second optics further comprises a mirror directing incoming light to said beamsplitter.

9. The headgear of claim 2 wherein said optics comprises at least one mirror.

10. The headgear of claim 4 wherein said optics comprises at least one mirror for directing light from said electronic display to a beamsplitter in front of an eye of a wearer.

11. The headgear of claim 1 including optics arranged for diverting light which would otherwise enter an eye of a wearer to said camera and for diverting light emitted from said

Motorola v. Stellar
Motorola Exhibit 1032
Page 230

display to said eye of a wearer such that diverted light from said display is collinear with said light which would otherwise enter said eye of said wearer.

12. The headgear of claim 11 wherein said camera and said display are opposite one another so as to have aligned optical axes and said optics comprises an optical element positioned so as to be in front of an eye of a wearer and between said camera and said electronic display.

13. The headgear of claim 12 wherein said optical element comprises a two-sided mirror making a 45° angle with said optical axes.

14. The headgear of claim 12 wherein said optical element comprises a beamsplitter making a 45° angle with said optical axes and wherein said electronic display incorporates a polarizer and wherein said headgear includes a further polarizer in front of said camera oriented to block polarized light emitted by said display.

15. The headgear of claim 11 wherein said optics comprises a mirror and including a beamsplitter, said beamsplitter positioned between said mirror and an eye of a wearer.

16. The headgear of claim 15 wherein said beamsplitter comprises a first beamsplitter, an optical axis of said camera is perpendicular to an optical axis of said display, and said electronic display incorporates a polarizer and including

a second beamsplitter interposed along said optical axes and making a 45° angle with

Motorola v. Stellar
Motorola Exhibit 1032
Page 231

said optical axes;

a polarizer in front of said camera oriented to block polarised light emitted by said display.

17. The headgear of claim 4 further including head tracking means input with an electronic output signal of said wide angle camera.

18. The headgear of claim 17 including a processor for providing a reality window manager, said processor outputting to said electronic display such that said display provides a virtual window as well as providing a viewfinder for said narrow-angle electronic camera.

19. The headgear of claim 1 further comprising means for (I) directing incoming rays of light that would enter an eye of a user in an absence of said means into said camera and (ii) directing rays of light emitted from said display into said eye of a user, each directed emitted ray of light being approximately collinear with an incoming ray of light from which said each directed emitted ray of light was derived, prior to direction of said incoming ray of light into said camera.

20. The headgear of claim 9 where said at least one mirror is a two sided mirror.

21. The headgear of claim 20 where said mirror comprises a flat transparent surface with a metallic coating on one side, and where said one side faces toward said camera.

Motorola v. Stellar
Motorola Exhibit 1032
Page 232

22. The headgear of claim 11 where said optics includes a beamsplitter and where said optics further includes a concave reflective material discontinuity.

23. The headgear of claim 11 where said optics includes a beamsplitter and where light emitted from said display passes through said beamsplitter at least once before travelling away from said beamsplitter and then back toward said beamsplitter and being reflected off of said beamsplitter toward an eye of said wearer.

24. The headgear of claim 23 where said display includes a polarizer.

25. The headgear of claim 23 where said display beamsplitter comprises a dichroic beamsplitter which has polarization properties.

26. Camera bearing eyeglasses comprising:

an electronic camera borne by said eyeglasses;

an electronic display responsive to an electronic output from said electronic camera, said electronic display borne by said eyeglasses for providing a viewfinder for said electronic camera.

27. The eyeglasses of claim 26 including optics for directing light emitted from said electronic display to an eye of a wearer of said eyeglasses.

28. The eyeglasses of claim 26 including optics arranged for diverting light which would

Motorola v. Stellar
Motorola Exhibit 1032
Page 233

otherwise enter an eye of a wearer to said camera and for diverting light emitted from said display to said eye of a wearer such that said diverted light from said display is collinear with said light which would otherwise enter said eye of said user.

29. The eyeglasses of claim 28 wherein said optics comprises a beamsplitter implemented as a metallisation of a lens of said eyeglasses.

30. The headgear of claim 1 including a transmitter for transmitting camera signals.

31. The headgear of claim 1 wherein said headgear comprises eyeglasses having a safety strap said strap receiving an output wire from said camera and including a body pack receiving a recorder fed with said camera output wire from said strap.

32. Camera bearing headgear, comprising:

an electronic camera borne by said headgear;

an electronic display borne by said headgear;

a processor connected to an output of said camera and to an input of said electronic display.

33. The headgear of claim 32 including optics arranged for diverting light which would otherwise enter an eye of a wearer to said camera and for diverting light emitted from said display to said eye of a wearer such that said diverted light from said display is collinear with said light which would otherwise enter said eye of said wearer.

Motorola v. Stellar
Motorola Exhibit 1032
Page 234

34. The headgear of claim 32 wherein said processor comprises a computer wirelessly connected to a computer network.

35. The headgear of claim 32 wherein said headgear comprises eyeglasses having a safety strap said strap receiving an output wire from said camera and including a body pack receiving a recorder fed with said camera output wire from said strap.

36. The headgear of claim 32 where said processor comprises a vision analysis processor and a graphics synthesis processor.

37. The headgear of claim 36 where said processor includes means for compensating for parallax between said camera and said display.

38. The headgear of claim 36 where said processor means for compensating for parallax between said camera and said display includes a machine vision process, and a computer graphics rendering process.

39. The headgear of claim 32 further including head tracking means input with an electronic output signal of said wide angle camera.

40. The headgear of claim 39 including a processor for providing a reality window manager, said processor outputting to said electronic display such that said display provides a virtual window as well as providing a viewfinder for said electronic camera.

Motorola v. Stellar
Motorola Exhibit 1032
Page 235

41. Camera bearing headgear comprising:

an electronic camera borne by said headgear;

an electronic display borne by said headgear;

optics arranged for diverting light which would otherwise enter an eye of a wearer to said camera and for diverting light emitted from said display to said eye of a wearer such that said diverted light from said display is collinear with said light which would otherwise enter said eye of said wearer.

42. The headgear of claim 40 further including a focusable camera and focusable display means where said focusable camera and focusable display means are such that they may be operated by a single control that focuses real light going to said camera and virtual light coming from said display onto the same depth plane.

43. The headgear of claim 41 further including a camera with zoom and display means with zoom where a zoom setting of both said camera and said display means may be operated by a single control so that a virtual light principle is maintained for all zoom settings.

44. The headgear of claim 41 further including an autofocus camera and remotely focusable display means where said autofocus camera drives a focus of said focusable display means.

45. The headgear of claim 41 where said camera is a left camera, said display is a left display, and said optics are left optics, and further including a right camera, right display, and right optics, similarly arranged, except that one of said cameras is an automatic focus

Motorola v. Stellar
Motorola Exhibit 1032
Page 236

camera and the other is a remotely focusable camera, where said automatic focus camera provides a focus output to said remotely focusable camera.

46. The headgear of claim 45 where said left display and said right display are remotely focusable displays and where said automatic camera also provides outputs to focus both of said remotely focusable displays onto the same depth plane as an object onto which said automatic focus camera is focussed.

47. The headgear of claim 46 where said automatic focus camera also provides a signal to automatically adjust vergence of at least said cameras so that their optical axes intersect in the vicinity of an object to which they are focussed.

Motorola v. Stellar
Motorola Exhibit 1032
Page 237

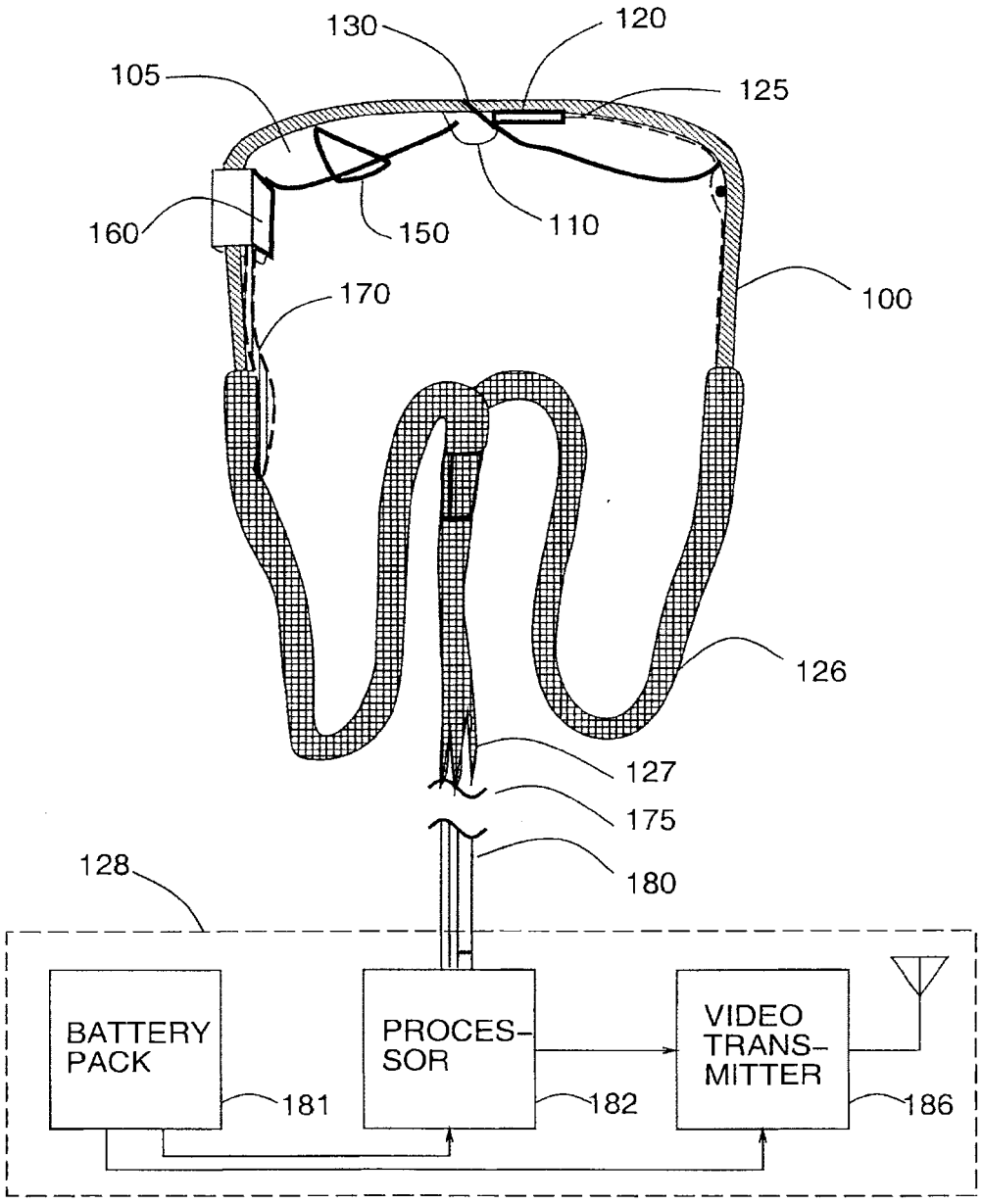


FIG. 1 – FOVEATED EMBODIMENT OF WEARABLE CAMERA SYSTEM

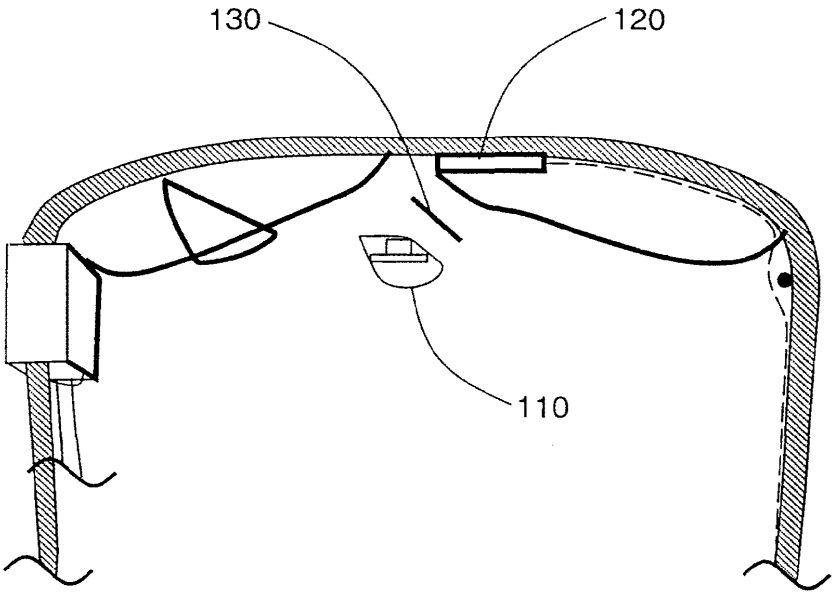


FIG. 1a – FOVEATED EMBODIMENT OF WEARABLE CAMERA SYSTEM – DETAIL OF BEAMSPLITTER

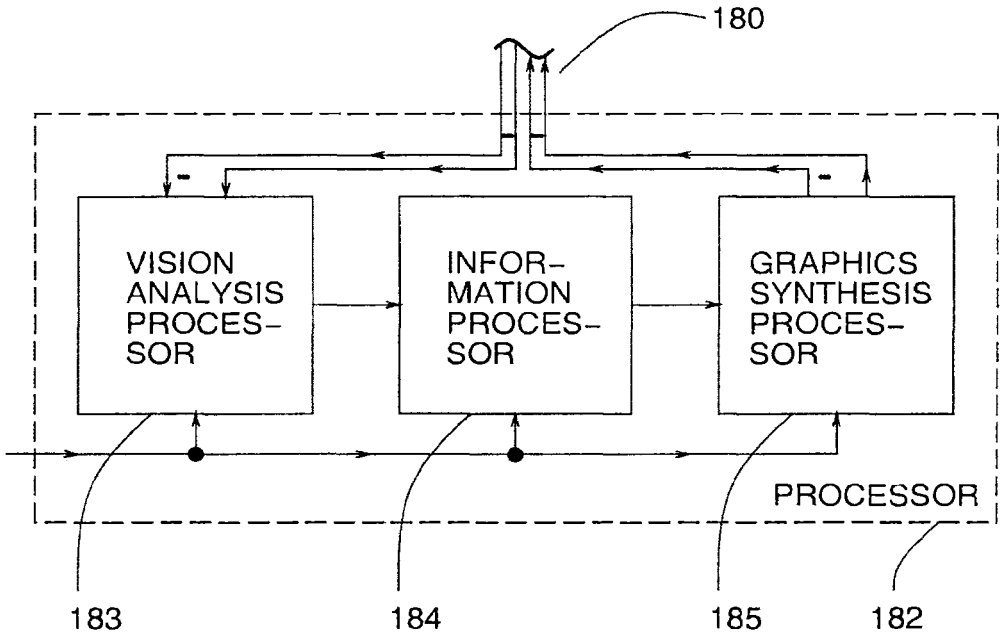


FIG. 1b – FOVEATED EMBODIMENT OF WEARABLE CAMERA SYSTEM – DETAIL OF PROCESSOR

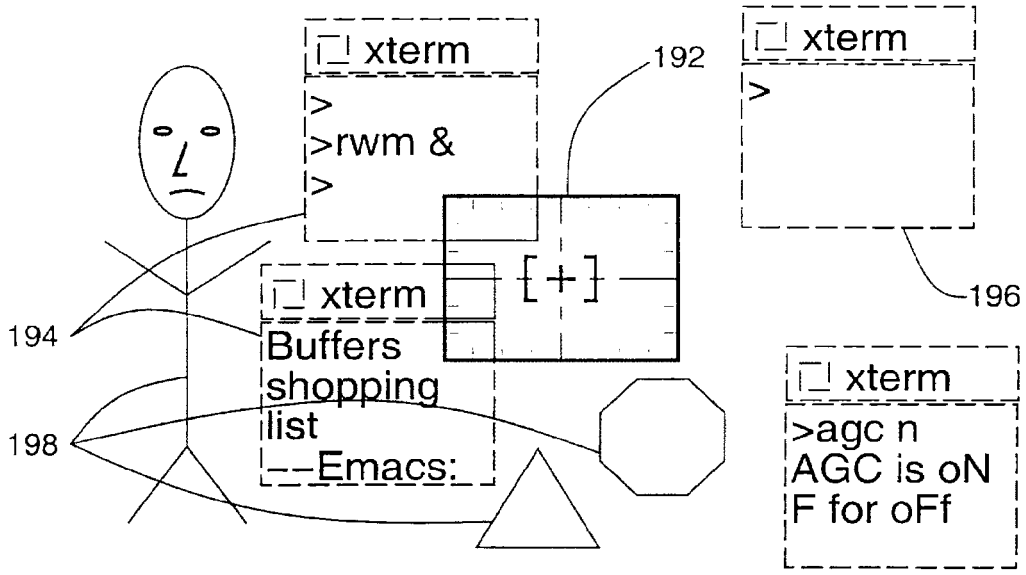


FIG. 1c – FOVEATED EMBODIMENT OF WEARABLE CAMERA SYSTEM – AS SEEN WHILE LOOKING THROUGH VIEWFINDER

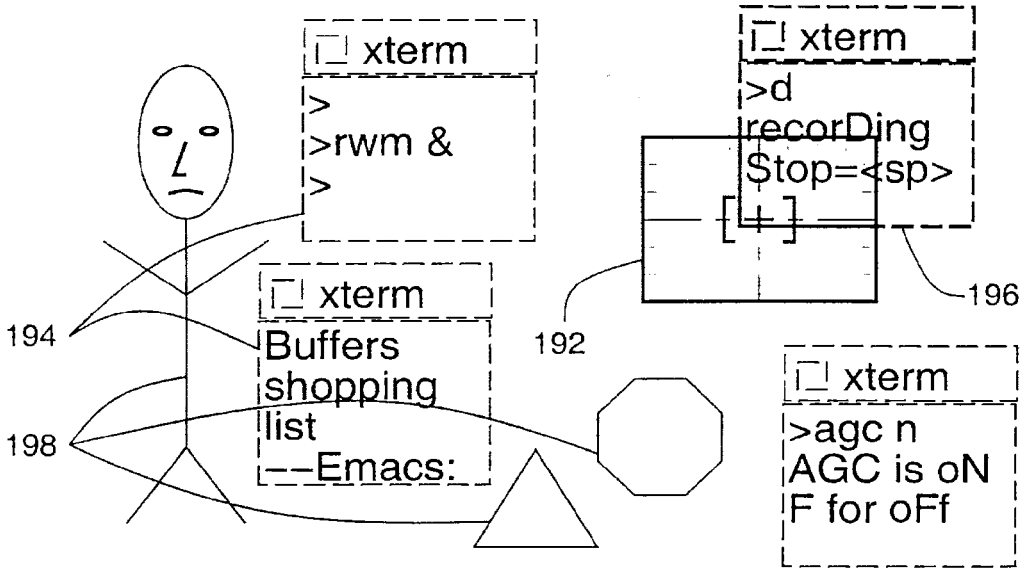


FIG. 1d – FOVEATED EMBODIMENT OF WEARABLE CAMERA SYSTEM – AS SEEN WHILE LOOKING THROUGH VIEWFINDER

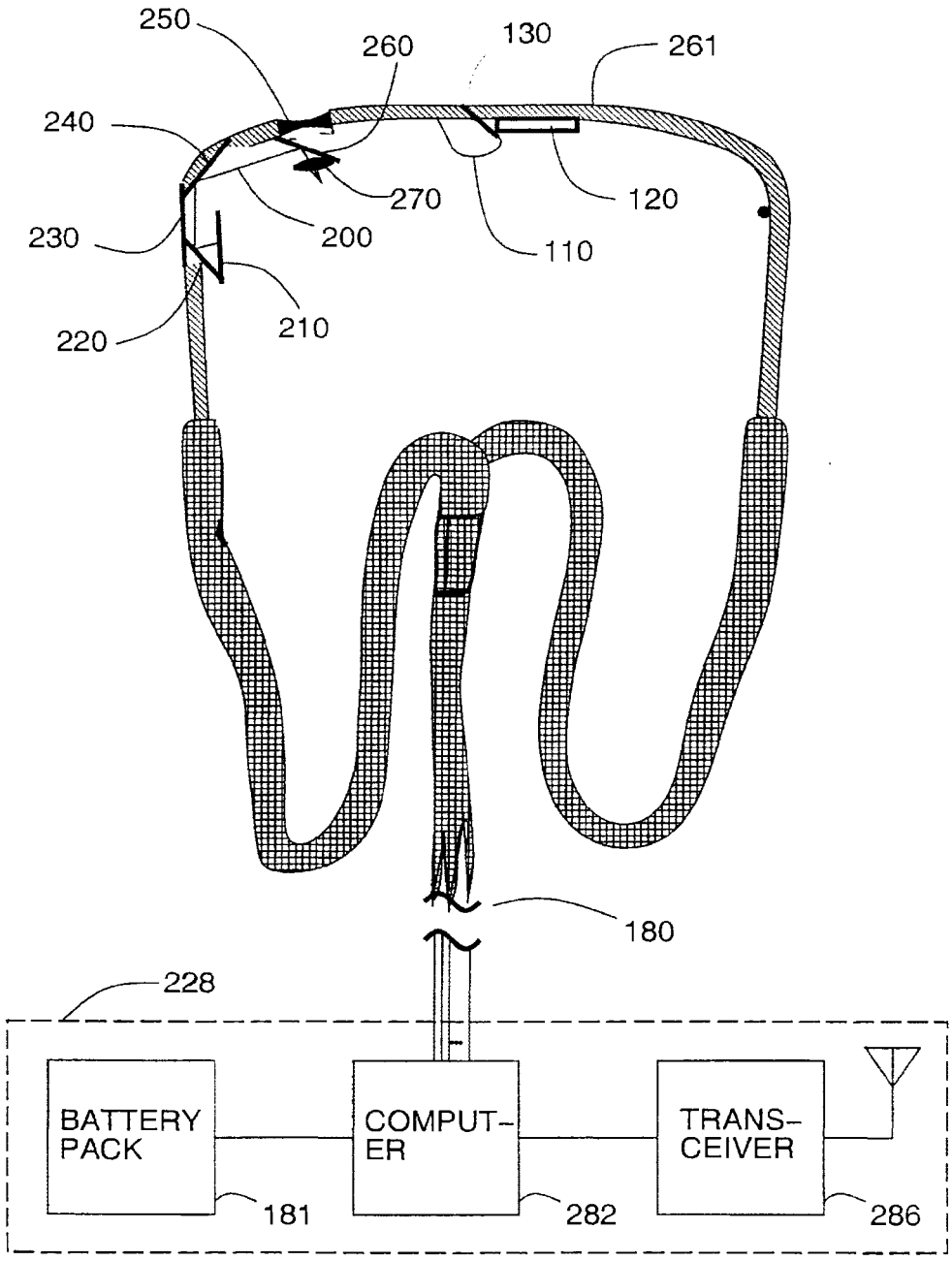


FIG. 2 – EMBODIMENT OF WEARABLE CAMERA SYSTEM WITH BOTH EYES VISIBLE TO OTHERS

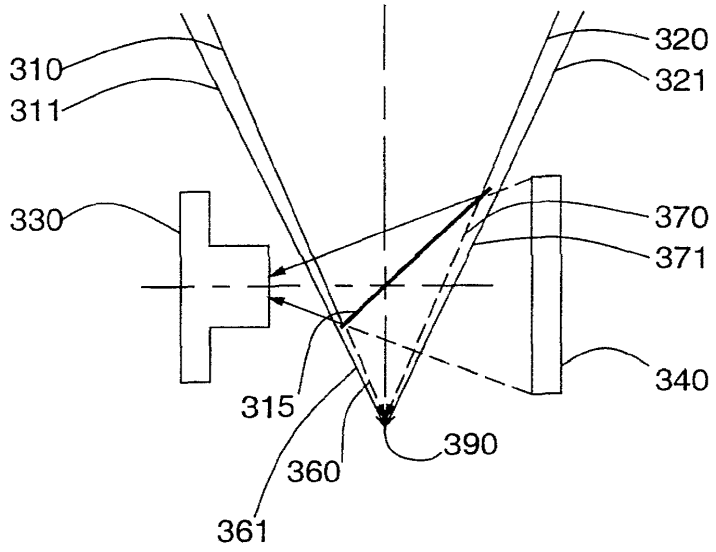


FIG. 3 – VIRTUAL LIGHT

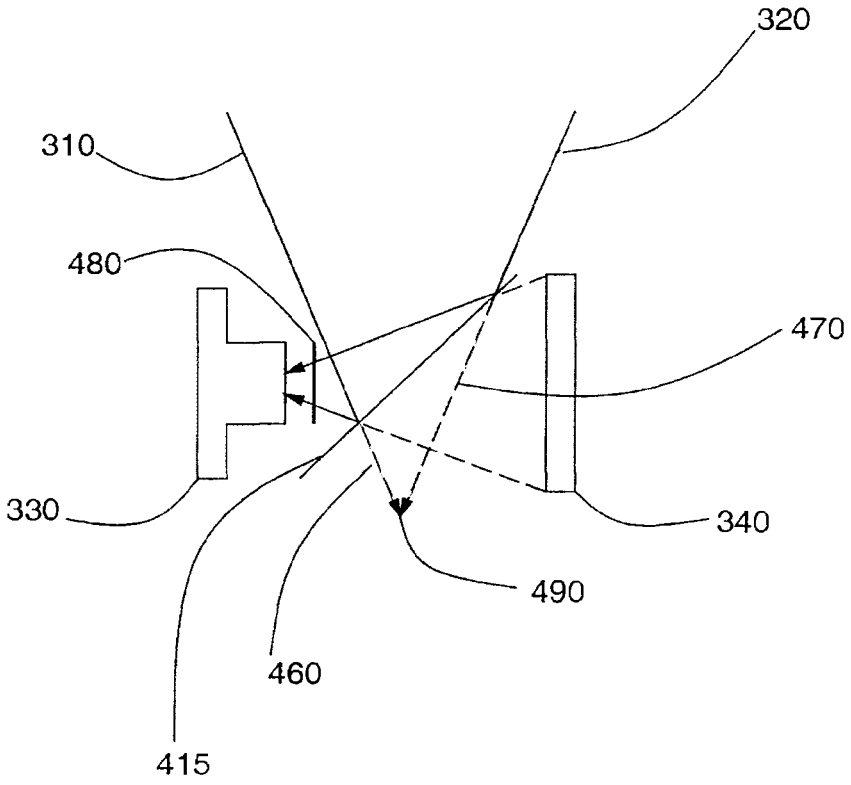


FIG. 4 – PARTIAL VIRTUAL LIGHT WITH VIDEO FEEDBACK PREVENTION MEANS

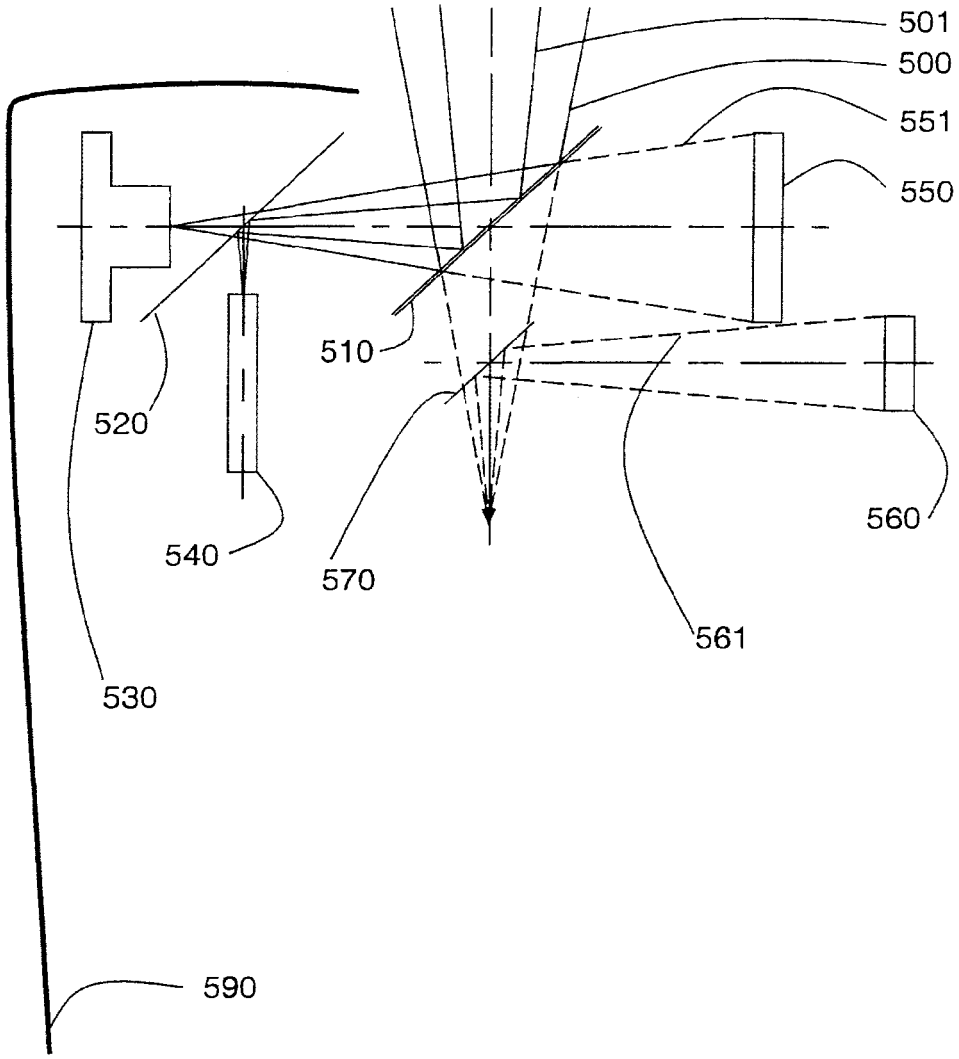


FIG. 5 – FOVEATED WEARABLE CAMERA WITH FOVEATED VIEWFINDER MEANS

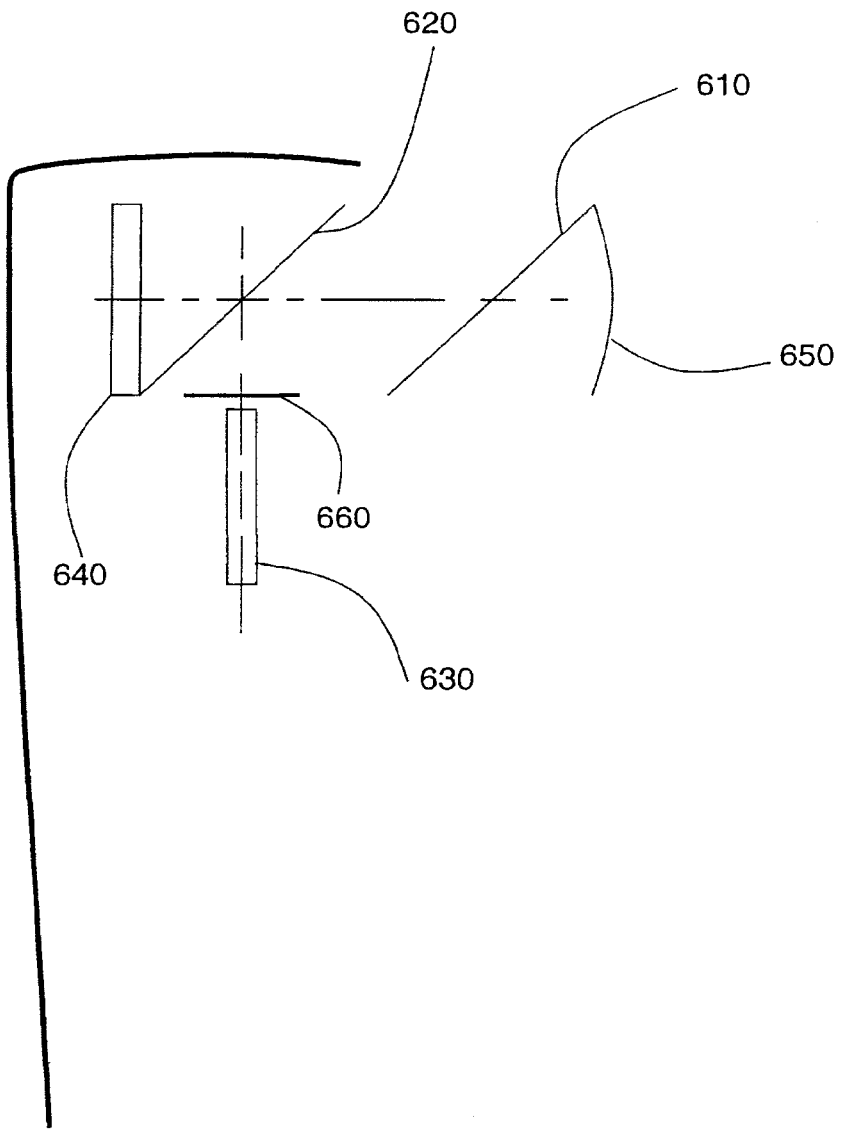


FIG. 6 – WEARABLE CAMERA SYSTEM WITH VIEWFINDER ALLOWING OTHERS TO SEE BOTH OF WEARER'S EYES

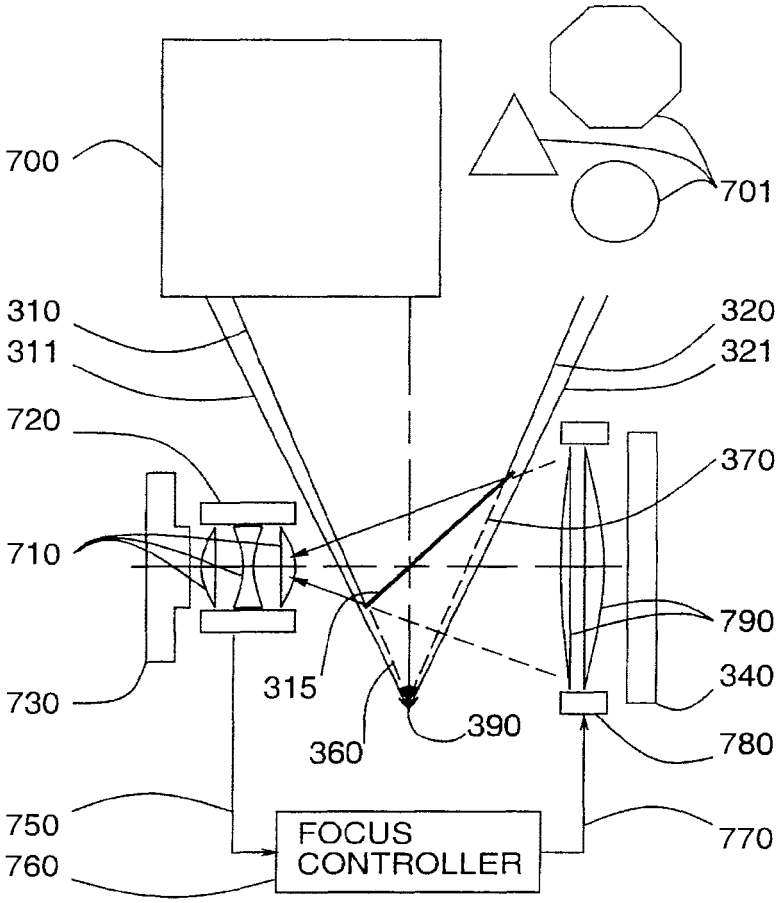


FIG. 7 – VIRTUAL LIGHT WITH FOCUS COUPLING

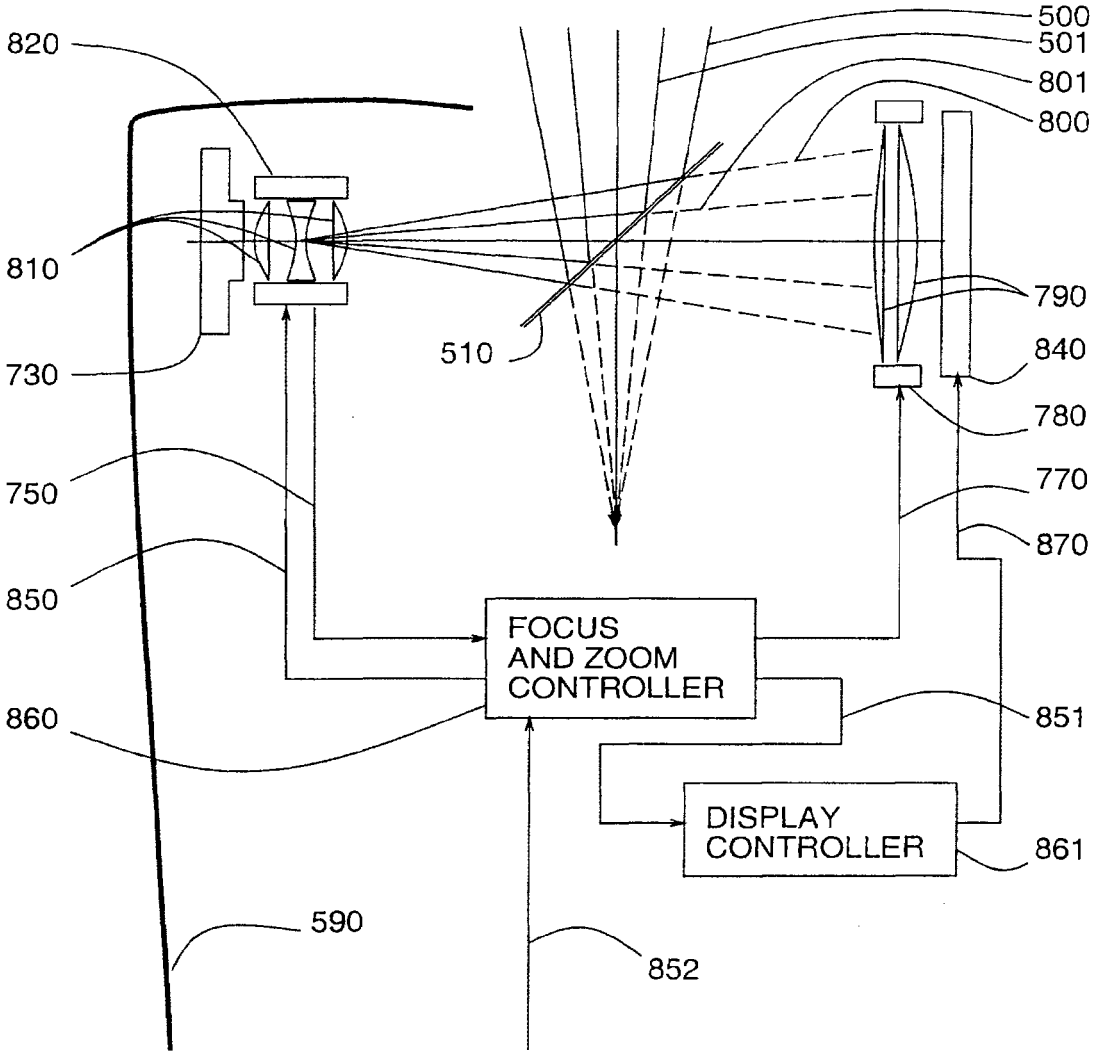


FIG. 8 – WEARABLE CAMERA SYSTEM WITH ZOOM LENS

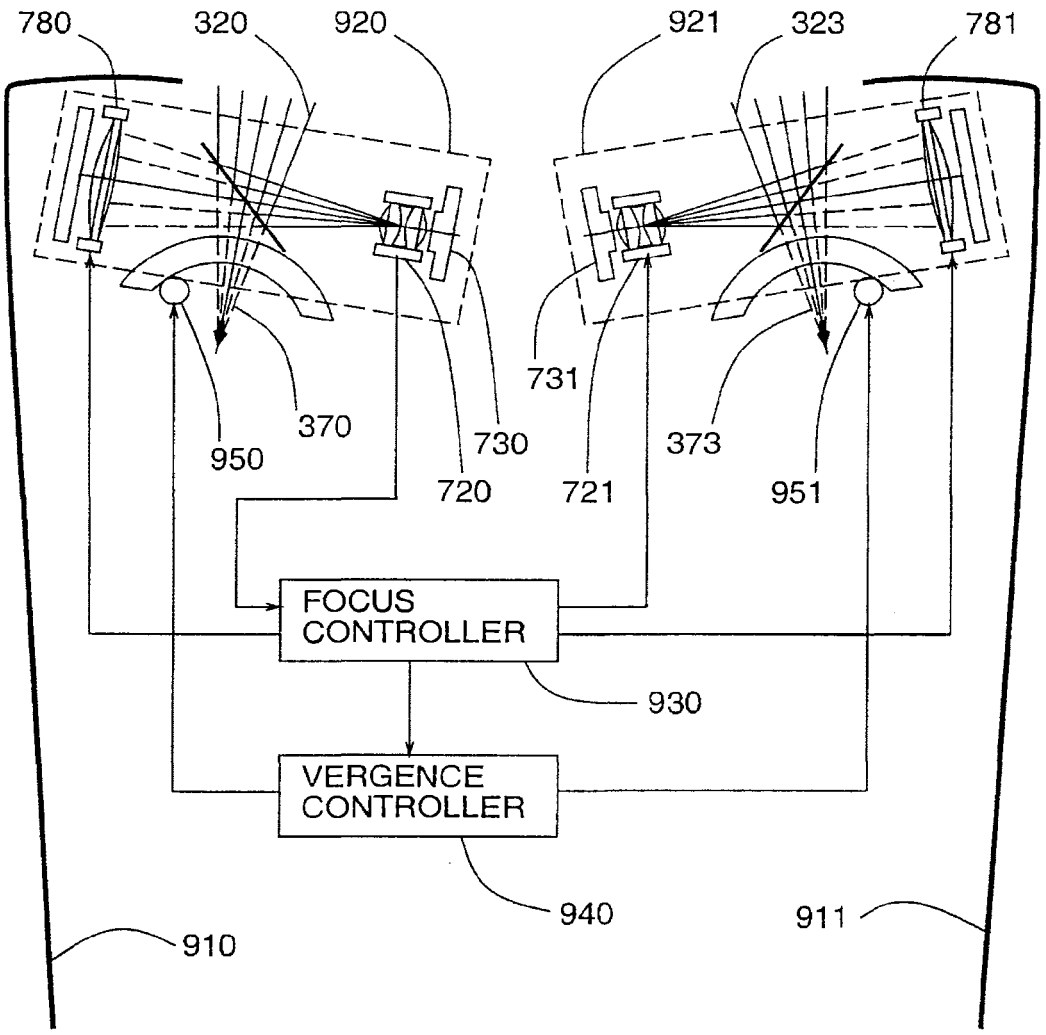


FIG. 9 – STEREO WEARABLE CAMERA SYSTEM

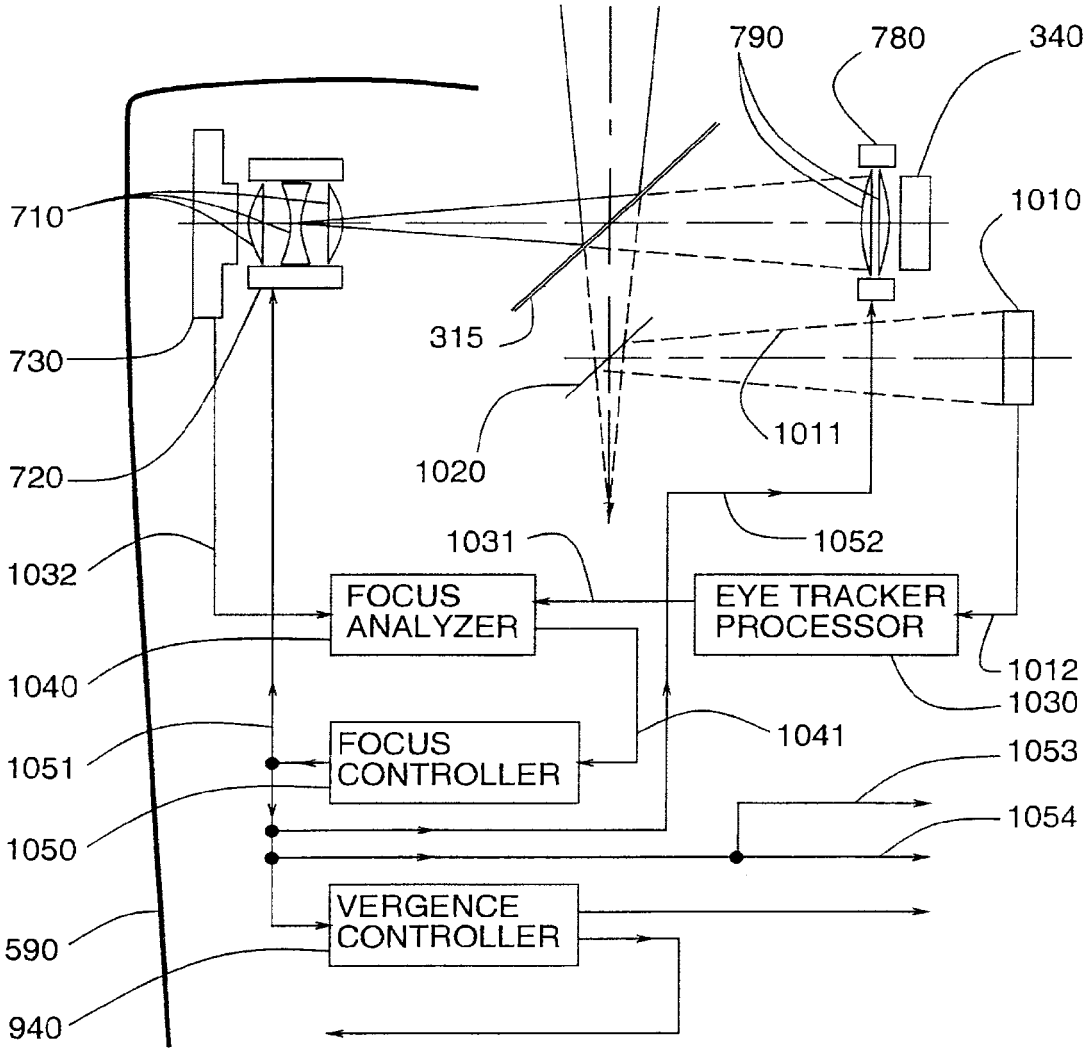


FIG. 10 – WEARABLE CAMERA SYSTEM WITH AUTOFOCUS AND VERGENCE DRIVEN BY EYETRACKER

INTERNATIONAL SEARCH REPORT

Inter onal Application No
PCT/CA 99/00249

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 H04N5/232 G06F1/16

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 H04N G06F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	US 4 786 966 A (FALLSTROM ROBERT D ET AL) 22 November 1988 see column 3, line 44 - column 8, line 31	1,2,9, 26,27,30 4,5,19, 31
Y	DE 44 36 528 A (LIXFELD WOLF DIETER) 25 April 1996 see column 3, line 14 - column 4, line 34	4,10,17
Y	WO 96 36271 A (LEICA AG ;STUETTLER HERBERT M (AT)) 21 November 1996 see page 17, line 13 - page 19	5
Y	WO 97 34411 A (FRASER VOLPE CORP ;VOLPE JOSEPH B (US)) 18 September 1997 see page 6, line 21 - page 8, line 5	11-13, 28,33,34

-/--

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
2 July 1999	09/07/1999

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Materne, A

1

Form PCT/ISA/210 (second sheet) (July 1992)

Motorola v. Stellar
Motorola Exhibit 1032
Page 252

INTERNATIONAL SEARCH REPORT

Intel ɔnal Application No
PCT/CA 99/00249

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication,where appropriate, of the relevant passages	Relevant to claim No.
Y	US 5 550 585 A (CHERRI ALLAN) 27 August 1996 see column 3 - column 4, line 8	11-13, 19-23, 28,33,36
Y	PATENT ABSTRACTS OF JAPAN vol. 096, no. 011, 29 November 1996 & JP 08 179223 A (CANON INC), 12 July 1996 see abstract & US 5 815 741 A (OKUYAMA ET AL.)	10,20-23
Y	DE 195 47 166 A (LG ELECTRONICS INC) 27 June 1996 see column 3, line 16 - column 7, line 18	31
X	25 - 32: "WEARABLE COMPUTING: A FIRST STEP TOWARD PERSONAL IMAGING" COMPUTER, vol. 30, no. 2, 1 February 1997, pages 25-32, XP000722152	32
Y	see page 26, column 2, line 33 - page 27, column 1, line 12	34-37,39
A		38,40-47
Y	WO 94 26061 A (FRIEDLAND MICHAEL) 10 November 1994 see page 2, line 30 - page 5	35
Y	US 5 610 678 A (TOYODA YASUHIRO ET AL) 11 March 1997 see column 4, line 40 - column 27	17,37,39
A	EP 0 665 686 A (TEXAS INSTRUMENTS INC) 2 August 1995 see column 2, line 20 - column 5	1-47
A	EP 0 827 337 A (SEIKO EPSON CORP) 4 March 1998 see column 5, line 36 - column 24, line 1	1-47
A	DE 92 17 643 U (SIWOFF) 17 March 1993 see page 28 - page 44	1-47

1

Form PCT/ISA/210 (continuation of second sheet) (July 1992)

Motorola v. Stellar
Motorola Exhibit 1032
Page 253

INTERNATIONAL SEARCH REPORT

information on patent family members

Inter nal Application No
PCT/CA 99/00249

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 4786966 A	22-11-1988	US 4884137 A	28-11-1989
		US 4970589 A	13-11-1990
		US 5005213 A	02-04-1991
		US 5200827 A	06-04-1993
DE 4436528 A	25-04-1996	NONE	
WO 9636271 A	21-11-1996	EP 0825826 A	04-03-1998
WO 9734411 A	18-09-1997	AU 2529197 A	01-10-1997
		EP 0890259 A	13-01-1999
US 5550585 A	27-08-1996	NONE	
DE 19547166 A	27-06-1996	KR 146142 B	15-09-1998
		US 5844604 A	01-12-1998
WO 9426061 A	10-11-1994	US 5583571 A	10-12-1996
US 5610678 A	11-03-1997	JP 7199280 A	04-08-1995
		JP 7199281 A	04-08-1995
EP 0665686 A	02-08-1995	US 5491510 A	13-02-1996
		CN 1115152 A	17-01-1996
		JP 8032960 A	02-02-1996
EP 0827337 A	04-03-1998	WO 9731477 A	28-08-1997
DE 9217643 U	03-06-1993	US 5267331 A	30-11-1993
		US 5359675 A	25-10-1994
		AU 653459 B	29-09-1994
		CA 2085277 A	10-12-1993
		GB 2267793 A,B	15-12-1993

Motorola v. Stellar
Motorola Exhibit 1032
Page 254

PCT WORLD INTELLECTUAL PROPERTY ORGANIZATION International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 6 : G06F 13/00 — A1

(11) International Publication Number: WO 99/56216

(43) International Publication Date: 4 November 1999 (04.11.99)

(21) International Application Number: PCT/US99/09317

(22) International Filing Date: 29 April 1999 (29.04.99)

(30) Priority Data:
09/069,257 29 April 1998 (29.04.98) US

(71) Applicant: SENSORMATIC ELECTRONICS CORPORATION [US/US]; 951 Yamat Road, Boca Raton, FL 33431-0700 (US).

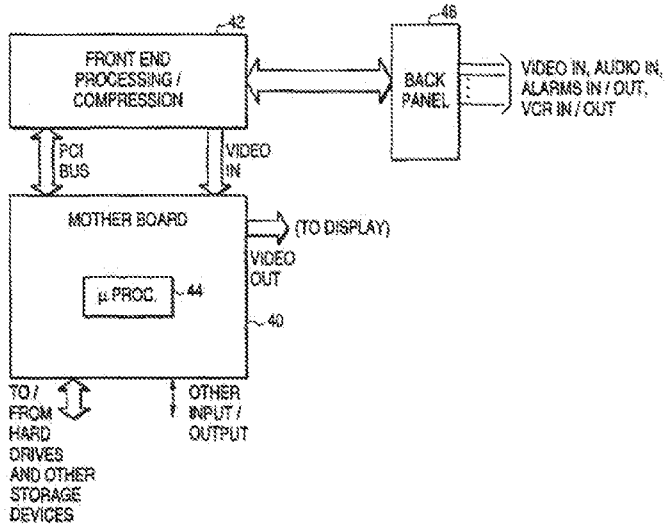
(72) Inventors: MACCORMACK, David, Ross; 3344 31st Street, San Diego, CA 92104 (US). WINTER, Gerhard, Josef; 7408 Park Village Road, San Diego, CA 92129 (US). LIN-LIU, Sen; 13005 Brixton Place, San Diego, CA 92130 (US).

(74) Agents: KASHIMBA, Paul, T. et al.; 951 Yamato Road, Boca Raton, FL 33431-0700 (US).

(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published
With international search report.

(54) Title: EFFICIENT PRE-ALARM BUFFER MANAGEMENT



(57) Abstract

A hard disk (100) in a video data storage apparatus (20) includes a first section in which video data is stored and appointed for permanent recording (216), and a second section in which the video data is stored subject to rewriting after a short period of time. If an alarm event occurs (204), some or all of the data in the second section may be secured for permanent storage (216). The process to be employed in securing the data in the second section for permanent storage (216) is adapted to the proportion of the data in the second section which is desired to be secured.

FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AL	Albania	ES	Spain	LS	Lesotho	SI	Slovenia
AM	Armenia	FI	Finland	LT	Lithuania	SK	Slovakia
AT	Austria	FR	France	LU	Luxembourg	SN	Senegal
AU	Australia	GA	Gabon	LV	Latvia	SZ	Swaziland
AZ	Azerbaijan	GB	United Kingdom	MC	Monaco	TD	Chad
BA	Bosnia and Herzegovina	GE	Georgia	MD	Republic of Moldova	TG	Togo
BB	Barbados	GH	Ghana	MG	Madagascar	TJ	Tajikistan
BE	Belgium	GN	Guinea	MK	The former Yugoslav Republic of Macedonia	TM	Turkmenistan
BF	Burkina Faso	GR	Greece			TR	Turkey
BG	Bulgaria	HU	Hungary	ML	Mali	TT	Trinidad and Tobago
BJ	Benin	IE	Ireland	MN	Mongolia	UA	Ukraine
BR	Brazil	IL	Israel	MR	Mauritania	UG	Uganda
BY	Belarus	IS	Iceland	MW	Malawi	US	United States of America
CA	Canada	IT	Italy	MX	Mexico	UZ	Uzbekistan
CF	Central African Republic	JP	Japan	NE	Niger	VN	Viet Nam
CG	Congo	KE	Kenya	NL	Netherlands	YU	Yugoslavia
CH	Switzerland	KG	Kyrgyzstan	NO	Norway	ZW	Zimbabwe
CI	Côte d'Ivoire	KP	Democratic People's Republic of Korea	NZ	New Zealand		
CM	Cameroon			PL	Poland		
CN	China	KR	Republic of Korea	PT	Portugal		
CU	Cuba	KZ	Kazakstan	RO	Romania		
CZ	Czech Republic	LC	Saint Lucia	RU	Russian Federation		
DE	Germany	LI	Liechtenstein	SD	Sudan		
DK	Denmark	LK	Sri Lanka	SE	Sweden		
EE	Estonia	LR	Liberia	SG	Singapore		

Motorola v. Stellar
Motorola Exhibit 1032
Page 256

Efficient Pre-Alarm Buffer Management

CROSS-REFERENCE TO RELATED APPLICATION

This application is a continuation-in-part of co-pending prior application Serial No. 08/740,627, filed October 31, 1996. The disclosure of the parent application, Serial No. 08/740,627, is incorporated herein by reference. Also to be noted is another related application, Serial No. 08/729,620, also filed October 31, 1996, now U.S. Patent No. 5,822,542.

BACKGROUND OF THE INVENTION

The above-referenced parent patent application discloses a digital video recorder which has intelligent video information management capabilities. A preferred application of the recorder of the parent application, as disclosed therein, is for selective recording of video signal streams generated by closed-circuit video security surveillance cameras. For this application, the recorder disclosed in the parent application is adapted to receive simultaneous input video signal streams from up to 16 cameras.

It is often desirable to record signal streams output from surveillance video cameras in order to preserve a record of unusual events captured by the video cameras. However, because of the enormous quantity of raw information present in a video signal stream, it is difficult to provide in an economical manner sufficient storage capacity for video signals corresponding to long periods of time. There have been a number of proposals intended to provide for efficient storage of surveillance video signals. For example, it has been proposed to record surveillance video signal streams only at very low frame rates (say, on the order of one field or frame per second). Low frame rate recording, however, carries the risk that crucial images will go unrecorded.

The difficulties in providing adequate storage capacity are increased when it is desired to have more than one video camera share a single recording device. One technique that has been utilized to improve the effectiveness of a shared recording device is to allocate larger portions of the recording bandwidth to video signal streams in which motion is detected. The premise is that signal streams representative of static images are unlikely to include information that is important. While this is a useful strategy, there remain significant risks that important information will be left out of the stream of images actually selected for

Motorola v. Stellar
Motorola Exhibit 1032
Page 257

recording.

The parent patent application discloses an additional strategy, referred to as pre-alarm buffering, which also promotes efficient use of limited signal storage capacity. The basic concept is that the respective video streams generated by some or all of the cameras connected to the recorder are not usually selected for permanent storage. Instead, a ring buffer is provided to record the signal streams at a given (perhaps shared) field rate for a limited period of time, say one minute. If a significant event is detected, such as tripping of an alarm sensor, actuation of an alarm condition by a human operator, or detection of a predetermined characteristic of an incoming image stream by machine analysis of the image stream, then the video signal stream in the ring buffer, which would normally have been overwritten, is preserved for permanent storage. Pre-alarm buffering represents a desirable compromise which avoids devoting permanent storage capacity to large quantities of uninteresting information, while increasing the likelihood that significant information will be permanently recorded. The present application is concerned with techniques for efficiently managing pre-alarm buffering operations.

OBJECTS AND SUMMARY OF THE INVENTION

It is accordingly an object of the invention to provide a digital video recorder with pre-alarm buffering capabilities.

It is a further object of the invention to provide a digital video recorder in which the signal storage capability is efficiently utilized.

According to a first aspect of the invention, there is provided a video data storage apparatus, including a plurality of video cameras, each generating a respective stream of video signals; conversion circuitry, connected to the plurality of video signals, for selectively converting the streams of video signals into respective streams of video data signals; a circular data buffer for selectively storing ones of the streams of video data signals subject to overwriting by more current video data signals; a main data store for selectively storing ones of the streams of video signals and for writing the video data signals in the main data store to a removable archive recording medium; a detection circuit for detecting an alarm condition; and a control circuit for selecting between a first process and a second process different from the first process, on the basis of the alarm condition detected by the detection circuit, the first and second processes both being processes for transferring a stream of video data signals from the circular data buffer to the main data store.

Motorola v. Stellar
Motorola Exhibit 1032
Page 258

According to this aspect of the invention, the circular data buffer and the main data store may respectively include first and second portions of a hard disk drive. Moreover, the first process may include reading the stream of video data signals to be transferred from the circular data buffer and rewriting that stream of video data signals to the main data store, and the second process may include designating the first portion of the hard disk to be a portion of the main data store.

According to a second aspect of the invention, there is provided a method of operating a digital video recorder which includes a disk-shaped storage medium and which selectively records on the storage medium digital data signals representing respective streams of video signals generated by a plurality of video cameras connected to the recorder, the recorder including a pre-alarm buffer as a designated portion of the storage medium, and the method including the steps of detecting an alarm condition, selecting, on the basis of the detected alarm condition, one of two processes for designating for permanent storage video data signals stored in the pre-alarm buffer, and executing the selected one of the two processes; wherein the first of the two processes includes reading some but not all of the video data signals stored in the pre-alarm buffer and writing the read video data signals into a portion of the storage medium different from the pre-alarm buffer, and the second of the two processes includes (i) redesignating the designated portion of the storage medium corresponding to the pre-alarm buffer such that all of the video data signals stored in the designated portion are appointed for permanent storage, and (ii) designating a new portion of the storage medium to be the pre-alarm buffer.

According to a third aspect of the invention, there is provided a method of operating a digital video recorder which includes a disk-shaped storage medium and which selectively records on the storage medium digital data signals representing respective streams of video signals generated by a plurality of video cameras connected to the recorder, the method including the steps of selecting ones of the video cameras for recording on the storage medium in a pre-alarm buffer mode; for each of the selected video cameras, designating a respective portion of the storage medium to serve as a circular buffer for temporarily storing video data signals representing video signals generated by the respective camera; temporarily storing in the designated portions video data signals representing video signals generated by the respective selected cameras; detecting an alarm condition; determining that at least one of the selected cameras is relevant to the detected alarm condition; and, for each camera determined

Motorola v. Stellar
Motorola Exhibit 1032
Page 259

to be relevant to the detected alarm condition: (i) re-designating for permanent storage the respective portion of the storage medium previously designated to be the circular buffer for the respective camera, and (ii) designating a portion of the storage medium, different from the redesignated portion, to serve as a circular buffer for temporarily storing video data signals generated by the respective camera.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a perspective view of a video recording/personal computer (VR/PC) unit provided in accordance with the invention.

Fig. 2 is a summary block diagram representation of electronic components of the VR/PC unit of Fig. 1.

Fig. 3 is a summary block diagram representation of a front end processing/compression component shown in Fig. 2.

Fig. 4 illustrates video data and index data formats utilized by the VR/PC unit in storing video data on the hard disk provided therein.

Fig. 5 illustrates processing carried on by a main processor in the VR/PC unit in response to an indication of an alarm condition.

Fig. 6 illustrates in flow-chart form a video storage processing software module, provided in accordance with the invention, for the main processor of the VR/PC unit.

Fig. 7 illustrates an alternative video data format provided, according to an aspect of the invention, for the VR/PC hard disk.

Fig. 8 is a flow-chart illustrating an alternative pre-alarm buffer management technique provided in accordance with the invention.

DESCRIPTION OF PREFERRED EMBODIMENTS

Fig. 1 is a perspective view of an integrated device which combines digital video recording, random access retrieval of recorded video data, and user-friendly personal-computer-based functionality. Reference numeral 20 generally indicates the integrated device, which may be referred to as a video recording/personal computer or "VR/PC" unit. The VR/PC unit is adapted to receive streams of video signals generated by one or more video cameras. A preferred embodiment is configured to receive simultaneous input from 16 cameras (which are not shown in Fig. 1). The VR/PC unit also provides an output video signal, either live from one or more video cameras, or reproduced from video data storage facilities provided within the VR/PC unit, to drive one or more display monitors, which also

Motorola v. Stellar
Motorola Exhibit 1032
Page 260

are not shown in Fig. 1.

The internal components of the VR/PC unit 20 are contained within a molded plastic housing 22. As will be seen, the internal components include control and signal processing circuitry, as well as a number of data recording devices. For example, integrated within the VR/PC unit there are preferably two or more fixed or "hard" data recording drives of the magnetic type, as well as at least one drive for a removable data storage medium. A preferred embodiment includes both a floppy disk drive and a digital audio tape (DAT) drive. The floppy drive may be used for loading software programs; the DAT drive may be used to store video data, retrieved from the internal hard drives, for permanent or archival storage on a magnetic tape formatted in accordance with the standard DAT format. Access to the drives for removable media (which are not shown in the drawing) may be had via a hinged dust-shield 24 provided at a front elevation 26 of the housing 22. Also provided at the front elevation 26 is a front panel 28 on which a plurality of switches are mounted. The switches permit the user to control various functions such as selecting input cameras for displaying, setting a format for a displayed video signal, and controlling playback operations.

A commercial embodiment of a VR/PC unit, of a type in which the present invention may be applied, is currently being sold under the trademark "INTELLEX" by the assignee of the present invention, Sensormatic Electronics Corporation, Boca Raton, Florida.

An overview of the internal components of the VR/PC unit will now be provided, with reference to Fig. 2. As seen from Fig. 2, primary components include a motherboard 40 and front end processing/compression electronics 42.

The motherboard 40 provides the overall intelligence and control for the VR/PC unit. Preferably, the motherboard 40 is constructed in accordance with conventional architecture for personal computer motherboards. The central processing unit for the motherboard is preferably constituted by a conventional microprocessor 44, which may, for example, be one of the models of the well known Pentium line of microprocessors.

The motherboard 40 controls, and exchanges data with, data storage devices such as the above-mentioned hard disk drives, DAT drive and floppy disk drive. The motherboard is also adapted to receive user control signals, which may be input via the front panel 28 (Fig. 1) or via conventional user input devices (not shown) such as a mouse and/or a keyboard. The motherboard 40 also exchanges data with the front end processing/compression electronics 42 while receiving an input digital video signal from the front end electronics 42, and

Motorola v. Stellar
Motorola Exhibit 1032
Page 261

providing an output video signal to a display monitor, which is not explicitly shown in Fig. 2.

It should be understood that the motherboard 40 includes conventional features such as program memory, working memory, input and output data communication ports, data signal bus connections, interfaces for recording medium drives, and video interface ports. All of these are preferably of conventional construction.

The front end electronics 42 provide signal processing with respect to input video signals received via a back panel 46. The arrangement of the front end electronics 42 may be like that incorporated in the above-mentioned INTELLEX video recorder and/or as disclosed in the above-referenced parent patent application.

Certain features of the front end electronics 42 are schematically illustrated in Fig. 3. At the input side of the front end electronics 42 is a multiplexer 50 which selects ones of the input camera streams for recording and/or display by the VR/PC unit. Any one of the input video signal streams may be assigned to any one of three video signal locking channels 52-1, 52-2 and 52-3. At the output side of the signal locking channels, a channel-selection multiplexer 54 is arranged to assign any one of the three signal locking channels to either one of two signal conversion channels 56-1 and 56-2. The signal conversion channels are provided to convert the selected stream of analog video signals into a sequence of digital video data. The resulting digital video data is then subjected to further processing, including data compression, as indicated at 58 in Fig. 3. The processed data is then made available for storage via the motherboard and/or for display.

Preferably, the digital video data is also supplied to a signal processing circuit (not separately shown in Fig. 3) which selectively applies image content analysis algorithms to one or more of the input video streams in order to detect significant characteristics of the images represented by the video streams. Among other possibilities, the signal processing circuit may be programmed to detect motion, or certain types of motion, in the input video signal streams.

Fig. 4 illustrates a format in which compressed video data is stored on one or more of the hard disk drives of the VR/PC unit. As seen from Fig. 4, the data stored on the hard drives includes compressed video data 100 and indexed data 102. The video data corresponds to the incoming streams from all 16 cameras (if as many as 16 cameras are connected to the VR/PC, are in operation, and are selected for either permanent or pre-alarm buffer recording). The video data is preferably stored in an audio/video interleave (AVI) format.

Motorola v. Stellar
Motorola Exhibit 1032
Page 262

The data corresponding to the streams of incoming video signals are stored interleaved together in the form of fixed length files 104, of which N files 104 are shown in Fig. 4 as being recorded on the hard disk. A preferred size for each of the files 104 is about 20 megabytes. By dividing up the continuous streams of video data into files, loss of data due to a drop out or data corruption on the hard disk can be limited.

Even with data compression, the storage capacity provided by the files 104 is limited. It is therefore a preferred mode of operating the VR/PC that the video data files be transferred to a removable storage medium, such as a magnetic tape, for archival storage.

In addition to the quasi-permanent video data files 104, there is also stored on the hard disk video data maintained in a pre-alarm buffer section of the disk (reference numeral 106). The pre-alarm buffer 106 preferably stores video data corresponding to the incoming video signals from all 16 cameras in an interleaved fashion and at what is substantially the full frame rate for the system (e.g., 45 fields per second divided among the 16 cameras). By contrast, it should be understood that some or all of the 16 cameras may not be currently recorded at all in the quasi-permanent files 104, or may be stored at a "time lapse" rate that is substantially less frequent than 45/16 fields per second. The pre-alarm buffer 106 is preferably implemented as a ring buffer on the hard disk and may, for example, store all of the video fields captured at the front end electronics over the past 60 seconds. As in the files 104, the respective signal streams are stored in an interleaved fashion in the pre-alarm buffer 106. It should also be understood that at least some of the 16 cameras may be placed in an "inactive" mode, such that not even pre-alarm buffering is performed for the signals generated from such cameras. In this case, greater storage bandwidth for each other camera is available in the pre-alarm buffer.

Turning now to the index data on the hard disk, overall indexing information covering all of the files 104 is indicated at reference numeral 108. For each of the N files 104, a starting date and time and an ending date and time are provided. An additional, file-specific index is provided with respect to each one of the individual files 104. This file-specific index is illustrated at 110 and provides, for each field of video data, the date and time at which the field was captured, the camera by which the field was captured, event-related information, and the offset within the file at which the field can be found. As indicated at reference numeral 112, the event information given for a particular field may include data indicative of the occurrence of more than one type of event at the time that the field was captured. The

Motorola v. Stellar
Motorola Exhibit 1032
Page 263

detection of events may be accomplished through alarm sensors interfaced to the VR/PC unit, and/or by analysis of characteristics of the image stream. The analysis may have occurred either at the time the image stream was received or by playing back the image stream at a later time. The image stream analysis algorithms used to detect the events may return confidence factor values in addition to detecting that an event itself has occurred. In such cases, the data indicating that an event has been detected may be accompanied by the confidence factor provided by the event detection algorithm, as indicated at reference numeral 114.

In a preferred embodiment of the invention, the indexing information 102 is stored on the same hard disk with the associated video data files 100, and the indexing information is also stored on a second hard disk. The second hard disk may then be accessed in order to search for the locations on the first hard disk of video data that is of interest to the user, while access to the first hard disk for the purpose of storing new video data thereon continues without interruption for index searching. In one embodiment of the invention, two hard disks are provided, of which one is used for video data storage (and associated indexing) while the other hard disk is not used for video data storage, but rather is dedicated to backup or "shadow" index information and storage of programs or the like. In another embodiment of the invention, three or more hard disk drives are provided. In the latter embodiment, one of the hard drives is dedicated to the shadow index and program information storage, and the other two or more hard disks are available for video data storage.

There will now be described an alarm handler software component which controls operation of the microprocessor 44 (Fig. 2) in connection with responding to detection of alarm conditions. The alarm handler software component is illustrated in flow-chart form in Fig. 5. For the purposes of Fig. 5, it is assumed that an alarm message has been received by the microprocessor 44 from the front end electronics 42. It is then determined, at step 120, whether a user of the VR/PC unit has elected to have alarms handled according to a standard protocol or a custom protocol. If a standard protocol has been selected, then step 122 follows step 120. At step 122, one or more predetermined "alarm out" signals are generated according to the type of alarm message that was received. For example, the "alarm out" signal or signals may automatically close or lock doors, actuate sirens or visible alarm indications, or the like. Following step 122 is step 124, at which a message is generated to cause the front end electronics 42 to change the sequence in which the video signal fields are captured from the respective cameras attached to the VR/PC unit. For example, cameras expected to produce

Motorola v. Stellar
Motorola Exhibit 1032
Page 264

images relevant to the alarm condition may be added to the sequence of cameras selected for recording, or may have their share of the recording bandwidth increased.

The next step is step 126, at which it is determined whether the VR/PC unit is being operated in a pre-alarm buffering mode. If so, then step 128 follows step 126. In step 128, a software message is dispatched to instruct a video storage software component to capture for permanent storage relevant data in the pre-alarm buffer, as will be described in more detail below.

Following step 128 is step 130 (which directly follows step 126 if the VR/PC is not being operated in a pre-alarm buffering mode). At step 130, the alarm timer is set (or extended, if an alarm condition is already in effect), and the detected alarm event is added to a list of alarm events maintained by the microprocessor 44.

Step 132 follows step 130. Step 132 indicates that the recording sequence established at step 124 is maintained until the alarm timer times out. The determination as to whether the last alarm has timed out is made at step 134, and if this occurs, the alarm timer is shut down (step 136).

If at step 120 it was determined that a custom alarm handling mode is in effect, then step 138 follows step 120. At step 138, the determination is made as to the camera, type of event and the time of occurrence relative to the alarm condition which has been detected. There follows step 140, at which the relevant camera, event type and time data are used to fetch the appropriate event response script from an event response script database 142. Following step 140 is a software loop, indicated at step 144, which is carried out for each command in the retrieved event response script. The loop is made up of steps 146, 148 and 150. At step 146, the command corresponding to the present line in the script is read. At step 148, a message corresponding to the command is encoded, and at step 150 the message is sent to a system director software component, which functions as a message clearing house for the software which programs the microprocessor 44. It will be understood that the command messages sent to the system director software component will trigger appropriate responses in other software components which control operation of the microprocessor 44.

Motorola v. Stellar
Motorola Exhibit 1032
Page 265

An example of a typical event response script follows:

Event Response Script (Example)

ALARM1 OUT = ON	(1)
ALARM2 OUT = ON	(2)
CAMERA1RATE = 30	(3)
CAMERA1 = ON	(4)
WAIT = 30	(5)
RESUME	(6)

It will be observed that the exemplary event response script set forth above consists of six lines. The first line indicates that the alarm 1 output signal is to be turned on. This may be, for example, a signal to actuate a visual alarm indicator such as a flashing light. The second line indicates that the alarm 2 output signal is to be turned on. This may operate, for example, an audible alarm indicator, such as a siren.

The third line indicates that the rate at which fields from camera 1 are to be captured for recording is set to 30 fields per second. The remaining recording bandwidth will then be allocated among other cameras which had previously been sequenced for recording.

The fourth line indicates that recording status for camera 1 is to be set to "on". This command would override any previous command that had software-disabled camera 1.

The fifth command indicates that the status defined by the first four lines of the response script is to be maintained for 30 seconds.

The sixth and final line of the script indicates that the prior operating status of the system is to resume after the 30-second alarm response.

The exemplary event response script shown above contains no commands in regard to video data that has been pre-alarm buffered, but it will be appreciated that the script may include commands to secure for permanent storage relevant video data in the pre-alarm buffer, as discussed above in connection with step 128.

The above-mentioned video storage software component will now be described. The video storage software component performs the functions of managing pre-alarm video data buffering on the hard disk or disks, storing incoming video streams on the hard disk, and indexing the stored video data on the hard disk. The video data format on the disk was described above, in connection with Fig. 4.

The video storage software component is illustrated in flow-chart form on Fig. 6.

Motorola v. Stellar
Motorola Exhibit 1032
Page 266

Initially, it is determined at step 200 whether the video storage software component is now engaged in the pre-alarm buffer management portion of its function or the function of storing incoming video data for quasi-permanent recording (represented by block 202). For the sake of the further discussion, it will be assumed that the video storage software component is engaged in pre-alarm buffer management. In this case, it is determined, as represented at decision step 204, whether an alarm condition has been detected. If not, the next "chunk" of video data to be stored in the pre-alarm buffer is placed at the next storage location in the portion of the hard disk utilized as a ring buffer for pre-alarm storage (step 206; it will be recalled that the pre-alarm buffer portion of the hard disk's space was indicated by reference numeral 106 in Fig. 4; it should also be understood that a "chunk" of video data corresponds to a quantity of data that is conveniently handled and buffered in preparation for writing the data onto the hard disk). After step 206, it is determined whether the end of the ring buffer portion 106 of the hard disk has been reached (step 208). If so, the pointer indicative of the next storage location in the ring buffer 106 is moved to the front of the ring buffer (step 210). Otherwise, the pointer is simply moved to the next storage location in the ring buffer 106 (step 212).

If at step 204 an alarm condition was found to have been detected, then step 214 follows step 204. Step 214 represents a decision point in the video storage software component, at which a selection is made between alternative processes for preventing video data stored in the pre-alarm buffer from being overwritten, and securing the data of interest for permanent storage. The decision as to which one of the alternative processes to employ may be made on a number of different bases, but preferably is to be made by determining what proportion of the video data stored in the pre-alarm buffer is relevant to the alarm condition that was detected. One way this may be done is by comparing the total number of camera streams stored in the pre-alarm buffer with the number of cameras indicated as "relevant" in an alarm-handling script that has been established for the detected alarm condition. If the number of relevant cameras is few in comparison to the number of cameras currently being recorded in the pre-alarm buffer, then a first process, represented by steps 216-220 would be selected. If all or a relatively large number of the camera streams being recorded in the pre-alarm buffer are relevant to the alarm condition, then a process represented by steps 222 and 224 would be selected. Thus, the process for securing for permanent storage video data in the pre-alarm buffer is adapted to the currently-detected alarm condition. The process of securing

Motorola v. Stellar
Motorola Exhibit 1032
Page 267

for permanent recording video data stored in the pre-alarm buffer may be referred to as pre-alarm buffer "integration" in the sense that data from the pre-alarm buffer is being integrated with other video data selected for permanent storage.

The pre-alarm buffer integration process of steps 216-220 begins with copying from the pre-alarm buffer portion of the hard disk to the "permanent storage" portion of the hard disk the video data in the pre-alarm buffer which was generated by cameras that are relevant to the currently-detected alarm condition. That is, the relevant data is read from the pre-alarm buffer portion 106 of the hard disk (Fig. 4) and then is written into the one of the permanent storage files 104 into which interleaved video data is currently being recorded. As indicated in step 218 of Fig. 6, the copying of the relevant data from the pre-alarm buffer portion to the permanent storage portion of the hard disk continues until all of the relevant data has been transferred. Then, as indicated at step 220, the pointer data for the pre-alarm buffer is reset.

The alternative pre-alarm buffer integration process, represented by steps 222 and 224, avoids the processing burden required for reading data from the pre-alarm buffer and rewriting the data in the permanent storage portion of the hard disk. Instead, a new portion of the disk, different from that currently being used for the pre-alarm buffer, is designated to be the pre-alarm buffer and the existing pre-alarm buffer data, in its entirety, is designated for permanent storage. This can be accomplished entirely by updating pointer values and index data, so that no reading and rewriting of the video data itself is required. Although this technique is advantageous in terms of conserving processing resources, it represents a potential waste of storage capacity, to the extent that any of the data in the pre-alarm buffer is not relevant to the currently detected alarm condition.

The pre-alarm buffer integration process of steps 216 and 218, which entails reading video data from the pre-alarm buffer and then writing that data into a permanent storage file, may also be carried out according to the following alternative. In this alternative technique, the occurrence of an alarm initiates reading from the pre-alarm buffer of implicated camera streams for transfer to the permanent data file; at the same time, current data for those streams continues to be written into the pre-alarm buffer. The reading/transfer proceeds at a faster rate than the writing of the current data, and continues until the reading/transfer "catches up" to the current data. At that point, the current data is written directly into the permanent storage file, and this continues until the alarm interval ends. Upon expiration of the alarm, recording of the relevant camera streams into the pre-alarm buffer resumes.

Motorola v. Stellar
Motorola Exhibit 1032
Page 268

An alternative approach to the problem of pre-alarm buffer integration will now be described with reference to Figs. 7 and 8. This approach relies upon separate pre-alarm ring buffers for each camera that is to be buffered, in place of the shared, interleaved pre-alarm buffer 106 shown in Fig. 4.

Fig. 7 shows a modification to the video data format of Fig. 4, in that the pre-alarm buffer 106 is replaced with separate ring buffers 230, each of which is dedicated to a respective one of the cameras selected for pre-alarm buffering.

As indicated in Fig. 8, provision of dedicated buffers for each camera to be pre-alarm recorded eliminates any need for reading and rewriting the pre-alarm buffered data in the event of any relevant alarm condition. Initially in Fig. 8, it is determined (step 232) whether an alarm condition is detected. If not, normal pre-alarm buffer recording takes place, as represented by block 234 in Fig. 8, and as described above in connection with steps 206-212 of Fig. 6.

Continuing to refer to Fig. 8, if an alarm condition was detected, then step 236 follows step 232. As indicated at step 236, for each camera stream determined to be relevant to the detected alarm condition, steps 238 and 240 are carried out. At step 238, the ring buffer corresponding to the relevant camera is redesignated for permanent storage and then a new ring buffer is established for the camera (step 240). The impact of step 238 is illustrated at 242 in Fig. 7, which provides some details of a "permanent recording" video data file 104 which has been designated "file number 1". In Fig. 7, blocks 244-1 and 244-2 represent blocks of video data which include interleaved streams generated from a plurality of cameras. Blocks 244-1 and 244-2 represent the data format produced when a number of camera streams were designated for concurrent recording in a permanent portion of the hard disk with time-division multiplexing of the recording bandwidth. A non-interleaved data block 246 is shown as present between blocks 244-1 and 244-2. Block 246 corresponds to video data produced by a single camera, originally recorded in a pre-alarm ring buffer for that camera which was later re-designated for permanent storage. Marker 248 is present in the sequence of data blocks to indicate that the next block is a non-interleaved block. It will be understood that the sequence of blocks illustrated at 242 is a virtual sequence, established by index and pointing information used to manage the data recorded on the hard disk.

Motorola v. Stellar
Motorola Exhibit 1032
Page 269

WHAT IS CLAIMED IS:

1. A video data storage apparatus, comprising:

a plurality of video cameras, each generating a respective stream of video signals;

conversion means, connected to said plurality of video cameras, for selectively converting said streams of video signals into respective streams of video data signals;

circular buffer means for selectively storing ones of said streams of video data signals subject to overwriting by more current video data signals;

main storage means for selectively storing ones of said streams of video data signals and for writing the video data signals stored in said main storage means to a removable archive recording medium;

detection means for detecting an alarm condition; and

control means for selecting between a first process and a second process different from said first process, on the basis of the alarm condition detected by said detection means; said first and second processes both being processes for transferring a stream of video data signals from said circular buffer means to said main storage means.

2. A video data storage apparatus according to claim 1, wherein:

said circular buffer means and said main storage means comprise, respectively, first and second portions of a hard disk drive;

said first process comprises reading said stream of video data signals to be transferred from said circular buffer means and writing said read stream of video data signals to said main storage means; and

said second process comprises designating said first portion of said hard disk drive to be a portion of said main storage means.

3. A video data storage apparatus according to claim 1, wherein said detection means includes means for analyzing images represented by at least one of said streams of dynamic video signals generated by said video cameras.

4. A video data storage apparatus according to claim 1, wherein said detection means includes at least one alarm sensor.

Motorola v. Stellar
Motorola Exhibit 1032
Page 270

5. A method of operating a digital video recorder which includes a disk-shaped storage medium and selectively records on said storage medium digital data signals representing respective streams of video signals generated by a plurality of video cameras connected to the recorder, the recorder including a pre-alarm buffer as a designated portion of said storage medium, the method comprising the steps of:

detecting an alarm condition;

selecting, on the basis of the detected alarm condition, one of two processes for designating for permanent storage video data signals stored in said pre-alarm buffer; and

executing the selected one of said two processes;

a first of said two processes including reading some but not all of video data signals stored in said pre-alarm buffer and writing the read video data signals in a portion of said storage medium different from said pre-alarm buffer; and

a second of said two processes including (i) redesignating said designated portion of said storage medium corresponding to said pre-alarm buffer such that all of the video data signals stored in said designated portion are appointed for permanent storage, and (ii) designating a new portion of said storage medium to be the pre-alarm buffer.

6. A method according to claim 5, wherein said storage medium is a hard disk.

7. A method according to claim 5, wherein said pre-alarm buffer is maintained in an interleaved condition for storing respective signal streams generated by more than one of said plurality of video cameras.

8. A method of operating a digital video recorder which includes a disk-shaped storage medium and selectively records on said storage medium digital data signals representing respective streams of video signals generated by a plurality of video cameras connected to the recorder, the method comprising the steps of:

(a) selecting ones of said video cameras for recording on said storage medium in a pre-alarm buffer mode;

(b) for each of said selected video cameras, designating a respective portion of said storage medium to serve as a circular buffer for temporarily storing video data signals representing video signals generated by the respective camera;

Motorola v. Stellar
Motorola Exhibit 1032
Page 271

(c) temporarily storing in said designated portions video data signals representing video signals generated by the respective selected cameras;

(d) detecting an alarm condition;

(e) determining that at least one of the selected cameras is relevant to the detected alarm condition; and

(f) for each camera determined to be relevant to the detected alarm condition,

(i) re-designating for permanent storage the respective portion of the storage medium designated at step (b) to be the circular buffer for the respective camera; and

(ii) designating a portion of said storage medium, different from said redesignated portion, to serve as a circular buffer for temporarily storing video data signals generated by the respective camera.

9. A method according to claim 8, wherein said storage medium is a hard disk.

Motorola v. Stellar
Motorola Exhibit 1032
Page 272

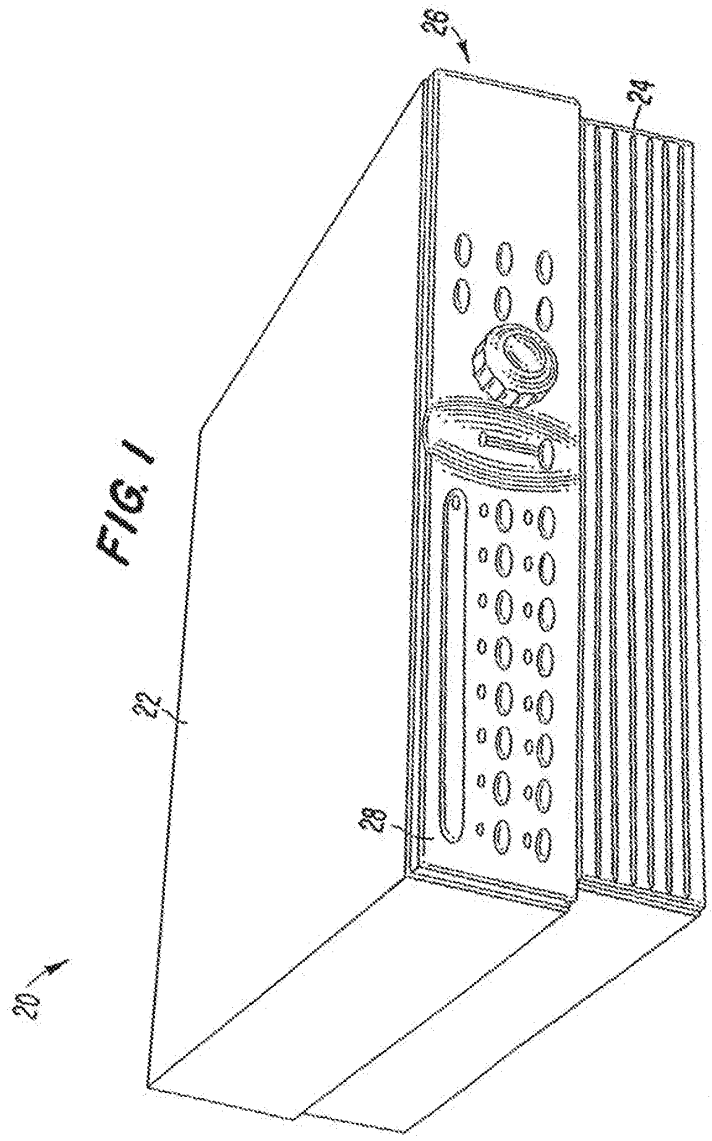
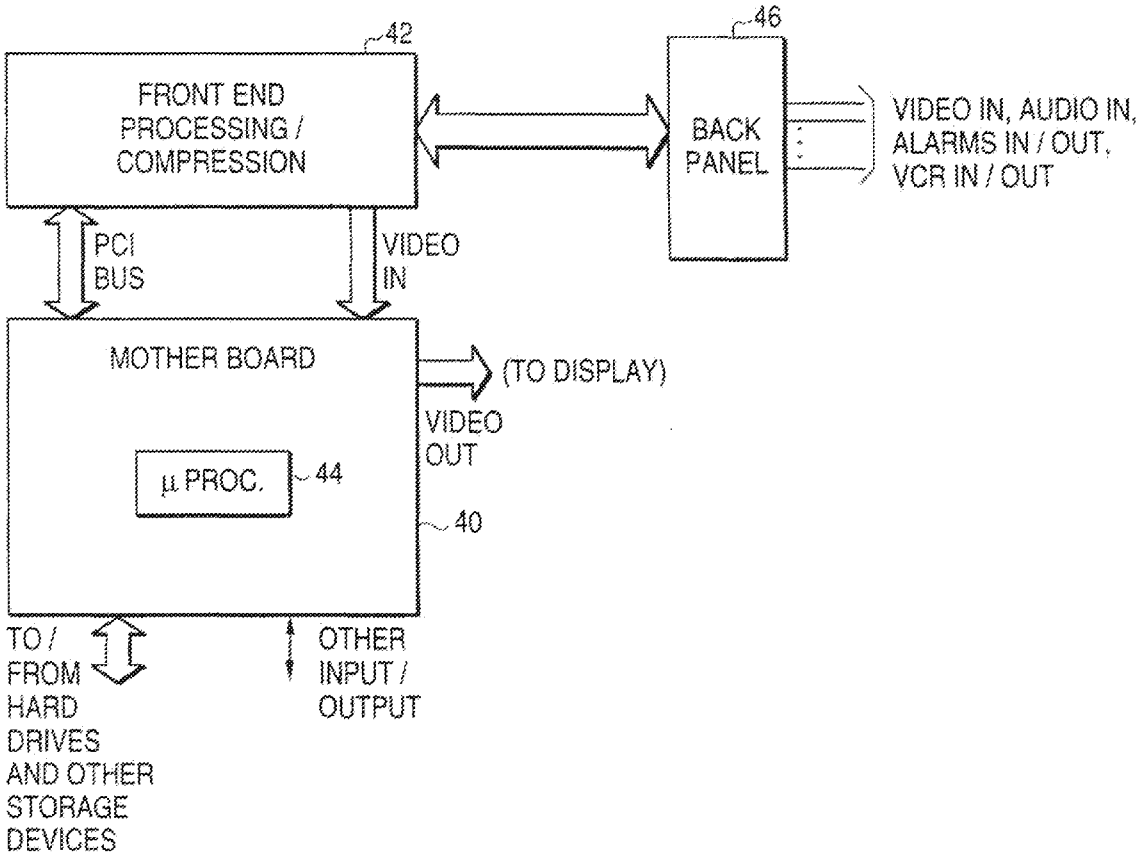


FIG. 1

VR/PC

FIG. 2



Motorola v. Stellar
Motorola Exhibit 1032
Page 274

FIG. 3

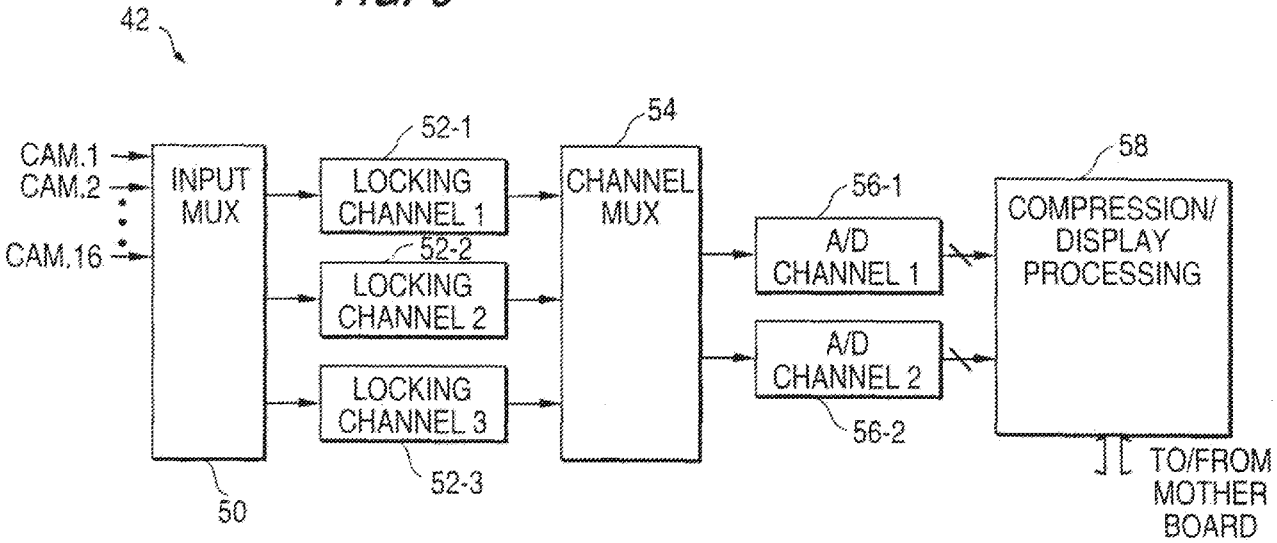
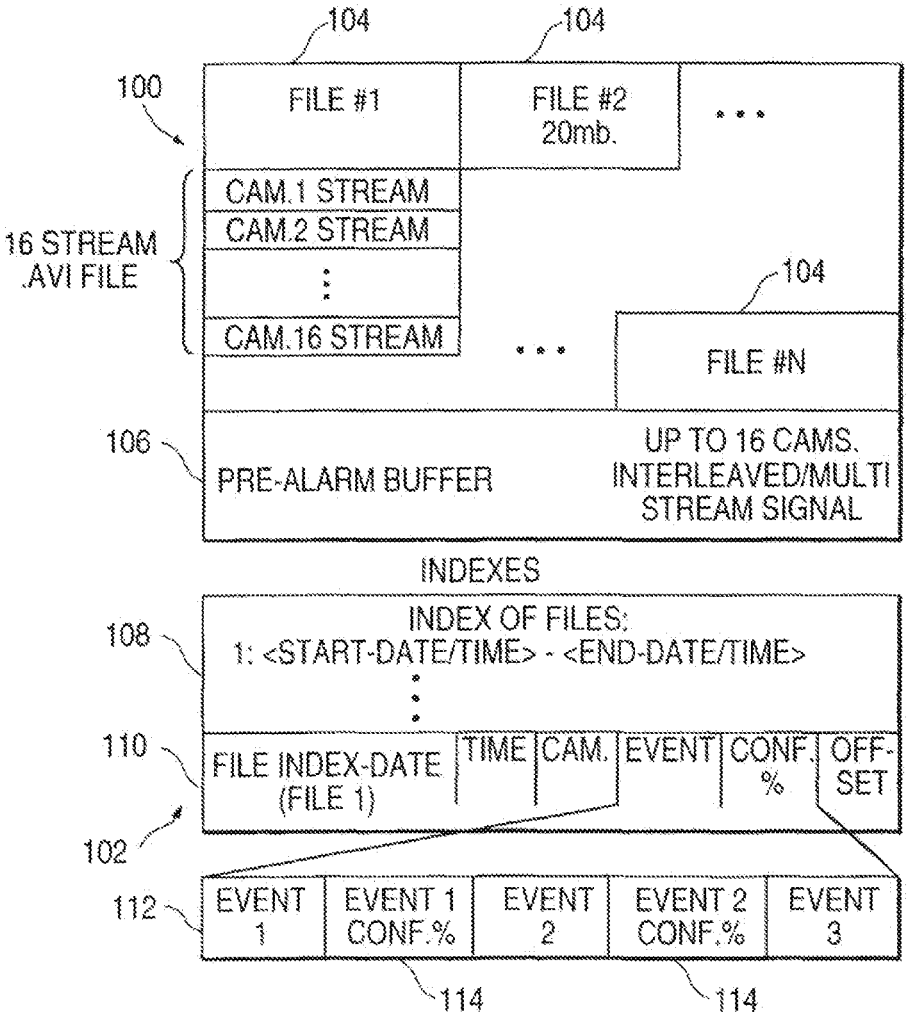

42
CAM.1
CAM.2
CAM.16
INPUT MUX
50
52-1
LOCKING CHANNEL 1
52-2
LOCKING CHANNEL 2
LOCKING CHANNEL 3
52-3
54
CHANNEL MUX
56-1
A/D CHANNEL 1
A/D CHANNEL 2
56-2
58
COMPRESSION/ DISPLAY PROCESSING
TO/FROM MOTHER BOARD

FIG. 4

VIDEO DATA FORMAT ON DISK



Motorola v. Stellar
Motorola Exhibit 1032
Page 276

FIG. 5

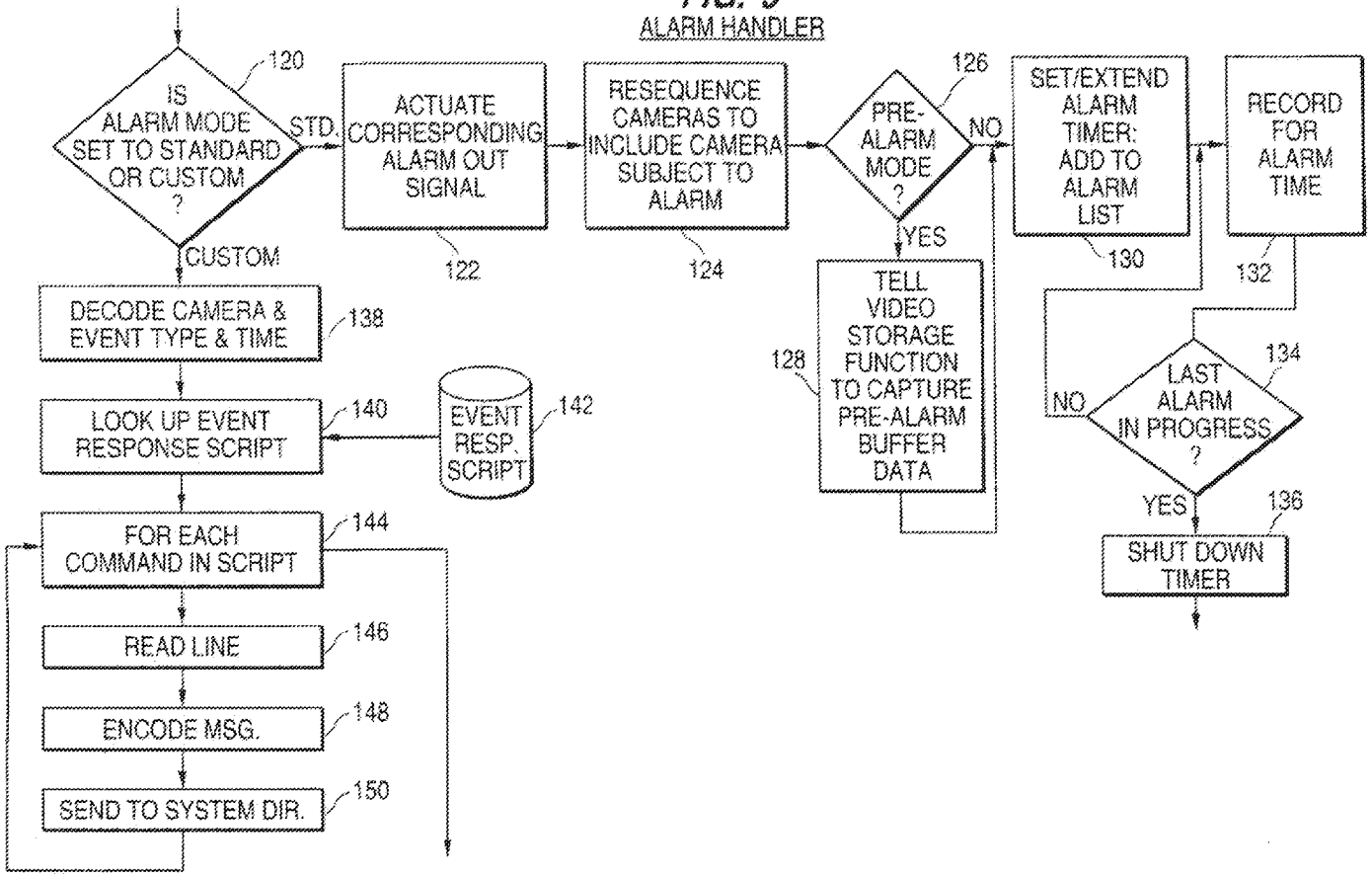
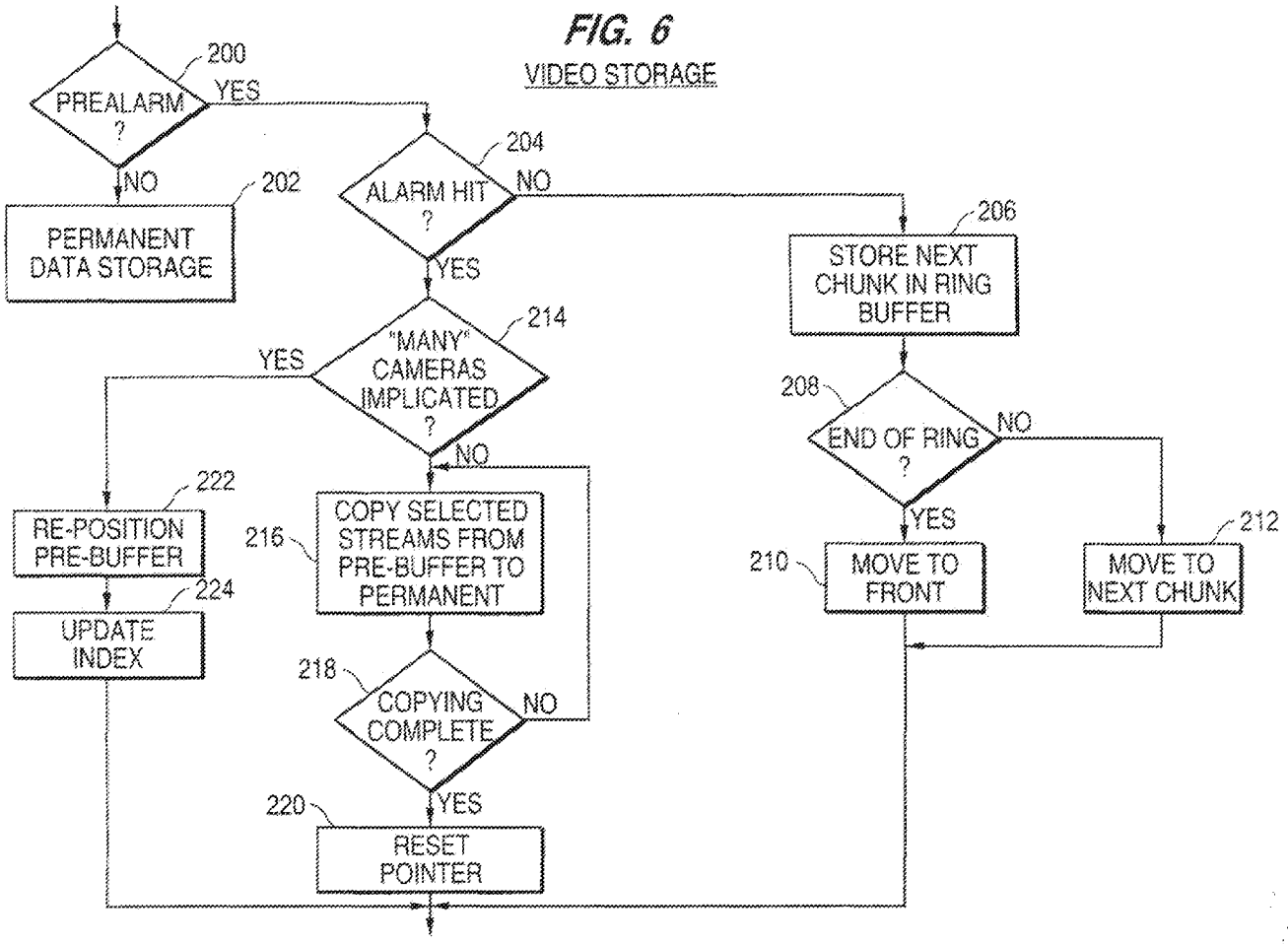

ALARM HANDLER
IS ALARM MODE SET TO STANDARD OR CUSTOM ?
120
STD.
CUSTOM
ACTUATE CORRESPONDING ALARM OUT SIGNAL
122
RESEQUENCE CAMERAS TO INCLUDE CAMERA SUBJECT TO ALARM
124
PRE-ALARM MODE ?
126
NO
YES
SET/EXTEND ALARM TIMER: ADD TO ALARM LIST
130
RECORD FOR ALARM TIME
132
TELL VIDEO STORAGE FUNCTION TO CAPTURE PRE-ALARM BUFFER DATA
128
LAST ALARM IN PROGRESS ?
134
NO
YES
SHUT DOWN TIMER
136
DECODE CAMERA & EVENT TYPE & TIME
138
LOOK UP EVENT RESPONSE SCRIPT
140
EVENT RESP. SCRIPT
142
FOR EACH COMMAND IN SCRIPT
144
READ LINE
146
ENCODE MSG.
148
SEND TO SYSTEM DIR.
150

FIG. 6

VIDEO STORAGE



Motorola v. Stellar
Motorola Exhibit 1032
Page 278

FIG. 7

VIDEO DATA FORMAT ON DISK
-NON-INTERLEAVED PRE-ALARM BUFFER

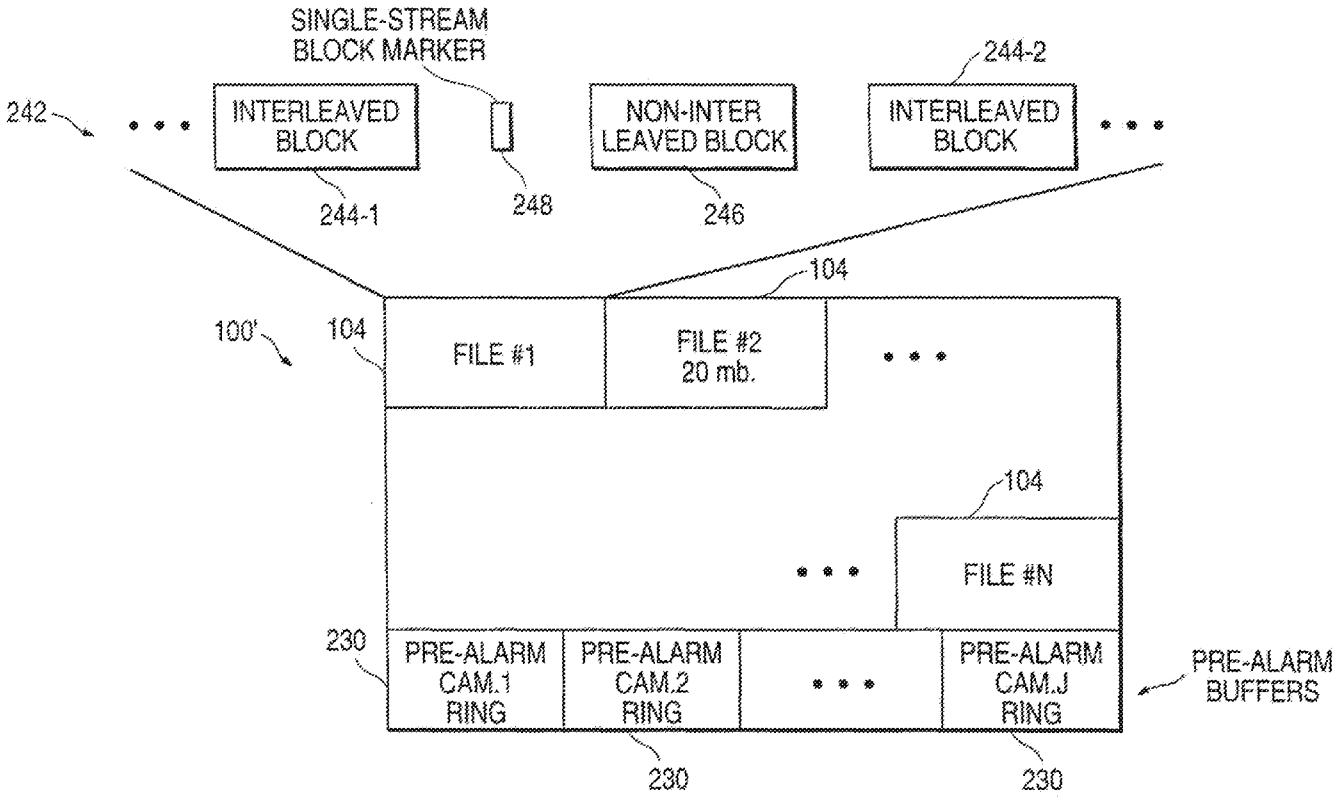
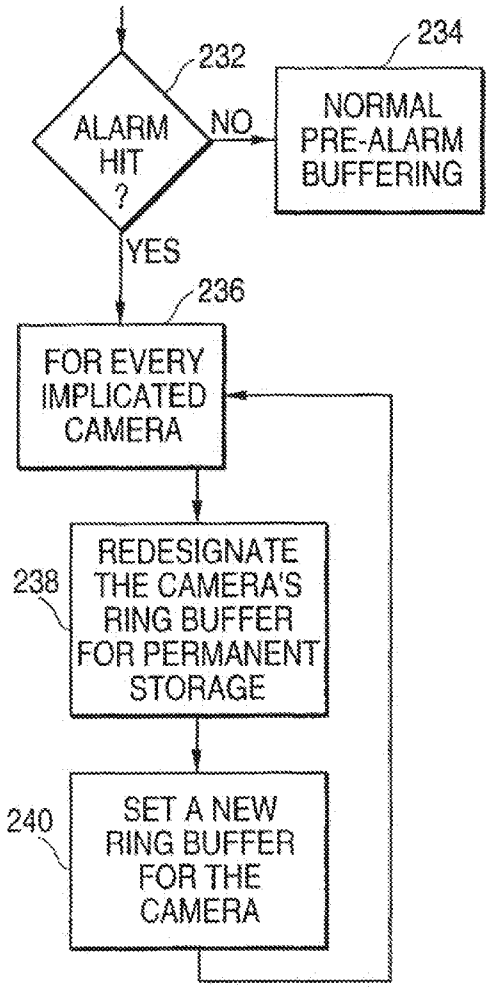


FIG. 8
ALARM HANDLING-
NON-INTERLEAVED
PRE-ALARM BUFFER



INTERNATIONAL SEARCH REPORT

International application No.
PCT/US99/09317

A. CLASSIFICATION OF SUBJECT MATTER
IPC(6) :G06F 13/00
US CL :709/261
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
U.S. : 709/261

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
APS

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5,724,475 A (KIRSTEN) 03 March 1998, fig. 2, fig.2, item 72, fig. 2, item 78, fig. 2, item 76, fig. 1, fig. 2, item 74.	1-9

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

*	Special categories of cited documents:	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A"	document defining the general state of the art which is not considered to be of particular relevance	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E"	earlier document published on or after the international filing date	"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"L"	document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&"	document member of the same patent family
"O"	document referring to an oral disclosure, use, exhibition or other means		
"P"	document published prior to the international filing date but later than the priority date claimed		

Date of the actual completion of the international search	Date of mailing of the international search report
24 JULY 1999	18 AUG 1999
Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. (703) 305-3230	Authorized officer THOMAS PEESO Telephone No. (703) 305-9784

Form PCT/ISA/210 (second sheet)(July 1992)*

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
27 April 2006 (27.04.2006)

PCT

(10) International Publication Number
WO 2006/044476 A2

(51) International Patent Classification:
H04B 1/66 (2006.01)

(21) International Application Number:
PCT/US2005/036701

(22) International Filing Date: 12 October 2005 (12.10.2005)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
60/617,988 12 October 2004 (12.10.2004) US

(71) Applicants and
(72) Inventors: **VANMAN, Robert, Vernon** [US/US]; 6803 Shoreview Drive, McKinney, TX 75070 (US). **GOBLE, Simon, Christopher** [GB/US]; 3102 Greer Road, Palo Alto, CA 94303 (US).

(74) Agents: **ROBINSON, Ross, T.** et al.; Jenkens & Gilchrist, Suite 3700, 1445 Ross Avenue, Dallas, TX 75202 (US).

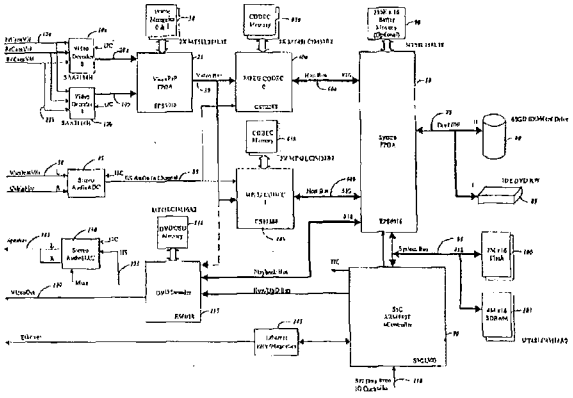
(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, LY, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:
— *without international search report and to be republished upon receipt of that report*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: METHOD OF AND SYSTEM FOR MOBILE SURVEILLANCE AND EVENT RECORDING



(57) Abstract: A data-encoding system includes a source of unencoded data, and a first encoder interoperably coupled to the source, wherein the first encoder is adapted to receive the unencoded data, encode the unencoded data, and output encoded data at a first data rate. The data encoding system further includes a second encoder interoperably coupled to the source, wherein the second encoder is adapted to receive the unencoded data, encode the unencoded data, and output encoded data at a second data rate in which the second data rate exceeds the first data rate. This Abstract is provided to comply with rules requiring an Abstract that allows a searcher or other reader to quickly ascertain subject matter of the technical disclosure. This Abstract is submitted with the understanding that it will not be used to interpret or limit the scope or meaning of the claims.

WO 2006/044476 A2

METHOD OF AND SYSTEM FOR MOBILE SURVEILLANCE AND EVENT RECORDING

CROSS-REFERENCE TO RELATED APPLICATIONS

[001] This patent application claims priority from, and incorporates by reference the entire disclosure of, U.S. Provisional Patent Application No. 60/617,988, filed on October 12, 2004.

BACKGROUND OF THE INVENTION

[002] This invention is directed to a video surveillance system, and in particular, by way of example and not limitation, to a video surveillance system adapted to be mounted in a law enforcement vehicle for producing a permanent digital evidentiary record, on a multi-media disc, of a traffic stop or other event and incidents occurring after a suspect's vehicle has been stopped.

[003] In law enforcement, a reliable witness that is incapable of perjury is needed to substantiate actions taken by a law enforcement officer and to protect the officer against false allegations by persons involved in an incident. An excellent witness of this type is a video recording of the incident, now widely used in traffic stops and criminal investigations, which can be reviewed after the incident and archived. By recording the incident first-hand as it actually happens, video recordings serve to eliminate conflicting individual interpretations of the incident and facilitate effective and efficient law enforcement.

[004] Vehicle-mounted video cameras to make video records of an incident or scene external to the law enforcement vehicle are well known in the art. For example, U.S. Pat. No. 4,949,186 to Peterson discloses a vehicle-mounted system in which a video-cassette recorder is housed in a vault located in the trunk of a patrol car. U.S. Pat. No. 5,677,979 to Squicciarini et al discloses a video surveillance system which integrates the outputs of a video camera, a radar unit, a remote control, and a wireless microphone to produce a comprehensive video recording of an incident from its beginning to the end. This system also uses a video cassette recorder to capture the incident on videotape. However, VHS and digital video tapes are bulky, requiring considerable space for storage, are susceptible to damage, and degrade over time. Additionally, the data on tapes may only be accessed sequentially.

Motorola v. Stellar
Motorola Exhibit 1032
Page 283

SUMMARY OF THE INVENTION

[005] A video-data chapter segmentation method includes monitoring for at least one external start trigger, and responsive to detection of at least one of the at least one external start trigger, creating a chapter start point at a point in the video data corresponding to a specified time preceding the at least one detected external start trigger. The method further includes initiating recording of the video data beginning at the point in the video data and monitoring for at least one stop trigger. The method still further includes responsive to detection of at least one of the at least one stop trigger, creating a chapter stop point at a point in the data corresponding to a specified time preceding the at least one detected stop trigger.

[006] A video-data chapter segmentation computer system includes a processor and a memory. The memory includes software instructions adapted to enable the computer system to perform the steps of monitoring for at least one external start trigger, and responsive to detection of at least one of the at least one external start trigger, creating a chapter start point at a point in the video data corresponding to a specified time preceding the at least one detected external start trigger. The software instructions are further adapted to enable the computer system to perform the steps of initiating recording of the video data beginning at the point in the video data, monitoring for at least one stop trigger, and responsive to detection of at least one of the at least one stop trigger, creating a chapter stop point at a point in the data corresponding to a specified time preceding the at least one detected stop trigger.

[007] A data-encoding system includes a source of unencoded data, and a first encoder interoperably coupled to the source, wherein the first encoder is adapted to receive the unencoded data, encode the unencoded data, and output encoded data at a first data rate. The data encoding system further includes a second encoder interoperably coupled to the source, wherein the second encoder is adapted to receive the unencoded data, encode the unencoded data, and output encoded data at a second data rate in which the second data rate exceeds the first data rate.

[008] A data-encoding method includes a first encoder interoperably coupled to a source of unencoded data receiving the unencoded data, encoding the unencoded data, and outputting encoded data at a first data rate. The method further includes a second encoder interoperably coupled to the source receiving the unencoded data, encoding the unencoded data, and outputting encoded data at a second data rate, wherein the second data rate exceeds the first data rate.

Motorola v. Stellar
Motorola Exhibit 1032
Page 284

[009] A data-overflow-handling method includes storing at least one of captured audio data, video data, and metadata to a first directory of a non-removable data storage medium, and determining whether an event is being recorded. The method further includes responsive to a determination that an event is being recorded, storing an image of the stored at least one of captured audio data, video data, and metadata to a second directory of the non-removable data storage medium. The method still further includes determining whether a predefined capacity threshold relative to a removable data storage medium has been exceeded, and responsive to a determination that the predefined capacity threshold has been exceeded, creating a third directory of the non-removable data storage medium. The method still further includes determining whether data in the second directory of the non-removable storage medium has not been stored to the removable data storage medium, and responsive to a determination that data in the second directory of the non-removable storage medium has not been stored to the removable data storage medium, storing any unstored data in the second directory to the removable data storage medium. The method further includes determining whether the second directory contains finalization files, and responsive to a determination that the second directory contains finalization files, finalizing the removable storage medium and providing a prompt to insert another removable storage medium. The method still further includes responsive to a determination that the second directory contains no finalization files, returning to the step of determining whether data in the second directory of the non-removable storage medium has not been stored to the removable data storage medium.

[0010] A data-overflow-handling computer system includes a processor and a memory. The memory includes software instructions adapted to enable the computer system to perform the steps of storing at least one of captured audio data, video data, and metadata to a first directory of a non-removable data storage medium, determining whether an event is being recorded, and responsive to a determination that an event is being recorded, storing an image of the stored at least one of captured audio data, video data, and metadata to a second directory of the non-removable data storage medium. The memory further includes software instructions adapted to enable the computer system to perform the steps of determining whether a predefined capacity threshold relative to a removable data storage medium has been exceeded, and responsive to a determination that the predefined capacity threshold has been exceeded, creating a third directory of the non-removable data storage medium. The memory further includes software instructions adapted to enable the computer system to perform the steps of determining

Motorola v. Stellar
Motorola Exhibit 1032
Page 285

whether data in the second directory of the non-removable storage medium has not been stored to the removable data storage medium, and responsive to a determination that data in the second directory of the non-removable storage medium has not been stored to the removable data storage medium, storing any unstored data in the second directory to the removable data storage medium. The memory further includes software instructions adapted to enable the computer system to perform the steps of determining whether the second directory contains finalization files, and responsive to a determination that the second directory contains finalization files, finalizing the removable storage medium and providing a prompt to insert another removable storage medium. The memory still further includes software instructions adapted to enable the computer system to perform the step of responsive to a determination that the second directory contains no finalization files, returning to the step of determining whether data in the second directory of the non-removable storage medium has not been stored to the removable data storage medium.

[0011] A method for archiving data includes receiving data, storing the data on a first data storage medium, and selecting a portion of the data. The method further includes determining if at least one environmental factor indicates that environmental conditions are acceptable for storing the selected portion of the data on a second data storage medium. The method still further includes responsive to a determination that the at least one environmental factor indicates that environmental conditions are acceptable, storing the selected portion of the data on the second data storage medium.

[0012] A computer system for archiving data includes a processor and a memory. The memory includes software instructions adapted to enable the computer system to perform the steps of receiving data, storing the data on a first data storage medium, and selecting a portion of the data. The memory further software instructions adapted to enable the computer system to perform the steps of determining if at least one environmental factor indicates that environmental conditions are acceptable for storing the selected portion of the data on a second data storage medium, and responsive to a determination that the at least one environmental factor indicates that environmental conditions are acceptable, storing the selected portion of the data on the second data storage medium.

[0013] A data security method includes performing a checksum on data contained on a removable data storage medium, and storing the checksum on the removable data storage medium in at least one of an encrypted and a hidden form. The method further includes storing

Motorola v. Stellar
Motorola Exhibit 1032
Page 286

a unique serial number pertaining to the removable storage medium to the removable storage medium, and storing a checksum and a corresponding unique serial number of a plurality of previous removable storage media to the removable storage medium.

[0014] A data security computer system includes a processor and a memory. The memory includes software instructions adapted to enable the computer system to perform the steps of performing a checksum on data contained on a removable data storage medium, and storing the checksum on the removable data storage medium in at least one of an encrypted and a hidden form. The memory further includes software instructions adapted to enable the computer system to perform the steps of storing a unique serial number pertaining to the removable storage medium to the removable storage medium, and storing a checksum and a corresponding unique serial number of a plurality of previous removable storage media to the removable storage medium.

[0015] The above summary of the invention is not intended to represent each embodiment or every aspect of the present invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0016] A more complete understanding of the method and apparatus of the present invention may be obtained by reference to the following Detailed Description when taken in conjunction with the accompanying Drawings wherein:

[0017] FIGURE 1 is a block diagram of an in-vehicle system for recording video, audio, and data in accordance with principles of the present invention;

[0018] FIGURE 2 is a procedure for opportunistic archiving without error checking in accordance with principles of the present invention;

[0019] FIGURE 3 is a procedure for opportunistic archiving with optional error checking in accordance with principles of the present invention;

[0020] FIGURE 4 is a procedure for automatic DVD-video chapter segmentation by external triggers in accordance with principles of the present invention;

[0021] FIGURE 5 is a procedure for parallel high and low bit-rate encoding with post even bit rate selection in accordance with principles of the present invention;

[0022] FIGURE 6 is a perspective and side view of an embodiment of a drive suspension system in accordance with principles of the present invention; and

Motorola v. Stellar
Motorola Exhibit 1032
Page 287

[0023] FIGURE 7 is a procedure for automatic DVD-video disc record overflow handling in accordance with principles of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

[0024] Referring now to FIGURE 1, a block diagram of an in-vehicle system for recording video, audio, and data in accordance with an embodiment of the present invention is illustrated. In the system of FIGURE 1, a first video decoder 10a and a second video decoder 10b each include a plurality of respective video inputs 15a, 15b for receiving analog video signals from one or more video sources, such as, for example, a video camera. In the embodiment of the present invention illustrated in FIGURE 1, each of the video decoder 10a and 10b receives analog video signals from a front video camera, a rear video camera, and an in-vehicle camera, although it should be understood that, in some embodiments, more or fewer cameras may be used. Each of the video decoders 10a, 10b processes the received video signals and produces respective digital video signals 20a and 20b. The digital video signals 20a and 20b are then provided to a video processor 25. The video processor 25 processes the digital video signals 20a and 20b and outputs the processed video signals to a video bus 35 as a video stream.

[0025] In an exemplary embodiment of the present invention, the video processor 25 includes a video picture-over-picture (POP) field programmable gate array (FPGA) chip that processes video from one or more sources to combine the video from the multiple sources to be combined into a single video stream. For example, two video camera feeds can be processed by the video processor 25 for simultaneous display on the same screen as a split screen image. The system of FIGURE 1 can be further provided with a frame memory 30 associated with the video processor 25 to store video frames during processing by the video processor 25. The video stream from the video bus 35 is provided to first and second audio/video encoder integrated circuits (ICs) 40a, 40b. In accordance with principles of the present invention, the first and second video encoder ICs 40a, 40b include circuitry adapted to encode video and audio in compliance with a Motion Picture Expert Group (MPEG) standard, such as the MPEG-2 standard. For example the first and second video encoders 40a, 40b can be MPEG codec ICs. However, other video-encoding standards may be used without departing from principles of the invention.

[0026] The system of FIGURE 1 also includes an audio analog-to-digital converter 45 adapted to receive analog audio signals 50 from one or more audio sources, such as

Motorola v. Stellar
Motorola Exhibit 1032
Page 288

microphones, and process the analog audio signals 50 to produce a digital audio signal 55. In accordance with the embodiment of the present invention illustrated in FIGURE 1, an analog audio signal from a wireless microphone is provided to a left channel input of the audio analog-to-digital converter 45, an analog audio signal from a cabin microphone is provided to a right channel of the audio analog-to-digital converter 45, and the audio analog-to-digital converter 45 outputs a combined digital audio signal 55 therefrom.

[0027] The digital audio signal 55 is then provided to each of the first and second audio/video encoder ICs 40a, 40b. Each of the first and second audio/video encoder ICs 40a, 40b encodes the video stream received from the video bus 35 and the digital audio signal 55 from the audio analog-to-digital converter 45 as respective encoded audio/video streams 60a and 60b, such as, for example, MPEG-2 streams. In various embodiments of the present invention, the first audio/video encoder IC 40a and the second audio/video encoder IC 40b output representations of the same video and audio streams that have been encoded at different data rates in parallel. For example, in accordance with principles of the present invention, the first audio/video encoder IC 40a outputs a high-bit-rate encoded stream 60a (e.g., 6.0 Mbps), while the second audio/video encoder IC 40b outputs a low-bit-rate encoded stream 60b (e.g., 1.0 Mbps) representation of the same audio and video signals. The low-bit-rate stream can be obtained, for example, by reducing at least one of the video resolution and the frame rate. The system of FIGURE 1 can be further provided with first and second coded memory 65a, 65b associated with each of the first and second audio/video encoder ICs 40a, 40b, respectively, for use by the first and second audio/video encoder ICs 40a, 40b as memory storage during encoding operations.

[0028] The resolution, bit-rate, and frame rate of both the low-bit-rate stream and the high-bit-rate stream can be set based on a record length selection made in a setup menu. Some example combinations are shown in Table 1:

Motorola v. Stellar
Motorola Exhibit 1032
Page 289

Resolution	Var. Bit rate	Frame Rate	Record Length
720x480	5-6 Mbps	30 fps	2 hrs
480x480	2.0 Mbps	30 fps	4 hrs
352x480	1.5 Mbps	30 fps	6 hrs
352x480	1.1 Mbps	30 fps	8 hrs

TABLE 1

[0029] Each of the first encoded stream 60a and the second encoded stream 60b are then provided to a system FPGA 70. The system FPGA 70 provides the first encoded stream 60a and the second encoded stream 60b over an IDE bus 75 to a hard drive 80. The system of FIGURE 1 can further include a buffer memory 90 associated with the system FPGA 70 to buffer data before it is written to the hard drive 80. The first encoded stream 60a and the second encoded stream 60b are each buffered and written to the hard drive 80. As a result, two versions of the same video and audio source, for example, a high-bit-rate encoded and a low-bit-rate encoded version, are buffered and written to the hard drive 80 for subsequent processing. After a predetermined time period has elapsed and/or after a particular event has occurred, the encoded video and audio data may be sent over the IDE bus 75 from the hard drive 80 to a DVD read/write (RW) drive 85 for archiving to a DVD disc. In accordance with an embodiment of the present invention, the encoded video and audio data is written to the DVD disc so that the DVD disc is formatted as a standard DVD video disc playable in a standalone (i.e., non-PC based) DVD player. The hard drive 80 is described as an example of a non-removable data storage medium such as typically found in personal computers. A DVD disc is described as an example of a removable data storage medium. Other examples of removable data storage media include floppy discs, and flash memory drives.

[0030] The system of FIGURE 1 further includes a microcontroller 90 that functions to control the various components as well as the overall operation of the system of FIGURE 1. Flash memory 100 and dynamic RAM 105 may further be connected to the microcontroller 90 via a system bus 95. The flash memory 100 may function to store firmware for use by the microcontroller 90, and the dynamic RAM 105 may be used by the microcontroller 90 as temporary storage. In accordance with principles of the present invention, the firmware within

Motorola v. Stellar
Motorola Exhibit 1032
Page 290

the flash memory 100 can be upgraded, for example, by inserting a disc including updated firmware into the DVD RW drive 85.

[0031] The microcontroller 90 is further provided with a data input 110 for receiving metadata including externally-measured data. Examples of metadata that can be provided to the data input 110 include Global Positioning System (GPS) coordinates, GPS calculated patrol speed, vehicle speed sensor (VSS) calculated patrol speed, radar measured patrol speed, radar target speed, accelerometer X, Y, and Z values, braking status, emergency lights status, siren status, system board temperature, drive door opening and closing logging, power up and power down logging, and DVD disc ejection and insertion logging. The metadata is provided by the microcontroller 90 to the system FPGA 70, which further transmits the metadata to the hard drive 80, where it is written to a metadata log file in association with the encoded audio and video data. Accordingly, a particular item of metadata can be directly linked to the audio and video segment obtained at the time that the metadata item was measured.

[0032] In addition, a subset of the metadata is included in the encoded audio and video data so that it is available for viewing in parallel with the audio and video during playback. In accordance with an embodiment of the present invention, the subset of the metadata is included in one or more closed-captioning fields of an MPEG-2 encoded DVD disc. An advantage provided by including the subset of the metadata in a closed-captioning field is that the visibility of the metadata information can be selectively toggled by a viewer of the audio and video. Another advantage provided by including the subset of the metadata in a closed-captioning field is that the information in the closed-captioning field is a text overlay that does not effect the encoding of the underlying video; thus, the underlying video is not degraded by the inclusion of the metadata. Examples of metadata that may be included in the closed-captioning field include time, date, frame counter, vehicle ID, GPS longitude and latitude, vehicle speed (from VSS signal), radar target speed, radar patrol car speed, remote microphone active indicator, emergency lights active indicator, siren active indicator, braking in progress indicator, and camera ID and zoom level. In still another embodiment of the present invention, the subset of metadata may by provided in a subtitle field.

[0033] The system of FIGURE 1 further allows for playback of encoded audio and video stored on the hard drive 80 and a disc in the DVD RW drive 85. To accomplish playback, the system of FIGURE 1 further includes a DVD decoder 115 that receives encoded audio and video from either the hard drive 80 or the DVD RW drive 85 via a playback bus. The DVD

Motorola v. Stellar
Motorola Exhibit 1032
Page 291

decoder 115 decodes the video into a video output signal 120 and decodes the audio into a digital audio signal 125. The digital audio signal 125 is provided to a digital-to-audio converter 130 that converts the digital audio signal to an analog audio signal 135. A DVD/on-screen display (OSD) memory 140 may further be provided for use by the DVD decoder 115 as temporary storage during decoding.

[0034] The system of FIGURE 1 may also be provided with an Ethernet interface 145 that allows for communication between either a wired or wireless Ethernet-connected device and the microcontroller 90. The Ethernet interface 145 may be used, for example, for transmitting encoded audio and video, as well as associated metadata, to a central office. The Ethernet port can also be used for uploading new firmware files, and for populating user settings as configured on a laptop computer attached to the invention. Specific identifiers shown in FIGURE 1 for various components illustrated therein are for illustrative purposes. These identifiers will be understood by those having skill in the art to be merely examples of components that could be employed in the system shown therein. Other commercially available components could be employed without departing from the principles of the invention.

EVENT BASED RECORDING

[0035] In various embodiments of the present invention, recording of video, audio, and metadata is event-based. In these embodiments, the system only records when a triggering event has occurred, for example, when the user turns on the emergency lights, siren, the onboard accelerometers sense a vehicle crash, or when the user manually hits a record button. Upon occurrence of the event, the beginning of a recorded event is marked. Other examples of an event that initiates recording can be, for example, a traffic stop, a chase, a domestic call, or pulling into a driveway. The recording of the event continues until a stop point is determined. In at least one embodiment of the present invention, the stop point is determined when the user hits a stop button. The system may also include an automatic stop event that allows the system to automatically stop recording at a predetermined time after all start record triggers have been turned off (e.g., the lights and siren are off and the wireless microphone is off), but the user has forgotten to hit the stop button. If the system detects that that condition has occurred based on user settings, it can decide to enter a stop flag and stop recording the event.

[0036] In at least one embodiment of the present invention, when the system is turned on, two data streams (i.e., a high bit-rate stream and a low bit-rate stream) as well as metadata are recorded to the hard drive 80. The metadata may include, for example, the status of

Motorola v. Stellar
Motorola Exhibit 1032
Page 292

the brake lights, status of the emergency lights and siren, GPS coordinates, the vehicle's speed, data from an interface from the police radar system, etc. The metadata and the high and low bit-rate streams are time-stamped and synchronized. During recording to a DVD disc, the video and/or audio of events, as well as the metadata are recorded to the DVD disc.

[0037] The system may also use vehicle speed as a recording trigger where the system can initiate the recording of an event if the patrol car exceeds a preset speed. For example, a department supervisor can decide that if an officer ever goes in excess of 110 miles an hour, the system should begin recording an event to the hard drive 80 or the DVD drive 85. A new event begins automatically and the officer has no control over the recording of the event. Likewise, organizations outside of law enforcement may utilize threshold criteria for initiating self-activating monitoring of persons or conditions.

OPPORTUNISTIC ARCHIVING

[0038] The automobile environment is subject to demanding environmental conditions for the operation of electronic equipment. Recording onto a rewriteable DVD in an automobile environment is particularly subject to these conditions. A system in accordance with principles the present invention has a drive suspension system in place. The system monitors shock and vibration in x, y, and z axes using accelerometers. The system may also monitor the vehicle speed by one or more of three methods. The system can monitor vehicle speed through the VSS signal. If an optional GPS subsystem is included in the system, the system can get speed coordinates from the GPS data. If the system is interfaced to a radar system and the radar is operating in moving mode, the system can get vehicle speed from the radar. In various embodiments of the present invention, an opportunistic archiving algorithm is used that provides parameters and steering as to when the system should burn to the DVD drive 85. Using shock and vibration measurements, the opportunistic archiving algorithm is adapted to ensure that data is not written to the DVD disc until environmental conditions are acceptable for doing so.

[0039] Referring now to FIGURE 2, a procedure for opportunistic archiving without error checking in accordance with principles of the present invention is illustrated. In step 205, background recording of data including, for example, audio data, video data, and metadata, is initiated. In background recording, an encoded stream, and optionally associated metadata, is continuously written to the hard drive 80. Thus, referring again to FIGURES 1 and 2, during background recording, the first encoded stream 60a and the second encoded stream 60b, and optionally associated metadata, are continuously written to the hard drive 80. Background

Motorola v. Stellar
Motorola Exhibit 1032
Page 293

recording of audio, video, and metadata is typically performed in one minute segments, although it should be understood that other segment lengths may be used. After initiation of background recording (step 205), the data is buffered in RAM (step 210) and then written to the hard drive 80 (step 215). A determination is then made regarding whether any record triggers are active (step 217). If a determination is made that no active record triggers exist (step 220), background recording is continued (step 225) and the procedure returns to step 205.

[0040] If a determination is made that a record trigger is active (step 230), the data to be archived on the DVD is selected (step 235). The range of data to be archived includes selected time periods before and after event start and stop points. For example, the system can be configured to archive a range of data that extends from ten minutes prior to the start point and ten minutes after the stop point. At step 240, a verification of environmental factors is performed to insure that environmental conditions are acceptable for recording data to the DVD disc. The environmental factors can include, for example, temperature, shock, and vibration measurements. If the environmental factors are determined to exceed DVD drive limits (step 245), better environmental conditions are waited for via use of, for example, a timer (step 250), and the procedure returns to step 240. Steps 240-255 can be characterized collectively as opportunistic-archiving steps.

[0041] If the environmental factors are determined to be within predetermined limits (step 255), burning of a sector of data to the DVD disc is initiated (step 260). During the burn cycle, accelerometers are monitored to determine whether any G-spikes exceed tolerable limits (step 265). An example of a tolerable limit for burning of data to a DVD is less than 0.3 G. If it is determined that a G-spike occurred during the burn cycle that is above tolerable limits (step 270), a decision is made to rewrite the sector in question (step 275) and the procedure returns to step 260. If it is determined that no G-spikes occurred during the burn cycle that are above the tolerable limits (step 280), the procedure continues to the next sector to be burned (step 285) and then returns to step 205. Steps 260-285 can be characterized collectively as reactive correction steps.

[0042] Referring now to FIGURE 3, a procedure for opportunistic archiving with optional error checking in accordance with principles of the present invention is illustrated. In step 305, background recording of data including, for example, audio data, video data , and metadata, is initiated. In background recording, an encoded stream, and optionally associated metadata, is continuously written to the hard drive 80. Thus, referring again to FIGURES 1 and

Motorola v. Stellar
Motorola Exhibit 1032
Page 294

3, during background recording, the first encoded stream 60a and the second encoded stream 60b, and optionally associated metadata, are continuously written to the hard drive 80. Background recording of audio data , video data, and metadata is typically performed in one minute segments, although it should be understood that other segment lengths may be used. After initiation of background recording (step 305), the data is buffered in RAM (step 310) and then written to the hard drive 80 (step 315). A determination is then made regarding whether any record triggers are active (step 317). If a determination is made that no active record triggers exist (step 320), background recording is continued (step 325) and the procedure returns to step 305.

[0043] If a determination is made that a record trigger is active (step 330), the data to be archived on the DVD is selected (step 335). The range of data to be archived includes selected time periods before and after event start and stop points. For example, the system can be configured to archive a range of data that extends from ten minutes prior to the start point and ten minutes after the stop point. At step 340, a verification of environmental factors is performed in order to insure that environmental conditions are acceptable for recording data to the DVD disc. The environmental factors can include, for example, temperature, shock, and vibration measurements. If the environmental factors are determined to exceed DVD drive limits (step 345), better environmental conditions are waited for via use of, for example, a timer (step 350), and the procedure returns to step 340. Steps 340-355 can be characterized collectively as opportunistic archiving steps.

[0044] If the environmental factors are determined to be within predetermined limits (step 355), burning a sector of data to the DVD disc is initiated (step 360). At step 365, a checksum is calculate for the sector from hard drive data. The burned sector is then read from the DVD disc (step 370), and a checksum is calculated from the sector read from the DVD (step 375). The checksum obtained from hard drive data and the checksum obtained from the burned DVD sector are compared and, if the checksums do not match, the sector is rewritten (step 380) and the procedure returns to step 360. If the checksums match, the archiving procedure returns to step 305. Steps 360-385 can be characterized collectively as DVD burn error correction steps.

[0045] In various embodiments, an opportunistic archiving algorithm may be used that also considers, in addition to environmental factors, how much data the system needs to archive to the DVD disc. For example, if the system starts off in the morning and there have been no events and no start flags, the system is operating with zero unburned events. However,

Motorola v. Stellar
Motorola Exhibit 1032
Page 295

if, for example, the user gets into a high-speed chase that lasts for three hours and the system has not detected a stop trigger, the system has recorded three hours of unburned data to the hard drive 80. In this situation, the system could lower the environmental limits, at step 255 or 355 for example, in order to archive the large amount of accumulated data to the DVD disc. Environmental conditions, including a speed factor, may also be considered. The system may consider whether the vehicle is driving along at a high rate of speed (e.g., hundred miles an hour) or if it is stopped. The algorithm may also consider accumulated shock and vibration.

[0046] The algorithm processing starts with the calculation of how much data is present and comes up with a numerical value. And then the processor using the algorithm comes up with a numerical value for how conducive the environment is to DVD burning. The processor using the algorithm subtracts the environment number from the unburned data number and comes up with a value. If the value is positive, the need to burn data is greater than how bad the environmental conditions are. If the algorithm defines a negative number, the unburned data does not outweigh how bad the environmental conditions are.

[0047] If the environmental conditions are very poor, the system does not record anything. Instead, the system just waits and monitors for a while and checks the environmental conditions again. If the speed factor is zero (i.e., the car is stopped), that is preferably an automatic burn decision. Condition one is no speed, which is preferably an automatic decision to burn anything on the hard drive 80 that needs to be burned. Condition number two is unacceptable environmental conditions under which the system does not burn anything. Condition number three is somewhere in between, in which the system has some unburned event data, the car is moving, and determinations are made regarding how bad the conditions are, how much does the need to burn data outweigh the environmental conditions that the system detects.

[0048] The hard drive 80 of the system preferably has a accelerometer to detect physical shocks. When the hard drive 80 detects an unacceptable shock, the system goes back and recopies the last section. An error is assumed, so the last DVD section is overwritten. The hard drive 80 may be mounted on a vibration shock mount as well. In various embodiments, the DVD drive 85 can also include an accelerometer to detect physical shocks. Hard drives typically have a 200 g shock tolerance whereas DVD drives typically have a 0.5 g shock tolerance.

[0049] An illustrative opportunistic archiving algorithm could utilize the following equation:

Motorola v. Stellar
Motorola Exhibit 1032
Page 296

(Buffer Amount)-[(Speed Factor)+(Shock Factor)+(Vibration Factor)]=Archive Threshold

where

Buffer Amount = Size of Data Buffer

Speed Factor = Accumulated Vehicle Speed From Recent History

Shock Factor = Peak Shock in Recent History

Vibration Factor = Accumulated Vibration From Recent History

[0050] If the Archive Threshold is exceeded, the need to burn data overrides the environmental conditions. If the Archive Threshold is not exceeded, the amount of unburned data does not override the environmental conditions.

AUTOMATIC CHAPTER SEGMENTATION BY EVENT MARKERS

[0051] In various embodiments of the present invention, the system may be adapted to automatically divide the video into separate navigable chapters to make location of a specific point or event easier during playback, such that each chapter of the DVD disc contains the data from one event. This process eliminates the need to fast forward or rewind the media to search for a specific traffic stop or event. The start of an event period is determined by monitoring metadata from various devices, such as external emergency lights, emergency siren, wireless microphone activation, extreme shock data from accelerometers indicating, for example, a collision or panic braking, an elapsed time period, etc. The start of an event period can also be determined by an operator pressing a RECORD key on a control panel.

[0052] The end of an event is determined by the operator pressing a STOP key on the control panel or by the passage of a predetermined period of time after any triggering device is turned off or is inactive. In various embodiments, when the system is turned on, all video data, audio data, and metadata is continuously written to the hard drive 80, and only event data is written to the DVD disc. The system is able to automatically include video and audio data that occurred prior to the start of the event period or after the end of an event period by moving event start and end flags based on rules determined by user settings. For example, a setting in a user-interface menu can be used to determine how much data to include in the DVD chapter before and after the event markers.

[0053] Referring now to FIGURE 4, a procedure for automatic DVD-video chapter segmentation by external triggers is illustrated. In step 405, background recording of data including audio, video, and metadata is initiated. In various embodiments of the present

Motorola v. Stellar
Motorola Exhibit 1032
Page 297

invention, background recording of audio, video, and metadata is performed in one-minute segments, although it should be understood that other segment lengths may be used. At step 410, external record triggers are monitored for the occurrence of one or more triggering events. If a record trigger is not detected (step 415), the procedure returns to step 405.

[0054] If a record trigger is detected (step 420), a new chapter start point is initiated (step 425) that includes a specified number of minutes of data from before the event start point to the beginning of the chapter. At step 430, burning of the data from the event period to the DVD is started. At step 435, monitoring of stop triggers is performed. The stop triggers may be either generated by a timer or user-initiated. If a stop trigger is not detected (step 440), event recording is continued (step 445), and the procedure returns to step 430. If a stop trigger is detected (step 450), a chapter stop point is determined, which step includes a specified number of minutes of data from after the event stop point being added to the end of the chapter (step 455). Next, the DVD chapter menu is built (step 460), a video frame from the event is selected for use as a selectable chapter icon (step 465), and a time/date stamp from the chapter stop point is used as part of the chapter name/number (step 470). Next, the DVD chapter is closed out (step 475), and the procedure returns to step 405.

PARALLEL HIGH AND LOW BIT-RATE ENCODING

[0055] In order to provide users with the ability to archive as many hours of video and audio data on to a single DVD disc, while still providing maximum video quality for important events, various embodiments of the present invention provide for encoding multiple versions of the same video and audio source in parallel. The system encodes both a high bit-rate stream and a lower bit-rate stream. Both streams are buffered and written to the hard drive 80.

[0056] The rules for archiving event data to the DVD disc can be determined by user settings. During typical operation, the system will automatically transfer the lower bit-rate video stream to the DVD disc based on event markers. Should the system capture some video or audio footage that the user deems to be important, the user can transfer the high bit-rate version to the DVD disc from data on the hard drive 80. This process allows users to make extended-length recordings without having to sacrifice audio and video quality of important events.

[0057] A user may choose high or low quality video after an event has occurred. The system by default archives events to the DVD that are low quality. After the recording has been made, if something that was important has occurred, the user can easily go back and set new start and stop flags. A section of video may be chosen, whether it was included in the original

Motorola v. Stellar
Motorola Exhibit 1032
Page 298

event or not, a new chapter added to the DVD, and a high resolution version of the video can be chosen to be burned to DVD. After the fact, a user can choose to grab any video from the hard drive 80 and make new chapters on the DVD. The new chapters can be based on the same event or on multiple events or non-events, and then a user could choose high or low resolution.

[0058] Referring now to FIGURE 5, a procedure for high and low bit-rate encoding with post-event bit-rate selection in accordance with principles of the present invention is illustrated. In various embodiments of the present invention, the high and low bit-rate encoding occurs in parallel. At step 505, a raw video stream, such as a BT656 stream, is split into first and second streams that are identical to each other. The first stream is provided to a first video encoder 40a, which encodes the stream at a low bit-rate to be used for normal recording (step 510). The low bit-rate stream can be optionally written to a temporary storage area, such as a hard drive 80, Flash RAM, RAM, or other storage media (step 515). The second stream is provided to a second video encoder 40b, which encodes the stream at a high bit rate to be used as a backup for important events (step 520). The data of the high bit-rate stream is then written to a circular buffer (step 525), which is a continuously-overwritten data buffer on a hard drive 80, Flash RAM, RAM, or other storage media. If no important events occur while the high bit-rate data is in the circular buffer (step 530), new high bit-rate data overwrites old data in the circular buffer (step 535).

[0059] If an operator deems a time period from the data buffer to be important (step 540), the system takes the high-bit-rate data from the important time period (step 545) selected by the operator. At step 550, the low-bit-rate data and the selected portion of the high-bit-rate data are written to storage media, such as a DVD disc, hard drive, flash memory, etc. (step 550). In various embodiments, the step 550 of writing the low-bit-rate data to the storage media can include opportunistic archiving such as that described with respect to FIGURE 2 and FIGURE 3. In various embodiment of the present invention, step 515 of writing the low-bit-rate stream to a temporary storage can be omitted, and the low-bit-rate stream can be written directly to the storage media in step 550. In other embodiments of the present invention, the temporary storage for the low-bit-rate data and the circular buffer for the high-bit-rate data are the same hard drive, and the storage media for the low-bit-rate data and the selected portion of the high-bit-rate data are a DVD disc.

RECORD AFTER-THE-FACT

Motorola v. Stellar
Motorola Exhibit 1032
Page 299

[0060] Recording after-the-fact permits manual chapter event creation to be performed. If a user wants to go in after the fact and copy some video that wasn't marked as an event, the user can go back and manually put in a new start and stop point. The system will automatically grab that section of video and feed it to the DVD drive 85 and make a new chapter. The common use of that feature will be by, for example, internal affairs in order to investigate some alleged misconduct. Of course, embodiments of the system may be applied to areas outside of the area of law enforcement, and then the conduct referred to may be an officer or another party in an organization utilizing the methods and systems of the present invention.

DRIVE SUSPENSION SYSTEM

[0061] A drive suspension system in accordance with principles of the present invention permits isolation of the DVD drive from environmental conditions that could impair DVD burning. Different suspension systems may be used in different versions of the system. One version of the system as currently envisioned is entirely overhead-console mounted. Another version of the system is a multi-piece unit (e.g., two) that may be used when there is not room to mount the overhead console-mounted version. In the second version, the user can, for example, put the recording unit underneath the seat and the display and control panel on a stalk near the radio console area. Although packaging for the drive suspension system is different on the two versions discussed, the underlying principles are analogous and other versions are possible without departing from principles of the present invention.

[0062] Referring now to FIGURE 6, a perspective and side elevational view of an embodiment of a drive suspension system in accordance with an embodiment of the present invention are illustrated. In FIGURE 6, a DVD recorder drive 605 slides into a drive chassis 610. The drive suspension system includes a momentum mass in the form of a heavy steel chassis weight 615. The assembly including the DVD recorder drive 605, the drive chassis 610, and the chassis weight 615 is suspended inside an assembly shield area 620 by expansion elements, such as, for example, assembly springs 625. On the chassis 610, four pins 635 insert into four vibrational-energy-absorption elements, such as, for example, silicon-oil-filled sack dampers 630. A hole inside the particular damper shown in FIGURE 6 is provided for the pins 635 from the chassis 610 to meet into. The four silicon-oil-filled sack dampers 630 serve to stabilize the floating mechanism, provide heavy damping characteristics, and reduce the resonance frequency. The chassis weight 615 provides momentum and also serves to help

Motorola v. Stellar
Motorola Exhibit 1032
Page 300

reduce the resonance frequency. In a typical embodiment, there is about one-half inch of suspension travel in every direction.

[0063] In the under-seat version of the system, a spring orientation pivot 640 is used to permit horizontal mounting or vertical mounting (e.g., on the side of a cage) or mounting on a stalk or on a center console. If the system is mounted flat, the springs are mounted in an upward orientation.. However, if the user turns the orientation such that the drive is pointing upward and gravity is trying to pull the drive in a different direction, the spring may be pivoted so that the spring is able to handle the gravity load in that direction.

AUTOMATIC DVD-VIDEO DISC RECORD OVERFLOW HANDLING

[0064] Various embodiments of the invention provide a method to seamlessly allow a user to record data onto the DVD disc to the disc's capacity, yet continue to capture and prepare additional data intended to be burned onto another DVD disc. With previous in-vehicle recording systems, there was a risk of running out of media (e.g., DVD) space during the middle of a patrol officer's shift. Since the media is considered evidentiary in nature, many law enforcement agencies limit access to the media, and do not provide the officer with a second piece of media. Thus, when the media became full, it would necessitate a trip back to the police station to replace the media with blank media. Automatic DVD-Video disc record overflow handling in accordance with principles of the invention serves to eliminate the need for an officer to return to the police station to replace media during a shift. The officer may continue recording even after the DVD media is at capacity. In a typical case, the system finalizes a first DVD and automatically prepares unburned data for an additional DVD. When new media (e.g., DVD) is inserted into the drive, the unburned data is automatically transferred onto the new media.

[0065] Referring now to FIGURE 7, a procedure for automatic DVD-video disc record overflow handling is illustrated. At step 705, video, audio, and data from vehicle mounted cameras, microphones, and sensors is captured. At step 710, video, audio, and data is continuously written onto a hard drive 80. Next, a determination is made regarding whether the system is in event-record mode (step 715). If the system is not in event-record mode, the procedure (step 720) returns to step 705. Steps 705-720 can be characterized collectively as a data-capture process.

[0066] If it is determined that the system is in event-record mode (step 725), the procedure continues to step 730, at which step data is written into a DVD image working

Motorola v. Stellar
Motorola Exhibit 1032
Page 301

directory on the hard drive 80. At step 735, a determination is made regarding whether the working directory is close to reaching the size limit of the DVD disc. If it is determined that the working directory is not close to reaching the size limit of the DVD disc (step 740), the procedure returns to step 715. If it is determined that the working directory is close to reaching the size limit of the DVD disc, a DVD chapter-stop point is initiated and a DVD chapter menu is built (step 745). Next, all remaining files for the DVD-video image are closed out (step 750), the current working directory is saved (step 755), and a new working directory is created (step 760). The procedure then returns to step 715. Steps 730-760 can be characterized collectively as DVD image preparation steps.

[0067] From step 730, an execution proceeds also to step 765. At step 765, un-burned data in the working directory is looked for. Next, a determination is made regarding whether there is un-burned data in the working directory (step 770). If there is no un-burned data in the working directory (step 775), the process returns to step 765. If there is unburned data in the working directory, DVD-video data from the working directory is transferred on to the DVD-video disc (step 780). At step 785, a determination is made regarding whether the working directory contains finalized files. If the working directory does not contain finalized files (step 787), the procedure returns to step 765. If the working directory contains finalized files, the DVD is finalized (step 790). At step 795, the user is prompted to replace the current DVD with a blank DVD. At step 796, a determination is made regarding if the user has loaded a blank DVD. If the user has not loaded a blank DVD (step 797), the procedure returns to step 795. If the user has loaded a blank DVD, a check is made for a new DVD working directory (step 798). The procedure then returns to step 765. Steps 765-798 can be characterized collectively as DVD burning process steps.

AUTOMATIC DVD DISC-IMAGE BACK-UP

[0068] In various embodiments, the system's hard drive 80 is formatted with a separate partition that is reserved for making mirror images of DVD discs. A typical DVD RW disc is 4.7 GB. As the system is creating a DVD disc, the system makes an exact duplicate of the entire disc on the hard drive 80 in a separate partition. An administrator or user can select how many back-up copies of DVDs the system retains.

[0069] As the user continues to create new DVDs, the oldest hard-drive backup will be overwritten; thus, if the user selected three back-up images, by the time the user creates the fourth DVD, the oldest one is being overwritten with a mirror image of the number four disc.

Motorola v. Stellar
Motorola Exhibit 1032
Page 302

Using this feature, if an original DVD is lost, unreadable, or intentionally destroyed, a supervisor can go back and create an exact copy of the same DVD disc.

VIDEO DATA SECURITY

[0070] Since the system's video files are typically in MPEG-2 format, the files could conceivably be manipulated using video-editing tools. In litigation, attorneys could attempt bring into question the authenticity of the MPEG files, suggesting that they could be exported, manipulated, and then re-inserted onto the disc. The system thus uses checksums in some embodiments to ensure that the files have not been manipulated or edited.

First Level of Security – The Self-Verifying Checksum Result

[0071] When the system is ready to close a DVD disc (e.g., just prior to disc ejection), the system performs a checksum calculation on the disc contents and writes that result into a hidden and/or encrypted file saved on the DVD disc. By using a video utility, the DVD disc can be analyzed to see if a checksum result from the disc's contents matches the result of the hidden (and/or encrypted) checksum result on that DVD disc. This process verifies that the disc's content matches the checksum file.

Second Level of Security – System Verification of the Hidden (or Encrypted) Checksum Files

[0072] The system also provides a method to verify that the checksum file that is hidden on a DVD disc has not been recreated to match a manipulated disc. This is done by comparing subsequently-recorded DVD discs (e.g., discs recorded using the same system) to the DVD disc in question. The system automatically generates a unique disc serial number for each DVD disc it records. This serial number is written onto the DVD disc and is also saved into a log file in the system's non-volatile memory. When a DVD disc is closed, the checksum result of that DVD disc is also written to the log file in the system's non-volatile memory.

[0073] The log file preferably contains the serial number and checksum result of every DVD disc that that specific system has authored. The entire contents of the log files that are stored on the system's non-volatile memory may then be copied onto every DVD disc the system creates. Every DVD disc created by a specific system can be used to verify the validity of a checksum result contained on any other DVD disc previously recorded by the same system.

COVERT RECORDING MODE

[0074] In various embodiments of the present invention, the system has the ability to be placed into a covert-recording mode. In this mode, the system has the appearance of being

Motorola v. Stellar
Motorola Exhibit 1032
Page 303

powered off. However, it is actually recording data, such as video and audio, on the hard drive 80. The covert-recording mode permits events inside a patrol car to be recorded without a suspect being aware that he is being recorded. A record trigger is generated when the system is placed into covert-recording mode. However, the system will only archive to the DVD after the system has been taken out of covert recording mode to prevent the DVD drive noise from giving an indication that the system is not actually powered off.

[0075] In an illustrative example of placing the system into covert recording mode, a user presses and holds a power OFF key for more than 2 seconds. A sound indicates that the unit has been placed into covert recording mode and all lights, backlights, indicators, and displays are turned off. This gives the appearance to a back-seat occupant that the unit is turned off. The system automatically selects an interior camera input to be recorded. The covert mode is ended by pressing POWER ON or a STOP key. At that time, the system lights, backlights, indicators, and displays are turned on, and the video that has been marked for recording will be archived to the DVD disc.

[0076] Various embodiments of the invention may reside in a computer system. Here, the term "computer system" is to be understood to include at least a memory and a processor. In general, the memory will store, at one time or another, at least portions of an executable program code, and the processor will execute one or more of the instructions included in that executable program code. It will be appreciated that the term "executable program code" and the term "software" mean substantially the same thing for the purposes of this description. It is not necessary to the practice of this invention that the memory and the processor be physically located in the same place. That is to say, it is foreseen that the processor and the memory might be in different physical pieces of equipment or even in geographically distinct locations.

[0077] Various embodiments of the invention may also be embodied in a computer program product, as will now be explained. On a practical level, the software that enables the computer system to perform the operations described further below in detail, may be supplied on any one of a variety of media. Furthermore, the actual implementation of the approach and operations of the invention are actually statements written in a programming language. Such programming language statements, when executed by a computer, cause the computer to act in accordance with the particular content of the statements. Furthermore, the software that enables a computer system to act in accordance with the invention may be provided in any number of

Motorola v. Stellar
Motorola Exhibit 1032
Page 304

forms including, but not limited to, original source code, assembly code, object code, machine language, compressed or encrypted versions of the foregoing, and any and all equivalents.

[0078] One of skill in the art will appreciate that "media", or "computer-readable media", as used here, may include a diskette, a tape, a compact disc, an integrated circuit, a ROM, a CD, a cartridge, a remote transmission via a communications circuit, or any other similar medium useable by computers. For example, to supply software for enabling a computer system to operate in accordance with the invention, the supplier might provide a diskette or might transmit the software in some form via satellite transmission, via a direct telephone link, or via the Internet. Thus, the term, "computer readable medium" is intended to include all of the foregoing and any other medium by which software may be provided to a computer.

[0079] Although the enabling software might be "written on" a diskette, "stored in" an integrated circuit, or "carried over" a communications circuit, it will be appreciated that, for the purposes of this application, the computer usable medium will be referred to as "bearing" the software. Thus, the term "bearing" is intended to encompass the above and all equivalent ways in which software may be associated with a computer usable medium.

[0080] For the sake of simplicity, therefore, the term "program product" is thus used to refer to a computer useable medium, as defined above, which bears in any form of software to enable a computer system to operate according to the above-identified invention. Thus, the invention may also be embodied in a program product bearing software that enables a computer to perform management of information according to the invention.

[0081] In the foregoing Detailed Description, it can be seen that various features may be grouped together into a single embodiment for the purpose of streamlining the disclosure. This method of disclosure is not to be interpreted as reflecting an intention that the claimed embodiment(s) of the invention require more features than are expressly recited in each claim. Rather, as the following claims reflect, inventive subject matter lies in less than all the features of a single disclosed embodiment. Thus, the following claims are hereby incorporated into the Detailed Description, with each claim standing on its own as a separate embodiment of the invention.

Motorola v. Stellar
Motorola Exhibit 1032
Page 305

WHAT IS CLAIMED IS:

1. A video-data chapter segmentation method comprising:

monitoring for at least one external start trigger;

responsive to detection of at least one of the at least one external start trigger, creating a chapter start point at a point in the video data corresponding to a specified time preceding the at least one detected external start trigger;

initiating recording of the video data beginning at the point in the video data;

monitoring for at least one stop trigger; and

responsive to detection of at least one of the at least one stop trigger, creating a chapter stop point at a point in the data corresponding to a specified time preceding the at least one detected stop trigger.

2. The method of claim 1, wherein the step of monitoring for at least one external start trigger comprises at least one of:

monitoring for emergency light activation;

monitoring for siren activation;

monitoring for a vehicle crash;

monitoring for a predefined vehicle speed being exceeded;

monitoring for wireless microphone activation;

monitoring for record button activation; and

monitoring for acceleration outside a predefined range.

3. The method of claim 1, wherein the specified time preceding the at least one detected external start trigger is zero seconds.

4. The method of claim 1, wherein the specified time preceding the at least one detected stop trigger is zero seconds.

5. The method of claim 1, wherein the step of monitoring for at least one stop trigger comprises at least one of:

monitoring for stop button activation;

monitoring for timer expiration following deactivation of a triggering device.

Motorola v. Stellar
Motorola Exhibit 1032
Page 306

6. The method of claim 1, further comprising:

building a chapter menu;

using a frame from the video data between the chapter start point and the chapter stop inclusive as a selectable chapter icon.

7. The method of claim 6, further comprising using a time and date stamp from the chapter start point in a chapter identifier.

8. The method of claim 7, further comprising background recording the video data.

9. The method of claim 1, further comprising, prior to detection of the at least one stop trigger, continuing recording of the video data.

10. A video-data chapter segmentation computer system comprising:

a processor; and

a memory including software instructions adapted to enable the computer system to perform the steps of:

monitoring for at least one external start trigger;

responsive to detection of at least one of the at least one external start trigger, creating a chapter start point at a point in the video data corresponding to a specified time preceding the at least one detected external start trigger;

initiating recording of the video data beginning at the point in the video data;

monitoring for at least one stop trigger; and

responsive to detection of at least one of the at least one stop trigger, creating a chapter stop point at a point in the data corresponding to a specified time preceding the at least one detected stop trigger.

11. The computer system of claim 10, wherein the step of monitoring for at least one external start trigger comprises at least one of:

monitoring for emergency light activation;

monitoring for siren activation;

monitoring for a vehicle crash;

monitoring for a predefined vehicle speed being exceeded;

Motorola v. Stellar
Motorola Exhibit 1032
Page 307

monitoring for wireless microphone activation;

monitoring for record button activation; and

monitoring for acceleration outside a predefined range.

12. The computer system of claim 10, wherein the specified time preceding the at least one detected external start trigger is zero seconds.

13. The computer system of claim 10, wherein the specified time preceding the at least one detected stop trigger is zero seconds.

14. The computer system of claim 10, wherein the step of monitoring for at least one stop trigger comprises at least one of:

monitoring for stop button activation;

monitoring for timer expiration following deactivation of a triggering device.

15. The computer system of claim 10, further comprising software instructions adapted to enable the computer system to perform the steps of:

building a chapter menu;

using a frame from the video data between the chapter start point and the chapter stop inclusive as a selectable chapter icon.

16. The computer system of claim 15, further comprising software instructions adapted to enable the computer system to perform the step of using a time and date stamp from the chapter start point in a chapter identifier.

17. The computer system of claim 16, the software instructions further comprising software instructions adapted to enable the computer system to perform the steps of background recording the video data.

18. The computer system of claim 10, further comprising software instructions adapted to enable the computer system to perform the step of, prior to detection of the at least one stop trigger, continuing recording of the video data.

Motorola v. Stellar
Motorola Exhibit 1032
Page 308

19. A data-encoding system comprising:

a source of unencoded data;

a first encoder interoperably coupled to the source;

wherein the first encoder is adapted to receive the unencoded data, encode the unencoded data, and output encoded data at a first data rate;

a second encoder interoperably coupled to the source;

wherein the second encoder is adapted to receive the unencoded data, encode the unencoded data, and output encoded data at a second data rate;

wherein the second data rate exceeds the first data rate.

20. The data-encoding system of claim 19, further comprising:

a first data storage device adapted to store the data encoded at the first rate; and

a second data storage device adapted to store a user-selected portion of the data encoded at the second rate.

21. The data-encoding system of claim 20, wherein the first data storage device and the second data storage device are identical.

22. The data-encoding system of claim 20, wherein:

the first data storage comprises non-removable data storage media; and

the second data storage comprises removable data storage media.

23. The data-encoding system of claim 22, wherein:

the first data storage is a hard drive; and

the removable data storage media is selected from the group consisting of a digital video disc and a compact disc.

24. The data-encoding system of claim 22, wherein the first data storage is adapted to store at least a portion of the data encoded at the second rate and output the user-selected portion of the data encoded at the second rate.

25. The data-encoding system of claim 24, wherein the second data storage is adapted to receive the user-selected portion of the data encoded at the second rate from the first data storage and store the received user-selected portion of the data encoded at the second rate.

Motorola v. Stellar
Motorola Exhibit 1032
Page 309

26. The data-encoding system of claim 21, further comprising a third data storage adapted to receive the user-selected portion of the data encoded at the second rate from the second data storage and store the received user-selected portion of the data encoded at the second rate.

27. The data-encoding system of claim 24, wherein the first data storage cyclically overwrites previously-stored data encoded at the second rate responsive to receipt of new data encoded at the second rate.

28. The data-encoding system of claim 19, wherein the unencoded data is video data.

29. A data-encoding method comprising:

a first encoder interoperably coupled to a source of unencoded data receiving the unencoded data, encoding the unencoded data, and outputting encoded data at a first data rate;

a second encoder interoperably coupled to the source receiving the unencoded data, encoding the unencoded data, and outputting encoded data at a second data rate; and

wherein the second data rate exceeds the first data rate.

30. The data-encoding method of claim 29, further comprising:

a first data storage device storing the data encoded at the first rate; and

a second data storage device storing a user-selected portion of the data encoded at the second rate.

31. The method of claim 30, wherein the first data storage device and the second data storage device are identical.

32. The method of claim 30, wherein:

the first data storage comprises non-removable data storage media; and

the second data storage comprises removable data storage media.

33. The method of claim 32, wherein:

the first data storage is a hard drive; and

the removable data storage media is selected from the group consisting of a digital video disc and a compact disc.

Motorola v. Stellar
Motorola Exhibit 1032
Page 310

34. The data-encoding method of claim 32, further comprising the first data storage storing at least a portion of the data encoded at the second rate and outputting the user-selected portion of the data encoded at the second rate.

35. The data-encoding method of claim 34, further comprising the second data storage receiving the user-selected portion of the data encoded at the second rate from the first data storage and storing the received user-selected portion of the data encoded at the second rate.

36. The data-encoding method of claim 31, further comprising a third data storage adapted receiving the user-selected portion of the data encoded at the second rate from the second data storage and storing the received user-selected portion of the data encoded at the second rate.

37. The data-encoding method of claim 34, further comprising the first data storage cyclically overwriting previously-stored data encoded at the second rate responsive to receipt of new data encoded at the second rate.

38. The data-encoding method of claim 29, wherein the unencoded data is video data.

39. A data-overflow-handling method comprising:

storing at least one of captured audio data, video data, and metadata to a first directory of a non-removable data storage medium;

determining whether an event is being recorded;

responsive to a determination that an event is being recorded, storing an image of the stored at least one of captured audio data, video data, and metadata to a second directory of the non-removable data storage medium;

determining whether a predefined capacity threshold relative to a removable data storage medium has been exceeded;

responsive to a determination that the predefined capacity threshold has been exceeded, creating a third directory of the non-removable data storage medium;

determining whether data in the second directory of the non-removable storage medium has not been stored to the removable data storage medium;

Motorola v. Stellar
Motorola Exhibit 1032
Page 311

responsive to a determination that data in the second directory of the non-removable storage medium has not been stored to the removable data storage medium, storing any unstored data in the second directory to the removable data storage medium;

determining whether the second directory contains finalization files;

responsive to a determination that the second directory contains finalization files, finalizing the removable storage medium and providing a prompt to insert another removable storage medium; and

responsive to a determination that the second directory contains no finalization files, returning to the step of determining whether data in the second directory of the non-removable storage medium has not been stored to the removable data storage medium.

40. The data-overflow-handling method of claim 39, further comprising, responsive to insertion of another removable data storage medium, checking for the third directory.

41. The data-overflow-handling method of claim 40, further comprising:

determining whether data in the third directory of the non-removable storage medium has not been stored to the removable data storage medium;

responsive to a determination that data in the third directory of the non-removable storage medium has not been stored to the removable data storage medium, storing any unstored data in the third directory to the new removable data storage medium;

determining whether the third directory contains finalization files; and

responsive to a determination that the third directory contains finalization files, finalizing the removable storage medium and providing a prompt to insert another removable storage medium.

42. The data-overflow-handling method of claim 39, wherein:

a hard drive comprises the non-removable data storage medium; and

the removable data storage medium is a digital video disc.

Motorola v. Stellar
Motorola Exhibit 1032
Page 312

43. A data-overflow-handling computer system comprising:

a processor; and

a memory including software instructions adapted to enable the computer system to perform the steps of:

storing at least one of captured audio data, video data, and metadata to a first directory of a non-removable data storage medium;

determining whether an event is being recorded;

responsive to a determination that an event is being recorded, storing an image of the stored at least one of captured audio data, video data, and metadata to a second directory of the non-removable data storage medium;

determining whether a predefined capacity threshold relative to a removable data storage medium has been exceeded;

responsive to a determination that the predefined capacity threshold has been exceeded, creating a third directory of the non-removable data storage medium;

determining whether data in the second directory of the non-removable storage medium has not been stored to the removable data storage medium;

responsive to a determination that data in the second directory of the non-removable storage medium has not been stored to the removable data storage medium, storing any unstored data in the second directory to the removable data storage medium;

determining whether the second directory contains finalization files;

responsive to a determination that the second directory contains finalization files, finalizing the removable storage medium and providing a prompt to insert another removable storage medium; and

responsive to a determination that the second directory contains no finalization files, returning to the step of determining whether data in the second directory of the non-removable storage medium has not been stored to the removable data storage medium.

44. The computer system of claim 43, further comprising software instructions adapted to enable the computer system to perform the step of, responsive to insertion of another removable data storage medium, checking for the third directory.

Motorola v. Stellar
Motorola Exhibit 1032
Page 313

45. The system of claim 44, further comprising software instructions adapted to enable the computer system to perform the steps of::

determining whether data in the third directory of the non-removable storage medium has not been stored to the removable data storage medium;

responsive to a determination that data in the third directory of the non-removable storage medium has not been stored to the removable data storage medium, storing any unstored data in the third directory to the new removable data storage medium;

determining whether the third directory contains finalization files; and

responsive to a determination that the third directory contains finalization files, finalizing the removable storage medium and providing a prompt to insert another removable storage medium.

46. The system of claim 43, wherein:

a hard drive comprises the non-removable data storage medium; and

the removable data storage medium is a digital video disc.

47. A method of archiving data, the method comprising:

receiving data;

storing the data on a first data storage medium;

selecting a portion of the data;

determining if at least one environmental factor indicates that environmental conditions are acceptable for storing the selected portion of the data on a second data storage medium; and

responsive to a determination that the at least one environmental factor indicates that environmental conditions are acceptable, storing the selected portion of the data on the second data storage medium.

48. The method of claim 47, further comprising:

responsive to a determination that the at least one environmental factor indicates that environmental conditions are not acceptable, returning to the determining step.

49. The method of claim 47, wherein the at least one environmental factor comprises at least one of temperature, physical shock, and vibration.

Motorola v. Stellar
Motorola Exhibit 1032
Page 314

50. The method of claim 47, wherein the step of determining further comprises:

measuring the at least one environmental factor; and

determining if the at least one environmental factor is less than a predetermined threshold.

51. The method of claim 47, wherein the step of storing the selected portion of the data on the second data storage medium further comprises:

writing the selected portion of the data on the second data storage medium;

monitoring at least one accelerometer during the storing of the selected portion of the data;

determining if an output value of the at least one accelerometer exceeds a predetermined accelerometer threshold; and

responsive to a determination that the output value of the at least one accelerometer exceeds the predetermined accelerometer threshold, rewriting the selected portion of the data on the second data storage medium.

52. The method of claim 51, further comprising:

responsive to a determination that the output value of the at least one accelerometer does not exceed the predetermined accelerometer threshold, returning to the selecting step.

53. The method of claim 47, wherein the step of storing the selected portion of the data on the second data storage medium further comprises:

writing the selected portion of the data on the second data storage medium;

calculating a first checksum corresponding to the selected portion of the data;

reading the selected written portion of the data from the second data storage medium;

calculating a second checksum corresponding the selected written portion of the data read from the second data storage medium;

determining if the first checksum matches the second checksum; and

responsive to a determination that the first checksum does no match the second checksum, rewriting the selected portion of the data on the second data storage medium.

54. The method of claim 53, further comprising:

Motorola v. Stellar
Motorola Exhibit 1032
Page 315

responsive to a determination that the first checksum matches the second checksum, returning to the selecting step.

55. The method of claim 47, wherein the encoded data comprises at least one of video data, audio data, and metadata.

56. The method of claim 47, wherein the data comprises encoded data.

57. The method of claim 47, wherein the first data storage medium comprises a non-removable storage medium.

58. The method of claim 47, wherein the second data storage medium comprises a removable storage medium.

Motorola v. Stellar
Motorola Exhibit 1032
Page 316

59. A computer system for archiving data, the computer system comprising:

a processor; and

a memory including software instructions adapted to enable the computer system to perform the steps of:

receiving data;

storing the data on a first data storage medium;

selecting a portion of the data;

determining if at least one environmental factor indicates that environmental conditions are acceptable for storing the selected portion of the data on a second data storage medium; and

responsive to a determination that the at least one environmental factor indicates that environmental conditions are acceptable, storing the selected portion of the data on the second data storage medium.

60. The computer system of claim 59, further comprising software instructions adapted to enable the computer system to perform the step of, responsive to a determination that the at least one environmental factor indicates that environmental conditions are not acceptable, returning to the determining step.

61. The computer system of claim 59, wherein the at least one environmental factor comprises at least one of temperature, physical shock, and vibration.

62. The computer system of claim 59, wherein the step of determining further comprises:

measuring the at least one environmental factor; and

determining if the at least one environmental factor is less than a predetermined threshold.

63. The computer system of claim 59, wherein the step of storing the selected portion of the data on the second data storage medium further comprises:

writing the selected portion of the data on the second data storage medium;

monitoring at least one accelerometer during the storing of the selected portion of the data;

Motorola v. Stellar
Motorola Exhibit 1032
Page 317

determining if an output value of the at least one accelerometer exceeds a predetermined accelerometer threshold; and

responsive to a determination that the output value of the at least one accelerometer exceeds the predetermined accelerometer threshold, rewriting the selected portion of the data on the second data storage medium.

64. The computer system of claim 63, further comprising software instructions adapted to enable the computer system to perform the step of, responsive to a determination that the output value of the at least one accelerometer does not exceed the predetermined accelerometer threshold, returning to the selecting step.

65. The computer system of claim 59, wherein the step of storing the selected portion of the data on the second data storage medium further comprises:

writing the selected portion of the data on the second data storage medium;

calculating a first checksum corresponding to the selected portion of the data;

reading the selected written portion of the data from the second data storage medium;

calculating a second checksum corresponding the selected written portion of the data read from the second data storage medium;

determining if the first checksum matches the second checksum; and

responsive to a determination that the first checksum does no match the second checksum, rewriting the selected portion of the data on the second data storage medium.

66. The computer system of claim 65, further comprising software instructions adapted to enable the computer system to perform the step of, responsive to a determination that the first checksum matches the second checksum, returning to the selecting step.

67. The computer system of claim 59, wherein the encoded data comprises at least one of video data, audio data, and metadata.

68. The computer system of claim 59, wherein the data comprises encoded data.

69. The computer system of claim 59, wherein the first data storage medium comprises a non-removable storage medium.

Motorola v. Stellar
Motorola Exhibit 1032
Page 318

70. The computer system of claim 59, wherein the second data storage medium comprises a removable storage medium.

71. A data security method comprising:

performing a checksum on data contained on a removable data storage medium;

storing the checksum on the removable data storage medium in at least one of an encrypted and a hidden form;

storing a unique serial number pertaining to the removable storage medium to the removable storage medium; and

storing a checksum and a corresponding unique serial number of a plurality of previous removable storage media to the removable storage medium.

72. The data security method of claim 71, further comprising storing the unique serial number pertaining to the removable storage medium to a non-removable storage medium of a system used to store data to the removable storage medium.

73. A data security computer system comprising:

a processor; and

a memory including software instructions adapted to enable the computer system to perform the steps of:

performing a checksum on data contained on a removable data storage medium;

storing the checksum on the removable data storage medium in at least one of an encrypted and a hidden form;

storing a unique serial number pertaining to the removable storage medium to the removable storage medium; and

storing a checksum and a corresponding unique serial number of a plurality of previous removable storage media to the removable storage medium.

74. The data security system of claim 73, further comprising software instructions adapted to enable the computer system to perform the step of storing the unique serial number pertaining to the removable storage medium to a non-removable storage medium of a system used to store data to the removable storage medium.

Motorola v. Stellar
Motorola Exhibit 1032
Page 319

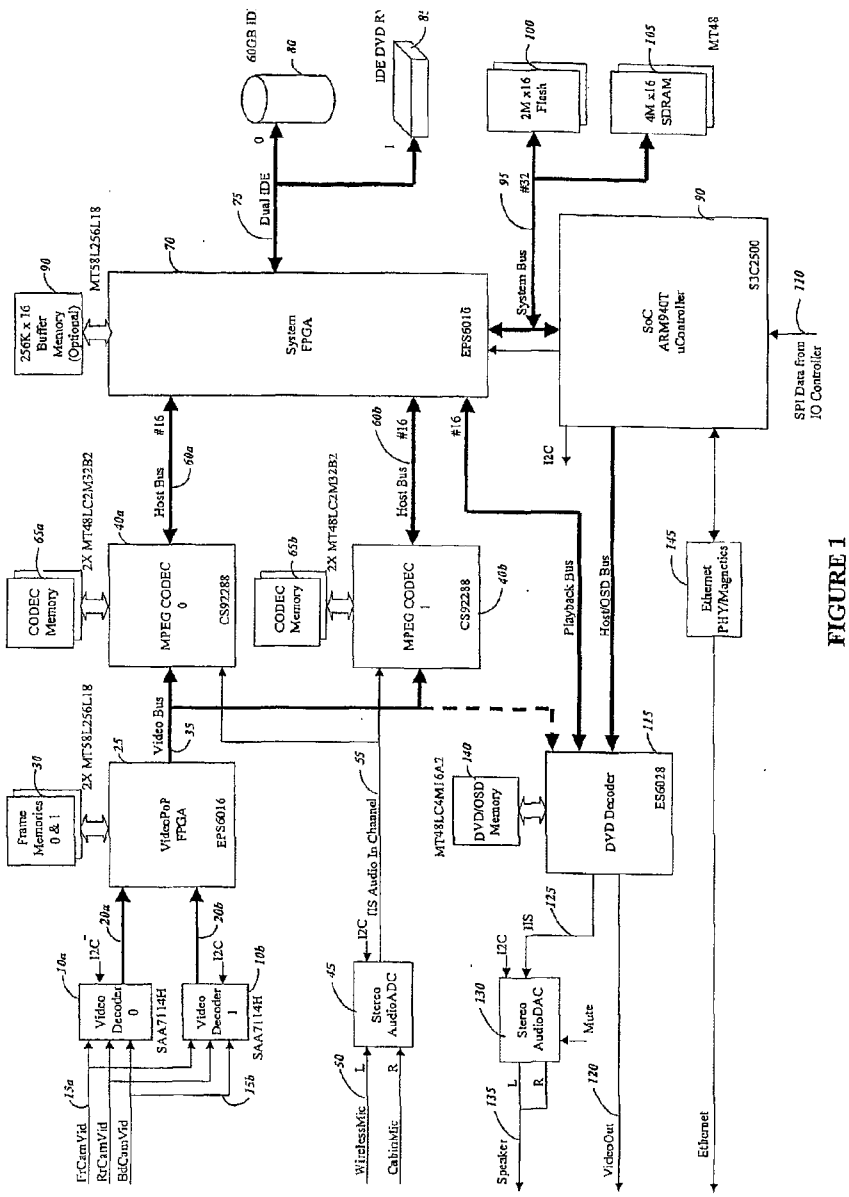


FIGURE 1

Motorola v. Stellar
Motorola Exhibit 1032
Page 320

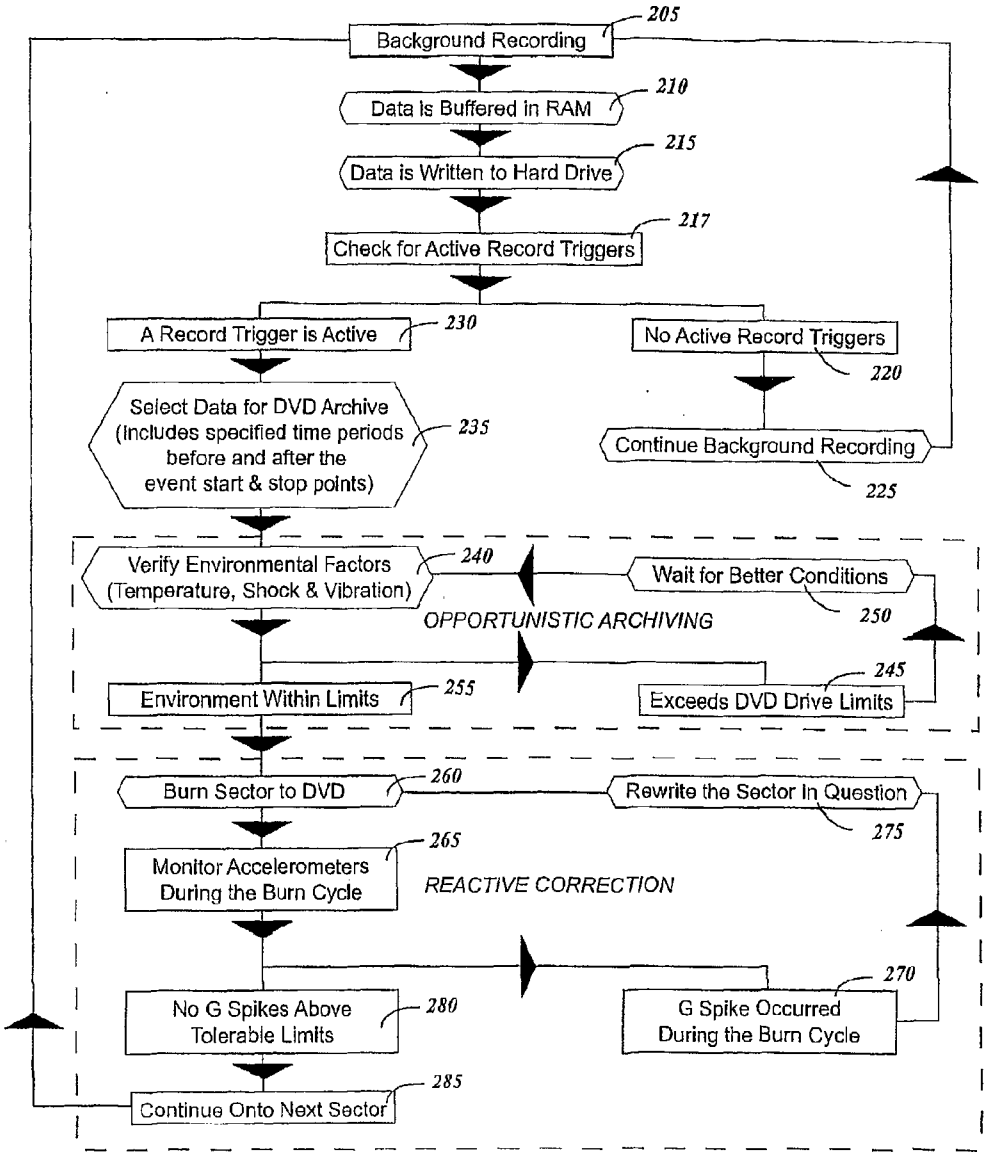


FIGURE 2

Motorola v. Stellar
Motorola Exhibit 1032
Page 321

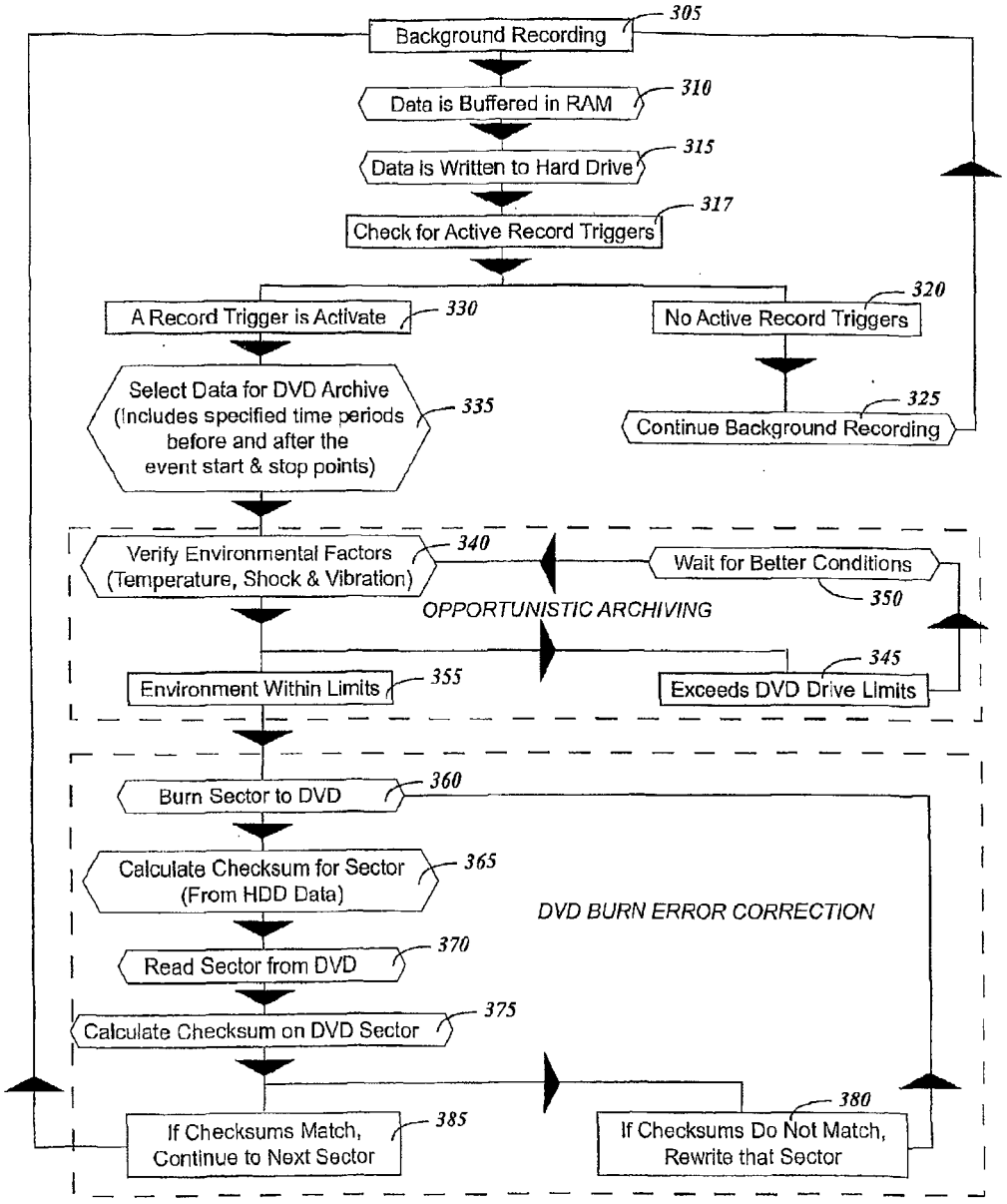


FIGURE 3

Motorola v. Stellar
Motorola Exhibit 1032
Page 322

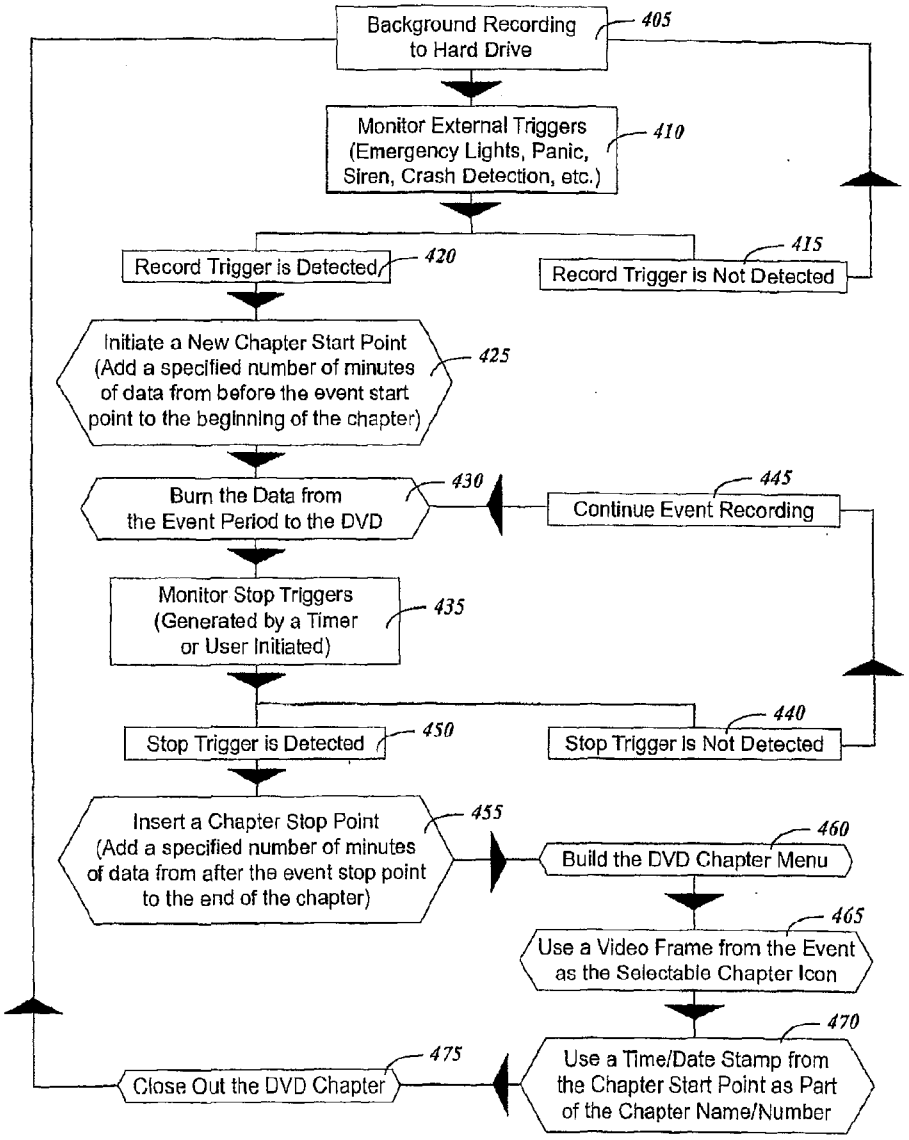


FIGURE 4

Motorola v. Stellar
Motorola Exhibit 1032
Page 323

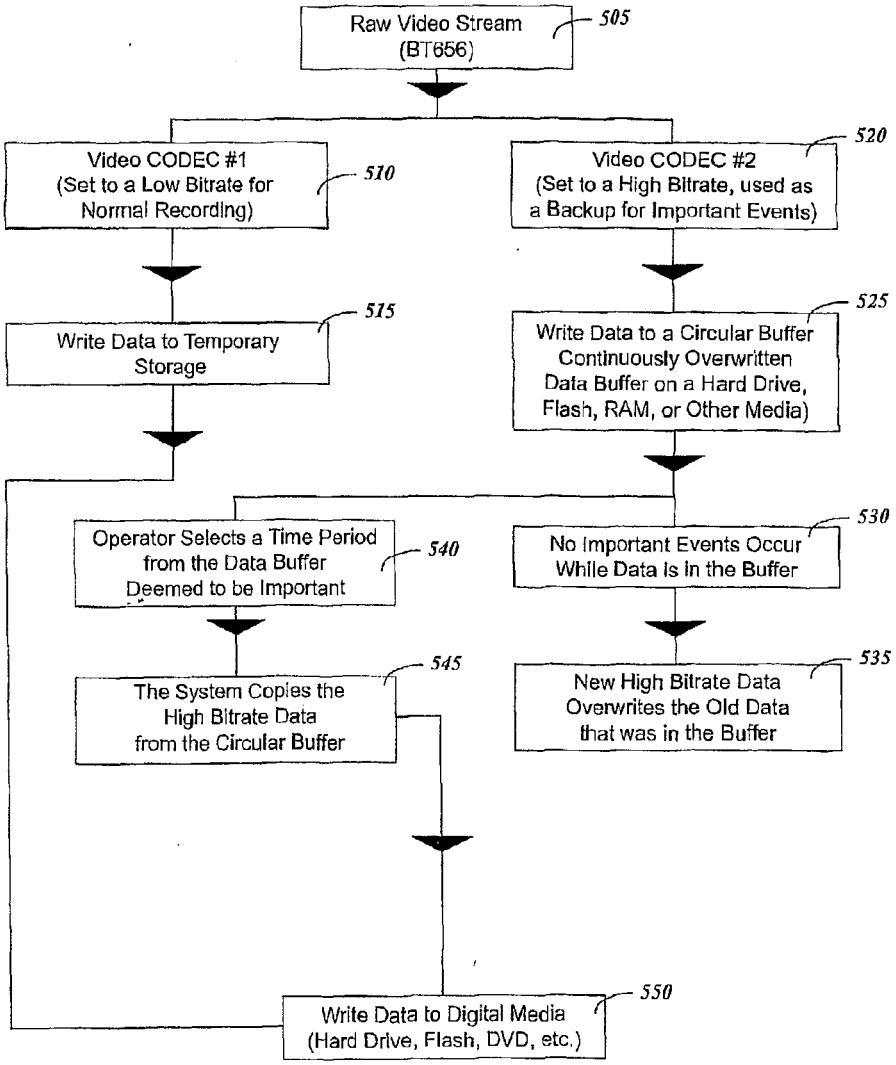


FIGURE 5

Motorola v. Stellar
Motorola Exhibit 1032
Page 324

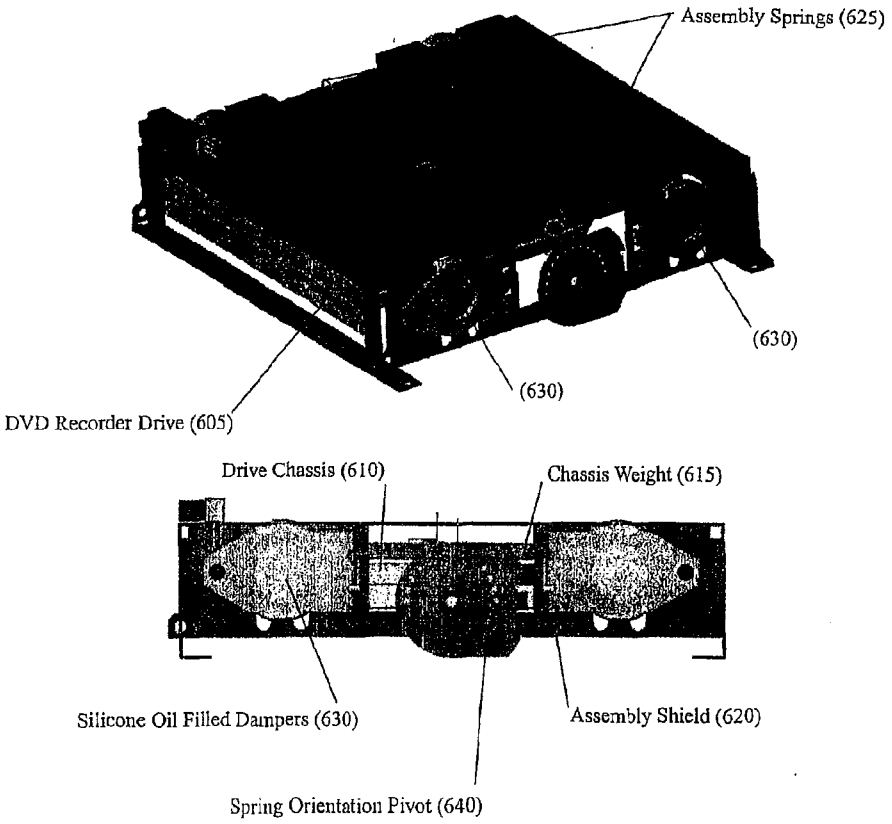


FIGURE 6

Motorola v. Stellar
Motorola Exhibit 1032
Page 325

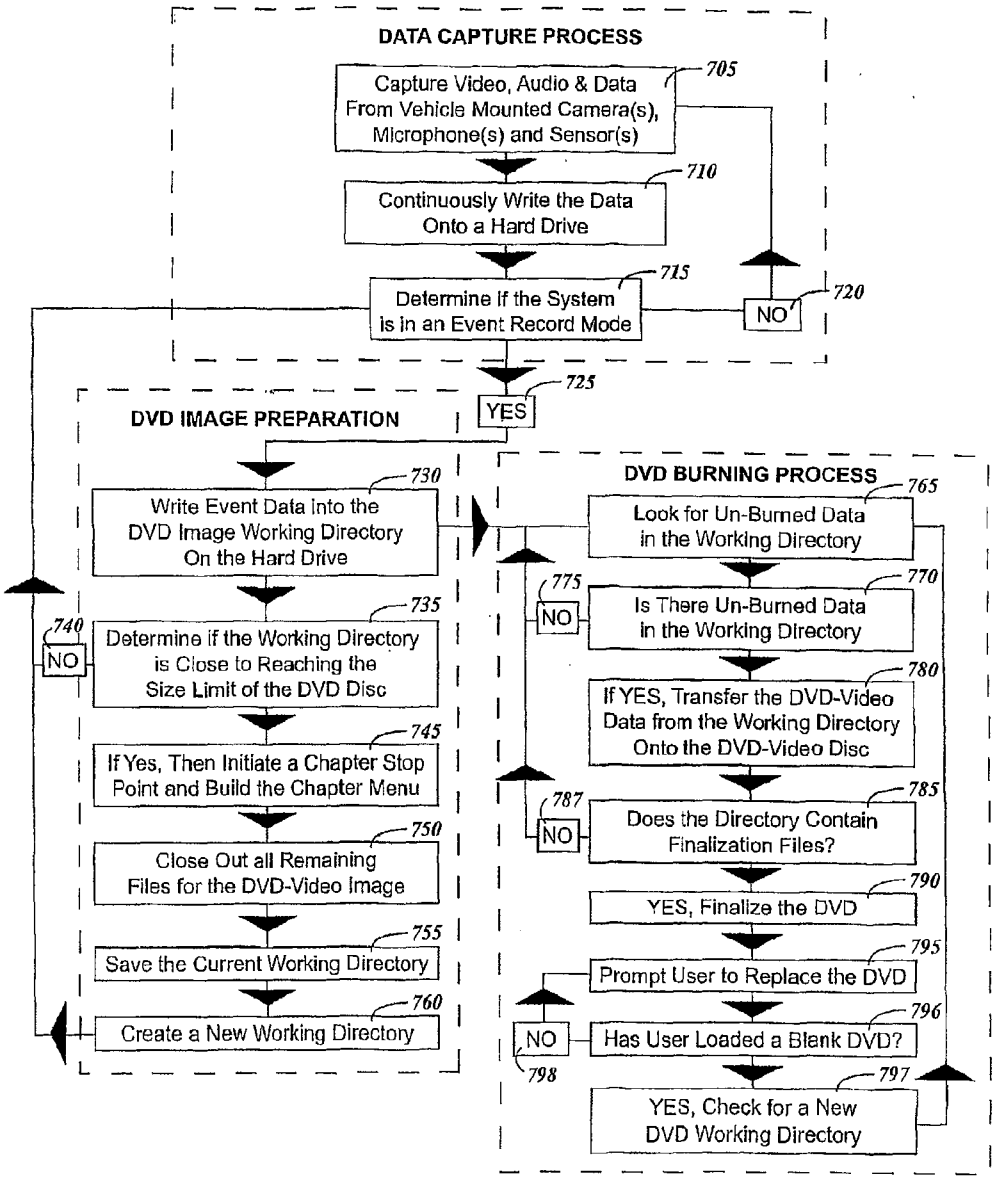


FIGURE 7

Motorola v. Stellar
Motorola Exhibit 1032
Page 326

Electronic Acknowledgement Receipt	
EFS ID:	30245318
Application Number:	15279155
International Application Number:	
Confirmation Number:	9873
Title of Invention:	WRITE-PROTECTED RECORDING
First Named Inventor/Applicant Name:	Paul DeKeyser
Customer Number:	24392
Filer:	Tomas Prieto/Olimpia Jakubowska
Filer Authorized By:	Tomas Prieto
Attorney Docket Number:	102246.0003US6
Receipt Date:	31-AUG-2017
Filing Date:	28-SEP-2016
Time Stamp:	17:51:11
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Information Disclosure Statement (IDS) Form (SB08)	IDS.pdf	613207 7f52851a3e4dbc39059b4d8592649cd065188dbd	no	7

Warnings:

Information:					
2	Foreign Reference	EP510968.pdf	2877197 42a48b6962cb5c52a0bccfa219f3444791bff140	no	18
Warnings:					
Information:					
3	Foreign Reference	EP1064783.pdf	2795407 ace07c75d12586c122d146992ba71ffa45f820cd	no	43
Warnings:					
Information:					
4	Foreign Reference	WO9222983.pdf	938116 cdd292f530121755d67da505ca596d8b7ce25289	no	55
Warnings:					
Information:					
5	Foreign Reference	WO9949656.pdf	1342962 f1450cd530ce21571baf57f901b214795a3c9c8b	no	73
Warnings:					
Information:					
6	Foreign Reference	WO9956216.pdf	4282984 38254687880edc04f4b7906c47875cc8bffb1573	no	27
Warnings:					
Information:					
7	Foreign Reference	WO2006044476.pdf	1988216 d826e9e565564a53d839e64680f39706dbb7946e	no	45
Warnings:					
Information:					
			Total Files Size (in bytes):	14838089	

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
P.O. BOX 1450
ALEXANDRIA, VA 22313-1450

Appl No.:	15/279,155
Inventor:	Paul DeKeyser
Applicant:	Paul DeKeyser
Filing Date:	September 28, 2016
Art Unit:	2487
Examiner:	Nhon Thanh Diep
Attorney Docket No.:	102246.0003US6

Title **Write-Protected Recording**

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

RESPONSE TO NON-FINAL OFFICE ACTION

Sir:

This paper responds to the Non-Final Office Action dated June 16, 2017, and is accompanied by terminal disclaimers. Please enter the amendments shown herein.

- Claim Amendments begin on page 2.
- Remarks begin on page 5.

Motorola v. Stellar
Motorola Exhibit 1032
Page 330

AMENDMENTS TO THE CLAIMS

This listing of claims represents the current version of claims before the Office:

1. (Currently Amended) A recording system comprising:

a sensor interface that captures sensor data from at least one sensor;

a memory coupled with the sensor interface;

a recording facility coupled with the sensor interface and memory, and that records at least some of the sensor data into an available portion of at least one buffer in the memory; and

a protecting facility coupled with the recording facility that responds to a trigger signal to record the at least some of the sensor data by designating a segment of the at least one buffer as a write-protected segment and by storing the write-protected segment as at least one file in the at least one buffer, wherein the write-protected segment includes a pre-recorded subset recorded before the trigger signal is received and a post-recorded subset to be recorded after the trigger signal is received.

2. (Original) The system of claim 1, further comprising a sending facility coupled with the memory and configured to transmit data associated with the at least one file from the memory to a remote memory.

3. (Original) The system of claim 1, wherein the sensor data comprises at least one of the following: image data and video data.

4. (Original) The system of claim 3, wherein the sensor data comprises a resolution of at least 640 x 480 pixels.

5. (Original) The system of claim 4, wherein the sensor data comprises a resolution of at least 1080p.

6. (Original) The system of claim 1, wherein the sensor data recorded into the available portions of the at least one buffer is compressed.

Motorola v. Stellar
Motorola Exhibit 1032
Page 331

7. (Original) The system of claim 6, wherein the sensor data recorded into the available portions of the at least one buffer is time compressed.

8. (Original) The system of claim 6, wherein the sensor data recorded into the available portions of the at least one buffer is frame compressed.

9. (Original) The system of claim 1, wherein the sensor data comprises at least one of the following: audio data and motion data.

10. (Original) The system of claim 1, wherein the memory comprises at least one of the following: RAM and flash.

11. (Original) The system of claim 1, wherein the sensor interface comprises a wireless interface to the at least one sensor.

12. (Original) The system of claim 11, wherein the wireless interface comprises a BlueTooth® wireless interface.

13. (Original) The system of claim 1, wherein the at least one buffer comprises a circular buffer.

14. (Original) The system of claim 1, further comprising a camera including the sensor interface, the memory, and the recording facility.

15. (Original) The system of claim 14, wherein the camera comprises a security camera.

16. (Original) The system of claim 1, further comprising a cell phone including the sensor interface, the memory, and the recording facility.

17. (Original) The system of claim 1, further comprising a personal area network coupled with the protecting facility and including at least two of the following: the sensor interface, the memory, and the recording facility.

18. (Original) The system of claim 1, wherein the at least one file in the at least one buffer comprises a single file.

Motorola v. Stellar
Motorola Exhibit 1032
Page 332

19. (Original) The system of claim 18, wherein the single file comprises an entirety of the at least one buffer.

20. (Currently Amended) The system of claim 1, wherein the trigger signal represents detection of at least one of the following: a motion, a sound, an image, content in a data stream, a pattern in the sensor data, a person, a human face, a computer screen, an event, a verbal command, operation of a ~~witch~~switch, and operation of a button.

21. (Original) The system of claim 1, wherein the protecting facility is further configured to update the write-protected segment as being non-protected and free for recording.

22. (Original) The system of claim 1, wherein the protecting facility is further configured to store the at least one file by indexing the write-protected segment in the at least one buffer.

23. (Currently Amended) The system of claim 22, wherein the protecting facility is further configured to index the write-protected segment while the recording facility is still recording the ~~recoding~~ sensor data into the memory.

Motorola v. Stellar
Motorola Exhibit 1032
Page 333

REMARKS/ARGUMENTS

The Non-Final Office Action dated June 16, 2017 ("2017 June OA") has been received and carefully considered. After entry of this amendment, claims 1-23 remain pending. In view of the amendments and remarks below, Applicant respectfully requests reconsideration.

Claim Amendments

Claims 1, 20 and 23 have been amended to correct typographical errors. No new matter has been added.

Double Patenting

The Office rejected claims 1-23 on the ground of nonstatutory double patenting over:

- Claims 1-10 of U.S. Patent No. 9,485,471;
- Claims 1-8, and 10 of U.S. Patent No. 7,593,034; and
- Claims 1-12 of U.S. Patent No. 8,692,882

The Office has also rejected claim 1 on the ground of non-statutory double patenting over:

- Claim 1 of U.S. Patent No. 8,310,540; and
- Claim 1 of U.S. Patent No. 8,928,752.

Applicant has submitted corresponding terminal disclaimers and thus believes the rejections have been overcome. Applicant respectfully requests withdrawal of the double patenting rejections.

Motorola v. Stellar
Motorola Exhibit 1032
Page 334

Request For Allowance

Claims 1-23 are pending in this application. The Applicant requests allowance of all pending claims.

Respectfully submitted,
Fish IP Law, LLP

Date: September 18, 2017

By: /Tomas A. Prieto/
Tomas A. Prieto
Reg. No. 60,675

Fish IP Law, LLP
2603 Main Street, Suite 1000
Irvine, CA 92614-4271
Telephone (949) 943-8300
Fax (949) 943-8358

PTO/AIA/26 (04-14)
Approved for use through 07/31/2016. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

TERMINAL DISCLAIMER TO OBVIATE A DOUBLE PATENTING REJECTION OVER A "PRIOR" PATENT	Docket Number (Optional) 102246.0003US6

In re Application of: Stellar, LLC

Application No.: 15/279155

Filed: September 28, 2016

For: WRITE-PROTECTED RECORDING

The applicant, Stellar LLC, owner of 100 percent interest in the instant application hereby disclaims, except as provided below, the terminal part of the statutory term of any patent granted on the instant application which would extend beyond the expiration date of the full statutory term of **prior patent** No. 8310540 as the term of said **prior patent** is presently shortened by any terminal disclaimer. The applicant hereby agrees that any patent so granted on the instant application shall be enforceable only for and during such period that it and the **prior patent** are commonly owned. This agreement runs with any patent granted on the instant application and is binding upon the grantee, its successors or assigns.

In making the above disclaimer, the applicant does not disclaim the terminal part of the term of any patent granted on the instant application that would extend to the expiration date of the full statutory term of the **prior patent**, "as the term of said **prior patent** is presently shortened by any terminal disclaimer," in the event that said **prior patent** later:

expires for failure to pay a maintenance fee;
is held unenforceable;
is found invalid by a court of competent jurisdiction;
is statutorily disclaimed in whole or terminally disclaimed under 37 CFR 1.321;
has all claims canceled by a reexamination certificate;
is reissued; or
is in any manner terminated prior to the expiration of its full statutory term as presently shortened by any terminal disclaimer.

Check either box 1 or 2 below, if appropriate.

1. ☐ The undersigned is the applicant. If the applicant is an assignee, the undersigned is authorized to act on behalf of the assignee.

I hereby acknowledge that any willful false statements made are punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.

2. ☑ The undersigned is an attorney or agent of record. Reg. No. 60675

/Tomas Prieto/ — Signature
September 18, 2017 — Date

Tomas Prieto — Typed or printed name

Attorney of Record — Title
949-943-8300 — Telephone Number

☑ Terminal disclaimer fee under 37 CFR 1.20(d) included.

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

This collection of information is required by 37 CFR 1.321. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

PTO/AIA/96 (08-12)
Approved for use through 01/31/2013. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

STATEMENT UNDER 37 CFR 3.73(c)

Applicant/Patent Owner: Stellar, Inc.

Application No./Patent No.: 7593034 Filed/Issue Date: November 10, 2008

Titled: WRITE-PROTECTED RECORDING

Stellar, Inc., a Corporation

(Name of Assignee) (Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that, for the patent application/patent identified above, it is (choose **one** of options 1, 2, 3 or 4 below):

1. ☑ The assignee of the entire right, title, and interest.

2. ☐ An assignee of less than the entire right, title, and interest (check applicable box):

   ☐ The extent (by percentage) of its ownership interest is _____%. Additional Statement(s) by the owners holding the balance of the interest must be submitted to account for 100% of the ownership interest.

   ☐ There are unspecified percentages of ownership. The other parties, including inventors, who together own the entire right, title and interest are:

   Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

3. ☐ The assignee of an undivided interest in the entirety (a complete assignment from one of the joint inventors was made). The other parties, including inventors, who together own the entire right, title, and interest are:

   Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

4. ☐ The recipient, via a court proceeding or the like (*e.g.*, bankruptcy, probate), of an undivided interest in the entirety (a complete transfer of ownership interest was made). The certified document(s) showing the transfer is attached.

The interest identified in option 1, 2 or 3 above (not option 4) is evidenced by either (choose **one** of options A or B below):

A. ☑ An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel 028980, Frame 0430, or for which a copy thereof is attached.

B. ☐ A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:

   1. From: _____ To: _____

      The document was recorded in the United States Patent and Trademark Office at

      Reel _____, Frame _____, or for which a copy thereof is attached.

   2. From: _____ To: _____

      The document was recorded in the United States Patent and Trademark Office at

      Reel _____, Frame _____, or for which a copy thereof is attached.

This collection of information is required by 37 CFR 3.73(b). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

PTO/AIA/96 (08-12)
Approved for use through 01/31/2013. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

STATEMENT UNDER 37 CFR 3.73(c)

3. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at

Reel _____, Frame _____, or for which a copy thereof is attached.

4. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at

Reel _____, Frame _____, or for which a copy thereof is attached.

5. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at

Reel _____, Frame _____, or for which a copy thereof is attached.

6. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at

Reel _____, Frame _____, or for which a copy thereof is attached.

☐ Additional documents in the chain of title are listed on a supplemental sheet(s).

☐ As required by 37 CFR 3.73(c)(1)(i), the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.

[NOTE: A separate copy (i.e., a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

/Tomas Prieto/	September 18, 2017
Signature	Date
Tomas Prieto	60675
Printed or Typed Name	Title or Registration Number

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

PTO/AIA/26 (04-14)
Approved for use through 07/31/2016. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

TERMINAL DISCLAIMER TO OBVIATE A DOUBLE PATENTING REJECTION OVER A "PRIOR" PATENT	Docket Number (Optional) 102246.0003US6

In re Application of: Stellar, LLC

Application No.: 15/279155

Filed: September 28, 2016

For: WRITE-PROTECTED RECORDING

The applicant, Stellar LLC, owner of 100 percent interest in the instant application hereby disclaims, except as provided below, the terminal part of the statutory term of any patent granted on the instant application which would extend beyond the expiration date of the full statutory term of **prior patent** No. 7593034 as the term of said **prior patent** is presently shortened by any terminal disclaimer. The applicant hereby agrees that any patent so granted on the instant application shall be enforceable only for and during such period that it and the **prior patent** are commonly owned. This agreement runs with any patent granted on the instant application and is binding upon the grantee, its successors or assigns.

In making the above disclaimer, the applicant does not disclaim the terminal part of the term of any patent granted on the instant application that would extend to the expiration date of the full statutory term of the **prior patent**, "as the term of said **prior patent** is presently shortened by any terminal disclaimer," in the event that said **prior patent** later:

expires for failure to pay a maintenance fee;
is held unenforceable;
is found invalid by a court of competent jurisdiction;
is statutorily disclaimed in whole or terminally disclaimed under 37 CFR 1.321;
has all claims canceled by a reexamination certificate;
is reissued; or
is in any manner terminated prior to the expiration of its full statutory term as presently shortened by any terminal disclaimer.

Check either box 1 or 2 below, if appropriate.

1. ☐ The undersigned is the applicant. If the applicant is an assignee, the undersigned is authorized to act on behalf of the assignee.

I hereby acknowledge that any willful false statements made are punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.

2. ☑ The undersigned is an attorney or agent of record. Reg. No. 60675

/Tomas Prieto/ — Signature
September 18, 2017 — Date

Tomas Prieto — Typed or printed name

Attorney of Record — Title
949-943-8300 — Telephone Number

☑ Terminal disclaimer fee under 37 CFR 1.20(d) included.

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

This collection of information is required by 37 CFR 1.321. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

PTO/AIA/96 (08-12)
Approved for use through 01/31/2013. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

STATEMENT UNDER 37 CFR 3.73(c)

Applicant/Patent Owner: Stellar, Inc.

Application No./Patent No.: 8692882 Filed/Issue Date: September 16, 2009

Titled: WRITE-PROTECTED RECORDING

Stellar, Inc., a Corporation

(Name of Assignee) (Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that, for the patent application/patent identified above, it is (choose **one** of options 1, 2, 3 or 4 below):

1. ☑ The assignee of the entire right, title, and interest.

2. ☐ An assignee of less than the entire right, title, and interest (check applicable box):

   ☐ The extent (by percentage) of its ownership interest is _____%. Additional Statement(s) by the owners holding the balance of the interest must be submitted to account for 100% of the ownership interest.

   ☐ There are unspecified percentages of ownership. The other parties, including inventors, who together own the entire right, title and interest are:

   Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

3. ☐ The assignee of an undivided interest in the entirety (a complete assignment from one of the joint inventors was made). The other parties, including inventors, who together own the entire right, title, and interest are:

   Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

4. ☐ The recipient, via a court proceeding or the like (*e.g.*, bankruptcy, probate), of an undivided interest in the entirety (a complete transfer of ownership interest was made). The certified document(s) showing the transfer is attached.

The interest identified in option 1, 2 or 3 above (not option 4) is evidenced by either (choose **one** of options A or B below):

A. ☑ An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel 028980, Frame 0430, or for which a copy thereof is attached.

B. ☐ A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:

   1. From: _____ To: _____

      The document was recorded in the United States Patent and Trademark Office at

      Reel _____, Frame _____, or for which a copy thereof is attached.

   2. From: _____ To: _____

      The document was recorded in the United States Patent and Trademark Office at

      Reel _____, Frame _____, or for which a copy thereof is attached.

This collection of information is required by 37 CFR 3.73(b). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

PTO/AIA/96 (08-12)
Approved for use through 01/31/2013. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

STATEMENT UNDER 37 CFR 3.73(c)

3. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at

Reel _____, Frame _____, or for which a copy thereof is attached.

4. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at

Reel _____, Frame _____, or for which a copy thereof is attached.

5. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at

Reel _____, Frame _____, or for which a copy thereof is attached.

6. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at

Reel _____, Frame _____, or for which a copy thereof is attached.

☐ Additional documents in the chain of title are listed on a supplemental sheet(s).

☐ As required by 37 CFR 3.73(c)(1)(i), the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.

[NOTE: A separate copy (i.e., a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

/Tomas Prieto/	September 18, 2017
Signature	Date
Tomas Prieto	60675
Printed or Typed Name	Title or Registration Number

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

PTO/AIA/26 (04-14)
Approved for use through 07/31/2016. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

TERMINAL DISCLAIMER TO OBVIATE A DOUBLE PATENTING REJECTION OVER A "PRIOR" PATENT	Docket Number (Optional) 102246.0003US6

In re Application of: Stellar, LLC

Application No.: 15/279155

Filed: September 28, 2016

For: WRITE-PROTECTED RECORDING

The applicant, Stellar LLC, owner of 100 percent interest in the instant application hereby disclaims, except as provided below, the terminal part of the statutory term of any patent granted on the instant application which would extend beyond the expiration date of the full statutory term of **prior patent** No. 8692882 as the term of said **prior patent** is presently shortened by any terminal disclaimer. The applicant hereby agrees that any patent so granted on the instant application shall be enforceable only for and during such period that it and the **prior patent** are commonly owned. This agreement runs with any patent granted on the instant application and is binding upon the grantee, its successors or assigns.

In making the above disclaimer, the applicant does not disclaim the terminal part of the term of any patent granted on the instant application that would extend to the expiration date of the full statutory term of the **prior patent**, "as the term of said **prior patent** is presently shortened by any terminal disclaimer," in the event that said **prior patent** later:

expires for failure to pay a maintenance fee;
is held unenforceable;
is found invalid by a court of competent jurisdiction;
is statutorily disclaimed in whole or terminally disclaimed under 37 CFR 1.321;
has all claims canceled by a reexamination certificate;
is reissued; or
is in any manner terminated prior to the expiration of its full statutory term as presently shortened by any terminal disclaimer.

Check either box 1 or 2 below, if appropriate.

1. ☐ The undersigned is the applicant. If the applicant is an assignee, the undersigned is authorized to act on behalf of the assignee.

I hereby acknowledge that any willful false statements made are punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.

2. ☑ The undersigned is an attorney or agent of record. Reg. No. 60675

/Tomas Prieto/ — Signature
September 18, 2017 — Date

Tomas Prieto — Typed or printed name

Attorney of Record — Title
949-943-8300 — Telephone Number

☑ Terminal disclaimer fee under 37 CFR 1.20(d) included.

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

This collection of information is required by 37 CFR 1.321. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

PTO/AIA/96 (08-12)
Approved for use through 01/31/2013. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

STATEMENT UNDER 37 CFR 3.73(c)

Applicant/Patent Owner: Stellar, Inc.

Application No./Patent No.: 9485471 Filed/Issue Date: March 8, 2013

Titled: WRITE-PROTECTED RECORDING

Stellar, Inc., a Corporation

(Name of Assignee) (Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that, for the patent application/patent identified above, it is (choose **one** of options 1, 2, 3 or 4 below):

1. ☑ The assignee of the entire right, title, and interest.

2. ☐ An assignee of less than the entire right, title, and interest (check applicable box):

   ☐ The extent (by percentage) of its ownership interest is _____%. Additional Statement(s) by the owners holding the balance of the interest must be submitted to account for 100% of the ownership interest.

   ☐ There are unspecified percentages of ownership. The other parties, including inventors, who together own the entire right, title and interest are:

   Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

3. ☐ The assignee of an undivided interest in the entirety (a complete assignment from one of the joint inventors was made). The other parties, including inventors, who together own the entire right, title, and interest are:

   Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

4. ☐ The recipient, via a court proceeding or the like (*e.g.*, bankruptcy, probate), of an undivided interest in the entirety (a complete transfer of ownership interest was made). The certified document(s) showing the transfer is attached.

The interest identified in option 1, 2 or 3 above (not option 4) is evidenced by either (choose **one** of options A or B below):

A. ☑ An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel 031486, Frame 0768, or for which a copy thereof is attached.

B. ☐ A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:

   1. From: _____ To: _____

      The document was recorded in the United States Patent and Trademark Office at

      Reel _____, Frame _____, or for which a copy thereof is attached.

   2. From: _____ To: _____

      The document was recorded in the United States Patent and Trademark Office at

      Reel _____, Frame _____, or for which a copy thereof is attached.

This collection of information is required by 37 CFR 3.73(b). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

PTO/AIA/96 (08-12)
Approved for use through 01/31/2013. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

STATEMENT UNDER 37 CFR 3.73(c)

3. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at

Reel _____, Frame _____, or for which a copy thereof is attached.

4. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at

Reel _____, Frame _____, or for which a copy thereof is attached.

5. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at

Reel _____, Frame _____, or for which a copy thereof is attached.

6. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at

Reel _____, Frame _____, or for which a copy thereof is attached.

☐ Additional documents in the chain of title are listed on a supplemental sheet(s).

☐ As required by 37 CFR 3.73(c)(1)(i), the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.

[NOTE: A separate copy (i.e., a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

/Tomas Prieto/	September 18, 2017
Signature	Date
Tomas Prieto	60675
Printed or Typed Name	Title or Registration Number

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

PTO/AIA/26 (04-14)
Approved for use through 07/31/2016. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

TERMINAL DISCLAIMER TO OBVIATE A DOUBLE PATENTING REJECTION OVER A "PRIOR" PATENT	Docket Number (Optional) 102246.0003US6

In re Application of: Stellar, LLC

Application No.: 15/279155

Filed: September 28, 2016

For: WRITE-PROTECTED RECORDING

The applicant, Stellar LLC, owner of 100 percent interest in the instant application hereby disclaims, except as provided below, the terminal part of the statutory term of any patent granted on the instant application which would extend beyond the expiration date of the full statutory term of **prior patent** No. 9485471 as the term of said **prior patent** is presently shortened by any terminal disclaimer. The applicant hereby agrees that any patent so granted on the instant application shall be enforceable only for and during such period that it and the **prior patent** are commonly owned. This agreement runs with any patent granted on the instant application and is binding upon the grantee, its successors or assigns.

In making the above disclaimer, the applicant does not disclaim the terminal part of the term of any patent granted on the instant application that would extend to the expiration date of the full statutory term of the **prior patent**, "as the term of said **prior patent** is presently shortened by any terminal disclaimer," in the event that said **prior patent** later:

expires for failure to pay a maintenance fee;
is held unenforceable;
is found invalid by a court of competent jurisdiction;
is statutorily disclaimed in whole or terminally disclaimed under 37 CFR 1.321;
has all claims canceled by a reexamination certificate;
is reissued; or
is in any manner terminated prior to the expiration of its full statutory term as presently shortened by any terminal disclaimer.

Check either box 1 or 2 below, if appropriate.

1. ☐ The undersigned is the applicant. If the applicant is an assignee, the undersigned is authorized to act on behalf of the assignee.

I hereby acknowledge that any willful false statements made are punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.

2. ☑ The undersigned is an attorney or agent of record. Reg. No. 60675

/Tomas Prieto/ — Signature
September 18, 2017 — Date

Tomas Prieto — Typed or printed name

Attorney of Record — Title
949-943-8300 — Telephone Number

☑ Terminal disclaimer fee under 37 CFR 1.20(d) included.

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

This collection of information is required by 37 CFR 1.321. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

PTO/AIA/96 (08-12)
Approved for use through 01/31/2013. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

STATEMENT UNDER 37 CFR 3.73(c)

Applicant/Patent Owner: Stellar, Inc.

Application No./Patent No.: 8310540 Filed/Issue Date: June 29, 2007

Titled: WRITE-PROTECTED RECORDING

Stellar, Inc., a Corporation

(Name of Assignee) (Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that, for the patent application/patent identified above, it is (choose **one** of options 1, 2, 3 or 4 below):

1. ☑ The assignee of the entire right, title, and interest.

2. ☐ An assignee of less than the entire right, title, and interest (check applicable box):

   ☐ The extent (by percentage) of its ownership interest is _____%. Additional Statement(s) by the owners holding the balance of the interest must be submitted to account for 100% of the ownership interest.

   ☐ There are unspecified percentages of ownership. The other parties, including inventors, who together own the entire right, title and interest are:

   Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

3. ☐ The assignee of an undivided interest in the entirety (a complete assignment from one of the joint inventors was made). The other parties, including inventors, who together own the entire right, title, and interest are:

   Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

4. ☐ The recipient, via a court proceeding or the like (*e.g.*, bankruptcy, probate), of an undivided interest in the entirety (a complete transfer of ownership interest was made). The certified document(s) showing the transfer is attached.

The interest identified in option 1, 2 or 3 above (not option 4) is evidenced by either (choose **one** of options A or B below):

A. ☑ An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel 028980, Frame 0430, or for which a copy thereof is attached.

B. ☐ A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:

   1. From: _____ To: _____

      The document was recorded in the United States Patent and Trademark Office at

      Reel _____, Frame _____, or for which a copy thereof is attached.

   2. From: _____ To: _____

      The document was recorded in the United States Patent and Trademark Office at

      Reel _____, Frame _____, or for which a copy thereof is attached.

This collection of information is required by 37 CFR 3.73(b). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

PTO/AIA/96 (08-12)
Approved for use through 01/31/2013. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

STATEMENT UNDER 37 CFR 3.73(c)

3. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at

Reel _____, Frame _____, or for which a copy thereof is attached.

4. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at

Reel _____, Frame _____, or for which a copy thereof is attached.

5. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at

Reel _____, Frame _____, or for which a copy thereof is attached.

6. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at

Reel _____, Frame _____, or for which a copy thereof is attached.

☐ Additional documents in the chain of title are listed on a supplemental sheet(s).

☐ As required by 37 CFR 3.73(c)(1)(i), the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.

[NOTE: A separate copy (i.e., a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

/Tomas Prieto/	September 18, 2017
Signature	Date
Tomas Prieto	60675
Printed or Typed Name	Title or Registration Number

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

PTO/AIA/26 (04-14)
Approved for use through 07/31/2016. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

TERMINAL DISCLAIMER TO OBVIATE A DOUBLE PATENTING REJECTION OVER A "PRIOR" PATENT	Docket Number (Optional) 102246.0003US6

In re Application of: Stellar, LLC

Application No.: 15/279155

Filed: September 28, 2016

For: WRITE-PROTECTED RECORDING

The applicant, Stellar LLC, owner of 100 percent interest in the instant application hereby disclaims, except as provided below, the terminal part of the statutory term of any patent granted on the instant application which would extend beyond the expiration date of the full statutory term of **prior patent** No. 8310540 as the term of said **prior patent** is presently shortened by any terminal disclaimer. The applicant hereby agrees that any patent so granted on the instant application shall be enforceable only for and during such period that it and the **prior patent** are commonly owned. This agreement runs with any patent granted on the instant application and is binding upon the grantee, its successors or assigns.

In making the above disclaimer, the applicant does not disclaim the terminal part of the term of any patent granted on the instant application that would extend to the expiration date of the full statutory term of the **prior patent**, "as the term of said **prior patent** is presently shortened by any terminal disclaimer," in the event that said **prior patent** later:

expires for failure to pay a maintenance fee;
is held unenforceable;
is found invalid by a court of competent jurisdiction;
is statutorily disclaimed in whole or terminally disclaimed under 37 CFR 1.321;
has all claims canceled by a reexamination certificate;
is reissued; or
is in any manner terminated prior to the expiration of its full statutory term as presently shortened by any terminal disclaimer.

Check either box 1 or 2 below, if appropriate.

1. ☐ The undersigned is the applicant. If the applicant is an assignee, the undersigned is authorized to act on behalf of the assignee.

I hereby acknowledge that any willful false statements made are punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.

2. ☑ The undersigned is an attorney or agent of record. Reg. No. 60675

/Tomas Prieto/ — Signature
September 18, 2017 — Date

Tomas Prieto — Typed or printed name

Attorney of Record — Title
949-943-8300 — Telephone Number

☑ Terminal disclaimer fee under 37 CFR 1.20(d) included.

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

This collection of information is required by 37 CFR 1.321. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Electronic Patent Application Fee Transmittal					
Application Number:	15279155				
Filing Date:	28-Sep-2016				
Title of Invention:	WRITE-PROTECTED RECORDING				
First Named Inventor/Applicant Name:	Paul DeKeyser				
Filer:	Tomas Prieto/Marie Nuguid				
Attorney Docket Number:	102246.0003US6				
Filed as Small Entity					
Filing Fees for Utility under 35 USC 111(a)					
Description		**Fee Code**	**Quantity**	**Amount**	**Sub-Total in USD($)**
Basic Filing:					
Pages:					
Claims:					
Miscellaneous-Filing:					
Petition:					
Patent-Appeals-and-Interference:					
Post-Allowance-and-Post-Issuance:					
Extension-of-Time:					

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
STATUTORY OR TERMINAL DISCLAIMER	2814	5	160	800
		Total in USD ($)		**800**

Electronic Acknowledgement Receipt	
EFS ID:	30400741
Application Number:	15279155
International Application Number:	
Confirmation Number:	9873
Title of Invention:	WRITE-PROTECTED RECORDING
First Named Inventor/Applicant Name:	Paul DeKeyser
Customer Number:	24392
Filer:	Tomas Prieto/Marie Nuguid
Filer Authorized By:	Tomas Prieto
Attorney Docket Number:	102246.0003US6
Receipt Date:	18-SEP-2017
Filing Date:	28-SEP-2016
Time Stamp:	20:42:18
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	DA
Payment was successfully received in RAM	$800
RAM confirmation Number	091917INTEFSW00007132500341
Deposit Account	500341
Authorized User	MARIE NUGUID
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: 37 CFR 1.16 (National application filing, search, and examination fees) 37 CFR 1.17 (Patent application and reexamination processing fees)	

37 CFR 1.19 (Document supply fees)

37 CFR 1.20 (Post Issuance fees)

37 CFR 1.21 (Miscellaneous fees and charges)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Amendment/Req. Reconsideration-After Non-Final Reject	1-Response-01c.pdf	32156 42c958e0ee6c602c9f52e23a14b55b4f5817c587	no	6
Warnings:					
Information:					
2	Power of Attorney	2-power.pdf	372412 b630e56c2762eec37bdfc8de98606a74717ebfed	no	1
Warnings:					
Information:					
3	Assignee showing of ownership per 37 CFR 3.73	002US-assignee-aia0096.pdf	117604 c7ac9d0daad97bd99f1a4cbde2210f71e10ae1ec	no	3
Warnings:					
Information:					
4	Terminal Disclaimer Filed	002US-TD-aia0026-patent.pdf	160063 2a0b2e4e55f32d6a8c1c014b1efd13014d392494	no	2
Warnings:					
Information:					
5	Assignee showing of ownership per 37 CFR 3.73	003US2-assignee-aia0096.pdf	117616 0f5085c03d958fb967bff4e4e0bdf27b9f8cc582	no	3
Warnings:					
Information:					
6	Terminal Disclaimer Filed	003US2-TD-aia0026patent.pdf	160051 9b4ab6e82580b3d5999a81a95ea09ee79783dab6	no	2
Warnings:					
Information:					

7	Assignee showing of ownership per 37 CFR 3.73	003US4-assignee-aia0096.pdf	117618 d97120a02868f20e760908d47cb07eaec1981b1d	no	3
Warnings:					
Information:					
8	Terminal Disclaimer Filed	003US4-TD-aia0026-patent.pdf	160045 4177356a315c5e1f3f93201ea1455267bfc6805f	no	2
Warnings:					
Information:					
9	Assignee showing of ownership per 37 CFR 3.73	003US5-assignee-aia0096.pdf	117612 2e7eef481a812c3f0fe00042afeabbeea8b1c842	no	3
Warnings:					
Information:					
10	Terminal Disclaimer Filed	003US5-TD-aia0026-patent.pdf	160051 33fcee39afbad6090691ee061b70f41e50ed16fe	no	2
Warnings:					
Information:					
11	Assignee showing of ownership per 37 CFR 3.73	003US-assignee-aia0096.pdf	117606 1a95e5488fcebdba2c2103d3dca9f1b92c2ab3e2	no	3
Warnings:					
Information:					
12	Terminal Disclaimer Filed	003US-TD-aia0026-patent.pdf	160045 5ab446dd0bdb86b5c340e65f4a56263157cc5f23	no	2
Warnings:					
Information:					
13	Fee Worksheet (SB06)	fee-info.pdf	30495 45a2ea91373ae2c7de59e7f1378ba7eb2480ea9a	no	2
Warnings:					
Information:					
			Total Files Size (in bytes):	1823374	

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PTO/SB/80 (11-06)
Approved for use through 11/30/2011. OMB 0651-0035
U.S. Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

POWER OF ATTORNEY TO PROSECUTE APPLICATIONS BEFORE THE USPTO

I hereby revoke all previous powers of attorney given in the application identified in the attached statement under 37 CFR 3.73(b).

I hereby appoint:

[X] Practitioners associated with the Customer Number: 24392

OR

[ ] Practitioner(s) named below (if more than ten patent practitioners are to be named, then a customer number must be used):

Name	Registration Number	Name	Registration Number

as attorney(s) or agent(s) to represent the undersigned before the United States Patent and Trademark Office (USPTO) in connection with any and all patent applications assigned only to the undersigned according to the USPTO assignment records or assignment documents attached to this form in accordance with 37 CFR 3.73(b).

Please change the correspondence address for the application identified in the attached statement under 37 CFR 3.73(b) to:

[X] The address associated with Customer Number: 24392

OR

[ ] Firm or Individual Name			
Address			
City		State	Zip
Country			
Telephone		Email	

Assignee Name and Address:

Stellar LLC
55 Hidden Trail
Irvine, CA 92603

A copy of this form, together with a statement under 37 CFR 3.73(b) (Form PTO/SB/96 or equivalent) is required to be filed in each application in which this form is used. The statement under 37 CFR 3.73(b) may be completed by one of the practitioners appointed in this form if the appointed practitioner is authorized to act on behalf of the assignee, and must identify the application in which this Power of Attorney is to be filed.

SIGNATURE of Assignee of Record

The individual whose signature and title is supplied below is authorized to act on behalf of the assignee

Signature	Paul DeKeyser	Date	10/24/13
Name	Paul DeKeyser	Telephone	(949) 463-7120
Title	~~President~~ MEMBER		

This collection of information is required by 37 CFR 1.31, 1.32 and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

PTO/AIA/96 (08-12)
Approved for use through 01/31/2013. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

STATEMENT UNDER 37 CFR 3.73(c)

Applicant/Patent Owner: Stellar, Inc.

Application No./Patent No.: 9485471 Filed/Issue Date: November 1, 2016

Titled: WRITE-PROTECTED RECORDING

Stellar, Inc., a Corporation

(Name of Assignee) (Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that, for the patent application/patent identified above, it is (choose **one** of options 1, 2, 3 or 4 below):

1. ☑ The assignee of the entire right, title, and interest.

2. ☐ An assignee of less than the entire right, title, and interest (check applicable box):

   ☐ The extent (by percentage) of its ownership interest is _____%. Additional Statement(s) by the owners holding the balance of the interest must be submitted to account for 100% of the ownership interest.

   ☐ There are unspecified percentages of ownership. The other parties, including inventors, who together own the entire right, title and interest are:

   Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

3. ☐ The assignee of an undivided interest in the entirety (a complete assignment from one of the joint inventors was made). The other parties, including inventors, who together own the entire right, title, and interest are:

   Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

4. ☐ The recipient, via a court proceeding or the like (*e.g.*, bankruptcy, probate), of an undivided interest in the entirety (a complete transfer of ownership interest was made). The certified document(s) showing the transfer is attached.

The interest identified in option 1, 2 or 3 above (not option 4) is evidenced by either (choose **one** of options A or B below):

A. ☑ An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel 028980, Frame 0430, or for which a copy thereof is attached.

B. ☐ A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:

   1. From: _____ To: _____

      The document was recorded in the United States Patent and Trademark Office at

      Reel _____, Frame _____, or for which a copy thereof is attached.

   2. From: _____ To: _____

      The document was recorded in the United States Patent and Trademark Office at

      Reel _____, Frame _____, or for which a copy thereof is attached.

This collection of information is required by 37 CFR 3.73(b). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

PTO/AIA/96 (08-12)
Approved for use through 01/31/2013. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

STATEMENT UNDER 37 CFR 3.73(c)

3. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at

Reel _____, Frame _____, or for which a copy thereof is attached.

4. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at

Reel _____, Frame _____, or for which a copy thereof is attached.

5. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at

Reel _____, Frame _____, or for which a copy thereof is attached.

6. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at

Reel _____, Frame _____, or for which a copy thereof is attached.

☐ Additional documents in the chain of title are listed on a supplemental sheet(s).

☐ As required by 37 CFR 3.73(c)(1)(i), the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.

[NOTE: A separate copy (i.e., a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

/Tomas Prieto/	September 18, 2017
Signature	Date
Tomas Prieto	60675
Printed or Typed Name	Title or Registration Number

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Application Number	Application/Control No.	Applicant(s)/Patent under Reexamination	
	15/279,155	DEKEYSER, PAUL	

Document Code - DISQ	Internal Document – DO NOT MAIL

TERMINAL DISCLAIMER	☒ APPROVED	☐ DISAPPROVED
Date Filed : 18 September, 2017	This patent is subject to a Terminal Disclaimer	

Approved/Disapproved by:

CHARRISSA BROWN

Technology Center: PLRC

Telephone: (571)272-1558
5 TD's Approved.

U.S. Patent and Trademark Office

PTO/SB/06 (09-11)
Approved for use through 1/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 15/279,155	Filing Date 09/28/2016	☐ To be Mailed

ENTITY: ☐ LARGE ☒ SMALL ☐ MICRO

APPLICATION AS FILED – PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 = *		X $ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 = *		X $ =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	

APPLICATION AS AMENDED – PART II

AMENDMENT	09/18/2017	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 23	Minus	** 23	= 0	X $40 =	0
	Independent (37 CFR 1.16(h))	* 1	Minus	***3	= 0	X $210 =	0
	☐ Application Size Fee (37 CFR 1.16(s))						
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
						TOTAL ADD'L FEE	0

AMENDMENT		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	*	Minus	**	=	X $ =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	X $ =	
	☐ Application Size Fee (37 CFR 1.16(s))						
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
						TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

LIE
/VICTOR BARLOW/

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
15/279,155	09/28/2016	Paul DeKeyser	102246.0003US6

CONFIRMATION NO. 9873

24392
FISH IP LAW, LLP
ROBERT D. FISH
2603 Main Street
Suite 1000
Irvine, CA 92614-6232

POA ACCEPTANCE LETTER

OC000000094180254

Date Mailed: 09/20/2017

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 09/18/2017.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at **(571) 272-4000** or **(571) 272-4200** or **1-888-786-0101**.

/qtran/

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

NOTICE OF ALLOWANCE AND FEE(S) DUE

24392 7590 10/25/2017

FISH IP LAW, LLP
ROBERT D. FISH
2603 Main Street
Suite 1000
Irvine, CA 92614-6232

EXAMINER	
DIEP, NHON THANH	
ART UNIT	PAPER NUMBER
2487	

DATE MAILED: 10/25/2017

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/279,155	09/28/2016	Paul DeKeyser	102246.0003US6	9873

TITLE OF INVENTION: WRITE-PROTECTED RECORDING

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$480	$0	$0	$480	01/25/2018

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the ENTITY STATUS shown above. If the ENTITY STATUS is shown as SMALL or MICRO, verify whether entitlement to that entity status still applies.

If the ENTITY STATUS is the same as shown above, pay the TOTAL FEE(S) DUE shown above.

If the ENTITY STATUS is changed from that shown above, on PART B - FEE(S) TRANSMITTAL, complete section number 5 titled "Change in Entity Status (from status indicated above)".

For purposes of this notice, small entity fees are 1/2 the amount of undiscounted fees, and micro entity fees are 1/2 the amount of small entity fees.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Maintenance fees are due in utility patents issuing on applications filed on or after Dec. 12, 1980. It is patentee's responsibility to ensure timely payment of maintenance fees when due. More information is available at www.uspto.gov/PatentMaintenanceFees.

PTOL-85 (Rev. 02/11)

Motorola v. Stellar
Motorola Exhibit 1032
Page 371

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: Mail **Mail Stop ISSUE FEE**
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
or Fax (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

24392 7590 10/25/2017
FISH IP LAW, LLP
ROBERT D. FISH
2603 Main Street
Suite 1000
Irvine, CA 92614-6232

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission
I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/279,155	09/28/2016	Paul DeKeyser	102246.0003US6	9873

TITLE OF INVENTION: WRITE-PROTECTED RECORDING

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$480	$0	$0	$480	01/25/2018

EXAMINER	ART UNIT	CLASS-SUBCLASS
DIEP, NHON THANH	2487	348-143000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).
- ❑ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
- ❑ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.
1 _____
2 _____
3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE (B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) : ❑ Individual ❑ Corporation or other private group entity ❑ Government

4a. The following fee(s) are submitted:
- ❑ Issue Fee
- ❑ Publication Fee (No small entity discount permitted)
- ❑ Advance Order - # of Copies _____

4b. Payment of Fee(s): **(Please first reapply any previously paid issue fee shown above)**
- ❑ A check is enclosed.
- ❑ Payment by credit card. Form PTO-2038 is attached.
- ❑ The director is hereby authorized to charge the required fee(s), any deficiency, or credits any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

5. **Change in Entity Status** (from status indicated above)
- ❑ Applicant certifying micro entity status. See 37 CFR 1.29 — NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.
- ❑ Applicant asserting small entity status. See 37 CFR 1.27 — NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.
- ❑ Applicant changing to regular undiscounted fee status. — NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____

PTOL-85 Part B (10-13) Approved for use through 10/31/2013. OMB 0651-0033 U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Motorola v. Stellar
Motorola Exhibit 1032
Page 372

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/279,155	09/28/2016	Paul DeKeyser	102246.0003US6	9873

24392 7590 10/25/2017

FISH IP LAW, LLP
ROBERT D. FISH
2603 Main Street
Suite 1000
Irvine, CA 92614-6232

EXAMINER	
DIEP, NHON THANH	

ART UNIT	PAPER NUMBER
2487	

DATE MAILED: 10/25/2017

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(Applications filed on or after May 29, 2000)

The Office has discontinued providing a Patent Term Adjustment (PTA) calculation with the Notice of Allowance.

Section 1(h)(2) of the AIA Technical Corrections Act amended 35 U.S.C. 154(b)(3)(B)(i) to eliminate the requirement that the Office provide a patent term adjustment determination with the notice of allowance. See Revisions to Patent Term Adjustment, 78 Fed. Reg. 19416, 19417 (Apr. 1, 2013). Therefore, the Office is no longer providing an initial patent term adjustment determination with the notice of allowance. The Office will continue to provide a patent term adjustment determination with the Issue Notification Letter that is mailed to applicant approximately three weeks prior to the issue date of the patent, and will include the patent term adjustment on the patent. Any request for reconsideration of the patent term adjustment determination (or reinstatement of patent term adjustment) should follow the process outlined in 37 CFR 1.705.

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

PTOL-85 (Rev. 02/11)

Motorola v. Stellar
Motorola Exhibit 1032
Page 373

OMB Clearance and PRA Burden Statement for PTOL-85 Part B

The Paperwork Reduction Act (PRA) of 1995 requires Federal agencies to obtain Office of Management and Budget approval before requesting most types of information from the public. When OMB approves an agency request to collect information from the public, OMB (i) provides a valid OMB Control Number and expiration date for the agency to display on the instrument that will be used to collect the information and (ii) requires the agency to inform the public about the OMB Control Number's legal significance in accordance with 5 CFR 1320.5(b).

The information collected by PTOL-85 Part B is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450. Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Notice of Allowability	Application No. 15/279,155	Applicant(s) DEKEYSER, PAUL	
	Examiner NHON DIEP	Art Unit 2487	AIA (First Inventor to File) Status No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to *09/18/2017*.
   ☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on_____.
2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.
3. ☒ The allowed claim(s) is/are *1-23*. As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

   Certified copies:

   a) ☐ All b) ☐ Some *c) ☐ None of the:
      1. ☐ Certified copies of the priority documents have been received.
      2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
      3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☒ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____
3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
4. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____ .
5. ☐ Examiner's Amendment/Comment
6. ☐ Examiner's Statement of Reasons for Allowance
7. ☐ Other _____.

/NHON DIEP/
Primary Examiner, Art Unit 2487

Motorola v. Stellar
Motorola Exhibit 1032
Page 375

PTO/SB/08a (01-10)
Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT
(Not for submission under 37 CFR 1.99)

Application Number	15279155
Filing Date	2016-09-28
First Named Inventor	Paul DeKeyser
Art Unit	2487
Examiner Name	DIEP, NHON THANH
Attorney Docket Number	102246.0003US6

U.S.PATENTS Remove

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	5204909		1993-04-20	Cowan	
	2	5381526		1995-01-10	Ellson	
	3	5418529		1995-05-23	De Luigi et al.	
	4	5523799		1996-06-04	Hattori et al.	
	5	5689442		1997-11-18	Swanson et al.	
	6	5790427		1998-08-04	Greer et al.	
	7	6163338		2000-12-19	Johnson et al.	
	8	6317817		2001-11-13	Shichiku et al.	

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /N.T.D/

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	15279155
	Filing Date	2016-09-28
	First Named Inventor	Paul DeKeyser
	Art Unit	2487
	Examiner Name	DIEP, NHON THANH
	Attorney Docket Number	102246.0003US6

	9	6351798		2002-02-26	Aono	
	10	6370198		2002-04-09	Washino	
	11	6618546		2003-09-09	Ichioka et al.	
	12	6831652		2004-12-14	Orr	
	13	6950600		2005-09-27	Dietz	
	14	7162607		2007-01-09	Macy et al.	
	15	7195164		2007-03-27	Patel	
	16	7587323		2009-09-08	Matz et al.	
	17	7263073		2007-08-28	Petite et al	
	18	7813822		2010-10-12	Hoffberg	
	19	7546602		2009-06-09	Heilsberg	

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /N.T.D/

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	15279155
	Filing Date	2016-09-28
	First Named Inventor	Paul DeKeyser
	Art Unit	2487
	Examiner Name	DIEP, NHON THANH
	Attorney Docket Number	102246.0003US6

If you wish to add additional U.S. Patent citation information please click the Add button. Add

U.S.PATENT APPLICATION PUBLICATIONS Remove

Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	20020005895		2002-01-17	Freeman et al.	
	2	20040183912		2004-09-23	Szolyga et al.	
	3	20060158968		2006-07-20	Vanman et al.	
	4	20070132773		2007-06-14	Plante	
	5	20070174538		2007-07-26	Christoffersson et al.	
	6	20050240942		2005-10-27	Smith	
	7	20080177994		2008-07-24	Mayer, Yaron	

If you wish to add additional U.S. Published Application citation information please click the Add button. Add

FOREIGN PATENT DOCUMENTS Remove

Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2] i	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /N.T.D/

EFS Web 2.1.17

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	15279155
	Filing Date	2016-09-28
	First Named Inventor	Paul DeKeyser
	Art Unit	2487
	Examiner Name	DIEP, NHON THANH
	Attorney Docket Number	102246.0003US6

	1	0510968	EP		1992-10-28	Canon Kabushiki Kaisha		
	2	92/22983	WO		1992-12-23	Browne et al.		
	3	99/49656	WO		1999-09-30	Mann		
	4	99/56216	WO		1999-11-04	MacCormack et al.		
	5	2006/044476	WO		2006-04-27	VanMan et al.		
	6	1064783	EP		2003-04-06	Mann, Stephen		

If you wish to add additional Foreign Patent Document citation information please click the Add button Add

NON-PATENT LITERATURE DOCUMENTS Remove

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T5
	1		

If you wish to add additional non-patent literature document citation information please click the Add button Add

EXAMINER SIGNATURE

Examiner Signature	/NHON T DIEP/	Date Considered	10/16/2017

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /N.T.D/

EFS Web 2.1.17

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	15279155
	Filing Date	2016-09-28
	First Named Inventor	Paul DeKeyser
	Art Unit	2487
	Examiner Name	DIEP, NHON THANH
	Attorney Docket Number	102246.0003US6

[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /N.T.D/

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	15279155
	Filing Date	2016-09-28
	First Named Inventor	Paul DeKeyser
	Art Unit	2487
	Examiner Name	DIEP, NHON THANH
	Attorney Docket Number	102246.0003US6

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

See attached certification statement.

The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Tomas Prieto/	Date (YYYY-MM-DD)	2017-08-31
Name/Print	Tomas Prieto	Registration Number	60675

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these record s.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	15279155	DEKEYSER, PAUL
	Examiner	Art Unit
	NHON DIEP	2487

CPC- SEARCHED		
Symbol	Date	Examiner
H04N7/18; 5/76, 77; G11B23/288; 27/10; 31/006; 2220/216; G08B13/19621, 19676; 15/001	06/12/2017	N.D.

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

SEARCH NOTES		
Search Notes	Date	Examiner
Inventor's names search, reviewed parents application , 13/790,553 (US 9,485,471 B2)	06/12/2017	N.D.
Reviewed parent cases	10/16/2017	N.D.

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner
See attached		10/16/2017	N.D.

Motorola v. Stellar
Motorola Exhibit 1032
Page 383

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	1	(15/279155).app.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/10/16 12:44
L2	13	Dekeyser-paul$.in.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/10/16 12:45
L3	15	("9485471" or "7593034" or "8310540" or "8928752" or "8692882").pn.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/10/16 12:46
L4	43	(buffer or memory or storag$3) same (writ$3 or stor$3) same protect$3 same ((first or 1st) and (second or 2nd)) same file and (pre and post) same record$3	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/10/16 12:58
L5	6	(buffer or memory or storag$3) same (writ$3 or stor$3) same protect$3 same ((first or 1st) and (second or 2nd)) same file and (pre and post) same record$3 same trigger$3	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/10/16 12:59
L10	34	(buffer or memory or storag$3) same (writ$3 or stor$3) same protect$3 same ((first or 1st) and (second or 2nd)) same file and (pre and post) same record$3 and trigger$3	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/10/16 13:03

EAST Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L6	0	((buffer or memory or storag$3) same (writ$3 or stor$3) same protect$3 same ((first or 1st) and (second or 2nd)) same file and (pre and post) same record$3 same trigger$3).clm.	USPAT	OR	ON	2017/10/16 13:01
L7	0	((buffer or memory or storag$3) same (writ$3 or stor$3) same protect$3 same ((first or 1st) and (second or 2nd)) same file and (pre and post) same record$3 same trigger$3).clm.	US-PGPUB; USPAT	OR	ON	2017/10/16 13:01
L8	0	((buffer or memory or storag$3) and (writ$3 or stor$3) same protect$3 and ((first or 1st) and (second or 2nd)) same file and (pre and post) same record$3 same trigger$3).clm.	US-PGPUB; USPAT	OR	ON	2017/10/16 13:02
L9	3	((buffer or memory or storag$3) and (writ$3 or stor$3) same protect$3 and ((first or 1st) and	US-PGPUB;	OR	ON	2017/10/16 13:02

		(second or 2nd)) same file and (pre and post) same record$3 and trigger$3).clm.	USPAT			

10/16/2017 1:05:41 PM
C:\Users\ndiep\Documents\EAST\Workspaces\default.wsp

Motorola v. Stellar
Motorola Exhibit 1032
Page 385

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	15279155	DEKEYSER, PAUL
	Examiner	**Art Unit**
	NHON DIEP	2487

CPC						
Symbol					**Type**	**Version**
H04N	/	7	/	18	F	2013-01-01
G11B	/	23	/	288	I	2013-01-01
G11B	/	27	/	10	I	2013-01-01
G11B	/	31	/	006	I	2013-01-01
G11B	/	2220	/	216	A	2013-01-01
H04N	/	5	/	76	I	2013-01-01
H04N	/	5	/	77	I	2013-01-01
G08B	/	15	/	001	A	2013-01-01
G08B	/	13	/	19621	A	2013-01-01
G08B	/	13	/	19676	A	2013-01-01
	/		/			
	/		/			
	/		/			
	/		/			
	/		/			

CPC Combination Sets							
Symbol					**Type**	**Set**	**Ranking**	**Version**
	/		/					
	/		/					

NONE		**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	23	
/NHON DIEP/ Primary Examiner.Art Unit 2487	10/16/2017	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	3 & 4C

Motorola v. Stellar
Motorola Exhibit 1032
Page 386

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	15279155	DEKEYSER, PAUL
	Examiner	**Art Unit**
	NHON DIEP	2487

US ORIGINAL CLASSIFICATION		INTERNATIONAL CLASSIFICATION										
CLASS	SUBCLASS	CLAIMED					NON-CLAIMED					
348	143	H	0	4	N	7 / 18 (2006.01.01)						
CROSS REFERENCE(S)												
CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)											

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	23	
/NHON DIEP/ Primary Examiner.Art Unit 2487	10/16/2017	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	3 & 4C

Motorola v. Stellar
Motorola Exhibit 1032
Page 387

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	15279155	DEKEYSER, PAUL
	Examiner	**Art Unit**
	NHON DIEP	2487

☒ Claims renumbered in the same order as presented by applicant ☐ CPA ☒ T.D. ☐ R.1.47

Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
1	1	17	17												
2	2	18	18												
3	3	19	19												
4	4	20	20												
5	5	21	21												
6	6	22	22												
7	7	23	23												
8	8														
9	9														
10	10														
11	11														
12	12														
13	13														
14	14														
15	15														
16	16														

NONE		**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	23	
/NHON DIEP/ Primary Examiner.Art Unit 2487	10/16/2017	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	3 & 4C

Motorola v. Stellar
Motorola Exhibit 1032
Page 388

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: Mail **Mail Stop ISSUE FEE**
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
or Fax (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

24392 7590 10/25/2017
FISH IP LAW, LLP
ROBERT D. FISH
2603 Main Street
Suite 1000
Irvine, CA 92614-6232

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission
I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/279,155	09/28/2016	Paul DeKeyser	102246.0003US6	9873

TITLE OF INVENTION: WRITE-PROTECTED RECORDING

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$480	$0	$0	$480	01/25/2018

EXAMINER	ART UNIT	CLASS-SUBCLASS
DIEP, NHON THANH	2487	348-143000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).
- ☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
- ☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.
1 Fish IP Law
2
3

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE: STELLAR, LLC
(B) RESIDENCE: (CITY and STATE OR COUNTRY): IRVINE, CA

Please check the appropriate assignee category or categories (will not be printed on the patent): ☐ Individual ☒ Corporation or other private group entity ☐ Government

4a. The following fee(s) are submitted:
- ☒ Issue Fee
- ☒ Publication Fee (No small entity discount permitted)
- ☐ Advance Order - # of Copies _____

4b. Payment of Fee(s): **(Please first reapply any previously paid issue fee shown above)**
- ☐ A check is enclosed.
- ☐ Payment by credit card. Form PTO-2038 is attached.
- ☒ The director is hereby authorized to charge the required fee(s), any deficiency, or credits any overpayment, to Deposit Account Number 500341 (enclose an extra copy of this form).

5. **Change in Entity Status** (from status indicated above)
- ☐ Applicant certifying micro entity status. See 37 CFR 1.29 — NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.
- ☐ Applicant asserting small entity status. See 37 CFR 1.27 — NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.
- ☐ Applicant changing to regular undiscounted fee status. — NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature /Robert D. Fish/ Date 01/19/2018
Typed or printed name Robert D. Fish Registration No. 33880

PTOL-85 Part B (10-13) Approved for use through 10/31/2013. OMB 0651-0033 U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Motorola v. Stellar
Motorola Exhibit 1032
Page 389

Electronic Patent Application Fee Transmittal

Application Number:	15279155
Filing Date:	28-Sep-2016
Title of Invention:	WRITE-PROTECTED RECORDING
First Named Inventor/Applicant Name:	Paul DeKeyser
Filer:	Robert Fish/Mara Rodriguez
Attorney Docket Number:	102246.0003US6

Filed as Small Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
UTILITY APPL ISSUE FEE	2501	1	480	480

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension-of-Time:				
Miscellaneous:				
			Total in USD ($)	480

Electronic Acknowledgement Receipt	
EFS ID:	31553091
Application Number:	15279155
International Application Number:	
Confirmation Number:	9873
Title of Invention:	WRITE-PROTECTED RECORDING
First Named Inventor/Applicant Name:	Paul DeKeyser
Customer Number:	24392
Filer:	Robert Fish/Mara Rodriguez
Filer Authorized By:	Robert Fish
Attorney Docket Number:	102246.0003US6
Receipt Date:	19-JAN-2018
Filing Date:	28-SEP-2016
Time Stamp:	15:28:42
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	DA
Payment was successfully received in RAM	$480
RAM confirmation Number	012218INTEFSW00002101500341
Deposit Account	500341
Authorized User	Mara Rodriguez
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: 37 CFR 1.21 (Miscellaneous fees and charges)	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Issue Fee Payment (PTO-85B)	Issue_Fee_Transmittal.pdf	185273 44330c50ca61ce818cd8ce2220ecf7ebd65c541e	no	1
Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	30777 a33dcd8101de8591a17a548efb8125536c7f0007	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	216050		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.
National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.
New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/279,155	03/06/2018	9912914	102246.0003US6	9873

24392 7590 02/14/2018

FISH IP LAW, LLP
2603 Main Street
Suite 1000
Irvine, CA 92614

ISSUE NOTIFICATION

The projected patent number and issue date are specified above.

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(application filed on or after May 29, 2000)

The Patent Term Adjustment is 0 day(s). Any patent to issue from the above-identified application will include an indication of the adjustment on the front page.

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (http://pair.uspto.gov).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Application Assistance Unit (AAU) of the Office of Data Management (ODM) at (571)-272-4200.

APPLICANT(s) (Please see PAIR WEB site http://pair.uspto.gov for additional applicants):

Paul DeKeyser, Irvine, CA;
STELLAR, LLC, Irvin, CA;

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The USA offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to encourage and facilitate business investment. To learn more about why the USA is the best country in the world to develop technology, manufacture products, and grow your business, visit SelectUSA.gov.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
P.O. BOX 1450
ALEXANDRIA, VA 22313-1450

Application No.:	**15/279,155**
Applicant:	**DeKeyser, Paul**
Filing Date:	**December 23, 2019**
Art Unit:	**2688**
Examiner:	**BRANIFF, CHRISTOPHER**
Attorney Docket No.:	**102246.0003US6**

Title **WRITE-PROTECTED RECORDING**

Mail Stop Petitions
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

PETITION TO ACCEPT AN UNINTENTIONALLY DELAYED CLAIM UNDER 35 U.S.C. §120 FOR THE BENEFIT OF A PRIOR-FILED NONPROVISIONAL APPLICATION (37 C.F.R. §1.78 (e))

Dear Sir or Madam:

Applicant submits the following:

1) Applicant hereby petitions for acceptance of an unintentionally delayed benefit claim under 37 C.F.R. §1.78(e).

2) Applicant states that the entire delay between the date the claim was due under 37 C.F.R. §1.78(d)(3) and the date the claim was filed was unintentional and caused by a change in staffing.

3) The petition fee set forth in 37 C.F.R. §1.17(m) is submitted herewith.

4) A corrected Application Data Sheet which lists the corrected priority application claim to: *US Application 11/770,920 filed on June 29, 2007, claims the benefit of provisional application 60/824/097 filed on August 31, 2006.*

///

5) A Certificate of Correction (with fee) to add the benefit claim since the patent issued on March 6, 2018.

Respectfully submitted,

Fish IP Law LLP

Date: June 29, 2020

By: /Tomas A. Prieto/
Tomas A. Prieto
Reg. No. 60675

Fish IP Law LLP
2603 Main Street, Suite 1000
Irvine, CA 92614-4271
Telephone: (949) 943-8300
Fax: (949) 943-8358

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
P.O. BOX 1450
ALEXANDRIA, VA 22313-1450

Application No.:	**15/279,155**
Applicant:	**DeKeyser, Paul**
Filing Date:	**December 23, 2019**
Art Unit:	**2688**
Examiner:	**BRANIFF, CHRISTOPHER**
Attorney Docket No.:	**102246.0003US6**

Title **WRITE-PROTECTED RECORDING**

Mail Stop Petitions
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

PETITION FOR EXPEDITED CONSIDERATION
UNDER 37 C.F.R. §1.182

Dear Sir or Madam:

1. Applicant respectfully requests expedited consideration of its Petition to Accept an Unintentionally Delayed Claim under 35 U.S.C. §120 for the Benefit of a Prior-Filed Provisional Application (37 C.F.R. §1.78 (e)).
2. A Petition to Accept an Unintentionally Delayed Claim under 35 U.S.C. §120 for the Benefit of a Prior-Filed Provisional Application (37 C.F.R. §1.78 (e)) is filed herewith.
3. A small entity fee of $200 for expedited consideration is submitted herewith.
4. Authorization is hereby made to charge additional fees or credit overpayment to Deposit Account No. 500341.

Respectfully submitted,

Fish IP Law LLP

Date: June 29, 2020

By: /Tomas A. Prieto/
Tomas A. Prieto
Reg. No. 60675

Fish IP Law LLP
2603 Main Street, Suite 1000
Irvine, CA 92614-4271
Telephone: (949) 943-8300
Fax: (949) 943-8358

Replacement ADS

PTO/AIA/14 (11-15)
Approved for use through 04/30/2017. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	102246.0003US6
	Application Number	15/279155
Title of Invention	WRITE-PROTECTED RECORDING	

The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76.
This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.

Secrecy Order 37 CFR 5.2:

☐ Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)

Inventor Information:

Inventor 1 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Paul		DeKeyser	

Residence Information (Select One) ◉ US Residency ○ Non US Residency ○ Active US Military Service

City	Irvine	State/Province	CA	Country of Residence	US

Mailing Address of Inventor:

Address 1	55 Hidden Trail		
Address 2			
City	Irvine	State/Province	CA
Postal Code	92603	Country	US

All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the **Add** button. Add

Correspondence Information:

Enter either Customer Number or complete the Correspondence Information section below.
For further information see 37 CFR 1.33(a).

☐ **An Address is being provided for the correspondence Information of this application.**

Customer Number	24392		
Email Address	patents@fishiplaw.com	Add Email	Remove Email

Application Information:

Title of the Invention	WRITE-PROTECTED RECORDING		
Attorney Docket Number	102246.0003US6	Small Entity Status Claimed	☒
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	4	Suggested Figure for Publication (if any)	

Replacement ADS

PTO/AIA/14 (11-15)
Approved for use through 04/30/2017. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	102246.0003US6
	Application Number	15/279155
Title of Invention	WRITE-PROTECTED RECORDING	

Filing By Reference:

Only complete this section when filing an application by reference under 35 U.S.C. 111(c) and 37 CFR 1.57(a). Do not complete this section if application papers including a specification and any drawings are being filed. Any domestic benefit or foreign priority information must be provided in the appropriate section(s) below (i.e., "Domestic Benefit/National Stage Information" and "Foreign Priority Information").

For the purposes of a filing date under 37 CFR 1.53(b), the description and any drawings of the present application are replaced by this reference to the previously filed application, subject to conditions and requirements of 37 CFR 1.57(a).

Application number of the previously filed application	Filing date (YYYY-MM-DD)	Intellectual Property Authority or Country

Publication Information:

☐ Request Early Publication (Fee required at time of Request 37 CFR 1.219)

☐ **Request Not to Publish.** I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application **has not and will not** be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32).
Either enter Customer Number or complete the Representative Name section below. If both sections are completed the customer Number will be used for the Representative Information during processing.

Please Select One:	◉ Customer Number	○ US Patent Practitioner	○ Limited Recognition (37 CFR 11.9)
Customer Number	24392		

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, 365(c), or 386(c) or indicate National Stage entry from a PCT application. Providing benefit claim information in the Application Data Sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.
When referring to the current application, please leave the "Application Number" field blank.

Prior Application Status	Pending		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
	Continuation of	13/790553	~~2016-03-08~~ 2013-03-08

Replacement ADS

PTO/AIA/14 (11-15)
Approved for use through 04/30/2017. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	102246.0003US6
	Application Number	15/279155
Title of Invention	WRITE-PROTECTED RECORDING	

Prior Application Status	Pending			Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)	
13/790553	Continuation of	12/560584	2009-09-16	

Prior Application Status	Patented			Remove	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
12/560584	Continuation of	12/268286	~~2009-09-16~~	~~8692882~~	~~2014-03-14~~

Prior Application Status	Patented		2008-11-10	7593034	Remove	2009-09-22
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number		Issue Date (YYYY-MM-DD)
12/268286	Continuation in part of	11/770920	~~2008-11-08~~	~~7593034~~		~~2009-09-22~~

Prior Application Status	Patented		2007-06-29	8310540	Remove	2012-11-13
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number		Issue Date (YYYY-MM-DD)
11/770920	Claims benefit of provisio	~~60/824095~~	2006-08-31	8310540		2012-11-13

Prior Application Status	Patented	60824097	Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
12/268286	Continuation in part of	11/846217	2007-08-28	8928752	2015-01-06

~~Prior Application Status~~	~~Pending~~		Remove
~~Application Number~~	~~Continuity Type~~	~~Prior Application Number~~	~~Filing or 371(c) Date (YYYY-MM-DD)~~
	~~Continuation in part of~~	~~11/84217~~	~~2015-01-06~~

Prior Application Status	Patented			Remove	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
11/846217	Claims benefit of provisio	60/824095	2006-08-31	8928752	2015-01-06

Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the **Add** button.

Foreign Priority Information:

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55. When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX)[i] the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(i)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

Replacement ADS

PTO/AIA/14 (11-15)
Approved for use through 04/30/2017. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	102246.0003US6
	Application Number	15/279155
Title of Invention	WRITE-PROTECTED RECORDING	

Application Number	Country[i]	Filing Date (YYYY-MM-DD)	Access Code[i] (if applicable)

Remove

Additional Foreign Priority Data may be generated within this form by selecting the **Add** button.

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

☐ This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.
NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	102246.0003US6
	Application Number	15/279155
Title of Invention	WRITE-PROTECTED RECORDING	

Authorization or Opt-Out of Authorization to Permit Access:

When this Application Data Sheet is properly signed and filed with the application, applicant has provided written authority to permit a participating foreign intellectual property (IP) office access to the instant application-as-filed (see paragraph A in subsection 1 below) and the European Patent Office (EPO) access to any search results from the instant application (see paragraph B in subsection 1 below).

Should applicant choose not to provide an authorization identified in subsection 1 below, applicant **must opt-out** of the authorization by checking the corresponding box A or B or both in subsection 2 below.

NOTE: This section of the Application Data Sheet is **ONLY** reviewed and processed with the **INITIAL** filing of an application. After the initial filing of an application, an Application Data Sheet cannot be used to provide or rescind authorization for access by a foreign IP office(s). Instead, Form PTO/SB/39 or PTO/SB/69 must be used as appropriate.

1. Authorization to Permit Access by a Foreign Intellectual Property Office(s)

A. Priority Document Exchange (PDX) - Unless box A in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the State Intellectual Property Office of the People's Republic of China (SIPO), the World Intellectual Property Organization (WIPO), and any other foreign intellectual property office participating with the USPTO in a bilateral or multilateral priority document exchange agreement in which a foreign application claiming priority to the instant patent application is filed, access to: (1) the instant patent application-as-filed and its related bibliographic data, (2) any foreign or domestic application to which priority or benefit is claimed by the instant application and its related bibliographic data, and (3) the date of filing of this Authorization. See 37 CFR 1.14(h)(1).

B. Search Results from U.S. Application to EPO - Unless box B in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the EPO access to the bibliographic data and search results from the instant patent application when a European patent application claiming priority to the instant patent application is filed. See 37 CFR 1.14(h)(2).

The applicant is reminded that the EPO's Rule 141(1) EPC (European Patent Convention) requires applicants to submit a copy of search results from the instant application without delay in a European patent application that claims priority to the instant application.

2. Opt-Out of Authorizations to Permit Access by a Foreign Intellectual Property Office(s)

☐ A. Applicant **DOES NOT** authorize the USPTO to permit a participating foreign IP office access to the instant application-as-filed. If this box is checked, the USPTO will not be providing a participating foreign IP office with any documents and information identified in subsection 1A above.

☐ B. Applicant **DOES NOT** authorize the USPTO to transmit to the EPO any search results from the instant patent application. If this box is checked, the USPTO will not be providing the EPO with search results from the instant application.

NOTE: Once the application has published or is otherwise publicly available, the USPTO may provide access to the application in accordance with 37 CFR 1.14.

Replacement ADS

PTO/AIA/14 (11-15)
Approved for use through 04/30/2017. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	102246.0003US6
	Application Number	15/279155
Title of Invention	WRITE-PROTECTED RECORDING	

Applicant Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Applicant 1

If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.

Clear

◉ Assignee	○ Legal Representative under 35 U.S.C. 117	○ Joint Inventor
○ Person to whom the inventor is obligated to assign.	○ Person who shows sufficient proprietary interest	

If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:

Name of the Deceased or Legally Incapacitated Inventor:

If the Applicant is an Organization check here. ☒

Organization Name	STELLAR, LLC		
Mailing Address Information For Applicant:			
Address 1	55 Hidden Trail		
Address 2			
City	Irvine	**State/Province**	CA
Country	US	Postal Code	92603
Phone Number		Fax Number	
Email Address			

Additional Applicant Data may be generated within this form by selecting the Add button.

Assignee Information including Non-Applicant Assignee Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Replacement ADS

PTO/AIA/14 (11-15)
Approved for use through 04/30/2017. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	102246.0003US6
	Application Number	15/279155
Title of Invention	WRITE-PROTECTED RECORDING	

Assignee 1

Complete this section if assignee information, including non-applicant assignee information, is desired to be included on the patent application publication. An assignee-applicant identified in the "Applicant Information" section will appear on the patent application publication as an applicant. For an assignee-applicant, complete this section only if identification as an assignee is also desired on the patent application publication.

If the Assignee or Non-Applicant Assignee is an Organization check here. ☐

Prefix	**Given Name**	Middle Name	**Family Name**	Suffix

Mailing Address Information For Assignee including Non-Applicant Assignee:

Address 1			
Address 2			
City		**State/Province**	
Country		Postal Code	
Phone Number		Fax Number	
Email Address			

Additional Assignee or Non-Applicant Assignee Data may be generated within this form by selecting the Add button.

Signature:

NOTE: This Application Data Sheet must be signed in accordance with 37 CFR 1.33(b). **However, if this Application Data Sheet is submitted with the INITIAL filing of the application and either box A or B is not checked in subsection 2 of the "Authorization or Opt-Out of Authorization to Permit Access" section, then this form must also be signed in accordance with 37 CFR 1.14(c).**

This Application Data Sheet **must** be signed by a patent practitioner if one or more of the applicants is a **juristic entity** (e.g., corporation or association). If the applicant is two or more joint inventors, this form must be signed by a patent practitioner, **all** joint inventors who are the applicant, or one or more joint inventor-applicants who have been given power of attorney (e.g., see USPTO Form PTO/AIA/81) on behalf of **all** joint inventor-applicants.

See 37 CFR 1.4(d) for the manner of making signatures and certifications.

Signature	~~/Robert D. Fish/~~ /Tomas A. Prieto/			Date (YYYY-MM-DD)	~~2016-09-28~~ 2020-06-29
First Name	~~Robert D.~~ Tomas A.	Last Name	~~Fish~~ Prieto	Registration Number	~~33880~~ 60675

Additional Signature may be generated within this form by selecting the Add button.

Replacement ADS

PTO/AIA/14 (11-15)
Approved for use through 04/30/2017. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	102246.0003US6
	Application Number	15/279155
Title of Invention	WRITE-PROTECTED RECORDING	

This collection of information is required by 37 CFR 1.76. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1 The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3 A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent CooperationTreaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Motorola v. Stellar
Motorola Exhibit 1032
Page 406

PTO/SB/44 (09-07)
Approved for use through 01/31/2020. OMB 0651-0033
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.
(Also Form PTO-1050)

UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO. : 9912914

APPLICATION NO.: 15/279,155

ISSUE DATE : March 6, 2018

INVENTOR(S) : DeKeyser, Paul

It is certified that an error appears or errors appear in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

US Application 11/770,920 claims the benefit of US Provisional Application 60/824,097 filed on August 31, 2006.

MAILING ADDRESS OF SENDER (Please do not use Customer Number below):

FISH IP LAW, LLP
2603 Main Street, Ste 1000, Irvine CA 92614

This collection of information is required by 37 CFR 1.322, 1.323, and 1.324. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1.0 hour to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Attention Certificate of Corrections Branch, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Electronic Patent Application Fee Transmittal

Application Number:	15279155
Filing Date:	28-Sep-2016
Title of Invention:	WRITE-PROTECTED RECORDING
First Named Inventor/Applicant Name:	Paul DeKeyser
Filer:	Tomas Prieto/Jack Reihl
Attorney Docket Number:	102246.0003US6

Filed as Small Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
PETITION FEE - 37 CFR 1.17(F)(GROUP I)	2462	1	200	200
PET. DELAY SUB OR RESTORE PRIORITY-CLAIM	2454	1	1000	1000
Patent-Appeals-and-Interference:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Post-Allowance-and-Post-Issuance:				
CERTIFICATE OF CORRECTION	2811	1	150	150
Extension-of-Time:				
Miscellaneous:				
		Total in USD ($)		**1350**

Electronic Acknowledgement Receipt	
EFS ID:	39859289
Application Number:	15279155
International Application Number:	
Confirmation Number:	9873
Title of Invention:	WRITE-PROTECTED RECORDING
First Named Inventor/Applicant Name:	Paul DeKeyser
Customer Number:	24392
Filer:	Tomas Prieto/Jack Reihl
Filer Authorized By:	Tomas Prieto
Attorney Docket Number:	102246.0003US6
Receipt Date:	29-JUN-2020
Filing Date:	28-SEP-2016
Time Stamp:	16:57:33
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	DA
Payment was successfully received in RAM	$1350
RAM confirmation Number	E20206SG58048460
Deposit Account	500341
Authorized User	Jack Reihl
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: 37 CFR 1.16 (National application filing, search, and examination fees) 37 CFR 1.17 (Patent application and reexamination processing fees)	

37 CFR 1.19 (Document supply fees)

37 CFR 1.20 (Post Issuance fees)

37 CFR 1.21 (Miscellaneous fees and charges)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Petition for review by the Office of Petitions	1-Petition_for_Unintentionally_Delayed_Claim.pdf	26689 48bbd74134ed1570635082d0c9c98ab03d8e0228	no	2
Warnings:					
Information:					
2	Petition for review by the Office of Petitions	2-Petition_for_expedited_consideration.pdf	20247 547b5e11f5bf73c0a095fa8bff86bb609c58e7d6	no	1
Warnings:					
Information:					
3	Application Data Sheet	3-ADS-Corrected-as-filed.pdf	2642046 fdc35326e5bbff3d3524ab4201c890affb98c35	no	9
Warnings:					
Information:					
This is not an USPTO supplied ADS fillable form					
4	Request for Certificate of Correction	4-sb0044-cert-correction.pdf	183338 bf75eee9eae6fb837a13862494485a08758 53c2	no	2
Warnings:					
Information:					
5	Fee Worksheet (SB06)	fee-info.pdf	33767 2b1fe48fd86f513613bb20beccda0f3eca720f 37d	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	2906087		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/279,155	09/28/2016	Paul DeKeyser	102246.0003US6	9873

24392 7590 07/16/2020

FISH IP LAW, LLP
2603 Main Street
Suite 1000
Irvine, CA 92614

EXAMINER	
DIEP, NHON THANH	

ART UNIT	PAPER NUMBER
2487	

NOTIFICATION DATE	DELIVERY MODE
07/16/2020	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

Patents@fishiplaw.com
rfish@fishiplaw.com

UNITED STATES PATENT AND TRADEMARK OFFICE

Commissioner for Patents
United States Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450
www.uspto.gov

In re Patent No. 9,912,914
Issue Date: 6 Mar 2018
Application No. 15/279,155
Filing or 371(c) Date: 28 Sep 2016
Attorney Docket No. 102246.0003US6

DECISION ON PETITION

This is a decision on the petition under 37 CFR 1.78(c), filed June 29, 2020, to accept an unintentionally delayed claim of benefit of provisional Application No. 60/824,097, filed August 31, 2006, and the petition under 37 CFR 1.182, filed June 29, 2020, to expedite a decision on the aforementioned delayed benefit petition.

The petition under 37 CFR 1.182 is **GRANTED**. The petition under 37 CFR 1.78(c), filed June 29, 2020, is being taken up for consideration in an expedited manner.

The petition under 37 CFR 1.78(c) is **DISMISSED**.

Title II of the Patent Law Treaties Implementation Act of 2012 amended the last sentence of 35 U.S.C. 119(e)(1) to delete the phrase "during the pendency of the application." In view of this amendment, a reissue application is not required to add or correct a benefit claim under 35 U.S.C. 119(e) after a patent has been granted on an application filed on or after November 29, 2000. A petition under 37 CFR 1.78 to accept an unintentionally delayed claim, along with a request for a Certificate of Correction under 37 CFR 1.323, may be filed to add or correct a benefit claim under 35 U.S.C. 119(e) to a prior-filed provisional application. This has always been the case with respect to adding or correcting a benefit claim under 35 U.S.C. 120.

The present application was filed after November 29, 2000, and matured into Patent No. 9,912,914 on March 6, 2018.

Under certain conditions as specified below, a Certificate of Correction can be used to correct:

(A) the failure to make reference to a prior application; or
(B) an incorrect reference to a prior application.

The following conditions must be satisfied:

(A) all requirements set forth in 37 CFR 1.78(a)(1) must have been met in the application which became the patent to be corrected;

(B) it must be clear from the record of the patent and the parent application(s) that priority is appropriate (see MPEP § 211et seq.); and
(C) a grantable petition to accept an unintentionally delayed claim for the benefit of a prior application must be filed, including a surcharge.

If all the above-stated conditions are satisfied, a Certificate of Correction can be used to amend the patent to make reference to a prior application, or to correct an incorrect reference to the prior application.

A petition for acceptance of a claim for late priority under 37 CFR 1.78(c) is only applicable to those applications in which a proper benefit claim is filed after the expiration of the period specified in 37 CFR 1.78(a)(4). In addition, the petition under 37 CFR § 1.78(c) must be accompanied by:

(1) the reference required by 35 U.S.C. § 119(c) and 37 CFR 1.78(a)(3) of the prior-filed application, which must be filed in an Application Data Sheet, unless previously submitted;
(2) the petition fee set forth in § 1.17(m); and
(3) a statement that the entire delay between the date the claim was due under 37 CFR 1.78(a)(4) and the date the claim was filed was unintentional. The Director may require additional where there is a question whether the delay was unintentional.

The petition does not meet requirement (3).

With respect to requirement (3): Petitioner has submitted the required statement of unintentional delay. However, the Director may require additional information where there is a question whether the delay was unintentional.

The USPTO requires additional information concerning whether a delay in seeking acceptance of a delayed benefit claim was unintentional where the petition to accept such benefit claim was filed more than two years after the date the benefit claim was due. See *Clarification of the Practice for Requiring Additional Information in Petitions Filed in Patent Applications and Patents Based on Unintentional Delay*, 85 FR 12222 (March 2, 2020).

In this instance, a petition under 37 CFR 1.78 was filed more than two years after the date the benefit claim was due. Therefore, applicant must provide sufficient information regarding the facts and circumstances surrounding the entire delay to support a conclusion that the entire delay was unintentional. *Id.* at 12223. Petitioner must explain the delay between when the benefit claim was due (Monday, January 30, 2017) and when the benefit claim was filed (June 29, 2020). Petitioner must explain why the initial petition was not filed until June 29, 2020. A general assertion that the delay was due to a change in staffing is not a detailed enough explanation.

When addressing the delay, petitioner is reminded that an intentional course of action is not rendered unintentional when, upon reconsideration, the petitioner changes his or her mind as to the course of action that should have been taken. *See In re Maldague*, 10 USPQ2d 1477, 1478

(Comm'r Pat. 1988). Petitioner's failure to carry the burden of proof to establish that the "entire" delay was "unintentional" may lead to the denial of a petition under 37 CFR 1.78, regardless of the circumstances that originally resulted in the failure to timely submit the domestic benefit claim.

Petitioner should note that the party whose delay is relevant is the party having the right or authority to present the domestic benefit claim in the above-identified application. When the applicant assigns the entire right, title, and interest in an invention to a third party (and thus does not retain any legal or equitable interest in the invention), the applicant's delay is irrelevant in evaluating whether the delay was unintentional. *See Kim v. Quigg*, 718 F. Supp. 1280, 1284, 12 USPQ2d 1604, 1607-08 (E.D. Va. 1989). *See* MPEP 711.03(c)(II)(C)-(F) for additional guidance on the information required to establish that the entire delay was unintentional.

In addition, the June 29, 2020 draft certificate of correction is not acceptable. Please correct (60) – Related U.S. Application Data of the front page of the Letters Patent to list the correct provisional application number.

If reconsideration of this decision is desired, applicant is encouraged to file a renewed petition under 37 CFR 1.78(c) (no additional petition fee due), provide a sufficient explanation of the circumstances surrounding the delay that establishes that the entire delay was unintentional, and a draft certificate of correction that makes appropriate changes to (60) – Related U.S. Application Data of the front page of the Letters Patent.

Further correspondence with respect to this matter should be delivered through one of the following mediums:

By mail:	Mail Stop PETITIONS Commissioner for Patents Post Office Box 1450 Alexandria, VA 22313-1450
By hand:	Customer Service Window Mail Stop Petitions Randolph Building 401 Dulany Street Alexandria, VA 22314
By fax:	(571) 273-8300 ATTN: Office of Petitions
By Internet:	EFS-Web

Any inquiries concerning this decision may be directed to the undersigned at (571) 272-3230.

/SHIRENE W BRANTLEY/
Attorney Advisor, OPET

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
P.O. BOX 1450
ALEXANDRIA, VA 22313-1450

Application No.:	**15/279,155**
Applicant:	**DeKeyser, Paul**
Filing Date:	**September 28, 2016**
Art Unit:	**2688**
Examiner:	**BRANIFF, CHRISTOPHER**
Attorney Docket No.:	**102246.0003US6**

Title **WRITE-PROTECTED RECORDING**

Mail Stop Petitions
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

RENEWED PETITION FOR EXPEDITED CONSIDERATION UNDER 37 C.F.R. §1.182

Dear Sir or Madam:

1. Applicant respectfully requests expedited consideration of its Renewed Petition to Accept an Unintentionally Delayed Claim under 35 U.S.C. §119(e) for the Benefit of a Prior-Filed Provisional Application (37 C.F.R. §1.78 (c)).
2. A Petition to Accept an Unintentionally Delayed Claim under 35 U.S.C. §119(e) for the Benefit of a Prior-Filed Provisional Application (37 C.F.R. §1.78 (c)) is filed herewith.
3. A small entity fee of $200 for expedited consideration is submitted herewith.
4. Authorization is hereby made to charge additional fees or credit overpayment to Deposit Account No. 500341.

Respectfully submitted,

Fish IP Law LLP

Date: September 10, 2020

By: /Tomas A. Prieto/
Tomas A. Prieto
Reg. No. 60675

Fish IP Law LLP
2603 Main Street, Suite 1000
Irvine, CA 92614-4271
Telephone: (949) 943-8300
Fax: (949) 943-8358

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
P.O. BOX 1450
ALEXANDRIA, VA 22313-1450

Application No.:	**15/279,155**
Applicant:	**DeKeyser, Paul**
Filing Date:	**September 28, 2016**
Art Unit:	**2688**
Examiner:	**BRANIFF, CHRISTOPHER**
Attorney Docket No.:	**102246.0003US6**

Title **WRITE-PROTECTED RECORDING**

Mail Stop Petitions
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

RENEWED PETITION TO ACCEPT AN UNINTENTIONALLY DELAYED CLAIM UNDER 35 U.S.C. §119(e) FOR THE BENEFIT OF A PRIOR-FILED NONPROVISIONAL APPLICATION (37 C.F.R. §1.78 (c))

Dear Sir or Madam:

In response to the Petition Decision dated July 16, 2020, Applicant submits the following:

1) Applicant submits herewith a Renewed Petition for Expedited Consideration pursuant to 37 C.F.R. §1.182.

2) Applicant hereby petitions for acceptance of an unintentionally delayed benefit claim under 37 C.F.R. §1.78(c).

3) Applicant states that the entire delay between the date the claim was due under 37 C.F.R. §1.78(d)(3), and the date the claim was filed, was unintentional. Applicant states that the entire delay in responding to the Petition Decision dated October 28, 2019, was unintentional, and is further explained as follows:

   An error in the priority claim of related application 15/279,155 was discovered during prosecution and Applicant has made multiple attempts at correcting the error in that application. One such attempt was made via a petition filed June 29, 2020. In preparation for the filing of that petition, the applications related to application 15/279,155 were also reviewed (including this application) to check whether the error

contained in 15/279,155 or any other error of priority was contained elsewhere in the patent family. It was only then that we discovered the error in the priority claim of this application. The petition was promptly filed following this discovery, on June 29, 2020. In the petition currently being filed in application 15/279,155, the undersigned explains that a contributing factor in the unintentional delay in that application was a change in staffing that also overlapped with the start of the COVID-19 pandemic and its associated challenges. Therefore, these same factors exacerbated the discovery of the error in the benefit of priority claim in this application.

Upon becoming aware of the Office's decision on July 16, 2020, Applicant has been working to respond with this updated petition as soon as possible. As noted above, the ongoing COVID-19 pandemic has resulted in delays in processing and docketing. While the delays are now significantly reduced relative to the delays suffered during the start of the pandemic, the challenges associated with working remotely and adjusting to the constant changes has prevented our staff from eliminating this delay altogether. Since the July 16, 2020 petition decision was received and first processed, the undesigned has been searching past records such as emails and docketing entries to ensure accuracy and completeness in the explanation and has undertaken multiple attempts to reach the Office for clarification before having success. Therefore, any delay between the July 16, 2020 petition decision and the filing of this petition is unintentional.

For the reasons discussed above, Applicant states that the entire delay between when the benefit claim was due and this petition to correct the benefit claim is unintentional.

4) Applicant states that the fee for the Petition to Accept an Unintentionally Delayed Benefit Claim in the amount of $1,000.00 pursuant to 37 C.F.R. §1.17(m) was previously paid on June 29, 2020.

5) A corrected Application Data Sheet which lists the corrected priority application claims.

6) A Request for Certificate of Correction to add the benefit claim since the patent issued on March 6, 2018. Additionally, a clerical error in the first page of the specification was discovered and is being corrected herein. Please note that the Certificate of Correction fee of $150.00 was previously paid on June 29, 2020.

7) As Applicant notes above, the fees for the Petition to Accept an Unintentionally Delayed Benefit Claim under 37 C.F.R. §1.78(c) and the request for Certificate of Correction were previously paid. As both petitions were denied, it is Applicant's understanding that the paid fees have not been applied. If these fees in fact do need to be paid again, authorization is hereby made to charge these fees, any additional fees or credit overpayment to Deposit Account No. 500341

Respectfully submitted,

Fish IP Law LLP

Date: September 10, 2020

By: /Tomas A. Prieto/
Tomas A. Prieto
Reg. No. 60675

Fish IP Law LLP
2603 Main Street, Suite 1000
Irvine, CA 92614-4271
Telephone: (949) 943-8300
Fax: (949) 943-8358

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	102246.0003US6
	Application Number	15/279155
Title of Invention	WRITE-PROTECTED RECORDING	

The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76.
This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.

Secrecy Order 37 CFR 5.2:

☐ Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)

Inventor Information:

Inventor 1 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Paul		DeKeyser	

Residence Information (Select One) ◉ US Residency ○ Non US Residency ○ Active US Military Service

City	Irvine	State/Province	CA	Country of Residence	US

Mailing Address of Inventor:

Address 1	55 Hidden Trail		
Address 2			
City	Irvine	State/Province	CA
Postal Code	92603	Country	US

All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the **Add** button. Add

Correspondence Information:

Enter either Customer Number or complete the Correspondence Information section below.
For further information see 37 CFR 1.33(a).

☐ **An Address is being provided for the correspondence Information of this application.**

Customer Number	24392		
Email Address	patents@fishiplaw.com	Add Email	Remove Email

Application Information:

Title of the Invention	WRITE-PROTECTED RECORDING		
Attorney Docket Number	102246.0003US6	Small Entity Status Claimed	☒
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	4	Suggested Figure for Publication (if any)	

PTO/AIA/14 (11-15)
Approved for use through 04/30/2017. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	102246.0003US6
	Application Number	
Title of Invention	WRITE-PROTECTED RECORDING	

Filing By Reference:

Only complete this section when filing an application by reference under 35 U.S.C. 111(c) and 37 CFR 1.57(a). Do not complete this section if application papers including a specification and any drawings are being filed. Any domestic benefit or foreign priority information must be provided in the appropriate section(s) below (i.e., "Domestic Benefit/National Stage Information" and "Foreign Priority Information").

For the purposes of a filing date under 37 CFR 1.53(b), the description and any drawings of the present application are replaced by this reference to the previously filed application, subject to conditions and requirements of 37 CFR 1.57(a).

Application number of the previously filed application	Filing date (YYYY-MM-DD)	Intellectual Property Authority or Country

Publication Information:

☐ Request Early Publication (Fee required at time of Request 37 CFR 1.219)

☐ **Request Not to Publish.** I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application **has not and will not** be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32).
Either enter Customer Number or complete the Representative Name section below. If both sections are completed the customer Number will be used for the Representative Information during processing.

Please Select One:	◉ Customer Number	○ US Patent Practitioner	○ Limited Recognition (37 CFR 11.9)
Customer Number	24392		

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, 365(c), or 386(c) or indicate National Stage entry from a PCT application. Providing benefit claim information in the Application Data Sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.
When referring to the current application, please leave the "Application Number" field blank.

Prior Application Status	Patented			Remove	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
15/279155	Continuation of	13/790553	~~2016-03-08~~ 2013-03-08	9485471	2016-11-01

PTO/AIA/14 (11-15)
Approved for use through 04/30/2017. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	102246.0003US6
	Application Number	
Title of Invention	WRITE-PROTECTED RECORDING	

Prior Application Status	Patented			Remove	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
13/790553	Continuation of	12/560584	2009-09-16	~~9485471~~	~~2016-11-01~~
Prior Application Status	Patented			8692882 Remove	2014-04-08
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
12/560584	Continuation of	12/268286	~~2009-09-16~~	~~8692882~~	~~2014-03-14~~
Prior Application Status	Patented		2008-11-10	7593034 Remove	2009-09-22
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
12/268286	Continuation in part of	11/770920	~~2008-11-08~~	~~7593034~~	~~2009-09-22~~
Prior Application Status	Expired		2007-06-29	8310540 Remove	2012-11-13
Application Number	Continuity Type		Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)	
11/770920	Claims benefit of provisional		~~60/824095~~	2006-08-31	
Prior Application Status	Patented		60824097	Remove	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
12/268286	Continuation in part of	11/846217	2007-08-28	8928752	2015-01-06
Prior Application Status	~~Expired~~			Remove	
Application Number	Continuity Type		Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)	
	~~Continuation in part of~~		~~11/84217~~	~~2015-01-06~~	
Prior Application Status	Expired			Remove	
Application Number	Continuity Type		Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)	
11/846217	Claims benefit of provisional		60824095	2006-08-31	

Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the **Add** button.

Foreign Priority Information:

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55. When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX)[i] the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(i)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

PTO/AIA/14 (11-15)
Approved for use through 04/30/2017. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	102246.0003US6
	Application Number	
Title of Invention	WRITE-PROTECTED RECORDING	

Application Number	Country[i]	Filing Date (YYYY-MM-DD)	Access Code[i] (if applicable)

Remove

Additional Foreign Priority Data may be generated within this form by selecting the **Add** button.

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

☐ This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.
NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.

PTO/AIA/14 (11-15)
Approved for use through 04/30/2017. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	102246.0003US6
	Application Number	
Title of Invention	WRITE-PROTECTED RECORDING	

Authorization or Opt-Out of Authorization to Permit Access:

When this Application Data Sheet is properly signed and filed with the application, applicant has provided written authority to permit a participating foreign intellectual property (IP) office access to the instant application-as-filed (see paragraph A in subsection 1 below) and the European Patent Office (EPO) access to any search results from the instant application (see paragraph B in subsection 1 below).

Should applicant choose not to provide an authorization identified in subsection 1 below, applicant **must opt-out** of the authorization by checking the corresponding box A or B or both in subsection 2 below.

NOTE: This section of the Application Data Sheet is **ONLY** reviewed and processed with the **INITIAL** filing of an application. After the initial filing of an application, an Application Data Sheet cannot be used to provide or rescind authorization for access by a foreign IP office(s). Instead, Form PTO/SB/39 or PTO/SB/69 must be used as appropriate.

1. Authorization to Permit Access by a Foreign Intellectual Property Office(s)

A. Priority Document Exchange (PDX) - Unless box A in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the State Intellectual Property Office of the People's Republic of China (SIPO), the World Intellectual Property Organization (WIPO), and any other foreign intellectual property office participating with the USPTO in a bilateral or multilateral priority document exchange agreement in which a foreign application claiming priority to the instant patent application is filed, access to: (1) the instant patent application-as-filed and its related bibliographic data, (2) any foreign or domestic application to which priority or benefit is claimed by the instant application and its related bibliographic data, and (3) the date of filing of this Authorization. See 37 CFR 1.14(h)(1).

B. Search Results from U.S. Application to EPO - Unless box B in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the EPO access to the bibliographic data and search results from the instant patent application when a European patent application claiming priority to the instant patent application is filed. See 37 CFR 1.14(h)(2).

The applicant is reminded that the EPO's Rule 141(1) EPC (European Patent Convention) requires applicants to submit a copy of search results from the instant application without delay in a European patent application that claims priority to the instant application.

2. Opt-Out of Authorizations to Permit Access by a Foreign Intellectual Property Office(s)

☐ A. Applicant **DOES NOT** authorize the USPTO to permit a participating foreign IP office access to the instant application-as-filed. If this box is checked, the USPTO will not be providing a participating foreign IP office with any documents and information identified in subsection 1A above.

☐ B. Applicant **DOES NOT** authorize the USPTO to transmit to the EPO any search results from the instant patent application. If this box is checked, the USPTO will not be providing the EPO with search results from the instant application.

NOTE: Once the application has published or is otherwise publicly available, the USPTO may provide access to the application in accordance with 37 CFR 1.14.

PTO/AIA/14 (11-15)
Approved for use through 04/30/2017. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	102246.0003US6
	Application Number	
Title of Invention	WRITE-PROTECTED RECORDING	

Applicant Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Applicant 1

If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.

Clear

◉ Assignee	○ Legal Representative under 35 U.S.C. 117	○ Joint Inventor
○ Person to whom the inventor is obligated to assign.	○ Person who shows sufficient proprietary interest	

If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:

Name of the Deceased or Legally Incapacitated Inventor:	

If the Applicant is an Organization check here. ☒

Organization Name	STELLAR, LLC

Mailing Address Information For Applicant:

Address 1	55 Hidden Trail		
Address 2			
City	Irvine	**State/Province**	CA
Country	US	Postal Code	92603
Phone Number		Fax Number	
Email Address			

Additional Applicant Data may be generated within this form by selecting the Add button.

Assignee Information including Non-Applicant Assignee Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

PTO/AIA/14 (11-15)
Approved for use through 04/30/2017. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	102246.0003US6
	Application Number	
Title of Invention	WRITE-PROTECTED RECORDING	

Assignee 1

Complete this section if assignee information, including non-applicant assignee information, is desired to be included on the patent application publication. An assignee-applicant identified in the "Applicant Information" section will appear on the patent application publication as an applicant. For an assignee-applicant, complete this section only if identification as an assignee is also desired on the patent application publication.

If the Assignee or Non-Applicant Assignee is an Organization check here. ☐

Prefix	**Given Name**	Middle Name	**Family Name**	Suffix

Mailing Address Information For Assignee including Non-Applicant Assignee:

Address 1			
Address 2			
City		**State/Province**	
Country		Postal Code	
Phone Number		Fax Number	
Email Address			

Additional Assignee or Non-Applicant Assignee Data may be generated within this form by selecting the Add button.

Signature:

NOTE: This Application Data Sheet must be signed in accordance with 37 CFR 1.33(b). **However, if this Application Data Sheet is submitted with the INITIAL filing of the application and either box A or B is not checked in subsection 2 of the "Authorization or Opt-Out of Authorization to Permit Access" section, then this form must also be signed in accordance with 37 CFR 1.14(c).**

This Application Data Sheet **must** be signed by a patent practitioner if one or more of the applicants is a **juristic entity** (e.g., corporation or association). If the applicant is two or more joint inventors, this form must be signed by a patent practitioner, **all** joint inventors who are the applicant, or one or more joint inventor-applicants who have been given power of attorney (e.g., see USPTO Form PTO/AIA/81) on behalf of **all** joint inventor-applicants.

See 37 CFR 1.4(d) for the manner of making signatures and certifications.

Signature	/Robert D. Fish/			Date (YYYY-MM-DD)	~~2016-09-28~~ 2020-09-10
First Name	Robert D.	Last Name	Fish	Registration Number	33880

Additional Signature may be generated within this form by selecting the Add button.

PTO/AIA/14 (11-15)
Approved for use through 04/30/2017. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	102246.0003US6
	Application Number	
Title of Invention	WRITE-PROTECTED RECORDING	

This collection of information is required by 37 CFR 1.76. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1 The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3 A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent CooperationTreaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Motorola v. Stellar
Motorola Exhibit 1032
Page 431

PTO/SB/44 (09-07)
Approved for use through 01/31/2020. OMB 0651-0033
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.
(Also Form PTO-1050)

UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO. : 9912914

APPLICATION NO.: 15/279,155

ISSUE DATE : March 6, 2018

INVENTOR(S) : DeKeyser, Paul

It is certified that an error appears or errors appear in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Regarding item (60) on the second page, please add:

Provisional Application 60/824,097 filed on August 31, 2006.

Regarding column 1, lines 13-16 please replace:
"This application Ser. No. 12/268,286 are also continuations-in-part of U.S. patent application Ser. No. 11/846,217, filed Aug. 28, 2007, which claims the benefit of U.S. provisional patent 60/824,095, filed Aug. 31, 2006."

With:
Application Ser. No. 12/268,286 is also a continuation-in-part of U.S. patent application Ser. No. 11/846,217, filed Aug. 28, 2007, which claims the benefit of U.S. provisional patent 60/824,095, filed Aug. 31, 2006.

MAILING ADDRESS OF SENDER (Please do not use Customer Number below):

FISH IP LAW, LLP
2603 Main Street, Ste 1000, Irvine CA 92614

This collection of information is required by 37 CFR 1.322, 1.323, and 1.324. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1.0 hour to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Attention Certificate of Corrections Branch, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Electronic Patent Application Fee Transmittal

Application Number:	15279155
Filing Date:	28-Sep-2016
Title of Invention:	WRITE-PROTECTED RECORDING
First Named Inventor/Applicant Name:	Paul DeKeyser
Filer:	Robert Fish/Jack Reihl
Attorney Docket Number:	102246.0003US6

Filed as Small Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
PETITION FEE - 37 CFR 1.17(F)(GROUP I)	2462	1	200	200
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension-of-Time:				
Miscellaneous:				
			Total in USD ($)	200

Electronic Acknowledgement Receipt	
EFS ID:	40525735
Application Number:	15279155
International Application Number:	
Confirmation Number:	9873
Title of Invention:	WRITE-PROTECTED RECORDING
First Named Inventor/Applicant Name:	Paul DeKeyser
Customer Number:	24392
Filer:	Robert Fish/Jack Reihl
Filer Authorized By:	Robert Fish
Attorney Docket Number:	102246.0003US6
Receipt Date:	10-SEP-2020
Filing Date:	28-SEP-2016
Time Stamp:	19:23:14
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	DA
Payment was successfully received in RAM	$200
RAM confirmation Number	E202090J23447649
Deposit Account	500341
Authorized User	Jack Reihl
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: 37 CFR 1.16 (National application filing, search, and examination fees) 37 CFR 1.17 (Patent application and reexamination processing fees)	

37 CFR 1.19 (Document supply fees)

37 CFR 1.20 (Post Issuance fees)

37 CFR 1.21 (Miscellaneous fees and charges)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Petition for review by the Office of Petitions	1-Renewed-Petition_for_expedited_consideration-01b.pdf	20403 3b267acb15f31643c5c21f635b82550b47378559	no	1
Warnings:					
Information:					
2	Petition for review by the Office of Petitions	2-Renewed-Petition_for_Unintentionally_Delayed_Claim-01b.pdf	28015 9b6fa59fc25230b3b5195f7f7104d309786c05d1	no	3
Warnings:					
Information:					
3	Application Data Sheet	3-ADS-amended-3US6.pdf	2424744 7d2c1bb4521dc37799e87957311cab77b52567f	no	9
Warnings:					
Information:					
This is not an USPTO supplied ADS fillable form					
4	Request for Certificate of Correction	4-sb0044-cert-correction.pdf	188669 770fa7bdffaf26ccceddc97c8a2debac86b7ab16	no	2
Warnings:					
Information:					
5	Fee Worksheet (SB06)	fee-info.pdf	30473 18e9df46ba25ffc80887 0f2277413390ac08a59b	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	2692304		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/279,155	09/28/2016	Paul DeKeyser	102246.0003US6	9873

24392 7590 09/23/2020

FISH IP LAW, LLP
2603 Main Street
Suite 1000
Irvine, CA 92614

EXAMINER	
DIEP, NHON THANH	

ART UNIT	PAPER NUMBER
2487	

NOTIFICATION DATE	DELIVERY MODE
09/23/2020	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

Patents@fishiplaw.com
rfish@fishiplaw.com

UNITED STATES PATENT AND TRADEMARK OFFICE

Commissioner for Patents
United States Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450
www.uspto.gov

In re Patent No. 9,912,914
Issue Date: 6 Mar 2018
Application No. 15/279,155
Filing or 371(c) Date: 28 Sep 2016
Attorney Docket No. 102246.0003US6

DECISION ON PETITION

This is a decision on the renewed petition under 37 CFR 1.78(c), filed September 10, 2020, to accept an unintentionally delayed claim of benefit of provisional Application No. 60/824,097, filed August 31, 2006, and the petition under 37 CFR 1.182, filed September 10, 2020, to expedite a decision on the aforementioned delayed benefit petition.

The petition under 37 CFR 1.182 is **GRANTED**. The petition under 37 CFR 1.78(c), filed September 10, 2020, is being taken up for consideration in an expedited manner.

The petition under 37 CFR 1.78(c) is **DISMISSED**.

Title II of the Patent Law Treaties Implementation Act of 2012 amended the last sentence of 35 U.S.C. 119(e)(1) to delete the phrase "during the pendency of the application." In view of this amendment, a reissue application is not required to add or correct a benefit claim under 35 U.S.C. 119(e) after a patent has been granted on an application filed on or after November 29, 2000. A petition under 37 CFR 1.78 to accept an unintentionally delayed claim, along with a request for a Certificate of Correction under 37 CFR 1.323, may be filed to add or correct a benefit claim under 35 U.S.C. 119(e) to a prior-filed provisional application. This has always been the case with respect to adding or correcting a benefit claim under 35 U.S.C. 120.

The present application was filed after November 29, 2000, and matured into Patent No. 9,912,914 on March 6, 2018.

Under certain conditions as specified below, a Certificate of Correction can be used to correct:

(A) the failure to make reference to a prior application; or
(B) an incorrect reference to a prior application.

The following conditions must be satisfied:

(A) all requirements set forth in 37 CFR 1.78(a)(1) must have been met in the application which became the patent to be corrected;

(B) it must be clear from the record of the patent and the parent application(s) that priority is appropriate (see MPEP § 211et seq.); and
(C) a grantable petition to accept an unintentionally delayed claim for the benefit of a prior application must be filed, including a surcharge.

If all the above-stated conditions are satisfied, a Certificate of Correction can be used to amend the patent to make reference to a prior application, or to correct an incorrect reference to the prior application.

A petition for acceptance of a claim for late priority under 37 CFR 1.78(c) is only applicable to those applications in which a proper benefit claim is filed after the expiration of the period specified in 37 CFR 1.78(a)(4). In addition, the petition under 37 CFR § 1.78(c) must be accompanied by:

(1) the reference required by 35 U.S.C. § 119(c) and 37 CFR 1.78(a)(3) of the prior-filed application, which must be filed in an Application Data Sheet, unless previously submitted;
(2) the petition fee set forth in § 1.17(m); and
(3) a statement that the entire delay between the date the claim was due under 37 CFR 1.78(a)(4) and the date the claim was filed was unintentional. The Director may require additional where there is a question whether the delay was unintentional.

The petition does not meet requirement (3).

With respect to requirement (3): The additional information provided in the September 10, 2020 petition, especially 3) does not directly pertain to this application. No petition decision was mailed in this application on October 28, 2019.

Applicant must provide sufficient information regarding the facts and circumstances surrounding the entire delay to support a conclusion that the entire delay was unintentional. Petitioner must explain the delay between when the benefit claim was due (Monday, January 30, 2017) and when the benefit claim was filed (June 29, 2020). When was the failure to file a timely benefit claim for Application No. 60/824,097 discovered? Petitioner must explain why the initial petition was not filed until June 29, 2020.

In addition, the September 10, 2020 draft certificate of correction is not acceptable. While the proposed correction to (60) – Related U.S. Application Data of the front page of the Letters Patent is appropriate, the changes to the specification are not acceptable.

When a benefit claim is submitted after the filing of an application, the reference to the prior application cannot include an incorporation by reference statement of the prior application. *See Dart Industries v. Banner*, 636 F.2d 684, 207 USPQ 273 (C.A.D.C. 1980). *See* MPEP 201.06(c) and 608.04(b). No new matter can be added to an application after its filing date (*see* 35 U.S.C. 132(a)). It is not possible to incorporate by reference the newly claimed provisional application. Please remove the incorporation by reference language with respect to Application No. 60/824,097.

If reconsideration of the decision is desired, please file a renewed petition under 37 CFR 1.78(c), an explanation of the delay in claiming benefit of Application No. 60/824,097 in this application, and a draft certificate of correction that includes the changes to (60) – Related U.S. Application Data of the front page of the Letters Patent and eliminates the incorporation by reference language with respect to Application No. 60/824,097.

Further correspondence with respect to this matter should be delivered through one of the following mediums:

By mail:	Mail Stop PETITIONS Commissioner for Patents Post Office Box 1450 Alexandria, VA 22313-1450
By hand:	Customer Service Window Mail Stop Petitions Randolph Building 40l Dulany Street Alexandria, VA 22314
By fax:	(571) 273-8300 ATTN: Office of Petitions
By Internet:	EFS-Web

Any inquiries concerning this decision may be directed to the undersigned at (571) 272-3230.

/SHIRENE W BRANTLEY/
Attorney Advisor, OPET

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/279,155	09/28/2016	Paul DeKeyser	102246.0003US6	9873

24392 7590 10/02/2020

FISH IP LAW, LLP
2603 Main Street
Suite 1000
Irvine, CA 92614

EXAMINER	
DIEP, NHON THANH	

ART UNIT	PAPER NUMBER
2487	

NOTIFICATION DATE	DELIVERY MODE
10/02/2020	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

Patents@fishiplaw.com
rfish@fishiplaw.com

UNITED STATES PATENT AND TRADEMARK OFFICE

Commissioner for Patents
United States Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450
www.uspto.gov

In re Patent No. 9,912,914
Issue Date: 6 Ma 2018
Application No. 15/279,155
Filing or 371(c) Date: 28 Sep 2016
Attorney Docket No. 102246.0003US6

CORRECTED
DECISION ON PETITION

This is a corrected decision on the renewed petition under 37 CFR 1.78(c), filed September 10, 2020, to accept an unintentionally delayed claim of benefit of provisional Application No. 60/824,097, filed August 31, 2006, and the petition under 37 CFR 1.182, filed September 10, 2020, to expedite a decision on the aforementioned delayed benefit petition.

The petition decision of September 18, 2020 is vacated.

The petition under 37 CFR 1.182 is **GRANTED**. The petition under 37 CFR 1.78(c), filed September 10, 2020, is being taken up for consideration in an expedited manner.

The petition under 37 CFR 1.78(c) is **DISMISSED**.

Title II of the Patent Law Treaties Implementation Act of 2012 amended the last sentence of 35 U.S.C. 119(e)(1) to delete the phrase "during the pendency of the application." In view of this amendment, a reissue application is not required to add or correct a benefit claim under 35 U.S.C. 119(e) after a patent has been granted on an application filed on or after November 29, 2000. A petition under 37 CFR 1.78 to accept an unintentionally delayed claim, along with a request for a Certificate of Correction under 37 CFR 1.323, may be filed to add or correct a benefit claim under 35 U.S.C. 119(e) to a prior-filed provisional application. This has always been the case with respect to adding or correcting a benefit claim under 35 U.S.C. 120.

The present application was filed after November 29, 2000, and matured into Patent No. 9,912,914 on March 6, 2018.

Under certain conditions as specified below, a Certificate of Correction can be used to correct:

(A) the failure to make reference to a prior application; or
(B) an incorrect reference to a prior application.

The following conditions must be satisfied:

(A) all requirements set forth in 37 CFR 1.78(a)(1) must have been met in the application which became the patent to be corrected;
(B) it must be clear from the record of the patent and the parent application(s) that priority is appropriate (see MPEP § 211et seq.); and
(C) a grantable petition to accept an unintentionally delayed claim for the benefit of a prior application must be filed, including a surcharge.

If all the above-stated conditions are satisfied, a Certificate of Correction can be used to amend the patent to make reference to a prior application, or to correct an incorrect reference to the prior application.

A petition for acceptance of a claim for late priority under 37 CFR 1.78(c) is only applicable to those applications in which a proper benefit claim is filed after the expiration of the period specified in 37 CFR 1.78(a)(4). In addition, the petition under 37 CFR § 1.78(c) must be accompanied by:

(1) the reference required by 35 U.S.C. § 119(c) and 37 CFR 1.78(a)(3) of the prior-filed application, which must be filed in an Application Data Sheet, unless previously submitted;
(2) the petition fee set forth in § 1.17(m); and
(3) a statement that the entire delay between the date the claim was due under 37 CFR 1.78(a)(4) and the date the claim was filed was unintentional. The Director may require additional where there is a question whether the delay was unintentional.

The petition does not meet requirement (3).

With respect to requirement (3): The additional information provided in the September 10, 2020 petition, especially 3) does not directly pertain to this application. No petition decision was mailed in this application on October 28, 2019.

Applicant must provide sufficient information regarding the facts and circumstances surrounding the entire delay to support a conclusion that the entire delay was unintentional. Petitioner must explain the delay between when the benefit claim was due (Monday, January 30, 2017) and when the benefit claim was filed (June 29, 2020). When was the failure to file a timely benefit claim for Application No. 60/824,097 discovered? Petitioner must explain why the initial petition was not filed until June 29, 2020.

If reconsideration of the decision is desired, please file a renewed petition under 37 CFR 1.78(c), and an explanation of the delay in claiming benefit of Application No. 60/824,097 in this application.

Further correspondence with respect to this matter should be delivered through one of the following mediums:

By mail:	Mail Stop PETITIONS Commissioner for Patents Post Office Box 1450 Alexandria, VA 22313-1450
By hand:	Customer Service Window Mail Stop Petitions Randolph Building 40l Dulany Street Alexandria, VA 22314
By fax:	(571) 273-8300 ATTN: Office of Petitions
By Internet:	EFS-Web

Any inquiries concerning this decision may be directed to the undersigned at (571) 272-3230.

/SHIRENE W BRANTLEY/
Attorney Advisor, OPET

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
P.O. BOX 1450
ALEXANDRIA, VA 22313-1450

Application No.:	**15/279,155**
Applicant:	**DeKeyser, Paul**
Filing Date:	**September 28, 2016**
Art Unit:	**2688**
Examiner:	**BRANIFF, CHRISTOPHER**
Attorney Docket No.:	**102246.0003US6**

Title **WRITE-PROTECTED RECORDING**

Mail Stop Petitions
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

RENEWED PETITION FOR EXPEDITED CONSIDERATION UNDER 37 C.F.R. §1.182

Dear Sir or Madam:

1. Applicant respectfully requests expedited consideration of its Renewed Petition to Accept an Unintentionally Delayed Claim under 35 U.S.C. §119(e) for the Benefit of a Prior-Filed Provisional Application (37 C.F.R. §1.78 (c)).
2. A Petition to Accept an Unintentionally Delayed Claim under 35 U.S.C. §119(e) for the Benefit of a Prior-Filed Provisional Application (37 C.F.R. §1.78 (c)) is filed herewith.
3. A small entity fee of $200 for expedited consideration is submitted herewith.
4. Authorization is hereby made to charge additional fees or credit overpayment to Deposit Account No. 500341.

Respectfully submitted,

Fish IP Law LLP

Date: October 22, 2020

By: /Tomas A. Prieto/
Tomas A. Prieto
Reg. No. 60675

Fish IP Law LLP
2603 Main Street, Suite 1000
Irvine, CA 92614-4271
Telephone: (949) 943-8300
Fax: (949) 943-8358

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
P.O. BOX 1450
ALEXANDRIA, VA 22313-1450

Application No.:	**15/279,155**
Applicant:	**DeKeyser, Paul**
Filing Date:	**September 28, 2016**
Art Unit:	**2688**
Examiner:	**BRANIFF, CHRISTOPHER**
Attorney Docket No.:	**102246.0003US6**

Title **WRITE-PROTECTED RECORDING**

Mail Stop Petitions
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

RENEWED PETITION TO ACCEPT AN UNINTENTIONALLY DELAYED CLAIM UNDER 35 U.S.C. §119(e) FOR THE BENEFIT OF A PRIOR-FILED PROVISIONAL APPLICATION (37 C.F.R. §1.78 (c))

Dear Sir or Madam:

In response to the Petition Decision dated October 2, 2020, Applicant submits the following:

1) Applicant submits herewith a Renewed Petition for Expedited Consideration pursuant to 37 C.F.R. §1.182.

2) Applicant hereby petitions for acceptance of an unintentionally delayed benefit claim under 37 C.F.R. §1.78(c).

3) Applicant states that the entire delay between the date the claim was due under 37 C.F.R. §1.78(d)(3), and the date the claim was filed, was unintentional. Applicant explains as follows:

   In the prior petition filed September 10, 2020 included a typographical error referencing a petition decision of October 28, 2019. This has been corrected in this petition. On October 20, 2020, Applicant's representative Tomás A. Prieto (Reg. No. 60,675) and Attorney Advisor Shirene Brantley spoke via telephone. During the call, Attorney Advisor Brantley indicated that this typographical error was the main reason for the dismissal of the prior petition. This typographical error has been corrected for this

petition. Applicant wishes to thank Attorney Advisor Brantley for the telephone call and for her input and comments.

A) Period Between January 30, 2017 and June 29, 2020

The failure to file a timely benefit claim to provisional application 60/824,097 was not discovered until a review of the patent family was performed when preparing a petition for related application 15/875,828. More specifically:

An error in the priority claim of related application 15/875,828 was discovered during prosecution of that application and Applicant has made multiple attempts at correcting the error in that application. One such attempt was made via a petition filed June 29, 2020. In preparation for the filing of that petition, the applications/patents related to application 15/875,828 were also reviewed (including this application) to check whether the error contained in 15/875,828 or any other error of priority was contained elsewhere in the patent family. It was only then that we discovered the error in the priority claim of this application to provisional application 60/824,097. The petition was promptly filed following this discovery, on June 29, 2020.

Thus, the entire delay between when the benefit claim was due (January 30, 2017) and when the benefit claim was first filed (June 29, 2020) is unintentional.

B) Period Between USPTO' Decision on July 16, 2020 and September 10, 2020 Petition

Upon becoming aware of the Office's decision on July 16, 2020, Applicant worked to respond with this updated petition as soon as possible. Since the July 16, 2020 petition decision was received and first processed, the undersigned worked to search past records such as emails and docketing entries to ensure accuracy and completeness in the explanation and made multiple attempts to reach the Office for clarification before having success. Therefore, any time that might be considered to be a delay between the July 16, 2020 petition decision and the filing of the petition on September 10, 2020 is unintentional.

C) Period Between USPTO's Decision on October 2, 2020 and This Petition

Finally, upon becoming aware of the Office's decision on October 2, 2020, Applicant has been working to respond with this updated petition as soon as possible. This has included carefully reviewing this new petition draft and attempting to reach the Office for clarification. Therefore, any time that might be considered to be a delay between the October 2, 2020 petition decision and the filing of this petition is unintentional

For the reasons discussed above, Applicant states that the entire delay between when the benefit claim was due and this petition to correct the benefit claim is unintentional.

4) Applicant states that the fee for the Petition to Accept an Unintentionally Delayed Benefit Claim in the amount of $1,000.00 pursuant to 37 C.F.R. §1.17(m) was previously paid on June 29, 2020.
5) A corrected Application Data Sheet which lists the corrected priority application claims.
6) A Request for Certificate of Correction to add the benefit claim since the patent issued on March 6, 2018. Additionally, a clerical error in the first page of the specification was discovered and is being corrected herein. Please note that the Certificate of Correction fee of $150.00 was previously paid on June 29, 2020.

7) As Applicant notes above, the fees for the Petition to Accept an Unintentionally Delayed Benefit Claim under 37 C.F.R. §1.78(c) and the request for Certificate of Correction were previously paid. As both petitions were denied, it is Applicant's understanding that the paid fees have not been applied. If these fees in fact do need to be paid again, authorization is hereby made to charge these fees, any additional fees or credit overpayment to Deposit Account No. 500341.

Respectfully submitted,

Fish IP Law LLP

Date: October 22, 2020

By: /Tomas A. Prieto/
Tomas A. Prieto
Reg. No. 60675

Fish IP Law LLP
2603 Main Street, Suite 1000
Irvine, CA 92614-4271
Telephone: (949) 943-8300
Fax: (949) 943-8358

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	102246.0003US6
	Application Number	15/279155
Title of Invention	WRITE-PROTECTED RECORDING	

The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76.
This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.

Secrecy Order 37 CFR 5.2:

☐ Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)

Inventor Information:

Inventor 1 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Paul		DeKeyser	

Residence Information (Select One) ◉ US Residency ○ Non US Residency ○ Active US Military Service

City	Irvine	State/Province	CA	Country of Residence	US

Mailing Address of Inventor:

Address 1	55 Hidden Trail		
Address 2			
City	Irvine	State/Province	CA
Postal Code	92603	Country	US

All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the **Add** button. Add

Correspondence Information:

Enter either Customer Number or complete the Correspondence Information section below.
For further information see 37 CFR 1.33(a).

☐ **An Address is being provided for the correspondence Information of this application.**

Customer Number	24392		
Email Address	patents@fishiplaw.com	Add Email	Remove Email

Application Information:

Title of the Invention	WRITE-PROTECTED RECORDING		
Attorney Docket Number	102246.0003US6	Small Entity Status Claimed	☒
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	4	Suggested Figure for Publication (if any)	

PTO/AIA/14 (11-15)
Approved for use through 04/30/2017. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	102246.0003US6
	Application Number	
Title of Invention	WRITE-PROTECTED RECORDING	

Filing By Reference:

Only complete this section when filing an application by reference under 35 U.S.C. 111(c) and 37 CFR 1.57(a). Do not complete this section if application papers including a specification and any drawings are being filed. Any domestic benefit or foreign priority information must be provided in the appropriate section(s) below (i.e., "Domestic Benefit/National Stage Information" and "Foreign Priority Information").

For the purposes of a filing date under 37 CFR 1.53(b), the description and any drawings of the present application are replaced by this reference to the previously filed application, subject to conditions and requirements of 37 CFR 1.57(a).

Application number of the previously filed application	Filing date (YYYY-MM-DD)	Intellectual Property Authority or Country

Publication Information:

☐ Request Early Publication (Fee required at time of Request 37 CFR 1.219)

☐ **Request Not to Publish.** I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application **has not and will not** be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32).
Either enter Customer Number or complete the Representative Name section below. If both sections are completed the customer Number will be used for the Representative Information during processing.

Please Select One:	◉ Customer Number	○ US Patent Practitioner	○ Limited Recognition (37 CFR 11.9)
Customer Number	24392		

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, 365(c), or 386(c) or indicate National Stage entry from a PCT application. Providing benefit claim information in the Application Data Sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.
When referring to the current application, please leave the "Application Number" field blank.

Prior Application Status	Patented			Remove	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
15/279155	Continuation of	13/790553	~~2016-03-08~~ 2013-03-08	9485471	2016-11-01

PTO/AIA/14 (11-15)
Approved for use through 04/30/2017. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	102246.0003US6
	Application Number	
Title of Invention	WRITE-PROTECTED RECORDING	

Prior Application Status	Patented				Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
13/790553	Continuation of	12/560584	2009-09-16	~~9485471~~	~~2016-11-01~~
Prior Application Status	Patented			8692882 Remove	2014-04-08
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
12/560584	Continuation of	12/268286	~~2009-09-16~~	~~8692882~~	~~2014-03-14~~
Prior Application Status	Patented		2008-11-10	7593034 Remove	2009-09-22
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
12/268286	Continuation in part of	11/770920	~~2008-11-08~~	~~7593034~~	~~2009-09-22~~
Prior Application Status	Expired		2007-06-29	8310540 Remove	2012-11-13
Application Number	Continuity Type		Prior Application Number		Filing or 371(c) Date (YYYY-MM-DD)
11/770920	Claims benefit of provisional		~~60/824095~~		2006-08-31
Prior Application Status	Patented		60824097		Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
12/268286	Continuation in part of	11/846217	2007-08-28	8928752	2015-01-06
Prior Application Status	~~Expired~~				Remove
Application Number	Continuity Type		Prior Application Number		Filing or 371(c) Date (YYYY-MM-DD)
	~~Continuation in part of~~		~~11/84217~~		~~2015-01-06~~
Prior Application Status	Expired				Remove
Application Number	Continuity Type		Prior Application Number		Filing or 371(c) Date (YYYY-MM-DD)
11/846217	Claims benefit of provisional		60824095		2006-08-31

Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the **Add** button.

Foreign Priority Information:

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55. When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX)[i] the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(i)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

PTO/AIA/14 (11-15)
Approved for use through 04/30/2017. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	102246.0003US6
	Application Number	
Title of Invention	WRITE-PROTECTED RECORDING	

Application Number	Country[i]	Filing Date (YYYY-MM-DD)	Access Code[i] (if applicable)

Remove

Additional Foreign Priority Data may be generated within this form by selecting the **Add** button.

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

☐ This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.
NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.

PTO/AIA/14 (11-15)
Approved for use through 04/30/2017. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	102246.0003US6
	Application Number	
Title of Invention	WRITE-PROTECTED RECORDING	

Authorization or Opt-Out of Authorization to Permit Access:

When this Application Data Sheet is properly signed and filed with the application, applicant has provided written authority to permit a participating foreign intellectual property (IP) office access to the instant application-as-filed (see paragraph A in subsection 1 below) and the European Patent Office (EPO) access to any search results from the instant application (see paragraph B in subsection 1 below).

Should applicant choose not to provide an authorization identified in subsection 1 below, applicant **must opt-out** of the authorization by checking the corresponding box A or B or both in subsection 2 below.

NOTE: This section of the Application Data Sheet is **ONLY** reviewed and processed with the **INITIAL** filing of an application. After the initial filing of an application, an Application Data Sheet cannot be used to provide or rescind authorization for access by a foreign IP office(s). Instead, Form PTO/SB/39 or PTO/SB/69 must be used as appropriate.

1. Authorization to Permit Access by a Foreign Intellectual Property Office(s)

A. Priority Document Exchange (PDX) - Unless box A in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the State Intellectual Property Office of the People's Republic of China (SIPO), the World Intellectual Property Organization (WIPO), and any other foreign intellectual property office participating with the USPTO in a bilateral or multilateral priority document exchange agreement in which a foreign application claiming priority to the instant patent application is filed, access to: (1) the instant patent application-as-filed and its related bibliographic data, (2) any foreign or domestic application to which priority or benefit is claimed by the instant application and its related bibliographic data, and (3) the date of filing of this Authorization. See 37 CFR 1.14(h)(1).

B. Search Results from U.S. Application to EPO - Unless box B in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the EPO access to the bibliographic data and search results from the instant patent application when a European patent application claiming priority to the instant patent application is filed. See 37 CFR 1.14(h)(2).

The applicant is reminded that the EPO's Rule 141(1) EPC (European Patent Convention) requires applicants to submit a copy of search results from the instant application without delay in a European patent application that claims priority to the instant application.

2. Opt-Out of Authorizations to Permit Access by a Foreign Intellectual Property Office(s)

☐ A. Applicant **DOES NOT** authorize the USPTO to permit a participating foreign IP office access to the instant application-as-filed. If this box is checked, the USPTO will not be providing a participating foreign IP office with any documents and information identified in subsection 1A above.

☐ B. Applicant **DOES NOT** authorize the USPTO to transmit to the EPO any search results from the instant patent application. If this box is checked, the USPTO will not be providing the EPO with search results from the instant application.

NOTE: Once the application has published or is otherwise publicly available, the USPTO may provide access to the application in accordance with 37 CFR 1.14.

PTO/AIA/14 (11-15)
Approved for use through 04/30/2017. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	102246.0003US6
	Application Number	
Title of Invention	WRITE-PROTECTED RECORDING	

Applicant Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Applicant 1

If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.

Clear

◉ Assignee	○ Legal Representative under 35 U.S.C. 117	○ Joint Inventor
○ Person to whom the inventor is obligated to assign.	○ Person who shows sufficient proprietary interest	

If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:

Name of the Deceased or Legally Incapacitated Inventor:

If the Applicant is an Organization check here. ☒

Organization Name	STELLAR, LLC		
Mailing Address Information For Applicant:			
Address 1	55 Hidden Trail		
Address 2			
City	Irvine	**State/Province**	CA
Country	US	Postal Code	92603
Phone Number		Fax Number	
Email Address			

Additional Applicant Data may be generated within this form by selecting the Add button.

Assignee Information including Non-Applicant Assignee Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

PTO/AIA/14 (11-15)
Approved for use through 04/30/2017. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	102246.0003US6
	Application Number	
Title of Invention	WRITE-PROTECTED RECORDING	

Assignee 1

Complete this section if assignee information, including non-applicant assignee information, is desired to be included on the patent application publication. An assignee-applicant identified in the "Applicant Information" section will appear on the patent application publication as an applicant. For an assignee-applicant, complete this section only if identification as an assignee is also desired on the patent application publication.

If the Assignee or Non-Applicant Assignee is an Organization check here. ☐

Prefix	**Given Name**	Middle Name	**Family Name**	Suffix

Mailing Address Information For Assignee including Non-Applicant Assignee:

Address 1			
Address 2			
City		**State/Province**	
Country		Postal Code	
Phone Number		Fax Number	
Email Address			

Additional Assignee or Non-Applicant Assignee Data may be generated within this form by selecting the Add button.

Signature:

NOTE: This Application Data Sheet must be signed in accordance with 37 CFR 1.33(b). **However, if this Application Data Sheet is submitted with the INITIAL filing of the application and either box A or B is not checked in subsection 2 of the "Authorization or Opt-Out of Authorization to Permit Access" section, then this form must also be signed in accordance with 37 CFR 1.14(c).**

This Application Data Sheet **must** be signed by a patent practitioner if one or more of the applicants is a **juristic entity** (e.g., corporation or association). If the applicant is two or more joint inventors, this form must be signed by a patent practitioner, **all** joint inventors who are the applicant, or one or more joint inventor-applicants who have been given power of attorney (e.g., see USPTO Form PTO/AIA/81) on behalf of **all** joint inventor-applicants.

See 37 CFR 1.4(d) for the manner of making signatures and certifications.

Signature	/Robert D. Fish/			Date (YYYY-MM-DD)	~~2016-09-28~~ 2020-10-22
First Name	Robert D.	Last Name	Fish	Registration Number	33880

Additional Signature may be generated within this form by selecting the Add button.

PTO/AIA/14 (11-15)
Approved for use through 04/30/2017. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	102246.0003US6
	Application Number	
Title of Invention	WRITE-PROTECTED RECORDING	

This collection of information is required by 37 CFR 1.76. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1 The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3 A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent CooperationTreaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Motorola v. Stellar
Motorola Exhibit 1032
Page 460

PTO/SB/44 (09-07)
Approved for use through 01/31/2020. OMB 0651-0033
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.
(Also Form PTO-1050)

UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO. : 9912914

APPLICATION NO.: 15/279,155

ISSUE DATE : March 6, 2018

INVENTOR(S) : DeKeyser, Paul

It is certified that an error appears or errors appear in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Regarding item (60) on the second page, please add:

Provisional Application 60/824,097 filed on August 31, 2006.

Regarding column 1, lines 13-16 please replace:
"This application Ser. No. 12/268,286 are also continuations-in-part of U.S. patent application Ser. No. 11/846,217, filed Aug. 28, 2007, which claims the benefit of U.S. provisional patent 60/824,095, filed Aug. 31, 2006."

With:
Application Ser. No. 12/268,286 is also a continuation-in-part of U.S. patent application Ser. No. 11/846,217, filed Aug. 28, 2007, which claims the benefit of U.S. provisional patent 60/824,095, filed Aug. 31, 2006.

MAILING ADDRESS OF SENDER (Please do not use Customer Number below):

FISH IP LAW, LLP
2603 Main Street, Ste 1000, Irvine CA 92614

This collection of information is required by 37 CFR 1.322, 1.323, and 1.324. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1.0 hour to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Attention Certificate of Corrections Branch, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Electronic Patent Application Fee Transmittal

Application Number:	15279155
Filing Date:	28-Sep-2016
Title of Invention:	WRITE-PROTECTED RECORDING
First Named Inventor/Applicant Name:	Paul DeKeyser
Filer:	Robert Fish/Jack Reihl
Attorney Docket Number:	102246.0003US6

Filed as Small Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
PETITION FEE - 37 CFR 1.17(F)(GROUP I)	2462	1	210	210
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension-of-Time:				
Miscellaneous:				
		Total in USD ($)		**210**

Electronic Acknowledgement Receipt	
EFS ID:	40921983
Application Number:	15279155
International Application Number:	
Confirmation Number:	9873
Title of Invention:	WRITE-PROTECTED RECORDING
First Named Inventor/Applicant Name:	Paul DeKeyser
Customer Number:	24392
Filer:	Robert Fish/Jack Reihl
Filer Authorized By:	Robert Fish
Attorney Docket Number:	102246.0003US6
Receipt Date:	22-OCT-2020
Filing Date:	28-SEP-2016
Time Stamp:	17:07:20
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	DA
Payment was successfully received in RAM	$210
RAM confirmation Number	E20200LH07459776
Deposit Account	500341
Authorized User	Jack Reihl
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: 37 CFR 1.16 (National application filing, search, and examination fees) 37 CFR 1.17 (Patent application and reexamination processing fees)	

37 CFR 1.19 (Document supply fees)

37 CFR 1.20 (Post Issuance fees)

37 CFR 1.21 (Miscellaneous fees and charges)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Petition for review by the Office of Petitions	1-Renewed-Petition_for_expedited_consideration-02a.pdf	20412 692f4722422353 7b424ea8fa6836cc661fe54d6a	no	1
Warnings:					
Information:					
2	Petition for review by the Office of Petitions	2-Renewed-Petition_for_Unintentionally_Delayed_Claim-02f.pdf	30258 e1854b679d0ec8abbe6dd2cbacdf4470d298c574	no	4
Warnings:					
Information:					
3	Application Data Sheet	3-ADS-amended-3US6.pdf	2429803 d684969a39ab08ed8c4f248bc0ac5cd2b7108a4a	no	9
Warnings:					
Information:					
This is not an USPTO supplied ADS fillable form					
4	Request for Certificate of Correction	4-sb0044-cert-correction.pdf	188669 770fa7bdffaf26ccceddc97c8a2debac86b7ab16	no	2
Warnings:					
Information:					
5	Fee Worksheet (SB06)	fee-info.pdf	30473 0be9d3acb18141d08a71f00ebce338c32ee83f69	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	2699615		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/279,155	09/28/2016	Paul DeKeyser	102246.0003US6	9873

24392 7590 11/03/2020

FISH IP LAW, LLP
2603 Main Street
Suite 1000
Irvine, CA 92614

EXAMINER	
DIEP, NHON THANH	

ART UNIT	PAPER NUMBER
2487	

NOTIFICATION DATE	DELIVERY MODE
11/03/2020	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

Patents@fishiplaw.com
rfish@fishiplaw.com

UNITED STATES PATENT AND TRADEMARK OFFICE

Commissioner for Patents
United States Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450
www.uspto.gov

In re Patent No. 9,912,914
Issue Date: 6 Mar 2018
Application No. 15/279,155
Filing or 371(c) Date: 28 Sep 2016
Attorney Docket No. 102246.0003US6

DECISION ON PETITION

This is a decision on the renewed petition under 37 CFR 1.78(c), filed October 22, 2020, to accept an unintentionally delayed claim of benefit of provisional Application No. 60/824,097, filed August 31, 2006, and the petition under 37 CFR 1.182, filed October 22, 2020, to expedite a decision on the aforementioned delayed benefit petition.

The petition under 37 CFR 1.182 is **GRANTED**. The petition under 37 CFR 1.78(c), filed October 22, 2020, is being taken up for consideration in an expedited manner.

The petition under 37 CFR 1.78(c) is **GRANTED**.

Title II of the Patent Law Treaties Implementation Act of 2012 amended the last sentence of 35 U.S.C. 119(e)(1) to delete the phrase "during the pendency of the application." In view of this amendment, a reissue application is not required to add or correct a benefit claim under 35 U.S.C. 119(e) after a patent has been granted on an application filed on or after November 29, 2000. A petition under 37 CFR 1.78 to accept an unintentionally delayed claim, along with a request for a Certificate of Correction under 37 CFR 1.323, may be filed to add or correct a benefit claim under 35 U.S.C. 119(e) to a prior-filed provisional application. This has always been the case with respect to adding or correcting a benefit claim under 35 U.S.C. 120.

The present application was filed after November 29, 2000, and matured into Patent No. 9,912,914 on March 6, 2018.

Under certain conditions as specified below, a Certificate of Correction can be used to correct:

(A) the failure to make reference to a prior application; or
(B) an incorrect reference to a prior application.

The following conditions must be satisfied:

(A) all requirements set forth in 37 CFR 1.78(a)(1) must have been met in the application which became the patent to be corrected;

(B) it must be clear from the record of the patent and the parent application(s) that priority is appropriate (see MPEP § 211et seq.); and
(C) a grantable petition to accept an unintentionally delayed claim for the benefit of a prior application must be filed, including a surcharge.

If all the above-stated conditions are satisfied, a Certificate of Correction can be used to amend the patent to make reference to a prior application, or to correct an incorrect reference to the prior application.

A petition for acceptance of a claim for late priority under 37 CFR 1.78(c) is only applicable to those applications in which a proper benefit claim is filed after the expiration of the period specified in 37 CFR 1.78(a)(4). In addition, the petition under 37 CFR § 1.78(c) must be accompanied by:

(1) the reference required by 35 U.S.C. § 119(c) and 37 CFR 1.78(a)(3) of the prior-filed application, which must be filed in an Application Data Sheet, unless previously submitted;
(2) the petition fee set forth in § 1.17(m); and
(3) a statement that the entire delay between the date the claim was due under 37 CFR 1.78(a)(4) and the date the claim was filed was unintentional. The Director may require additional where there is a question whether the delay was unintentional.

Additionally, a nonprovisional application in the benefit chain claiming the benefit of the prior-filed provisional application must have been filed within twelve months of the filing date of the prior-filed provisional application.

Petitioner has provided an adequate explanation to establish the entire delay between the date the claim was due under 37 CFR 1.78(a)(4) and the date a proper claim was filed and a grantable petition under 37 CFR 1.78(c) was filed was unintentional.

All the above requirements having been satisfied, the late claim for benefit of priority under 35 U.S.C. 119(e) is accepted as being unintentionally delayed.

A corrected Filing Receipt, which includes the priority claim to the prior-filed provisional application, accompanies this decision on petition.

Petitioner is advised that this decision grants the petition to accept the unintentionally delayed domestic benefit claim to the prior filed application because the petition requirements of 37 CFR 1.78(c) and the formal requirements for claiming domestic benefit (see MPEP 211.01 et. seq.) have been met. This acceptance should not be construed as meaning that any claim in this patent is entitled to the benefit of the prior-filed application. *See* MPEP 211.05 for more information regarding entitlement to domestic benefit.

Telephone inquiries pertaining to this decision may be directed to the undersigned at (571) 272-3230.

After the mailing of this decision, the application will be referred to Certificates of Correction Branch for issuance of a Certificate of Correction correcting the domestic benefit information.

/SHIRENE W BRANTLEY/
Attorney Advisor, OPET

ATTACHMENT: Corrected Filing Receipt

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
15/279,155	09/28/2016	2487	850	102246.0003US6	23	1

CONFIRMATION NO. 9873

CORRECTED FILING RECEIPT

24392
FISH IP LAW, LLP
2603 Main Street
Suite 1000
Irvine, CA 92614

Date Mailed: 11/03/2020

Receipt is acknowledged of this non-provisional utility patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF FIRST INVENTOR, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection.

Please verify the accuracy of the data presented on this receipt. If an error is noted on this Filing Receipt, please submit a written request for a corrected Filing Receipt, including a properly marked-up ADS showing the changes with strike-through for deletions and underlining for additions. If you received a "Notice to File Missing Parts" or other Notice requiring a response for this application, please submit any request for correction to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections provided that the request is grantable.

Inventor(s)

Paul DeKeyser, Irvine, CA;

Applicant(s)

STELLAR, LLC, Irvin, CA;

Power of Attorney: The patent practitioners associated with Customer Number 24392

Domestic Priority data as claimed by applicant

This application is a CON of 13/790,553 03/08/2013 PAT 9485471
which is a CON of 12/560,584 09/16/2009 PAT 8692882
which is a CON of 12/268,286 11/10/2008 PAT 7593034
which is a CIP of 11/770,920 06/29/2007 PAT 8310540
which claims benefit of 60/824,097 08/31/2006
and said 12/268,286 11/10/2008
is a CIP of 11/846,217 08/28/2007 PAT 8928752
which claims benefit of 60/824,095 08/31/2006

Foreign Applications for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see http://www.uspto.gov for more information.) - None.
Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

Permission to Access Application via Priority Document Exchange: Yes

Permission to Access Search Results: Yes

Applicant may provide or rescind an authorization for access using Form PTO/SB/39 or Form PTO/SB/69 as appropriate.

If Required, Foreign Filing License Granted: 10/07/2016
The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 15/279,155**
Projected Publication Date: Not Applicable
Non-Publication Request: No
Early Publication Request: No
** **SMALL ENTITY** **
Title

WRITE-PROTECTED RECORDING

Preliminary Class

348

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at http://www.uspto.gov/web/offices/pac/doc/general/index.html.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, http://www.stopfakes.gov. Part of a Department of Commerce initiative,

this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

GRANTED

The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where the conditions for issuance of a license have been met, regardless of whether or not a license may be required as set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign AssetsControl, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

NOT GRANTED

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

SelectUSA

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The U.S. offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to promote and facilitate business investment. SelectUSA provides information assistance to the international investor community; serves as an ombudsman for existing and potential investors; advocates on behalf of U.S. cities, states, and regions competing for global investment; and counsels U.S. economic development organizations on investment attraction best practices. To learn more about why the United States is the best country in the world to develop

technology, manufacture products, deliver services, and grow your business, visit http://www.SelectUSA.gov or call +1-202-482-6800.

Motorola v. Stellar
Motorola Exhibit 1032
Page 475

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
PO Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
15/279,155	09/28/2016	2487	850	102246.0003US6	23	1

CONFIRMATION NO. 9873

CORRECTED FILING RECEIPT

24392
FISH IP LAW, LLP
2603 Main Street
Suite 1000
Irvine, CA 92614

OC000000121080337

Date Mailed: 11/03/2020

Receipt is acknowledged of this non-provisional utility patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF FIRST INVENTOR, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection.

Please verify the accuracy of the data presented on this receipt. If an error is noted on this Filing Receipt, please submit a written request for a corrected Filing Receipt, including a properly marked-up ADS showing the changes with strike-through for deletions and underlining for additions. If you received a "Notice to File Missing Parts" or other Notice requiring a response for this application, please submit any request for correction to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections provided that the request is grantable.

Inventor(s)

Paul DeKeyser, Irvine, CA;

Applicant(s)

STELLAR, LLC, Irvin, CA;

Power of Attorney: The patent practitioners associated with Customer Number 24392

Domestic Priority data as claimed by applicant

This application is a CON of 13/790,553 03/08/2013 PAT 9485471
which is a CON of 12/560,584 09/16/2009 PAT 8692882
which is a CON of 12/268,286 11/10/2008 PAT 7593034
which is a CIP of 11/770,920 06/29/2007 PAT 8310540
which claims benefit of 60/824,097 08/31/2006
and said 12/268,286 11/10/2008
is a CIP of 11/846,217 08/28/2007 PAT 8928752
which claims benefit of 60/824,095 08/31/2006

Foreign Applications for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see http://www.uspto.gov for more information.) - None.
Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

Permission to Access Application via Priority Document Exchange: Yes

Motorola v. Stellar
Motorola Exhibit 1032
Page 476

Permission to Access Search Results: Yes

Applicant may provide or rescind an authorization for access using Form PTO/SB/39 or Form PTO/SB/69 as appropriate.

If Required, Foreign Filing License Granted: 10/07/2016
The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 15/279,155**
Projected Publication Date: Not Applicable
Non-Publication Request: No
Early Publication Request: No
** **SMALL ENTITY** **
Title

WRITE-PROTECTED RECORDING

Preliminary Class

348

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at http://www.uspto.gov/web/offices/pac/doc/general/index.html.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, http://www.stopfakes.gov. Part of a Department of Commerce initiative,

Motorola v. Stellar
Motorola Exhibit 1032
Page 477

this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

GRANTED

The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where the conditions for issuance of a license have been met, regardless of whether or not a license may be required as set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign AssetsControl, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

NOT GRANTED

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

SelectUSA

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The U.S. offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to promote and facilitate business investment. SelectUSA provides information assistance to the international investor community; serves as an ombudsman for existing and potential investors; advocates on behalf of U.S. cities, states, and regions competing for global investment; and counsels U.S. economic development organizations on investment attraction best practices. To learn more about why the United States is the best country in the world to develop

technology, manufacture products, deliver services, and grow your business, visit http://www.SelectUSA.gov or call +1-202-482-6800.

Motorola v. Stellar
Motorola Exhibit 1032
Page 479

UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

PATENT NO.	: 9,912,914 B2
APPLICATION NO.	: 15/279155
DATED	: March 6, 2018
INVENTOR(S)	: Paul DeKeyser

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

On the Title Page

Regarding item (60) on the second page, please add:
Provisional Application 60/824,097 filed on August 31, 2006.

In the Specification

Regarding Column 1, Lines 13-16 please replace:
"This application Ser. No. 12/268,286 are also continuations-in-part of U.S. patent application Ser. No. 11/846,217, filed Aug. 28, 2007, which claims the benefit of U.S. provisional patent 60/824,095, filed Aug. 31, 2006."

With:
Application Ser. No. 12/268,286 is also a continuation-in-part of U.S. patent application Ser. No. 11/846,217, filed Aug. 28, 2007, which claims the benefit of U.S. provisional patent 60/824,095, filed Aug. 31, 2006.

Signed and Sealed this
Twenty-fourth Day of November, 2020

Andrei Iancu
Director of the United States Patent and Trademark Office

AO 120 (Rev. 08/10)

TO:	REPORT ON THE FILING OR DETERMINATION OF AN ACTION REGARDING A PATENT OR TRADEMARK
Mail Stop 8 Director of the U.S. Patent and Trademark Office P.O. Box 1450 Alexandria, VA 22313-1450	

In Compliance with 35 U.S.C. § 290 and/or 15 U.S.C. § 1116 you are hereby advised that a court action has been filed in the U.S. District Court for the Eastern District of Texas on the following

☐ Trademarks or ☑ Patents. (☐ the patent action involves 35 U.S.C. § 292.):

DOCKET NO.	DATE FILED	U.S. DISTRICT COURT
4:22-cv-877	10/14/2022	for the Eastern District of Texas

PLAINTIFF	DEFENDANT
STELLAR, LLC	PITTASOFT CO., LTD. D/B/A BLACKVUE

	PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1	US 7,593,034	9/22/2009	STELLAR, LLC
2	US 8,692,882	4/8/2014	STELLAR, LLC
3	US 9,485,471	11/1/2016	STELLAR, LLC
4	US 9,912,914	3/6/2018	STELLAR, LLC
5	US 10,965,910	3/30/2021	STELLAR, LLC

In the above—entitled case, the following patent(s)/ trademark(s) have been included:

DATE INCLUDED	INCLUDED BY ☐ Amendment ☐ Answer ☐ Cross Bill ☐ Other Pleading	
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1		
2		
3		
4		
5		

In the above—entitled case, the following decision has been rendered or judgement issued:

DECISION/JUDGEMENT

CLERK	(BY) DEPUTY CLERK	DATE

Copy 1—Upon initiation of action, mail this copy to Director Copy 3—Upon termination of action, mail this copy to Director
Copy 2—Upon filing document adding patent(s), mail this copy to Director Copy 4—Case file copy