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PROVISIONAL APPLICATION FOR PATENT COVER SHEET

This is a request for filing a PROVISIONAL APPLICATION FOR PATENT under 37 CFR 1.53(c).

1007 U.S. PTO
04/09/01

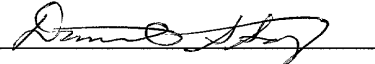
04/09/01

1007 U.S. PTO
04/09/01

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TITLE OF THE INVENTION (280 characters max)					
A DATA RECORDING SYSTEM PROVIDING INSTANT PLAYBACK AND EVENT MARKING					
Direct all correspondence to: CORRESPONDENCE ADDRESS					
☒ Customer Number		22204		Place Customer Number Bar Code Label here	
OR Type Customer Number here					
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ENCLOSED APPLICATION PARTS (check all that apply)					
☒ Specification		Number of Pages	24	☐ CD(s), Number	
☐ Drawing(s)		Number of Sheets		☐ Other (specify)	
☒ Application Data Sheet. See 37 CFR 1.76					
METHOD OF PAYMENT OF FILING FEES FOR THIS PROVISIONAL APPLICATION FOR PATENT					
☒ Applicant claims small entity status. See 37 CFR 1.27.					
☒ A check or money order is enclosed to cover the filing fees				FILING FEE AMOUNT (\$)	
☐ The Commissioner is hereby authorized to charge filing fees or credit any overpayment to Deposit Account Number:				\$75	
☐ Payment by credit card. Form PTO-2038 is attached.					
The invention was made by an agency of the United States Government or under a contract with an agency of the United States Government.					
☒ No.					
☐ Yes, the name of the U.S. Government agency and the Government contract number are: _____					

Respectfully submitted,

Date 04 / 09 / 01

SIGNATURE 

REGISTRATION NO.
(if appropriate)

43,143

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Docket Number:

744806-2

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USE ONLY FOR FILING A PROVISIONAL APPLICATION FOR PATENT

This collection of information is required by 37 CFR 1.51. The information is used by the public to file (and by the PTO to process) a provisional application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 8 hours to complete, including gathering, preparing, and submitting the complete provisional application to the PTO. 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, Washington, D.C. 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Box Provisional Application, Commissioner for Patents, Washington, D.C. 20231.

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Title

A Data Recording System Providing Instant Playback and Event Marking

Abstract

A data recording system stores a stream of video, audio, or other sampled signal data to a circular buffer. The circular buffer maintains a recording of the most recent signal values. Once the buffer is full, the newer data overwrites older data. The contents of the buffer can be displayed, played, or output to a signal reconstruction device from any location in the buffer selected by the user. The speed of the display, playback, or output can vary from single step to faster than real time. The direction can be forward (in the time sequence as it was recorded) or reverse (opposite the recording sequence). The user can manually mark positions in the buffer as an important area (event) or an external triggering device such as a control system, process upset sensor, or vision analysis system can mark event positions. The instant the manual or automatic event occurs the system can immediately display, play back or output the data signal without requiring the transfer of the data from the circular buffer to another buffer. Optionally, an event clip consisting of data before and after the event can be transferred to a different buffer for temporary or permanent use.

The circular buffer is implemented as a memory mapped file. This allows use of the caching capabilities of the operating system to automatically transfer the file contents between memory and disk as needed.

Description

System Architecture

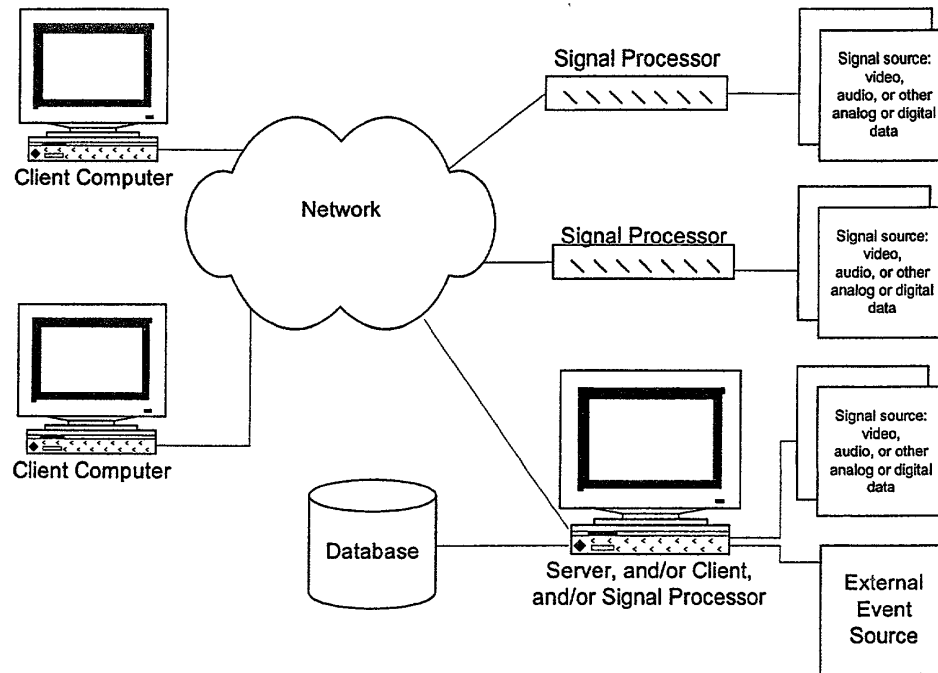


Figure 1: System Architecture

The system consists of the following elements:

Signal Source	The signal consists of a video, audio, or other analog or digital signal source.
Signal Processor	If the signal is in analog form, the signal processor first digitizes the signal. If desired, the signal data can be compressed to save on storage requirements. The signal processor analyzes the signal data to identify distinguishing features. The analysis data is stored along with the signal data and an accurate time stamp in the

	circular buffer. The time stamps allow the synchronization of the multiple input sources. Event information can also be placed in the curricular buffer.
Network	The different system components communicate over a network. The network can consist of a local area network, wide area network, or the Internet.
Server and Database	The server computer is responsible for maintaining the database of signal processor, event, and event clip information. One server is always required.
Event Source	An external triggering device such as a control system, process upset sensor, or vision analysis system can interface to the server to indicate the time of an event and can send relevant data about the event.
Client Computer	The client computer displays or reconstructs the contents of any circular buffer. It also shows a history of event information and can display event clips.

The simplest system would consist of a single computer performing the functions of a signal processor, server and client.

Signal Processor

Figure 2 depicts the Signal Processor logic. The logic supports several modes of operation. The Signal Processor can compress the signal data to save storage space and can analyze the image by applying various pattern recognition algorithms to classify the information content in the signal. An important function of the Signal Processor is to mark in the circular buffer when a event occurs and associate with this event any relevant data.

```

graph TD
    A[/Signal Source/] --> B[Digitize]
    B --> C{Compression on ?}
    C -- yes --> D[Compress]
    C -- no --> F{Analyze Uncompressed ?}
    D --> E{Analyze Compressed ?}
    E -- yes --> G[Analyze Compressed Signal Data]
    E -- no --> F
    F -- yes --> G
    F -- no --> H[/Event Data/]
    H --> I{Event Occurred?}
    I -- yes --> G
    I -- no --> J[Add Signal Data to Circular Buffer]
    G --> J
    J --> K[Add Timestamp, and Analysis Data to Signal Data]
    K --> L[End]
  
```

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Table 1. Demographic characteristics of the study population	
Age (years)	Mean (SD)
Male	55.2 (10.5)
Female	56.8 (11.2)
Marital status	
Married	78.5%
Single	21.5%
Education level	
High school or above	65.2%
Below high school	34.8%
Occupation	
White collar	45.1%
Blue collar	54.9%
Income (USD/month)	
< 1000	12.3%
1000-2000	35.7%
2000-3000	28.9%
> 3000	23.1%
Health insurance	
Yes	89.4%
No	10.6%
Comorbidities	
Hypertension	42.1%
Diabetes	18.5%
Cholesterol	31.2%
Smoking status	
Current smoker	15.3%
Former smoker	22.7%
Non-smoker	62.0%
Alcohol consumption	
Regular	8.9%
Occasional	25.4%
Never	65.7%

Memory Mapped Circular Buffer

The diagram illustrates a data capture and distribution system. On the left, two client buffers are shown: 'Client 1 MMBuffer View' and 'Client N MMBuffer View'. Each client buffer contains three data blocks: 'Data 1', 'Data 2', and 'Data Z'. Arrows from these blocks point to a central 'Data capture MMBuffer'. This central buffer also contains three data blocks: 'Data 1', 'Data 2', and 'Data Z'. From the central buffer, arrows point to two disk drives on the right: 'Disk Drive 1' and 'Disk Drive N'.

In some cases, the nature of the signal data is such that it can be naturally segmented into frames that represent self contained pieces of information. Video data consists of a sequence of frames that each represents an individual image. The following file format is suitable for this type of data:

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Maximum Frame Index
Maximum Frame Size
Average Frame Size
Frame Rate
Head Frame
Tail Frame
Format Size
Format 1
...
Format 128
Frame 1 Header: Time Stamp
Frame 1 Header: Page
Frame 1 Header: Offset
Frame 1 Header: Size
Frame 1: Frame Data
...
Frame n Header: Time Stamp
Frame n Header: Page
Frame n Header: Offset
Frame n Header: Size
Frame n: Frame Data

Signal Data Viewer Architecture

The client software can view the contents of the Signal Data Circular Buffers. A block diagram of the viewer is shown in Figure 3.

The Signal Data Viewer handles 3 types of data; Analysis, Frame and Event. The Analysis data represents information relating to the content or change in content of the signal data. The Analysis Viewer Module displays this analysis information. Usually this information is displayed as a trend of an analysis feature as a function of time. The user can identify unique positions in this trend and view the signal data associated with these positions.

The Signal Data may be stored in compressed format. If so, the data is first decompressed and then passed to the Signal Viewer Module for display. The Signal Display Control Module allows the user to view or reconstruct the signal in a forward and reverse play mode at various speeds. The user can also navigate with a slider or other user control to

arbitrary positions in the buffer. The signal viewer module can also output a portion of the Signal Data to a Save Module that can save the data in an appropriate format for use by external programs. The Save Module can compress the Signal Data using a standard compression technique to save on storage space.

The Event History Module displays the Event Data. The user can display the saved event clips associated with the event.

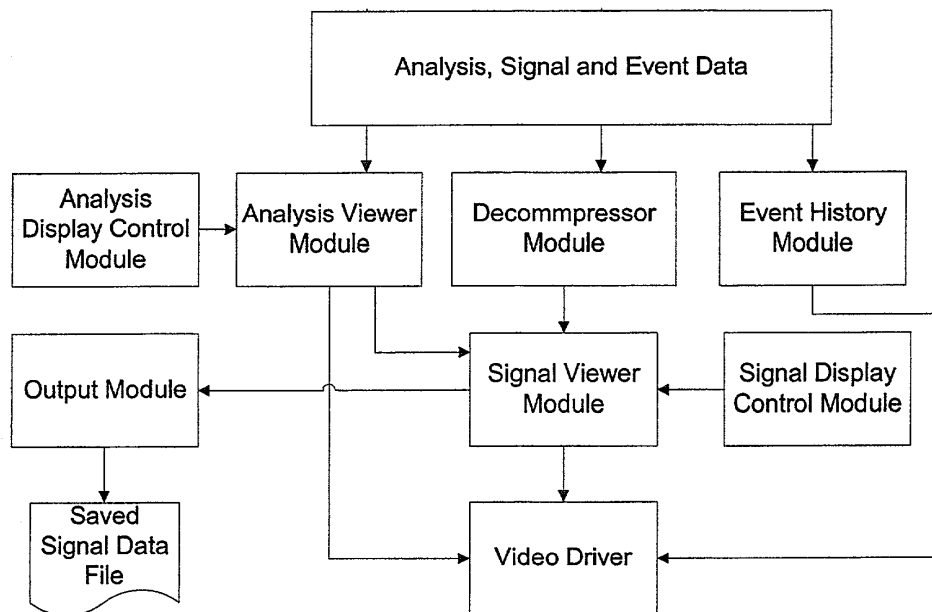


Figure 3: Signal Data Viewer Architecture

Signal Data Viewer Flowchart

Figure 4 shows a flowchart of the Signal Viewer. The user interacts with the viewer by requesting specific positions in the buffer for display or output. One possible means is the use of a slider bar to identify specific positions in the buffer for output. Forward and reverse buttons can identify the direction of change for the requested position and other user controls can determine the rate of change.

The buffer has two unique positions, the head and tail. The head represents the position in the buffer of the most recent data and the tail the position of the oldest data leaving the buffer. The head and tail are considered as real-time positions where the viewer outputs the signal data in the buffer in a live output mode.

At other positions in the buffer, the user requests the positions by manually indicating the new position by entering a time in a dialog, by sliding the pointer in the slider bar to a new position, or by selecting a particular play mode from the current buffer position.

```

graph TD
    Start([Start]) --> Connect[Connect to Circular Buffer]
    Connect --> GetPos[Get requested buffer position]
    GetPos --> RealTime{Real-time position?}
    RealTime -- yes --> StartBuf{Start of buffer?}
    StartBuf -- yes --> GetNewest[Get newest data item in buffer]
    StartBuf -- no --> GetOldest[Get oldest data item in buffer]
    RealTime -- no --> GetTime[Get time of requested position and get data item nearest to this time]
    GetNewest --> IsComp{Is data compressed?}
    GetOldest --> IsComp
    IsComp -- yes --> Decompress[Decompress]
    IsComp -- no --> DisplaySig[Display signal and analysis data]
    Decompress --> DisplaySig
    DisplaySig --> EventData{Event data at this time?}
    EventData -- yes --> DisplayEvent[Display event marker and data]
    DisplayEvent --> RealTimeMode{Requested position in realtime mode?}
    EventData -- no --> RealTimeMode
    RealTimeMode -- yes --> Connect
    RealTimeMode -- no --> UserRequest{Has user requested a new position?}
    UserRequest -- yes --> GetPos
    UserRequest -- no --> Connect

```

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Event Serial Interface

Event signals from external devices can trigger the system through a serial interface.

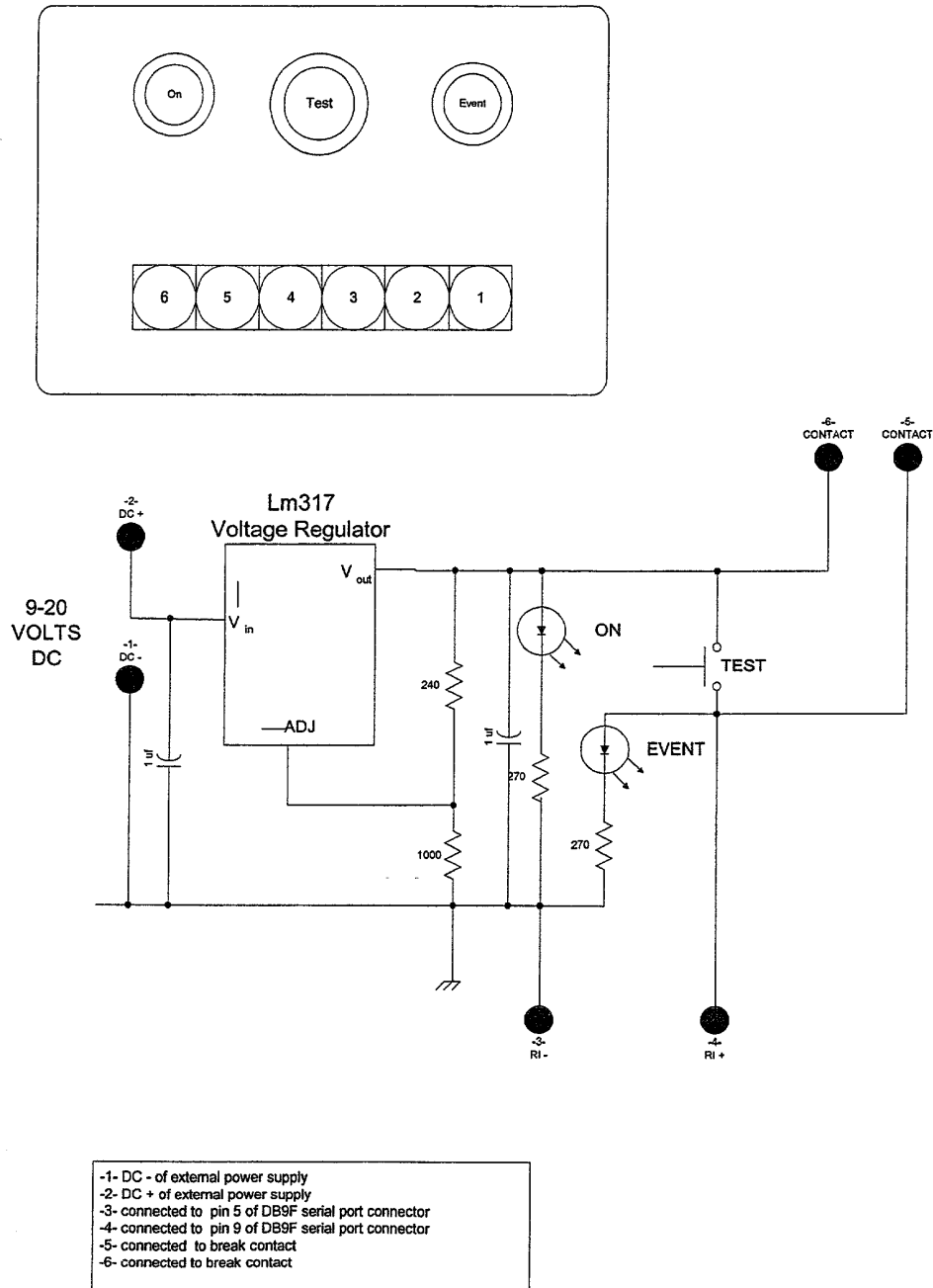


Figure 5: Event Interface

20 / 20 Hindsight User's Manual

place picture here

DRAFT

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Preliminary Draft (Not for Distribution)

10

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System Overview

The 20/20 Hindsight is a video event capture tool that is used to capture process upsets in a production or packaging line. Plant engineers can replay these events to observe the upset in detail and in slow motion to determine the root cause. The system continuously records one or more video signals to capture buffers and displays the contents of these buffers while recording is in progress. When an event happens, the operator views the event in the buffer and can manually make a movie of the event. A movie can also be made automatically by an interface to a control system, process upset sensor, or vision analysis system. A database stores the event information for easy review of the event history.

Place example here

System Setup

System Components

The following components make up the 20/20 Hindsight system:

Component	Cabling
Computer	System unit power cord
Video monitor	Video monitor power cord, video signal cable
Mouse	(Integral cable)
Keyboard	(Integral cable)
Camera and lens	Video coaxial cable
Camera power supply	Camera power cable
External trigger interface	Serial cable
External trigger interface power supply	(Integral cable)

Connecting the System Components

Before powering the computer, plug the keyboard, mouse and video monitor into the computer. Connect the computer and video monitor to the AC power source.

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706040-29729209

Connecting the camera video cable.

Connect the camera cable to the computer with the coaxial video cable (Figure 1). (The video coaxial cable may be bundled together with the camera power cable.) This cable has an RCA connector that plugs into the computer video capture card. Plug the RCA connector into the input labeled Video on the card. The other end of the video coax cable has a BNC connector for connection to the video output on the back of the camera (Figure 2)

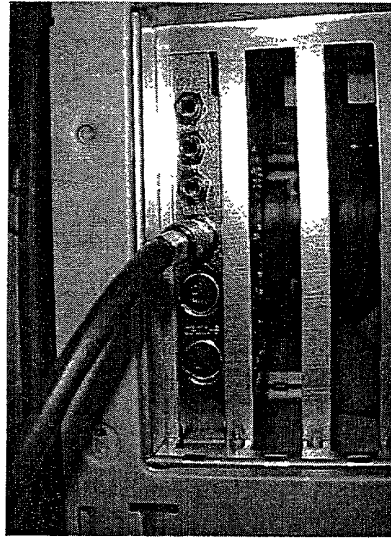


Figure 1: Video input connection



CAUTION! ALWAYS CONNECT THE CAMERA POWER CABLE TO THE BACK OF THE CAMERA FIRST, BEFORE PLUGGING THE CAMERA POWER TRANSFORMER IN TO THE AC POWER SOURCE

Connecting the camera power cable

The camera power cable has two leads at one end that connect to the 24 volt AC power input terminals on the back of the camera. Connect either wire to terminal 1. Connect the other wire to terminal 2. At the other end of the camera power cable is a small transformer that plugs into the AC power source (Figure 3).

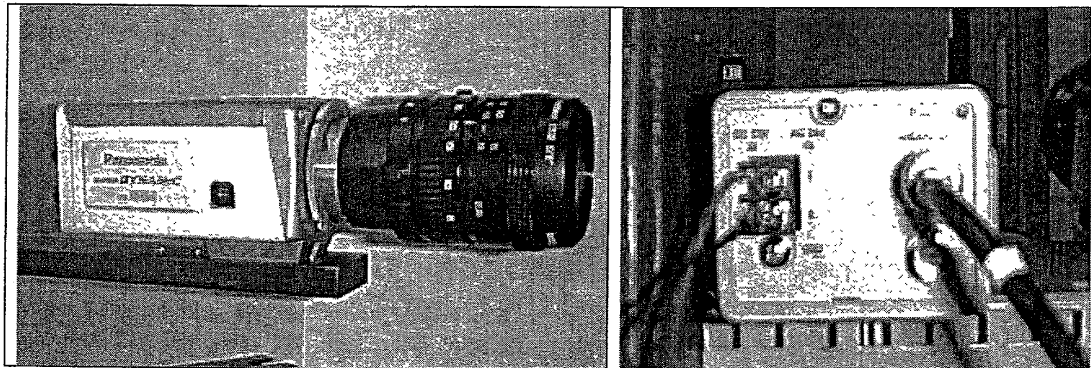


Figure 2: Camera view, showing power and video connections

video equipment. If the location uses 50 Hz power, 20/20 Hindsight will use PAL cameras and video equipment.

Both NTSC and PAL video standards produce interlaced video signals, where the even lines of a frame are captured in one field, and the odd lines are captured 1/60th or 1/50th of a second later, respectively, in the subsequent field. Two successive fields, 1 even plus 1 odd, make up a frame. In an ordinary video frame display, a fast-moving object will appear blurry, because the frame is the interlaced composition of two fields captured at slightly different times. The Hindsight Viewer will analyze the video image and display the two fields separately so that no interlace blurring occurs. The Hindsight video update rate is 60 images / second for NTSC cameras and 50 images / second for PAL.

Camera Setup

Cameras have a Setup menu that controls the important functions of the camera. Each camera will have a different setup procedure. See the camera manual for details on how to program specific cameras. Some of the important parameters are discussed below.

Electronic Shutter Speed Setting

The camera electronic shutter speed setting controls the amount of time that light energy is integrated (averaged) by the camera for each field. The longer the shutter time, the more light that contributes to the image. Generally longer shutter times yield a brighter, sharper picture. However, by keeping the shutter open longer, you increase the distance a moving object will travel across the image during the time the shutter is open. This has the effect of blurring moving details. To 'freeze' a moving object, you want a fast shutter time. Of course this means less time to integrate the incident light, so you need lots of light on the video view. You can always adjust the electronic shutter setting for more light, trading off a little of your ability to capture fast moving detail clearly.

Video Frame Sync Setting

In the interest of video quality, especially as related to lighting, it is advantageous to use a video standard with a refresh rate equal to the power line frequency. The camera frame rate can be synchronized with the power line frequency. This assures that every video field will be captured at the same point (the same phase) in the power line cycle. Although it is not apparent to the human eye, there is a cyclic variation in the intensity of artificial electric light that follows the cycling of the AC power line frequency. If the camera frame rate is not synchronized with the variations in light intensity, each frame will be captured in a slightly different lighting environment. The gradual drift of the frame capture time vs. the light intensity cycle will cause a slowly cycling light and dark variation in the apparent brightness of the video picture. In a color signal, whites will appear to darken to gray or yellow, and return to white in a slow cycle.

Lens Setting and Adjustment

The standard 8-48 mm zoom lens has three adjustment rings, focus, zoom, and aperture (Figure 4). Focus is the most forward adjustment ring on the lens. Zoom is the center adjustment. Aperture is the rear adjustment. The aperture adjustment has two effects, one of which will also interact with the shutter speed setup on the camera electronic settings.

The aperture ring controls the size of the opening through which light must pass in order to fall upon the light-sensing element of the camera. Opening the aperture increases the opening, allowing more light to reach the camera, and giving a brighter picture. You might think that widest possible opening is best, but in some cases there is a competing criteria. The size of the aperture also controls the *depth of field* of the focus of the lens. By this is meant the range of distance, near to far, that will be in focus at the same time for a given setting of the focus adjustment. A small aperture setting, while letting in little light, will on the other hand provide a greater depth of field. A large aperture setting, while letting in more light, will on the other hand provide a lesser depth of field. If the video view attempts to a wide range of both foreground and background detail, you will need sufficient depth of field to keep both the near and far extremes of the view in focus. Of course you can always adjust the electronic shutter setting for more light, trading off a little of your ability to capture fast moving detail clearly. In practice you must use judgment to find the best trade-off of these interacting parameters.

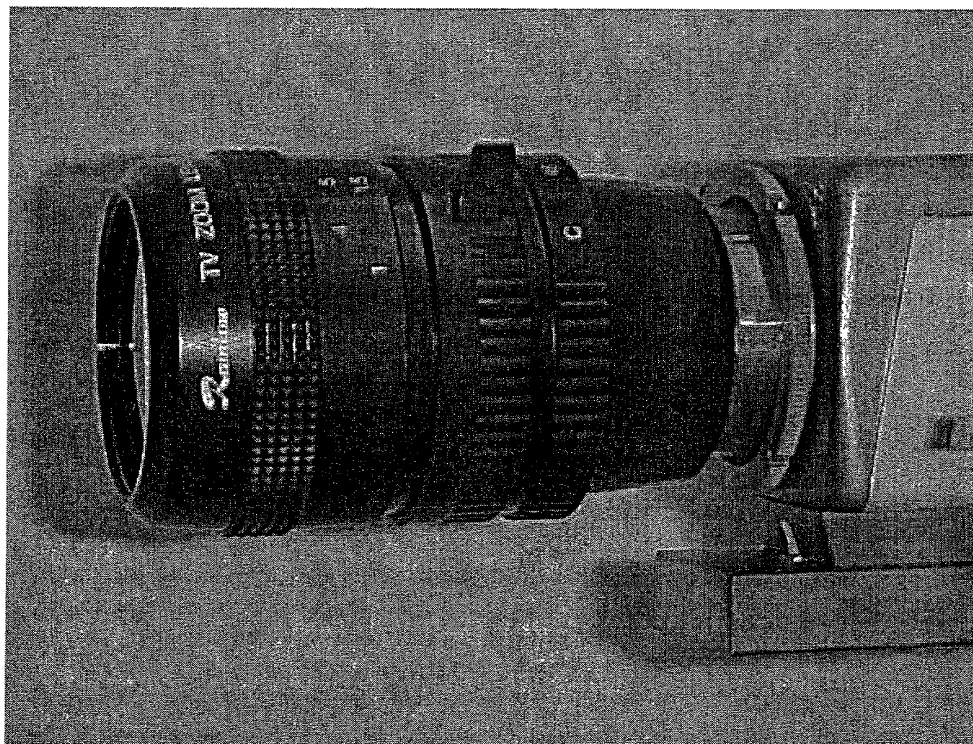


Figure 4: Rainbow 8-48 mm lens, showing the focus, zoom, and aperture adjustment rings

External Trigger

The 20/20 Hindsight system can respond external events, making a movie automatically using the external trigger interface. The external trigger could come from a control system, process upset sensor, or vision analysis system. External events are signaled to 20/20 Hindsight by a contact closure, such as a relay.

Connect the external trigger interface box to the 20/20 Hindsight capture computer using the DB9M/DB9F serial communications cable. Plug the serial cable DB9F (female) into serial port COM1 on the capture computer. Plug the serial cable DB9M (male) into the mating connector on the external trigger interface box. Connect the contact closure leads from the signaling system to terminals 1 and 2 on the external trigger interface box. Connect the trigger interface power supply cable to the mating connector on the interface box, and plug the power supply in the AC power source.

There is a momentary push-button switch on the external trigger interface box, which can be used to simulate a contact closure. Push this button to test the serial cable connection and make a movie.

A movie will be made when the external contacts go from open to closed. The external signal must open and close again to make a subsequent movie. The 20/20 Hindsight system will not respond to subsequent events less than 1 second following a recognized event.

Software Setup

The Capture Configuration dialog is invoked by clicking on the button in the upper right corner of the program.



Figure 5: Capture Configuration

Name	This is the name of the video signal. Usually this would describe the location of the field of view.
Buffer Size (Megabytes)	This parameter specifies how much disk space you wish to dedicate to the circular video buffer. The size of the buffer determines the number of hours and minutes of video data that can be stored before the buffer begins to overwrite.
Event Offset (milliseconds)	This parameter specifies the time delay from the actual occurrence of an event until the event trigger reaches the 20/20 Hindsight System. The system will select a video

Table 1. Demographic characteristics of the study population	
Age (years)	65.0 ± 1.5
Gender (male/female)	10/10
Education (years)	12.0 ± 1.0
Occupation (white/blue)	10/10
Marital status (married/divorced/widowed)	10/10/0
Smoking status (smoker/nonsmoker)	10/10
Alcohol consumption (yes/no)	10/10
Comorbidities (hypertension/diabetes/cholesterol)	10/10/10
Medication (antihypertensive/antidiabetic/anticholesterol)	10/10/10
Family history (hypertension/diabetes/cholesterol)	10/10/10
Physical activity (yes/no)	10/10
Stress level (low/moderate/high)	10/10/10
Social support (yes/no)	10/10
Health status (good/fair/poor)	10/10/10
Quality of life (yes/no)	10/10
Life satisfaction (yes/no)	10/10
Overall health (yes/no)	10/10
Physical health (yes/no)	10/10
Mental health (yes/no)	10/10
Social health (yes/no)	10/10
Emotional health (yes/no)	10/10
Financial health (yes/no)	10/10
Environmental health (yes/no)	10/10
Overall quality of life (yes/no)	10/10
Life satisfaction (yes/no)	10/10
Overall health (yes/no)	10/10
Physical health (yes/no)	10/10
Mental health (yes/no)	10/10
Social health (yes/no)	10/10
Emotional health (yes/no)	10/10
Financial health (yes/no)	10/10
Environmental health (yes/no)	10/10
Overall quality of life (yes/no)	10/10
Life satisfaction (yes/no)	10/10
Overall health (yes/no)	10/10
Physical health (yes/no)	10/10
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Social health (yes/no)	10/10
Emotional health (yes/no)	10/10
Financial health (yes/no)	10/10
Environmental health (yes/no)	10/10
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Life satisfaction (yes/no)	10/10
Overall health (yes/no)	10/10
Physical health (yes/no)	10/10
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Social health (yes/no)	10/10
Emotional health (yes/no)	10/10
Financial health (yes/no)	10/10
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Overall quality of life (yes/no)	10/10
Life satisfaction (yes/no)	10/10
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Financial health (yes/no)	10/10
Environmental health (yes/no)	10/10
Overall quality of life (yes/no)	10/10
Life satisfaction (yes/no)	10/10
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Mental health (yes/no)	10/10
Social health (yes/no)	10/10
Emotional health (yes/no)	10/10
Financial health (yes/no)	10/10
Environmental health (yes/no)	10/10
Overall quality of life (yes/no)	10/10
Life satisfaction (yes/no)	10/10
Overall health (yes/no)	10/10
Physical health (yes/no)	10/10
Mental health (yes/no)	10/10
Social health (yes/no)	10/10
Emotional health (yes/no)	10/10
Financial health (yes/no)	10/10
Environmental health (yes/no)	10/10
Overall quality of life (yes/no)	10/10
Life satisfaction (yes/no)	10/10
Overall health (yes/no)	10/10
Physical health (yes/no)	10/10
Mental health (yes/no)	10/10
Social health (yes/no)	10/10
Emotional health (yes/no)	10/10
Financial health (yes/no)	10/10
Environmental health (yes/no)	10/10
Overall quality of life (yes/no)	10/10
Life satisfaction (yes/no)	10/10
Overall health (yes/no)	10/10
Physical health (yes/no)	10/10
Mental health (yes/no)	10/10
Social health (yes/no)	10/10
Emotional health (yes/no)	10/10
Financial health (yes/no)	10/10
Environmental health (yes/no)	10/10
Overall quality of life (yes/no)	10/10
Life satisfaction (yes/no)	10/10
Overall health (yes/no)	10/10
Physical health (yes/no)	10/10
Mental health (yes/no)	10/10
Social health (yes/no)	10/10
Emotional health (yes/no)	10/10
Financial health (yes/no)	10/10
Environmental health (yes/no)	10/10
Overall quality of life (yes/no)	10/10
Life satisfaction (yes/no)	10/10
Overall health (yes/no)	10/10
Physical health (yes/no)	10/10
Mental health (yes/no)	10/10

This parameter specifies the number of frames of video to be included in the movies before the trigger frame. There are 60 frames per second for NTSC cameras and 50 frames per second for PAL cameras.

This parameter specifies the number of frames of video to be included in the movies after the trigger frame.

This parameter specifies the maximum number of movies to be saved. When the maximum number of movies is reached, the oldest movies will be discarded as additional new movies are made.

The Hindsight software is invoked by selecting the Hindsight Viewer program in the Start Menu, Programs. The Viewer program displays the contents of the video buffer and any movies that have been saved out of the buffer.

Controls on the display allow the user to easily manipulate the views to identify the important frames of interest (Figure 5):

Position Slider Bar Control	The position slider bar graphically shows the position of the current frame in the buffer and the time and date of the current frame and of the end frame. Movie icons are positioned to mark the event frames.
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Command Buttons The command buttons make a manual movie, save a video frame to a file, configure the hindsight video buffer, and jump to a frame at a particular instant in time.

Preliminary Draft (Not for Distribution)

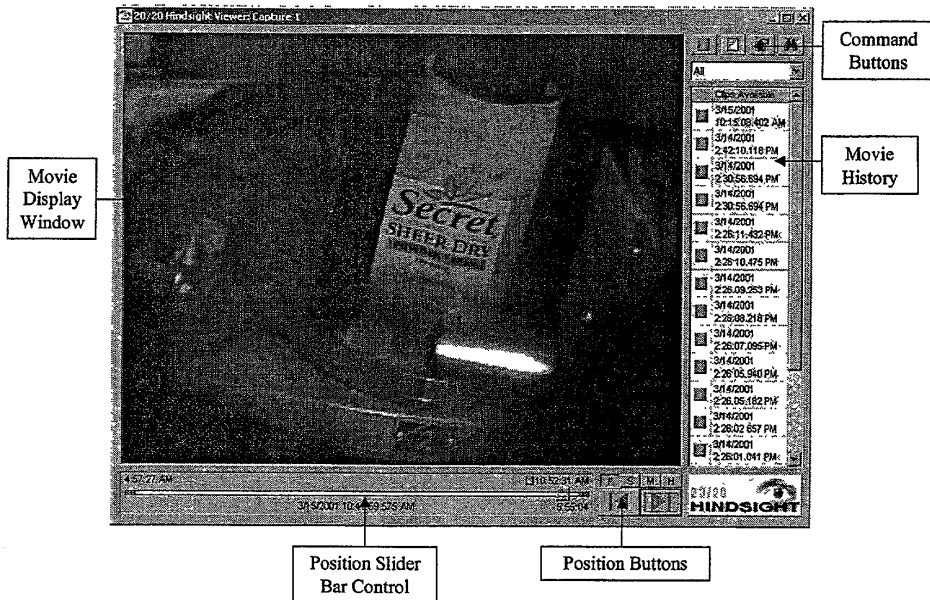


Figure 6: Layout of Hindsight Viewer

Position Slider Bar

The position slider bar shows buffer status and current frame information (Figure 6). The times of the beginning and end of the buffer are shown at the left and right ends of the bar. The duration of the buffer is shown at the lower right end.

The current frame marker indicates the location of the currently displayed frame in the buffer. The date and time of the current frame is shown in the center of the position slider bar. The position of the current frame marker will move as the video is played. You can search through the video buffer by holding down the left mouse button over the marker and dragging it to the left and right. As the indicator is moved, the movie display will update to show the frames at the new indicator positions. If the current frame indicator is moved all the way to the right end of the slider, then the live video is displayed as it enters the buffer. If it is positioned at the left end of the slider, then a movie is displayed of the last frames as they drop out of the buffer.

When a movie is made either manually from the user interface or automatically from an external event, a movie icon will be positioned in the slider bar indicating the location in time of the movie. As time progresses, the position of this icon will move to the left as the video data ages. When the date / time of the movie falls out of the buffer, the movie icon will disappear.

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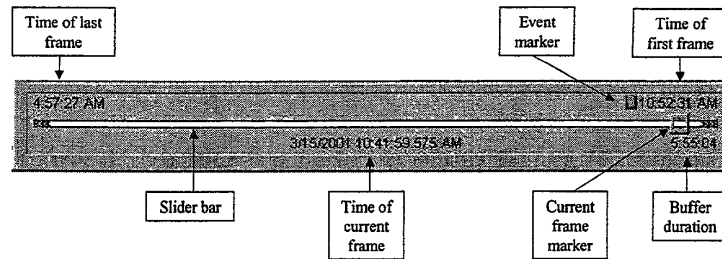


Figure 7: Position Slider Bar

Play Buttons

The play buttons control the play of the movie. The skip selection button selects whether the video will display every frame [F], or update by skipping through the buffer showing frames at a second [S], minute [M], or hour [H] steps. A left mouse click on the forward or reverse button updates the movie at the selected step interval. Holding the left mouse button down over these buttons will cause the current frame to be continuously updated.

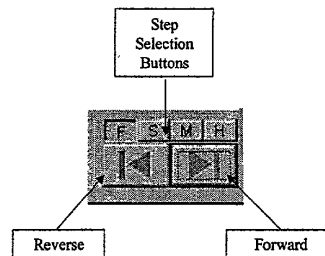


Figure 8: Play Buttons

Command Buttons

Make Movie

Clicking on the Make Movie button will cause the system to make a movie around the currently displayed frame. The movie icon will appear in the position slider bar and an entry will appear in the movie history table.

Save Frame

The Save Frame button will save the currently displayed frame to a file on the disk. The file is saved in JPEG format to conserve disk space.

Video Setup

The Video Setup button is used to configure the video buffer and movie properties. (See the Software Setup above.)

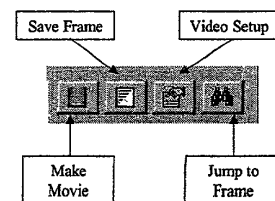


Figure 9: Command Buttons

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Jump to Frame

You can jump to a particular position in the video buffer by entering the date, time, and milliseconds in the invoked dialog box

Movie History

Filter Selection

The Filter Selection combo box allows a filter to be applied to the movie list. The default setting for this filter is to show All. Other selections are In Buffer, which only shows those movies that are still in the video buffer, and Keep, which shows those movies that have been marked for permanent retention.

Movie Entry

Each movie has an entry in the table indicating the date and time the movie was created. If the text is red, then that date and time is still in the video buffer and a movie icon representing that movie will be in the position slider bar. Once that date / time falls out of the buffer, the text will become black. A right click on the movie entry invokes a menu with the Make Movie Permanent and Delete items. Movies are normally kept until the maximum movie count is reached. After that, the oldest movies are automatically deleted as new movies are created. However, if the movie has been made permanent then it will not be deleted.

The Delete menu option will immediately delete a movie and its entry from the table.

The movie icon to the left is color-coded. If the movie was made manually, then the icon is yellow. If it is made automatically from an external trigger, then it is blue. The movie icon will have a star if the movie is to be kept.

The movie for an event can be viewed by double clicking on the entry in the table. A separate viewer window will be displayed for that movie. The controls for this viewer are identical to the controls for the main movie buffer viewer.

Filter Selection	Movie Entry
AI	3/15/2001 10:15:08 AM
AI	3/14/2001 2:42:10 PM
AI	3/14/2001 2:30:56 PM
AI	3/14/2001 2:30:56 PM
AI	3/14/2001 2:28:11 PM
AI	3/14/2001 2:28:18 PM
AI	3/14/2001 2:28:09 PM
AI	3/14/2001 2:28:08 PM
AI	3/14/2001 2:28:07 PM
AI	3/14/2001 2:28:06 PM
AI	3/14/2001 2:28:05 PM
AI	3/14/2001 2:28:04 PM
AI	3/14/2001 2:28:03 PM
AI	3/14/2001 2:28:02 PM
AI	3/14/2001 2:28:01 PM

Figure 10: Movie History Table

Appendix

Troubleshooting Guide

Symptom	Solution
Movie Display Window is black	1. Camera is not powered. Check that camera power leads are properly connected to terminals on back of

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	camera. Be sure the camera power supply transformer is plugged in to a working AC power source. 2. Video signal not connected. Be sure the coax video cable is connected to the video out connector on the back of the camera, and is plugged in to the input labeled 'VIDEO' on the back of the 20/20 Hindsight capture computer. 3. Not Enough Light. Be sure the lens aperture is open. Provide sufficient light. 4. Test the video signal by disconnecting the coax video cable from the capture computer and temporarily connecting it to the VIDEO input of a television monitor.
External Trigger Interface does no make movies	1. Interface box is not powered. Be sure power supply is connected to interface box and plugged in to a working power source. 2. Interface box is not properly connected to computer. Be sure serial cable connects interface box to COM1 serial port on computer. 3. External signaling device does not close a circuit between terminals 1 and 2 of the interface box. Check terminal connections. Test external device with an ohmmeter.