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Applicant	:	Matthew Bell
App. No	:	To be determined
Filed	:	On even date herewith
For	:	LENS SYSTEM
Examiner	:	To be determined
Art Unit	:	To be determined
Conf #	:	To be determined

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

The claims of the present application are different and possibly broader in scope than the claims pursued in the parent application(s). To the extent any prior amendments or characterizations of the scope of any claim or referenced art could be construed as a disclaimer of any subject matter supported by the present disclosure, Applicant hereby rescinds and retracts such disclaimer. Accordingly, the references previously considered in the parent application(s) may need to be re-visited.

Please charge any additional fees, including any fees for additional extension of time, or credit overpayment to Deposit Account No. 11-1410.

Respectfully submitted,

Dated: April 16, 2012

/Russell M. Jeide/
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041212

Electronic Patent Application Fee Transmittal

Application Number:	
Filing Date:	
Title of Invention:	LENS SYSTEM
First Named Inventor/Applicant Name:	Matthew Bell
Filer:	Russell M. Jeide/Christina Alvarez (RMJ)
Attorney Docket Number:	KM2326.007D1

Filed as Large Entity

Utility under 35 USC 111(a) Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Utility application filing	1011	1	380	380
Utility Search Fee	1111	1	620	620
Utility Examination Fee	1311	1	250	250
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
		Total in USD ($)		**1250**

Electronic Acknowledgement Receipt

EFS ID:	12554689
Application Number:	13448321
International Application Number:	
Confirmation Number:	3370
Title of Invention:	LENS SYSTEM
First Named Inventor/Applicant Name:	Matthew Bell
Customer Number:	20995
Filer:	Russell M. Jeide/Robin Leu
Filer Authorized By:	Russell M. Jeide
Attorney Docket Number:	KM2326.007D1
Receipt Date:	16-APR-2012
Filing Date:	
Time Stamp:	21:51:20
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$1250
RAM confirmation Number	7081
Deposit Account	
Authorized User	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)

1	Application Data Sheet	ADS_KM2326-007D1.pdf	895350 59557378fb6e1ec217c921c1c8d154903a101f0a	no	4
Warnings:					
Information:					
2		Spec_KM2326-007D1.pdf	574870 ba2a5c868beade39a4bcbc5841c59680aac460fa	yes	14
	Multipart Description/PDF files in .zip description				
	Document Description		**Start**	**End**	
	Specification		1	10	
	Claims		11	13	
	Abstract		14	14	
Warnings:					
Information:					
3	Drawings-only black and white line drawings	Drawings_KM2326-007D1.pdf	55671 19dced5aef9b7fa5badf11a6caf34bab372b821f	no	4
Warnings:					
Information:					
4	Oath or Declaration filed	Declaration_KM2326-007D1.pdf	51933 42186eb24763e9399d30ed8821c5bee1764aaf0f	no	1
Warnings:					
Information:					
5	Miscellaneous Incoming Letter	Request_to_Revisit_Art.pdf	33986 c72aaaeaf71a76589b486c1a42492ad43c2b8994	no	1
Warnings:					
Information:					
6	Fee Worksheet (SB06)	fee-info.pdf	33027 5db7e1021f062149badbb80e4a080e307fae917d	no	2
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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	KM2326.007D1
	Application Number	
Title of Invention	LENS SYSTEM	

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.

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☐ 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.)

Applicant Information:

Applicant 1 Remove

Applicant Authority ◉ Inventor ○ Legal Representative under 35 U.S.C. 117 ○ Party of Interest under 35 U.S.C. 118

Prefix	Given Name	Middle Name	Family Name	Suffix
	Matthew		Bell	

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

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Citizenship under 37 CFR 1.41(b) i: US

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Postal Code	94306	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:

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For further information see 37 CFR 1.33(a).

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

Customer Number	20995		
Email Address	efiling@kmob.com	Add Email	Remove Email

Application Information:

Title of the Invention	LENS SYSTEM		
Attorney Docket Number	KM2326.007D1	Small Entity Status Claimed	☐
Application Type	Nonprovisional		
Subject Matter	Utility		
Suggested Class (if any)		Sub Class (if any)	
Suggested Technology Center (if any)			
Total Number of Drawing Sheets (if any)	4	Suggested Figure for Publication (if any)	

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	KM2326.007D1
	Application Number	
Title of Invention	LENS SYSTEM	

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.

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Please Select One:	◉ Customer Number	○ US Patent Practitioner	○ Limited Recognition (37 CFR 11.9)
Customer Number	20995		

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This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, or 365(c) or indicate National Stage entry from a PCT application. Providing this 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(a)(2) or CFR 1.78(a)(4), and need not otherwise be made part of the specification.

Prior Application Status	Pending		Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
	Division of	12/269849	2008-11-12
Prior Application Status	Expired		Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
12/269849	non provisional of	60/987315	2007-11-12

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 benefit of foreign priority and to identify any prior foreign application for which priority is not claimed. 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(a).

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Application Number	Country [i]	Parent Filing Date (YYYY-MM-DD)	Priority Claimed
			◉ Yes ○ No

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	KM2326.007D1
	Application Number	
Title of Invention	LENS SYSTEM	

Assignee Information:

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

Assignee 1 Remove

If the Assignee is an Organization check here. ☒

Organization Name	Intellectual Ventures Holding 67 LLC		
Mailing Address Information:			
Address 1	7251 W. Lake Mead Blvd., Suite 300		
Address 2			
City	Las Vegas	**State/Province**	NV
Country [i]	US	Postal Code	89128
Phone Number		Fax Number	
Email Address			

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

Signature:

A signature of the applicant or representative is required in accordance with 37 CFR 1.33 and 10.18. Please see 37 CFR 1.4(d) for the form of the signature.

Signature	/Russell M. Jeide/			Date (YYYY-MM-DD)	2012-04-16
First Name	Russell	Last Name	Jeide	Registration Number	54198

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.**

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LENS SYSTEM

CROSS-REFERENCE TO RELATED APPLICATIONS

This application is a divisional of U.S. Application Serial No. 12/269,849, filed November 12, 2008, entitled "LENS SYSTEM," which claims the benefit of U.S. Provisional Patent Application Serial No. 60/987,315, filed Nov. 12, 2007 and entitled "FRAGMENTED LENS SYSTEM," each of which are hereby expressly incorporated by reference in their entireties.

BACKGROUND OF THE INVENTION

Field of the Invention

The present invention generally relates to interactive display systems. More specifically, the present invention relates to a lens system as might be used by an illuminator in an interactive display system.

Description of the Related Art

If a computer vision system uses a two-dimensional camera input and background subtraction, a random or semi-random dot pattern allows the system to more reliably detect objects that are at a different distance from a background. If the pattern is too regular, however, the object may disappear relative to the background when at a particular distance. This is a result of too many parts of a texture looking alike. Determinations as to the position of objects (or a more accurate indication thereof) therefore suffer. As a result, users may attempt to interact with an object (e.g., grab an object) that is not where the interactive display system otherwise indicates the object to presently be located. There is, therefore, a need for a system that may create lighting patterns useful to computer vision systems and to allow for more accurate tracking and determination of object positions in space.

SUMMARY OF THE INVENTION

In a first claimed embodiment, a system for projecting a pattern of light is disclosed. The system includes a light source (an illuminator) including multiple emitters of light. The emitters are arranged in a pattern. The system further includes

a cluster of lenses located in front of the light source. The cluster of lenses focuses and projects light from the emitters in numerous directions. The focused and projected light forms a pattern of light. A camera detects the pattern of light on an object illuminated by the emitters. A computing device executes instructions stored in memory to determine a location of the object in space utilizing at least the detected pattern of light on the object

In a variation of the aforementioned embodiment, the system may include a cluster of infrared light emitting diodes (LEDs). The light emitting diodes generate infrared light that is detectable by the camera but not by the eye of a human observer interacting with the object. The system may alternatively (or additionally) include a condenser lens located between the light source and the cluster of lenses. The condenser lens concentrates light from the light source to the cluster of lens.

A second claimed embodiment of the present invention is for a method for projecting a pattern of infrared light. Through this claimed method, light is emitted from a light source (an illuminator) including multiple emitters arranged in a pattern. A cluster of lenses focuses and projects the emitted light, the cluster of lenses located in front of the light source. The focused and projected light forms a pattern of light. That pattern is detected on an object illuminated by the emitters. As a result, the location of an object in space may be determined utilizing at least the detected pattern of light on the object. The location of the object may be determined by a computing device executing instructions stored in memory (e.g., a program).

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 illustrates an exemplary lens system including a lighting source, an optional condenser lens, and lens cluster.

FIG. 2 illustrates a number of semi-random light configurations for the lighting source of FIG. 1.

FIG. 3 illustrates the assembly of a lens cluster like that of FIG. 1.

FIG. 4 illustrates a cross-sectional illustration of light as created by an LED in an illuminator light source.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

The presently disclosed lens system may create an invisible light pattern that is useful to computer vision systems. If a computer vision system utilizes a pattern matching algorithm to identify position and distance of objects from a camera, the random or semi-random dot pattern generated by the present system allows the computer to uniquely identify each patch of the pattern projected by the illuminator. As a result, the computer may determine the position and distance of an object by identifying the illumination pattern on the object. The computer may make this determination by executing instructions corresponding to a computer program stored in memory. Results of these determinations may then be rendered on a display device, which may include user manipulation of an object on the display.

In a system where a computer vision system utilizes a stereo camera and a stereopsis algorithm to match features between two or more camera images, the vision system will attempt to find matches between texture patches in the different images. The disparity between these patches gives an indication of depth. The compared texture patches often lie along the same horizontal line in the two images. The presently disclosed lens system allows for patterned illumination that better ensures that all objects have texture thereby ensuring good performance by the stereo algorithm. This is especially true with respect to the axis along which the vision algorithm matches texture patches, is very important. The detected pattern may be aperiodic along one or more dimensions in this regard.

In this context, an embodiment of the presently disclosed invention provides for a lens system that may be used in conjunction with an illuminator to create an invisible random, semi-random, partially random, or repeating pattern useful to a computer vision system like those disclosed in U.S. Pat. No. 7,259,747 and U.S. patent application Ser. No. 12/100,737 (subsequently referred to as the '747 patent and '737 application, respectively). The system includes a lighting source composed of a pattern of light emitters, an optional condenser lens or similar hardware to focus emitted light onto a common area (namely a lens cluster), and a lens cluster containing multiple lenses. Each lens of the lens cluster may be of a similar focal

length and/or designed to displace an image of the emitter pattern by a particular distance.

FIG. 1 illustrates the aforementioned exemplary lens system 100 including a lighting source 110 (such as an illuminator), an optional condenser lens 120, and lens cluster 130. Light emitted from lighting source 110 is re-aimed by condenser lens 120 so that the light is directed towards the center of lens cluster 130. Lens cluster 130 then focuses and projects light from the emitters in numerous directions. The focused and projected light forms a pattern of light, which may be detected by a camera so that a computing device may determine a location of an object in space utilizing at least the detected pattern of light on the object. This determination may involve the execution of instructions corresponding to a program stored in memory.

Lighting source 110 may be akin to the lamp of the '747 patent. A lamp (like lamp 2 of FIG. 1 of the '747 patent) may illuminate a person(s) or other object(s). The lighting source 110 of the present application may also may be comparable to the light source of component 10 in FIG. 2 of the '747 patent. Lighting source 110 may also be configured in a manner similar to those illustrated in FIGS. 3 and 4 of the '747 patent.

Light source 110 includes any number of emitters as are further discussed in the context of FIG. 2. Each emitter may be mounted such that it emits light in a cone perpendicular to the surface of lighting source 110. If each emitter emits light in a cone, the center of the cone may be aimed at the center of lens cluster 130. Aiming may involve an optional intermediate lens (like condenser lens 120). The angle of the cone of light produced by the emitters may be chosen such that the cone will completely cover the surface of lens cluster 130. In an embodiment omitting a condenser lens, the lighting source 110 may focus light onto lens cluster 130 on its own. For example, each emitter at the lighting source 110 may be individually be angled with respect to the lens cluster 130.

Optional condenser lens 120 redirects light from each of the emitters in light source 110. Condenser lens 120 may be substituted with hardware or some other component similarly capable of concentrating and/or redirecting light. Condenser

lens 120 reduces wasted light by redirecting the emitters' light toward the center of the lens cluster 130 thereby seeking to ensure that as much emitted light as possible passes through lens cluster 130. Implementations of condenser lens 130 may include a convex lens, a plano-convex lens, a Fresnel lens, a set of micro-lenses, one or more prisms, or a prismatic film.

The focal length of the lenses in lens cluster 130 may be similar to the distance between lens cluster 130 and lighting source 110. A focal length of this nature helps ensure that light emitters at lighting source 110 are in focus or substantially in focus when an illuminator including lighting source 110 is pointed at a distant object. The position of the lighting source 110, optional condenser lens 120, and lens cluster 130 in system 100 may be adjusted to allow for an emitted light pattern to be focused at a variety of distances.

Lens cluster 130 takes the light from each emitter and focuses that light onto a number of points. Each lens in the lens cluster 130 may be used to focus the light of each emitter from illuminator light source 110 onto a different point. The theoretical number of points that may be created by shining the lighting source 110 through the lens cluster 130 is equal to the number of emitters in the lighting source multiplied by the number of lenses in the lens cluster 130. For example, a lighting source 110 with 200 LEDs and a lens cluster 130 with 36 lenses can create up to 7200 distinct points of light. An illuminator, lamp, or projector utilizing the present lens system 100 may create a high resolution texture that is useful to a computer vision system.

All the lenses in the lens cluster 130 may have a similar focal length. This similarity in length may better ensure that the pattern is focused together onto an object illuminated by the light source 110 (e.g., a pattern illuminator). Lenses may have somewhat different focal lengths so at least some of the pattern is in focus at different distances. In some instances, a semi-random or random pattern may be desirable to the functioning of the computer vision system. In such an instance, the lenses within the lens cluster 130 may displace the focused image by different distances to the side.

FIG. 2 illustrates a number of semi-random light configurations (210-230) for lighting source 110 of FIG. 1. The light configuration patterns may likewise be used to create a desired random or semi-random pattern as referenced above. In the patterns 220-230 illustrated in FIG. 2, each black `dot` is representative of an emission of light (i.e., a light emitter). It should be noted that the black `dots` are merely exemplary for the purpose of FIG. 2. The black `dots` need not necessarily emit `black light` or focused `dots` of light although various types of light, frequencies, and patterns within the pattern (e.g., dots versus squares versus asymmetric blobs) may be emitted from light source 110 and any constituent light emitters.

In that regard, potential light sources for emission of light are inclusive of light emitting diodes, laser diodes, incandescent bulbs, metal halide lamps, sodium vapor lamps, organic light emitting diodes (OLEDs), and pixels of a liquid crystal display (LCD) screen. The emitter(s) at light source 110 may be a backlit slide or backlit pattern of holes. In an embodiment like that of FIG. 1, each emitter (i.e., each dot) `aims` the light along a cone toward the lens cluster 130 or intermediate and optional condenser lens 120.

The pattern of illuminators may be randomized to varying degrees. For example, pattern 210 illustrates a rectangular grid of emitters with some removed at random. Pattern 220 illustrates a rotated grid of emitters with the columns shifted random amounts and random emitters removed. Pattern 230 consists of a randomly positioned, tight packing of emitters with a random set of emitters removed. The density of emitters on the light source varies across a variety of spatial scales. This variation in emitter density helps ensure that the emitters at light source 110 will create a pattern that varies in brightness even at distances where the emitted pattern is not entirely in focus.

The light source 110 of FIG. 1 and the pattern embodiments illustrated in FIG. 2 (210-230) are generally rectangular in shape. This rectangular configuration of the light source 110 in conjunction with a design of the lens cluster 130 helps create a pattern that roughly covers an otherwise rectangular area. The use of

rectangular light sources 110 and constituent patterns facilitates clustering of illuminators thereby covering broad areas without significant overlap. Nevertheless, other shapes may be used with respect to illuminator patterns and light source 110 configurations and overlap of patterns may be desirable and incurred.

The light source 110 may also be positioned on a motorized mount. Through such a mounting, the light source 110 may move or rotate thus creating further variation and control as to emitted light patterns and focus of the same at varying distances. Emitters in the patterns (210-230) may be turned on or off via an electronic control system thereby allowing the pattern emitted from the light source 110 to vary. The emitter pattern, too, may be regular (e.g., with no variance in layout or pattern) but the pattern of emitters that are in an `on state` at any given time may be random.

As initially noted above, different frequencies of light may be emitted from light source 110 with respect to emitting light in a particular pattern such as those illustrated in FIG. 2. Near-infrared, far-infrared, visible, and ultraviolet light are just some of the various light frequencies that may be emitted subject to a particular choice of light emitter. A number of different frequencies of light may be emitted from a single pattern (e.g., one `dot` may emit light at a near-infrared frequency while another `dot` emits light at an ultraviolet frequency). The light source 110 may be strobed in conjunction with the camera(s) of a corresponding computer vision system thereby allowing the presence and effects of ambient light to be reduced.

The pattern, frequency, strobing, and other manipulations of emitted light may be particularly useful with respect to operating a vision system like that disclosed in the '737 application. In a system like that disclosed in the '737 application, an interactive video display system allows a physical object to interact with a virtual object. A light source delivers a pattern of invisible light to a three-dimensional space occupied by the physical object and a camera detects invisible light scattered by the physical object. A computer system analyzes information generated by the camera, maps the position of the physical object in the three-dimensional space, and generates a responsive image that includes the virtual

object, which is then rendered on a display. Utilizing the present lens system to project a pattern of invisible light may improve the accuracy and utility of such a vision system.

FIG. 3 illustrates the assembly of a lens cluster like lens cluster 130 in FIG. 1. In element 310, a lens is illustrated that has had several square columns removed. These removed square pieces are then reassembled into a lens cluster (like that of FIG. 1) as shown in element 320. The varying angles and displacements of these squares have ensured some randomness in the focal points of the lenses in the cluster. In FIG. 3, the rough spatial positioning of the squares (shown with the corresponding pieces numbered 1 to 13) has been preserved. While this positioning is not necessary, this arrangement does provide the advantage of helping ensure that copies of each emitter that are projected as bright dots by the lens cluster are not too far apart. Further, this arrangement helps create a roughly rectangular shape to the overall pattern.

As is also evident in FIG. 3, there are multiple sizes of squares in the diagram (e.g., square [1] versus square [8]). While not necessary, this difference in size helps the computer vision system to process a variety of illumination levels. If the square is larger, the dots produced by the pattern will be brighter. By mixing large and small squares, the pattern becomes a mix of dense dimmer dots and sparse brighter dots. The computer vision system may then see some texture from the illuminator in conditions with high ambient illumination while having high resolution texture when the ambient illumination is low.

The lens cluster need not be constructed in this method. The lens cluster may be constructed of regular lenses, Fresnel lenses, or a mix of lenses. The lenses may or may not have a square cross-sectional shape. The lenses may or may not be different sizes. Although FIG. 3 shows a lens being cut apart to construct the lens cluster, it may be fabricated by casting from a mold, machining, or another technique. The `pieces` of the lens from which the lenses in the cluster are derived may or may not overlap.

Koito Exhibit 1002
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If the lenses in the lens cluster focus light onto different points, the emitter may not need to be completely random. For example, if there are a small number of bright emitters in a grid pattern and a large number of lenses in the lens cluster, the light produced by the illuminator can still be semi-random. Repetition would show up over very large length scales.

FIG. 4 illustrates a cross-sectional illustration of light as created by an LED in an illuminator light source. It should be noted that the dimensions of FIG. 4 are not to scale. In a real-world scenario, the object and focal plane are typically further away from a lens cluster. As such, FIG. 4 should be considered exemplary for the purpose of aiding understanding of the present disclosure.

In FIG. 4, light is emitted in a cone from an LED in the infrared LED cluster 110, which corresponds to lighting source 110 of FIG. 1. The light path is redirected toward the center of the lens cluster by the condenser lens 120, which likewise corresponds to the optional condenser lens of FIG. 1. When the light cone hits the lens cluster 130 (which corresponds to cluster 130 of FIG. 1), different parts of the LED light are focused onto different locations on a distant plane. This causes several bright spots to be created from the light of a single LED. When all the light from all the LEDs is tracked, the result is a dense overlapping pattern of focused light beams creating a discernable pattern that may be detected by a camera(s) and processed by a corresponding computing device.

The use of infrared light (or other types of non-visible or substantially invisible light) may prove useful in that it may be invisible (or nearly invisible) to the human eye of an observer interacting with an illuminated object. In this way, the illuminated object is not obscured by an illumination pattern nor or does the overall appearance of the object appear to have been altered. Notwithstanding, a computing device coupled to a camera may detect the pattern in order to track the object and interactions with the same with an increased degree of accuracy.

While the present invention has been described in connection with a series of exemplary embodiments, these descriptions are not intended to limit the scope of the invention to the particular forms set forth herein. To the contrary, the present

descriptions are intended to cover such alternatives, modifications, and equivalents as may be included within the spirit and scope of the invention as defined by the appended claims and otherwise appreciated by one of ordinary skill in the art.

WHAT IS CLAIMED IS:

1. A system for projecting a pattern of light, the system comprising:

a light source including a plurality of emitters configured to emit light, the plurality of emitters arranged in a pattern;

a cluster of lenses located in front of the light source, the cluster of lenses configured to focus and project light from the emitters in a plurality of directions, the focused and projected light forming a pattern of light;

a camera configured to detect the pattern of light on an object illuminated by at least a portion of the pattern of light; and

a computing device configured to execute instructions stored in memory to determine a location of the object in space based on at least the detected pattern of light on the object.

2. The system of claim 1, wherein the plurality of emitters includes light emitting diodes configured to generate infrared light that is detectable by the camera but not by an eye of a human observer interacting with the object.

3. The system of claim 1, further comprising a condenser lens located between the light source and the cluster of lenses, wherein the condenser lens concentrates light from the light source to the cluster of lens.

4. The system of claim 1, wherein the cluster of lens includes a Fresnel lens.

5. The system of claim 1, wherein the emitters are arranged in an irregular pattern.

6. The system of claim 1, wherein a first pattern of light projected by one of the lenses from the cluster of lenses overlaps with a second pattern of light projected by another of the lenses from the cluster of lenses.

7. The system of claim 1, wherein the pattern of light projected by the cluster of lenses is aperiodic along at least one dimension.

8. A method for projecting a pattern of infrared light, the method comprising:

emitting light from a light source including a plurality of emitters, the plurality of emitters arranged in a pattern;

focusing the emitted light in a plurality of directions using a cluster of lenses located in front of the light source, the focused light forming a pattern of light;

detecting the pattern of light on an object illuminated by at least a portion of the pattern of light; and

determining a location of the object in space based on at least the detected pattern of light on the object, wherein the location of the object is determined by a computing device executing instructions stored in memory.

9. The method of claim 8, wherein the plurality of emitters includes light emitting diodes configured to generate infrared light that is not detectable by an eye of a human observer interacting with the object.

10. The method of claim 8, further comprising a condenser lens located between the light source and the cluster of lenses, wherein the condenser lens concentrates light from the light source to the cluster of lens.

11. The method of claim 8, wherein the cluster of lens includes a Fresnel lens.

12. The method of claim 8, wherein the emitters are arranged in an irregular pattern.

13. The method of claim 8, wherein a first pattern of light projected by one of the lenses from the cluster of lenses overlaps with a second pattern of light projected by another of the lenses from the cluster of lenses.

14. The method of claim 8, wherein the pattern of light projected by the cluster of lenses is aperiodic along at least one dimension.

15. A tangible computer readable medium having instructions stored thereon, the instructions configured for execution by a computing system having one or more hardware processors in order to perform operations comprising:

instructing a light source to emit light from a plurality of emitters arranged in a pattern, wherein the emitted light is focused in a plurality of

directions by a cluster of lenses located in front of the light source in order to form a pattern of light;

detecting the pattern of light on an object illuminated by at least a portion of the pattern of light; and

determining a location of the object in space based on at least the detected pattern of light on the object.

16. The tangible computer readable medium of claim 15, wherein the plurality of emitters includes light emitting diodes configured to generate infrared light that is not detectable by an eye of a human observer interacting with the object.

17. The tangible computer readable medium of claim 15, wherein the condenser lens concentrates light from the light source to the cluster of lens.

18. The tangible computer readable medium of claim 15, wherein the emitters are arranged in an irregular pattern.

19. The tangible computer readable medium of claim 15, wherein a first pattern of light projected by one of the lenses from the cluster of lenses overlaps with a second pattern of light projected by another of the lenses from the cluster of lenses.

20. The tangible computer readable medium of claim 15, wherein the pattern of light projected by the cluster of lenses is aperiodic along at least one dimension.

ABSTRACT OF THE DISCLOSURE

A fragmented lens system for creating an invisible light pattern useful to computer vision systems is disclosed. Random or semi-random dot patterns generated by the present system allow a computer to uniquely identify each patch of a pattern projected by a corresponding illuminator or light source. The computer may determine the position and distance of an object by identifying the illumination pattern on the object.

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041012

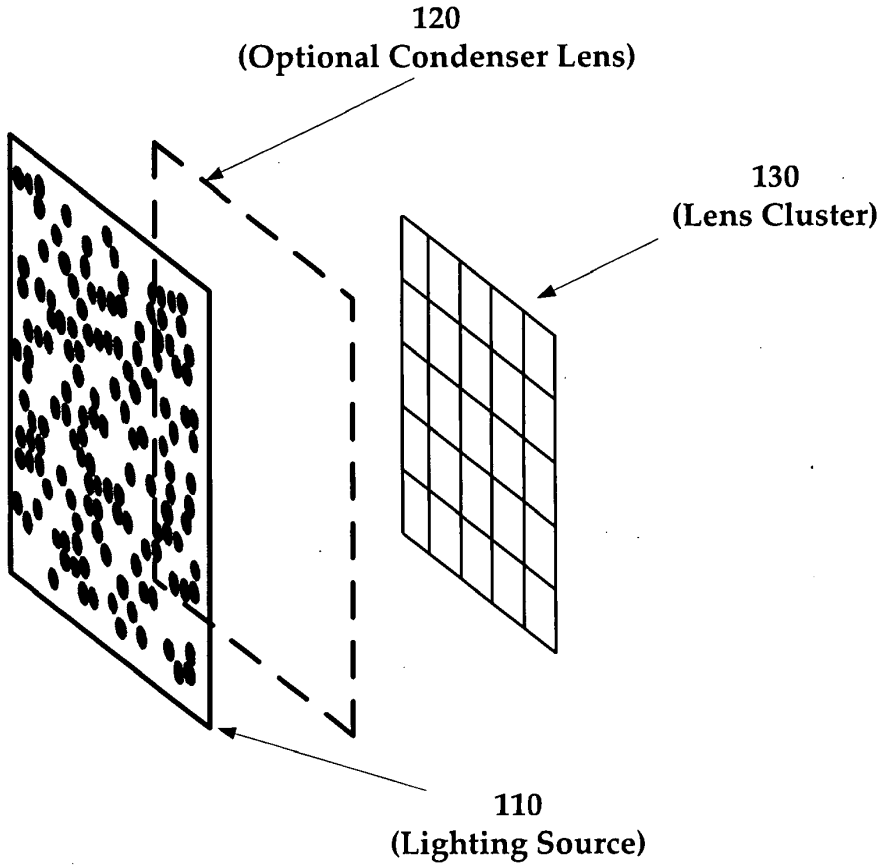
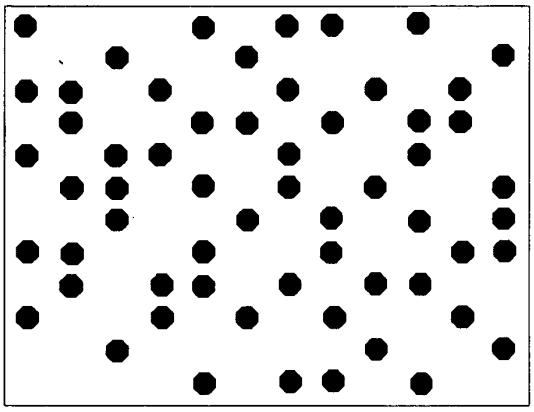
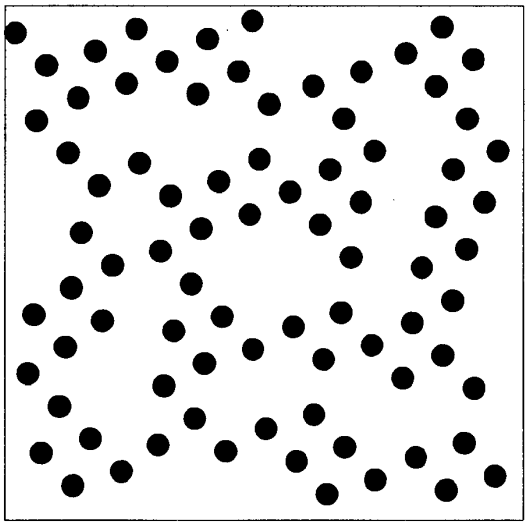

120
(Optional Condenser Lens)
130
(Lens Cluster)
110
(Lighting Source)

FIGURE 1





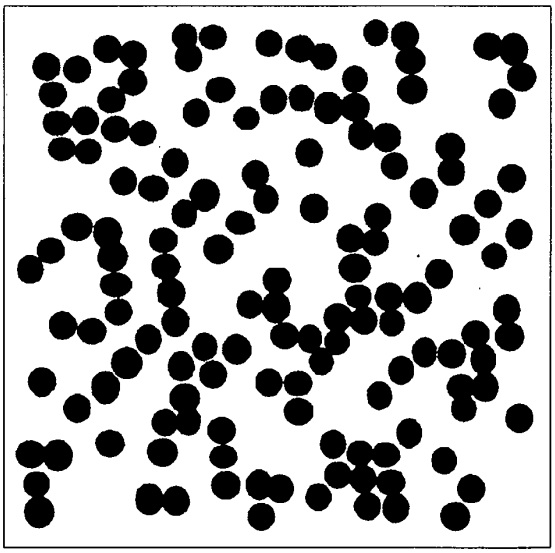
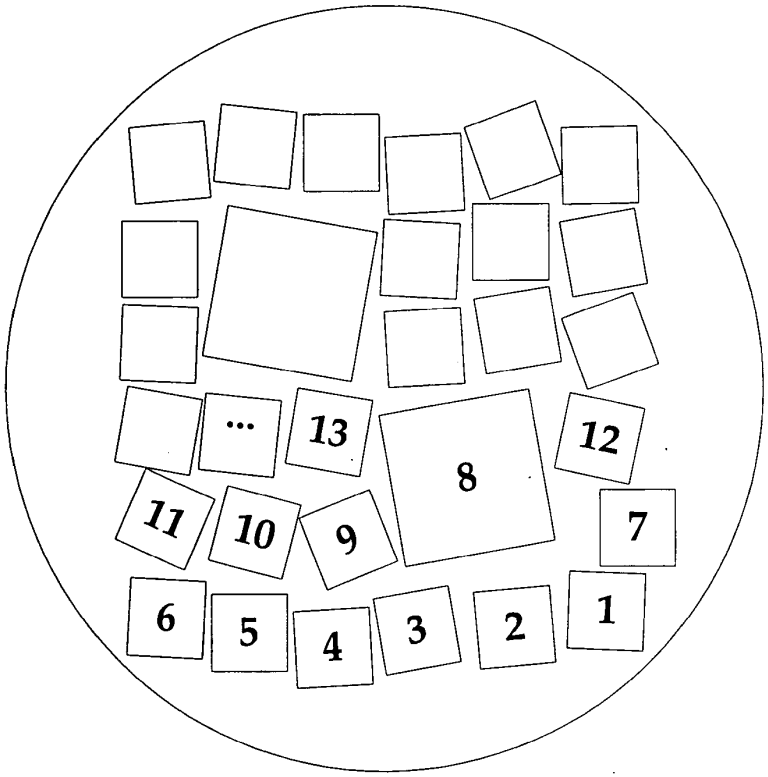
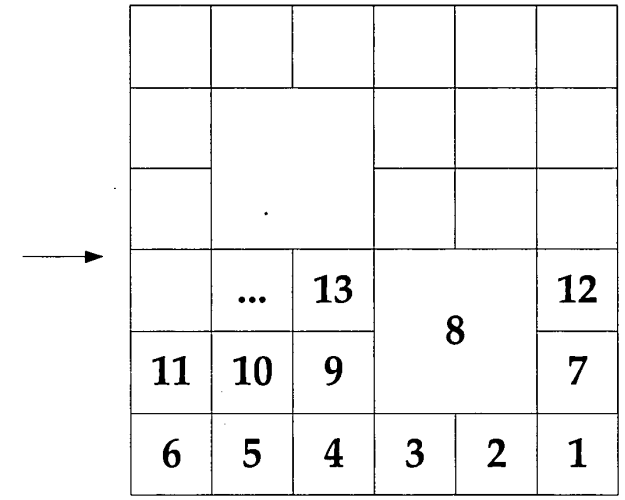


FIGURE 2

FIGURE 3



310
(Original Lens)



320
(Cluster of Displaced Lens Fragments)

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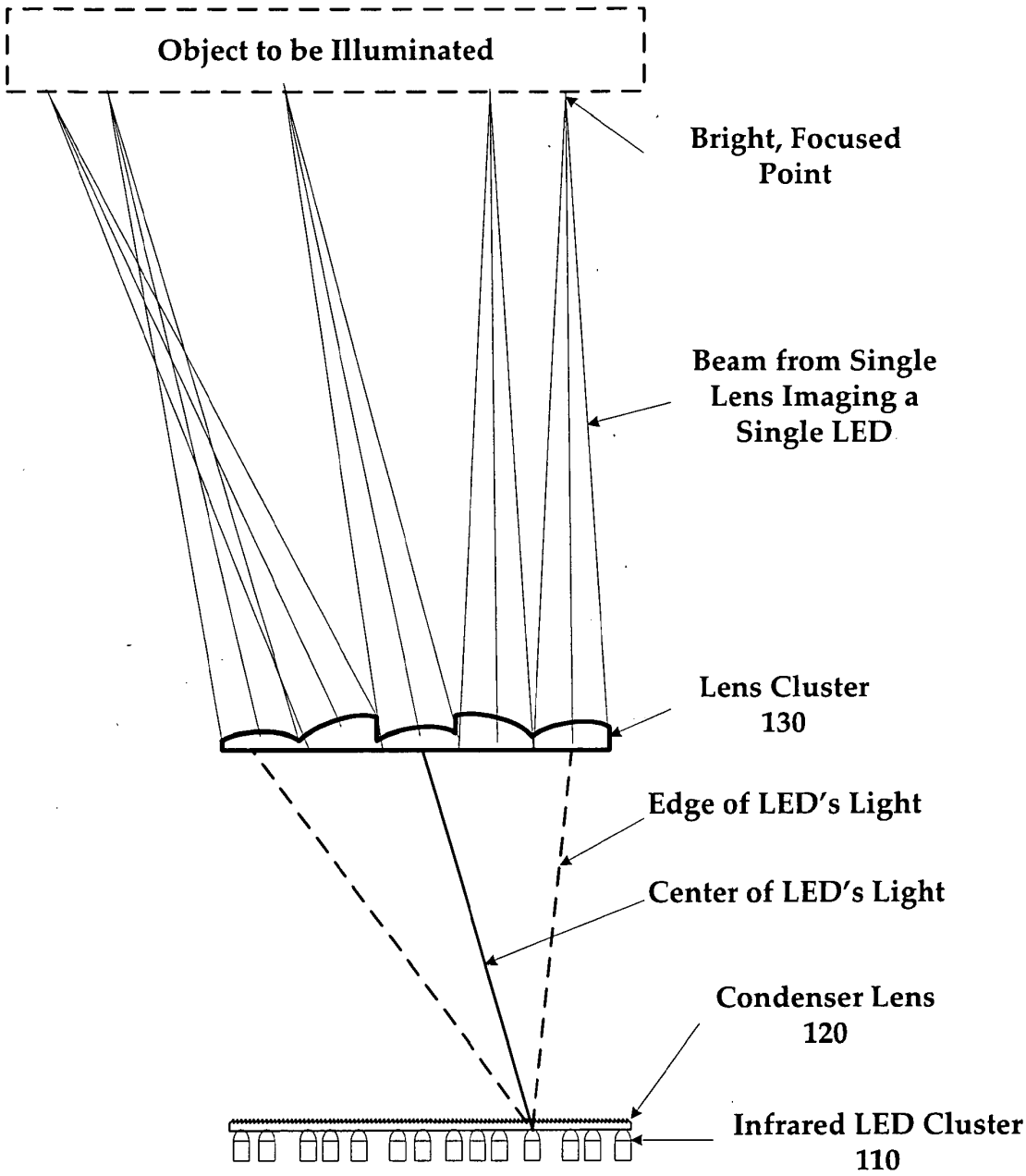

Object to be Illuminated
Bright, Focused Point
Beam from Single Lens Imaging a Single LED
Lens Cluster 130
Edge of LED's Light
Center of LED's Light
Condenser Lens 120
Infrared LED Cluster 110

FIGURE 4

DECLARATION FOR UTILITY OR DESIGN APPLICATION UNDER 37 CFR 1.63

Docket No.: KM2326.007A

Title: LENS SYSTEM

Inventors: Matthew Bell

Please Direct All Correspondence to Customer Number 20,995

This Declaration is directed to the invention that:

Was filed as Serial No. 12/269,849, filed on November 12, 2008

As a below named inventor:

I believe the inventor(s) named below to be the original and first inventor(s) of the subject matter which is described and claimed and for which a patent is sought;

I have reviewed and understand the contents of the above-identified application, including the claims, and any amendment filed herewith or identified above;

I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR 1.56;

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful, false statements may jeopardize the validity of the application or any patent issued thereon.

Full name of **first** inventor: Matthew Bell

Signature: Matt Bell Date: 6/24/09

Citizenship: United States of America

Mailing Address: 4245 Los Palos Avenue, Palo Alto, CA 94306

Residence Address: (if different than above)

Send Correspondence To:
KNOBBE, MARTENS, OLSON & BEAR, LLP
Customer No. 20,995

7288324 / kmb
061509

PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number: 13/448,321

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			N/A	380
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A			N/A	620
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	250
TOTAL CLAIMS (37 CFR 1.16(i))	20 minus 20 =	*			OR	x 60 =	0.00
INDEPENDENT CLAIMS (37 CFR 1.16(h))	3 minus 3 =	*				x 250 =	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			TOTAL	1250

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	RATE($)	ADDITIONAL FEE($)	OR	RATE($)	ADDITIONAL FEE($)
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.

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APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
13/448,321	04/16/2012	2875	1250	KM2326.007D1	20	3

CONFIRMATION NO. 3370

20995
KNOBBE MARTENS OLSON & BEAR LLP
2040 MAIN STREET
FOURTEENTH FLOOR
IRVINE, CA 92614

FILING RECEIPT

OC000000053957430

Date Mailed: 05/02/2012

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**

Applicant(s)

Matthew Bell, Palo Alto, CA;

Assignment For Published Patent Application

INTELLECTUAL VENTURES HOLDING 67 LLC, Las Vegas, NV

Power of Attorney: None

Domestic Priority data as claimed by applicant

This application is a DIV of 12/269,849 11/12/2008 PAT 8159682 *
which claims benefit of 60/987,315 11/12/2007
(*)Data provided by applicant is not consistent with PTO records.

Foreign Applications (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see http://www.uspto.gov for more information.)

If Required, Foreign Filing License Granted: 04/26/2012

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 13/448,321**

Projected Publication Date: 08/09/2012

Non-Publication Request: No

Early Publication Request: No

Title

LENS SYSTEM

Preliminary Class

362

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Title 37, Code of Federal Regulations, 5.11 & 5.15

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PTO/SB/80 (01-06)
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I hereby appoint:

☑ Practitioners associated with the Customer Number: 20,995

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:

☑ The address associated with Customer Number: 20,995

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Address			
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Assignee Name and Address:

Intellectual Ventures Holding 67 LLC
7251 W. Lake Mead Blvd., Suite 300
Las Vegas, Nevada 89128

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		Date	4-16-09
Name	Joe Kosiara	Telephone	
Title	Authorized Person for Intellectual Ventures Holding 67 LLC		

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.

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ON BEHALF OF A LEGAL ENTITY
37 C.F.R. 3.73(b)(2)(ii)

I, Joe Kosiara (whose title is supplied below), hereby declare that I am authorized to sign the Power of Attorney to Prosecute Applications Before the USPTO on behalf of Intellectual Ventures Holding 67 LLC.

Joe Kosiara
Authorized Person for Intellectual Ventures Holding 67 LLC

4-16-09
Date

6977141
041409

Electronic Acknowledgement Receipt

EFS ID:	13185399
Application Number:	13448321
International Application Number:	
Confirmation Number:	3370
Title of Invention:	LENS SYSTEM
First Named Inventor/Applicant Name:	Matthew Bell
Customer Number:	20995
Filer:	Don Neil Caceres Pua/Nino Lopez
Filer Authorized By:	Don Neil Caceres Pua
Attorney Docket Number:	KM2326.007D1
Receipt Date:	05-JUL-2012
Filing Date:	16-APR-2012
Time Stamp:	18:40:14
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	Assignee showing of ownership per 37 CFR 3.73(b).	KM2326-007D1_373.pdf	61952 8201ef55f648426637f9cce1ab8460c7197c6714	no	2

Warnings:	
Information:	

2	Power of Attorney	KM2326-007D1_POA.pdf	95340 0b86491b50f17ce67209b776201caa8bd970206b	no	2

Warnings:	
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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.

Docket No.: KM2326.007D1 **Customer No. 20995**

STATEMENT UNDER 37 CFR § 3.73(b)
ESTABLISHMENT OF ASSIGNEE

Applicant	:	Matthew Bell
App. No.	:	13/448,321
Filed	:	April 16, 2012
For	:	LENS SYSTEM
Examiner	:	Unknown
Group Art Unit	:	2875

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

This document is being filed with a copy of a Power of Attorney signed by the Assignee. This Statement sets forth the chain of title of the above-identified application.

Intellectual Ventures Holding 67 LLC, a Nevada limited liability company, is the Assignee of the entire right, title, and interest of the above-referenced application by virtue of:

A chain of title, in reverse order, from the inventor(s) to the current Assignee as shown by the following recorded assignments:

1. Assignment from Dhando Investments, Inc. to Intellectual Ventures Holding 67 LLC recorded in the United States Patent and Trademark Office on June 25, 2012, at Reel 028439, and Frame 0249.
2. Assignment from Reactrix (Assignment for the Benefit of Creditors), LLC to Dhando Investments, Inc. recorded in the United States Patent and Trademark Office on September 25, 2009, at Reel 023287, and Frame 0628.
3. Confirmatory Assignment of Reactrix Systems, Inc. to Reactrix (Assignment for the Benefit of Creditors), LLC recorded in the United States Patent and Trademark Office on June 12, 2009, at Reel 022823, and Frame 0255.
4. Assignment from Matthew Bell to Reactrix Systems, Inc. recorded in the United States Patent and Trademark Office on April 09, 2010, at Reel 024214, and Frame 0121.

5. Assignment from Matthew Bell to Reactrix Systems, Inc. recorded in the United States Patent and Trademark Office on December 03, 2009, at Reel 023599, and Frame 0341

The undersigned is an agent of Customer Number 20995 and is authorized to act on behalf of the Assignee. Please recognize or change the correspondence address for the above-identified application to **Customer No. 20995.**

Respectfully submitted,
KNOBBE, MARTENS, OLSON & BEAR, LLP

Dated: 7/5/12

By: _____
Don C. Pua
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13257702

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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
13/448,321	04/16/2012	Matthew Bell	KM2326.007D1

CONFIRMATION NO. 3370

20995
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POA ACCEPTANCE LETTER

OC000000055268639

Date Mailed: 07/12/2012

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 07/05/2012.

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.

/atesfai/

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

PTO/SB/08 Equivalent

INFORMATION DISCLOSURE STATEMENT BY APPLICANT		
	Application No.	13/448,321
	Filing Date	April 16, 2012
	First Named Inventor	Matthew Bell
	Art Unit	2875
(Multiple sheets used when necessary)	Examiner	Unknown
SHEET 1 OF 1	Attorney Docket No.	KM2326.007D1

U.S. PATENT DOCUMENTS

Examiner Initials	Cite No.	Document Number *Number - Kind Code (if known)* Example: 1,234,567 B1	Publication Date MM-DD-YYYY	Name of Patentee or Applicant	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear
	1	8,081,822 (KM2326.002A)	12-20-2011	Bell	
	2	8,098,277 (KM2326.009A)	01-17-2012	Bell	
	3	8,159,682 (KM2326.007A)	04-17-2012	Bell	
	4	2009/0179733	07-16-2009	Hattori et al.	

FOREIGN PATENT DOCUMENTS

Examiner Initials	Cite No.	Foreign Patent Document *Country Code-Number-Kind Code* Example: JP 1234567 A1	Publication Date MM-DD-YYYY	Name of Patentee or Applicant	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear	T[1]
	5	JP 10-207619	08-07-1998	Toshiba Corp.		X
	6	JP 11-057216	03-02-1999	Sony Corp.		X-Abstract

NON PATENT LITERATURE DOCUMENTS

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, page(s), volume-issue number(s), publisher, city and/or country where published.	T[1]
	7	Office Action in U.S. Application No. 12/269,849 (KM2326.007A), dated November 12, 2010	
	8	Examiner Interview Summary in U.S. Patent Application No. 12/269,849 (KM2326.007A), dated December 20, 2010	
	9	Final Office Action in U.S. Application No. 12/269,849 (KM2326.007A), dated May 12, 2011	
	10	Examiner Interview Summary in U.S. Patent Application No. 12/269,849 (KM2326.007A), dated July 6, 2011	
	11	Examiner Interview Summary in U.S. Patent Application No. 12/269,849 (KM2326.007A), dated July 14, 2011	
	12	Office Action in U.S. Application No. 12/269,849 (KM2326.007A), dated August 18, 2011	
	13	Examiner Interview Summary in U.S. Patent Application No. 12/269,849 (KM2326.007A), dated October 14, 2011	
	14	Notice of Allowance in U.S. Patent Application No. 12/269,849 (KM2326.007A), dated December 2, 2011	

13615161

Examiner Signature	Date Considered

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

T[1] - Place a check mark in this area when an English language Translation is attached.

PATENT ABSTRACTS OF JAPAN

(11)Publication number : **10-207619**
(43)Date of publication of application : **07.08.1998**

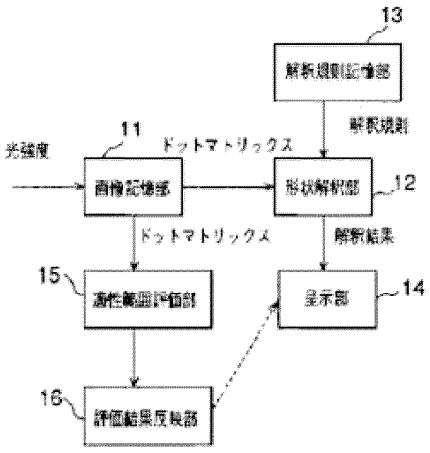
(51)Int.Cl. G06F 3/033
G06F 3/14
G06F 3/16
G09G 5/00
G09G 5/08

(21)Application number : **09-009773**
(22)Date of filing : **22.01.1997**

(71)Applicant : **TOSHIBA CORP**
(72)Inventor : **DOI MIWAKO**
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(54) USER INTERFACE DEVICE AND OPERATION RANGE INDICATING METHOD

(57)Abstract:
PROBLEM TO BE SOLVED: To lighten the burden on a user by deciding whether or not an body as an object of image processing is within a proper image-processable range and displaying specific visual information and/or visual information when it is decided that the body is not within the proper range.
SOLUTION: A proper range evaluation part 15 inputs a two-dimensional image stored in an image storage part 11 as a dot matrix, evaluates whether the object body is within the proper range (whether the object body is too close to or far away from a photodetection part or projects from the left or right, etc.), and generates feedback information corresponding to the evaluation result. An evaluation result reflection part 16 sends an indication on the basis of the feedback information so as to make a display device and/or voice reproducing device give presentation (e.g. cursor movement, a change in cursor shape, or a display of a message upon occasion) on which the evaluation result is reflected. Consequently, the burden on the user can be reduced.



(19)日本国特許庁（ＪＰ）　(12) **公開特許公報（Ａ）**　(11)特許出願公開番号

特開平10－207619

(43)公開日　平成10年(1998)８月７日

(51)Int.Cl.[6]		識別記号	FI		
Ｇ０６Ｆ	3/033	３１０	Ｇ０６Ｆ	3/033	３１０Ｙ
	3/14	３３０		3/14	３３０Ａ
	3/16	３３０		3/16	３３０Ｃ
Ｇ０９Ｇ	5/00	５５０	Ｇ０９Ｇ	5/00	５５０Ｃ
	5/08			5/08	Ｌ

審査請求　未請求　請求項の数11　ＯＬ　（全 11 頁）

(21)出願番号　特願平9－9773

(22)出願日　平成９年(1997)１月22日

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(74)代理人　弁理士　鈴江　武彦　（外６名）

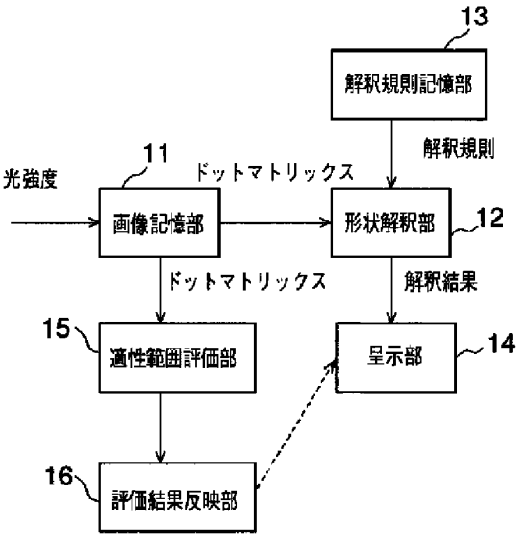
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(54)【発明の名称】　ユーザインタフェース装置及び操作範囲呈示方法

(57)【要約】

【課題】　画像処理により入力を行なうユーザインタフェース装置において、ユーザの操作上の負担を軽減したより使い易いユーザインタフェース装置及び操作範囲呈示方法を提供すること。

【解決手段】　画像処理により入力を行なうユーザインタフェース装置において、画像処理対象の物体が画像処理可能な適正範囲にあるか否かを判定する手段と、適正範囲にないと判定された場合、所定の視覚的情報および聴覚的情報の少なくとも一方を呈示する手段とを備えたことを特徴とする。例えば、適正範囲から遠方にはずれている場合、カーソルを小さくおよび／または薄く表示し、近傍にずれている場合、カーソルを大きく表示し、左方にはずれている場合、カーソルの左方の端を歪ませて表示し、右方にはずれていると判定された場合、カーソルの右方の端を歪ませて表示する。



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【特許請求の範囲】

【請求項１】画像処理により入力を行なうユーザインタフェース装置において、
画像処理対象の物体が画像処理可能な適正範囲にあるか否かを判定する手段と、
適正範囲にないと判定された場合、所定の視覚的情報および聴覚的情報の少なくとも一方を呈示する手段とを備えたことを特徴とするユーザインタフェース装置。

【請求項２】画像処理により入力を行なうユーザインタフェース装置において、
画像処理対象の物体が画像処理可能な適正範囲にあるか否かおよび適正範囲にない場合に画像処理対象の物体が適正範囲からどの方向にはずれているかを判定する手段と、
適正範囲にないと判定された場合、表示画面に表示するカーソルの表示状態を所定の状態に変化させて、画像処理対象の物体が適正範囲からどの方向にはずれているかを通知する手段とを備えたことを特徴とするユーザインタフェース装置。

【請求項３】画像処理対象の物体が適正範囲から遠方にはずれていると判定された場合、カーソルを小さくおよび／または薄く表示することを特徴とする請求項２に記載のユーザインタフェース装置。

【請求項４】画像処理対象の物体が適正範囲から近傍にずれていると判定された場合、カーソルを大きく表示することを特徴とする請求項２に記載のユーザインタフェース装置。

【請求項５】画像処理対象の物体が適正範囲から左方にはずれていると判定された場合、、カーソルの左方の端を歪ませて表示することを特徴とする請求項２に記載のユーザインタフェース装置。

【請求項６】画像処理対象の物体が適正範囲から右方にはずれていると判定された場合、カーソルの右方の端を歪ませて表示することを特徴とする請求項２に記載のユーザインタフェース装置。

【請求項７】適正範囲にないと判定された場合、音声を用いて画像処理対象の物体が適正範囲からどの方向にはずれているかを通知する手段をさらに備えたことを特徴とする請求項２ないし６のいずれか１項に記載のユーザインタフェース装置。

【請求項８】画像処理により入力を行なうユーザインタフェース装置において、
画像処理対象の物体が画像処理可能な適正範囲にあるか否かおよび適正範囲にない場合に画像処理対象の物体が適正範囲からどの方向にはずれているかを判定する手段と、
適正範囲にないと判定された場合、音声により画像処理対象の物体が適正範囲からどの方向にはずれているかを通知する手段とを備えたことを特徴とするユーザインタフェース装置。

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【請求項９】対象物体の画像処理により入力を行なうユーザインタフェース装置における対象物体の操作範囲呈示方法であって、
画像処理対象の物体が画像処理可能な適正範囲にあるか否かを判定し、
適正範囲にないと判定された場合、所定の視覚的情報および聴覚的情報の少なくとも一方を呈示することを特徴とする操作範囲呈示方法。

【請求項１０】対象物体の画像処理により入力を行なうユーザインタフェース装置における対象物体の操作範囲呈示方法であって、
画像処理対象の物体が画像処理可能な適正範囲にあるか否かおよび適正範囲にない場合に画像処理対象の物体が適正範囲からどの方向にはずれているかを判定し、
適正範囲にないと判定された場合、表示画面に表示するカーソルの表示状態を所定の状態に変化させて、画像処理対象の物体が適正範囲からどの方向にはずれているかを通知することを特徴とする操作範囲呈示方法。

【請求項１１】対象物体の画像処理により入力を行なうユーザインタフェース装置における対象物体の操作範囲呈示方法であって、
画像処理対象の物体が画像処理可能な適正範囲にあるか否かおよび適正範囲にない場合に画像処理対象の物体が適正範囲からどの方向にはずれているかを判定し、
適正範囲にないと判定された場合、音声により画像処理対象の物体が適正範囲からどの方向にはずれているかを通知することを特徴とする操作範囲呈示方法。

【発明の詳細な説明】

【０００１】

【発明の属する技術分野】本発明は、画像処理により入力を行なうユーザインタフェース装置及び画像処理の対象物体に対する操作範囲呈示方法に関する。

【０００２】

【従来の技術】コンピュータの入力デバイスとして、マウスが圧倒的に使われている。しかし、マウスで操作できることは、カーソルの移動と、メニューの選択などであり、あくまでも２次元のポインティングデバイスとしての役目に過ぎない。マウスで扱えるのは、２次元の情報であり、３次元空間の中の物体など奥行きがあるものを選択することは難しい。また、アニメーションを作成する場合、キャラクタの動きをつけるのに、マウスのような入力デバイスでは、自然な動きをつけることが難しい。

【０００３】３次元空間でのポインティングの難点を補うために、ボールを所望の方向に押したり回したりして６軸方向の情報を入力する装置や、いわゆるデータグローブやデータスーツ、サイバーグローブといった手などにはめて使用する装置が開発されている。しかし、これら装置は操作性の悪さ等のために、当初の期待程、普及していないのが現実である。

【０００４】これに対し、最近、ユーザは特殊な装置を扱うことなく、手振りや身振りでユーザの意図する情報を入力できる直接指示型の入力装置が開発されている。例えば、光を照射し、ユーザの手による反射光を受光し、これを画像化して特徴量抽出や形状認識処理を行ない、手の形状に応じた制御を実行したり、手の移動量に応じた分のカーソル移動や３次元モデルにおける視点の変更を行なったりするものがある。

【０００５】あるいは、ユーザの手の動きをビデオ撮影し、ビデオ映像を解析することにより、上記と同様の処理を行なうものがある。このような装置によって、ユーザは特殊な装置を装着などすることなく、簡易にジェスチャで入力を行なうことができる。

【０００６】

【発明が解決しようとする課題】しかし、この種の装置では、物体検出のための受光装置は固定的に設置されるため、ユーザの手などを正常に検出可能な範囲が限定される。したがって、ユーザの手などの位置によっては、その形状や動きを正確に検出することができず、ユーザが所望する制御等を実現できない問題があった。また、ユーザは３次元空間中での上記検出可能範囲を直ちに認識することは困難であることから、経験によって上記検出可能範囲内での操作を体得せざるを得ず、ユーザに操作上の負担を強いる問題があった。

【０００７】本発明は、上記事情を考慮してなされたもので、画像処理により入力を行なうユーザインタフェース装置において、ユーザの操作上の負担を軽減したより使い易いユーザインタフェース装置及び操作範囲呈示方法を提供することを目的とする。

【０００８】

【課題を解決するための手段】本発明は、画像処理により入力を行なうユーザインタフェース装置において、画像処理対象の物体が画像処理可能な適正範囲にあるか否かを判定する手段と、適正範囲にないと判定された場合、所定の視覚的情報および聴覚的情報の少なくとも一方を呈示する手段とを備えたことを特徴とする。

【０００９】本発明によれば、ユーザの手などの対象物体が適正範囲からはずれた場合、例えば表示装置や音声再生装置を用いてその旨を通知するので、ユーザは容易に３次元空間中での適正範囲を認識することができ、容易に適正範囲でジェスチャ等を行なって所望の指示等を入力することができる。

【００１０】また、本発明は、画像処理により入力を行なうユーザインタフェース装置において、画像処理対象の物体が画像処理可能な適正範囲にあるか否かおよび適正範囲にない場合に画像処理対象の物体が適正範囲からどの方向にはずれているかを判定する手段と、適正範囲にないと判定された場合、表示画面に表示するカーソルの表示状態を所定の状態に変化させて、画像処理対象の物体が適正範囲からどの方向にはずれているかを通知する手段とを備えたことを特徴とする。

【００１１】本発明によれば、ユーザの手などの対象物体が適正範囲からはずれた場合、表示画面に表示するカーソルの表示状態を所定の状態に変化させて、画像処理対象の物体が適正範囲からどの方向にはずれているかを通知するので、ユーザは視覚的に適正範囲から対象物体がはずれている方向を認識し、容易かつ即座に対象物体の位置を修正することができ、この結果、容易に３次元空間中での適正範囲を認識することができ、容易に適正範囲でジェスチャ等を行なって所望の指示等を入力することができる。

【００１２】好ましくは、画像処理対象の物体が適正範囲から遠方にはずれていると判定された場合、カーソルを小さくおよび／または薄く表示することを特徴とする。好ましくは、画像処理対象の物体が適正範囲から近傍にずれていると判定された場合、カーソルを大きく表示することを特徴とする。

【００１３】好ましくは、画像処理対象の物体が適正範囲から左方にはずれていると判定された場合、カーソルの左方の端を歪ませて表示することを特徴とする。好ましくは、画像処理対象の物体が適正範囲から右方にはずれていると判定された場合、カーソルの右方の端を歪ませて表示することを特徴とする。

【００１４】好ましくは、適正範囲にないと判定された場合、音声を用いて画像処理対象の物体が適正範囲からどの方向にはずれているかを通知する手段をさらに備えたことを特徴とする。

【００１５】また、本発明は、画像処理により入力を行なうユーザインタフェース装置において、画像処理対象の物体が画像処理可能な適正範囲にあるか否かおよび適正範囲にない場合に画像処理対象の物体が適正範囲からどの方向にはずれているかを判定する手段と、適正範囲にないと判定された場合、音声により画像処理対象の物体が適正範囲からどの方向にはずれているかを通知する手段とを備えたことを特徴とする。

【００１６】本発明によれば、ユーザの手などの対象物体が適正範囲からはずれた場合、音声を用いて画像処理対象の物体が適正範囲からどの方向にはずれているかを通知するので、ユーザは聴覚的に適正範囲から対象物体がはずれている方向を認識し、容易かつ即座に対象物体の位置を修正することができ、この結果、容易に３次元空間中での適正範囲を認識することができ、容易に適正範囲でジェスチャ等を行なって所望の指示等を入力することができる。

【００１７】また、本発明は、対象物体の画像処理により入力を行なうユーザインタフェース装置における対象物体の操作範囲呈示方法であって、画像処理対象の物体が画像処理可能な適正範囲にあるか否かを判定し、適正範囲にないと判定された場合、所定の視覚的情報および聴覚的情報の少なくとも一方を呈示することを特徴とす

る。

【００１８】また、本発明は、対象物体の画像処理により入力を行なうユーザインタフェース装置における対象物体の操作範囲呈示方法であって、画像処理対象の物体が画像処理可能な適正範囲にあるか否かおよび適正範囲にない場合に画像処理対象の物体が適正範囲からどの方向にはずれているかを判定し、適正範囲にないと判定された場合、表示画面に表示するカーソルの表示状態を所定の状態に変化させて、画像処理対象の物体が適正範囲からどの方向にはずれているかを通知することを特徴とする。

【００１９】また、本発明は、対象物体の画像処理により入力を行なうユーザインタフェース装置における対象物体の操作範囲呈示方法であって、画像処理対象の物体が画像処理可能な適正範囲にあるか否かおよび適正範囲にない場合に画像処理対象の物体が適正範囲からどの方向にはずれているかを判定し、適正範囲にないと判定された場合、音声により画像処理対象の物体が適正範囲からどの方向にはずれているかを通知することを特徴とする。

【００２０】なお、以上の各装置に係る発明は、方法に係る説明としても成立する。また、上記の発明は、相当する手順あるいは手段をコンピュータに実行させるためのプログラムを記録した機械読取り可能な媒体としても成立する。

【００２１】

【発明の実施の形態】以下、図面を参照しながら発明の実施の形態を説明する。図１は、本発明の一実施形態に係るユーザインタフェース装置の構成例を示す図である。また、図２に、本実施形態のユーザインタフェース装置の動作手順例を示す。

【００２２】本ユーザインタフェース装置は、例えば、グラフィックユーザインタフェースを持つ計算機に適用すると好適なものである。すなわち、表示画面上にカーソル、スライダーバー、スクロールバー、プルダウンメニュー、ボックス、リンク、アプリケーションなどのアイコンが表示され、ユーザが入力デバイスによりカーソルの移動、アイコンの選択、アプリケーションの起動などの指示を入力するようなシステムであって、入力デバイスがマウスのような専用器具を必要とせずユーザの手などの物体を画像処理することにより入力を受けるものであるシステムに適用するものである。

【００２３】本ユーザインタフェース装置は、入力機能部分と、フィードバック機能部分とに大別される。入力機能部分は、公知のものを利用することが可能で、光を発光し、ユーザの手などの対象物体による反射光を画像として捉えることにより（あるいは背景の光の対象物体による反射光を画像として捉えることにより）、その形状、動き、距離情報などを検出し、その形状等に応じた所定の制御（例えば入出力装置に関する制御あるいはアプリケーションソフトの起動など）を行なうもので、ユーザは手のモーションなどにより意図する入力を行なうことができる機能を提供するものである。本実施形態では、画像記憶部１１、形状解釈部１２、解釈規則記憶部１３、呈示部１４からなるものとする。

【００２４】フィードバック機能部分は、本発明に係る部分で、ユーザの手などの画像検出対象物体が適正な検出範囲にあるか否かを評価し、評価結果をユーザに呈示するものである。本実施形態では、画像記憶部１１、適性範囲評価部１５、評価結果反映部１６からなるものとする。

【００２５】まず、両機能部分に共通の画像記憶部１１と図示しない画像入力装置について説明する。画像記憶部１１は、図示しない画像入力装置から所定時間毎（例えば１／３０秒毎、１／６０秒毎、１／１００秒毎など）に出力される画像検出対象物体の２次元画像を逐次記憶する（ステップＳ１）。

【００２６】図示しない画像入力装置は、例えば、ＬＥＤなどの発光素子により近赤外線などの光を対象物体に照射する発光部と、対象物体からの反射光を２次元アレイ状に配列された受光素子で受光する受光部とを有するものである。なお、通常、発光部が発光しているときに受光した光の量と、発光部が発光していないときに受光した光の量の差をとることによって、バックグラウンドの補正を行ない、発光部からの光の対象物体による反射光の成分だけを取り出す。なお、画像入力装置は、発光部を持たず、ＣＣＤカメラなどの受光部のみ持つものであっても良い。

【００２７】例えば、画像入力装置の前にユーザの手を持ってきた場合、その手からの反射光画像が得られる。このとき、反射光画像の各画素値は、物体の性質（光を鏡面反射する、散乱する、吸収する、など）、物体面の向き、物体の距離、などに影響されるが、物体全体が一様に光を散乱する物体である場合、その反射光量は物体までの距離と密接な関係を持つ。手などはこのような性質を持つため、手を差し出した場合の反射光画面は、手の距離、手の傾き（部分的に距離が異なる）、などを反映する。したがって、これらの情報を抽出することによって、様々な情報の入力・生成が可能になる。

【００２８】次に、入力機能部分について説明する。形状解釈部１２は、画像記憶部１１に記憶された２次元画像を、Ｎ×Ｎ（例えば６４×６４）のドットマトリクスとして逐次取込む（ステップＳ２）。各画素は階調（例えば８ビット＝２５６階調）を持つものとする。図３（ａ）に、対象物体を手としたドットマトリクスの一例を示す。

【００２９】次に、形状解釈部１２は、ドットマトリクスから所定の特徴量を抽出し、解釈規則記憶部１３に記憶された解釈規則をもとに、形状解釈する（ステップＳ３）。そして、適合する解釈規則に応じた指示を解釈結

果として出力する（ステップＳ４，Ｓ５）。もし適合する解釈規則がなければ、必要に応じてドットマトリクスからの所定の特徴量の抽出の仕方を変更して（例えばドットマトリクスのしきい値処理を行なう場合、そのしきい値を変更する）、再度マッチング処理をやり直すようにしても良い。最終的に適合する解釈規則がなければ（ステップＳ４）、入力はなかったものとする。

【００３０】解釈規則記憶部１３は、形状解釈のための解釈規則を記憶する。例えば、ユーザの手の形状などの特徴量に応じた指示内容が解釈規則として記憶されている。指示内容には、アイコンの選択、アプリケーションの起動、カーソル移動等がある。カーソル移動の場合には、手の移動方向・距離に応じたカーソルの移動量も指示される。例えば、人差し指のみを立てた状態をカーソル移動に対応させ（この場合、例えば人差し指の先端の移動距離・方向がカーソルの移動距離・方向に対応づけられる）、人差し指のみを立てた状態で、親指を動かした動作を、カーソルの位置するアイコンの選択に対応させ、人差し指のみを立てた状態で、手のひらを反転させる動作を、カーソルの位置するアイコンに対応するアプリケーションの起動に対応させるなどの規則が考えられる。

【００３１】形状解釈部１２による形状解釈におけるドットマトリクスから特徴量の抽出の代表例は、距離情報の抽出と、領域抽出である。物体が一様で均質な散乱面を持つ物体であれば、反射光画像は距離画像とみなすことができる。したがって、受光部から見込んだ物体の立体形状を抽出することができる。物体が手であれば、手のひらの傾きなどが検出できる。手のひらの傾きは部分的な距離の違いとして現れる。また、手を移動させたときに画素値が変われば、距離が移動したと見ることができる。また、背景のように遠い物体からの反射光はほとんどないため、反射光画像からあるしきい値以上の領域を切り出すという処理で、物体の形状を簡単に切り出すことができる。例えば、物体が手であれば、そのシルエット像を切り出すのは極めて容易である。距離画像を用いる場合でも、一度しきい値によって領域抽出をしておいてから、その領域内の距離情報を用いる、という場合が多い。

【００３２】ドットマトリクスから抽出した特徴量と解釈規則とのマッチングの手法には種々のものがある。例えば、画像からベクトルを抽出するベクトル化、形状モデルにもとづいた形状の変形状態の抽出、走査線上の距離値にもとづいたスペクトル解析などである。

【００３３】もし適合する形状がなければ、例えばしきい値を変更するなどして、再度マッチング処理をやり直すようにしても良い。最終的に適合する形状がなければ、入力はなかったものと見なす。

【００３４】呈示部１４は、形状解釈部１２による解釈結果がユーザに視覚的な情報の呈示を指示するものである場合、表示装置にて形状解釈部１２による解釈結果を反映した呈示を行なう。例えば、カーソルを移動させ、カーソルの形状を変更させ、あるいは必要に応じてメッセージを呈示する。なお、メッセージの呈示には、音声再生装置が使用または併用されることもある。

【００３５】次に、フィードバック機能部分について説明する。適性範囲評価部１５は、画像記憶部１１に記憶された２次元画像を、図３（ａ）のようなドットマトリックスとして取込み（ステップＳ２）、対象物体が適性範囲にあるか否かを評価し、評価結果に応じたフィードバック情報を生成する（ステップＳ６～Ｓ１６）。

【００３６】評価結果反映部１６は、フィードバック情報をもとに、評価結果を反映した呈示を表示装置および／または音声再生装置にて行なうよう指示を出す（ステップＳ１７）。

【００３７】まず、適性範囲評価部１５について詳しく説明する。対象物体が適性範囲にある場合には、例えば図３（ａ）のような適当なドットマトリックスが得られ、ユーザの手などによる所望の入力が可能である。しかし、対象物体が適性範囲にある場合、より具体的には、対象物体が受光部に対して近すぎる場合、遠すぎる場合、左からはみ出している場合、右からはみ出している場合には、ユーザが所望する指示等は入力できない。

【００３８】そこで、適性範囲評価部１５は、ドットマトリックスを解析して、対象物体が適性範囲にあるか（ステップＳ６）、あるいは近すぎるか（ステップＳ８）、遠すぎるか（ステップＳ１０）、左からはみ出しているか（ステップＳ１２）、右からはみ出しているか（ステップＳ１４）を評価する。そして、対象物体が適性範囲にある場合、ユーザフィードバック情報＝ＮＵＬＬ（またはＮＵＬＬを示すコード；例えば０）とし（ステップＳ７）、近すぎる場合、ユーザフィードバック情報＝近（または近を示すコード；例えば１）とし（ステップＳ９）、遠すぎる場合、ユーザフィードバック情報＝遠（または遠を示すコード；例えば２）とし（ステップＳ１１）、左からはみ出している場合、ユーザフィードバック情報＝左（または左を示すコード；例えば３）とし（ステップＳ１３）、右からはみ出している場合、ユーザフィードバック情報＝右（または右を示すコード；例えば４）とし（ステップＳ１５）、それ以外の場合、ユーザフィードバック情報＝不適とする（ステップＳ１６）。

【００３９】図４に、この評価手順の一例を示す。また、図３（ａ）、図７（ａ）、図８（ａ）、図９（ａ）、図１０（ａ）にそれぞれ、対象物体が適性範囲にある場合のドットマトリックス例、近すぎる場合のドットマトリックス例、遠すぎる場合のドットマトリックス例、左からはみ出している場合のドットマトリックス例、右からはみ出している場合のドットマトリックス例を示す。

【００４０】対象物体が適性範囲にあるか否かの判定には、種々の方法が考えられるが、この例では、対象物体の画像の面積ｓ、対象物体の画像中の至近点の距離ｄ、対象物体の画像形状における垂直線の長さｌを使用するものとする。対象物体の画像の面積ｓは、ドットマトリックスにおける対象物体に対応する画素の個数またはその全画素に占める割合により表すことができる。また、対象物体の画像中の至近点の距離ｄは、ドットマトリックスにおける対象物体に対応する画素の濃度の最大値の逆数または画素の取り得る最高濃度－該濃度の最大値で表すことができる。対象物体の画像形状のにおける垂直線の長さｌは、図５に示すようにドットマトリックスにおける対象物体の画像の外形において画素が垂直に連続する最大個数により表すことができる。

【００４１】そして、面積ｓの下限値ｒと上限値α、画像中の至近点の距離ｄの下限値βと上限値δ、画像形状における垂直線の長さｌの上限値εを設定しておく。もし、ｒ≦面積ｓ≦α　かつ　β≦至近点の距離ｄ≦δ　かつ　垂直線の長さｌ≦εならば（ステップＳ２１）、範囲は適正とする（ステップＳ２２）。

【００４２】もし、面積ｓ＞α　かつ　至近点の距離ｄ＜βならば（ステップＳ２３）、近すぎるとする（ステップＳ２４）。もし、面積ｓ＜ｒ　かつ至近点の距離ｄ＞δならば（ステップＳ２５）、遠すぎるとする（ステップＳ２６）。

【００４３】もし、垂直線の長さｌ＞ε　かつ垂直線位置は右ならば（ステップＳ２７）、右からはみ出しているとする（ステップＳ２８）。もし、垂直線の長さｌ＞ε　かつ　垂直線位置は左ならば（ステップＳ２９）、左からはみ出しているとする（ステップＳ３０）。

【００４４】それ以外の場合には、範囲が不適とする（ステップＳ３１）。次に、評価結果反映部１６について詳しく説明する。図６に、この処理手順の一例を示す。この処理では、評価結果反映部１６は、適性範囲評価部１５から評価結果として与えられるユーザフィードバック情報にもとづいて、表示画面上に表示されているカーソルの形状を変形させることにより、評価結果を通知する。

【００４５】もし、ユーザフィードバック情報＝ＮＵＬＬならば（ステップＳ４１）、カーソルの形状は変更しない（ステップＳ４２）。この状態の一例を図３（ｂ）に示す。

【００４６】もし、ユーザフィードバック情報＝近ならば（ステップＳ４３）、例えば図７（ａ）に示すようにカーソルを大きくさせる（ステップＳ４４）。もし、ユーザフィードバック情報＝遠ならば（ステップＳ４５）、例えば図８（ａ）に示すようにカーソルを小さく薄くさせる（ステップＳ４６）。

【００４７】もし、ユーザフィードバック情報＝左ならば（ステップＳ４７）、例えば図９（ａ）に示すようにカーソルの左端を変形させる（ステップＳ４８）。もし、ユーザフィードバック情報＝右ならば（ステップＳ４９）、例えば図１０（ａ）に示すようにカーソルの左端を変形させる（ステップＳ５０）。

【００４８】もし、ユーザフィードバック情報＝不適ならば、エラーメッセージを表示する（ステップＳ５１）。図１１に、この処理手順の他の例を示す。この処理では、評価結果反映部１６は、適性範囲評価部１５から評価結果として与えられるユーザフィードバック情報にもとづいて、音声再生装置にて評価結果を音声で通知する。

【００４９】もし、ユーザフィードバック情報＝ＮＵＬＬならば（ステップＳ６１）、なにも呈示しない、あるいはカーソルが移動する音を呈示する（ステップＳ６２）。もし、ユーザフィードバック情報＝近ならば（ステップＳ６３）、例えば「近すぎるよ」などの音声を出力させる（ステップＳ６４）。

【００５０】もし、ユーザフィードバック情報＝遠ならば（ステップＳ６５）、例えば「遠すぎるよ」などの音声を出力させる（ステップＳ６６）。もし、ユーザフィードバック情報＝左ならば（ステップＳ６７）、例えば「左にはみ出しているよ」などの音声を出力させる（ステップＳ６８）。

【００５１】もし、ユーザフィードバック情報＝右ならば（ステップＳ６９）、例えば「右にはみ出しているよ」などの音声を出力させる（ステップＳ７０）。もし、ユーザフィードバック情報＝不適ならば、エラーメッセージを音声で呈示する（ステップＳ７１）。

【００５２】なお、図６の処理と図１１の処理を併用し、画像と音声で通知するようにしても良い。あるいは、画像で通知する機能と音声で通知する機能を容易しておき、ユーザーが個別に機能のオン／オフを設定できるようにしても良い。

【００５３】以上のように、本実施形態によれば、ユーザの手などの対象物体が適正範囲からはずれた場合、その旨を通知するので、ユーザは容易に３次元空間中での適正範囲を認識することができ、容易に適正範囲でジェスチャ等を行なって所望の指示等を入力することができる。

【００５４】なお、図２の手順では、入力機能部分の処理とフィードバック機能部分の処理は独立的に実行するものであったが、手順を修正して、入力機能部分の処理に先だってフィードバック機能部分の処理を行ない、対象物体が適正範囲にあると判定された場合にのみ入力機能部分の処理を実行するようにしても良い。

【００５５】また、以上の各機能は、ソフトウェアとしても実現可能である。また、上記した各手順あるいは手段をコンピュータに実行させるためのプログラムを記録した機械読取り可能な媒体として実施することもできる。本発明は、上述した実施の形態に限定されるもので

はなく、その技術的範囲において種々変形して実施することができる。

【００５６】

【発明の効果】本発明によれば、ユーザの手などの対象物体が適正範囲からはずれた場合、その旨を通知するので、ユーザは容易に３次元空間中での適正範囲を認識することができ、容易に適正範囲でジェスチャ等を行なって所望の指示等を入力することができる。

【図面の簡単な説明】

【図１】本発明の実施の形態に係るユーザインタフェース装置の構成例を示す図

【図２】本実施形態の処理手順の一例を示すフローチャート

【図３】対象物体が適性範囲にある場合のドットマトリクスの一例とその場合の画面表示例を示す図

【図４】対象物体が適性範囲にあるかどうかの評価手順の一例を示すフローチャート

【図５】対象物体の画像形状における垂直線の長さｌを説明するための図

＊【図６】評価結果反映手順の一例を示すフローチャート

【図７】対象物体が近すぎる場合のドットマトリクスの一例とその場合の画面表示例を示す図

【図８】対象物体が遠すぎる場合の適性範囲にあるドットマトリクスの一例とその場合の画面表示例を示す図

【図９】対象物体が左からはみ出している場合のドットマトリクスの一例とその場合の画面表示例を示す図

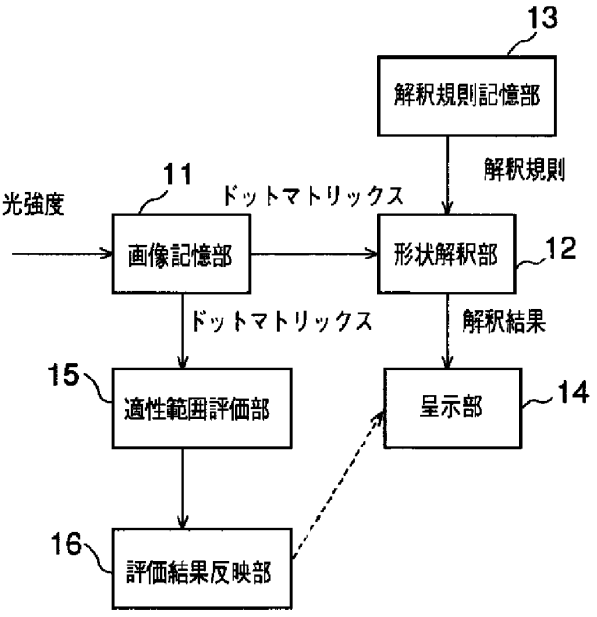
【図１０】対象物体が右からはみ出している場合のドットマトリクスの一例とその場合の画面表示例を示す図

【図１１】評価結果反映手順の他の例を示すフローチャート

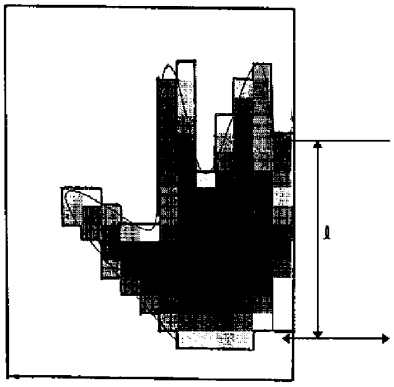
【符号の説明】

１１…画像記憶部
１２…形状解釈部
１３…解釈規則記憶部
１４…呈示部
１５…適性範囲評価部
１６…評価結果反映部

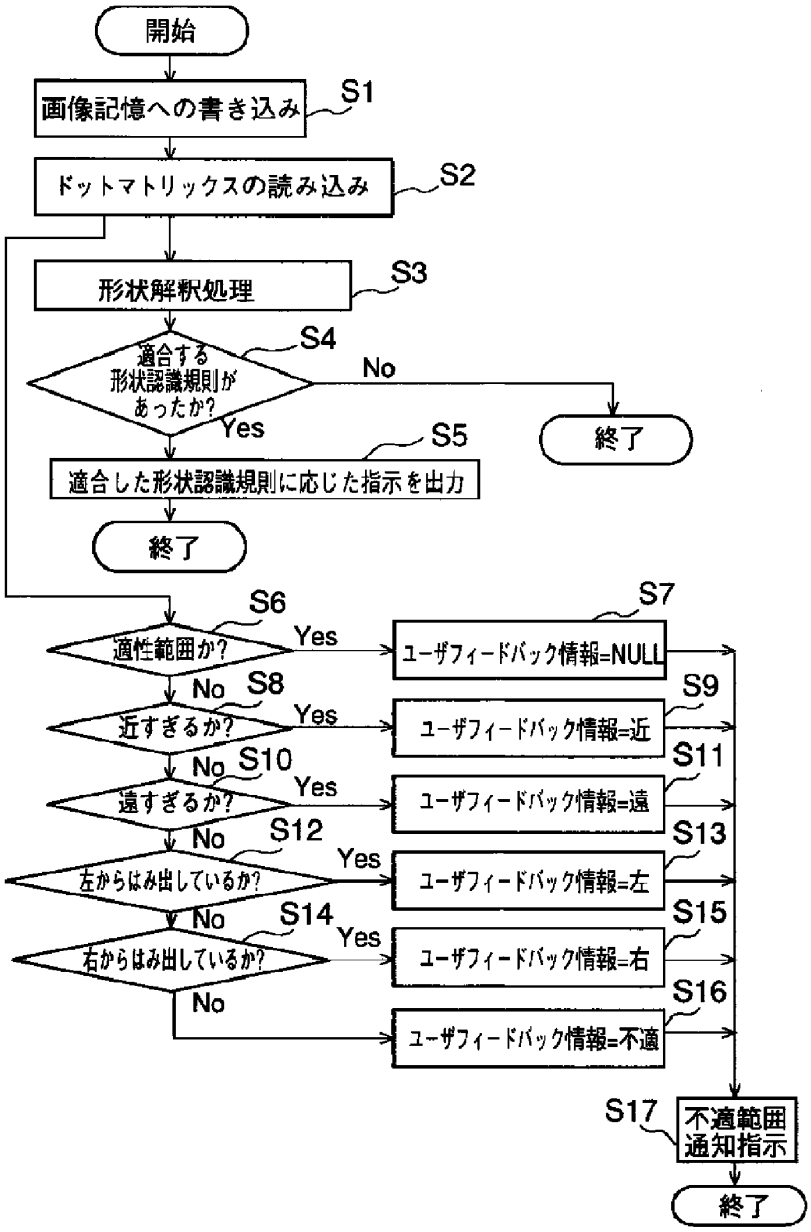
【図１】



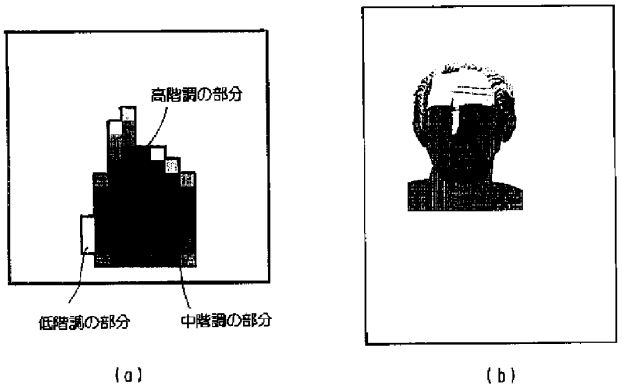
【図５】



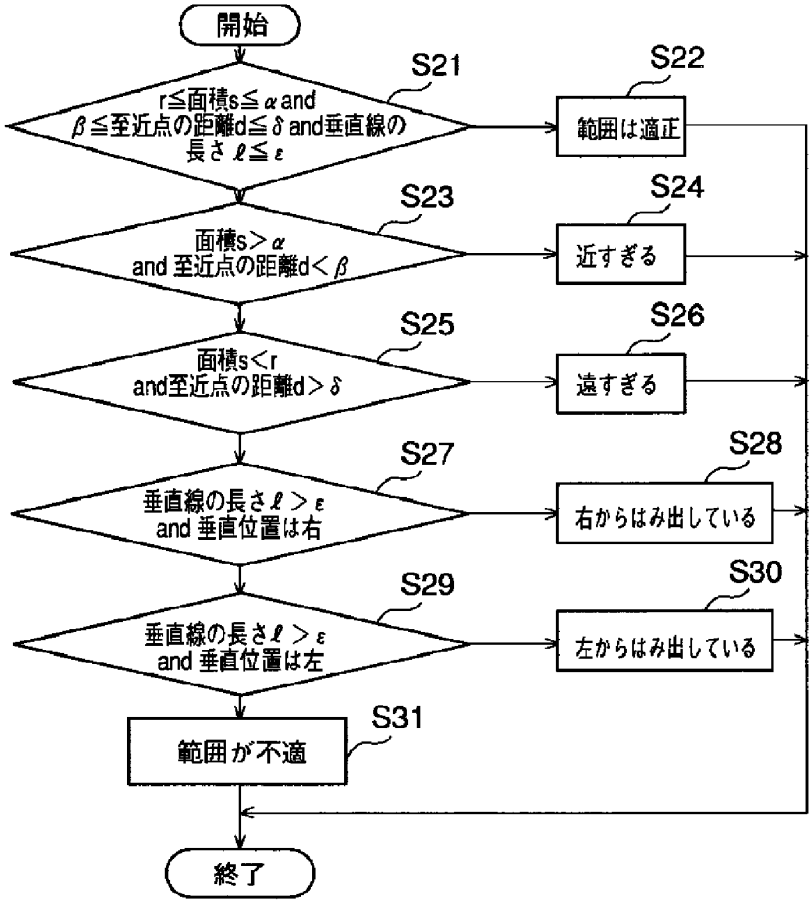
【図２】


開始
画像記憶への書き込み
S1
ドットマトリックスの読み込み
S2
形状解釈処理
S3
適合する形状認識規則があったか?
S4
No
Yes
終了
適合した形状認識規則に応じた指示を出力
S5
終了
適性範囲か?
S6
Yes
ユーザフィードバック情報=NULL
S7
No
近すぎるか?
S8
Yes
ユーザフィードバック情報=近
S9
No
遠すぎるか?
S10
Yes
ユーザフィードバック情報=遠
S11
No
左からはみ出しているか?
S12
Yes
ユーザフィードバック情報=左
S13
No
右からはみ出しているか?
S14
Yes
ユーザフィードバック情報=右
S15
No
ユーザフィードバック情報=不適
S16
不適範囲通知指示
S17
終了

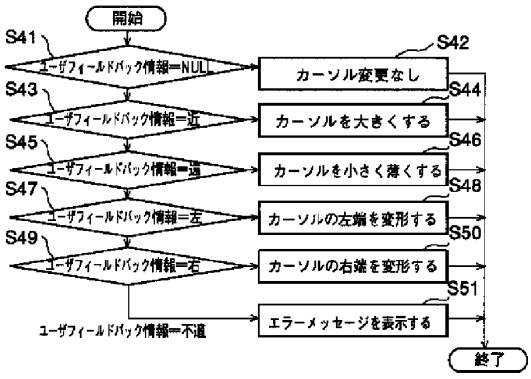
【図３】


高階調の部分
低階調の部分
中階調の部分
(a)
(b)

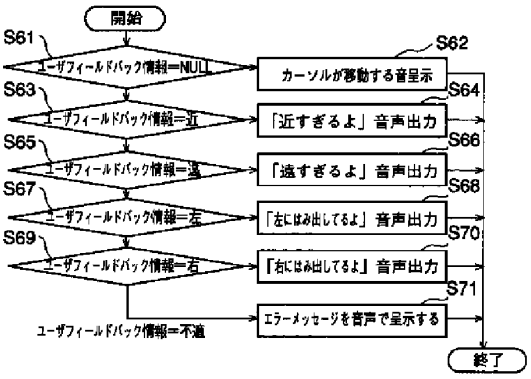
【図４】


開始
S21
r≦面積s≦αand
β≦至近点の距離d≦δand垂直線の
長さℓ≦ε
S22
範囲は適正
S23
面積s＞α
and 至近点の距離d＜β
S24
近すぎる
S25
面積s＜r
and至近点の距離d＞δ
S26
遠すぎる
S27
垂直線の長さℓ＞ε
and 垂直位置は右
S28
右からはみ出している
S29
垂直線の長さℓ＞ε
and 垂直位置は左
S30
左からはみ出している
S31
範囲が不適
終了

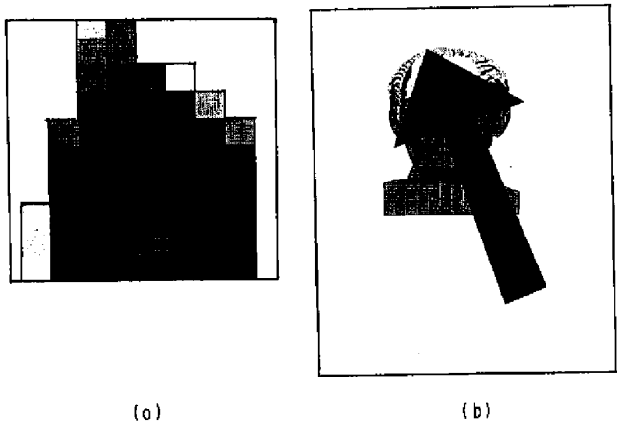
【図６】


開始
S41
ユーザフィールドバック情報=NULL
S42
カーソル変更なし
S43
ユーザフィールドバック情報=近
S44
カーソルを大きくする
S45
ユーザフィールドバック情報=遠
S46
カーソルを小さく薄くする
S47
ユーザフィールドバック情報=左
S48
カーソルの左端を変形する
S49
ユーザフィールドバック情報=右
S50
カーソルの右端を変形する
ユーザフィールドバック情報=不適
S51
エラーメッセージを表示する
終了

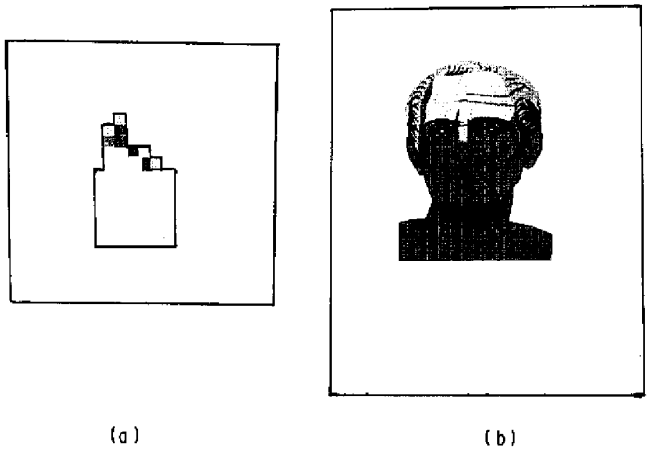
【図１１】


開始
S61
ユーザフィールドバック情報=NULL
S62
カーソルが移動する音呈示
S63
ユーザフィールドバック情報=近
S64
「近すぎるよ」音声出力
S65
ユーザフィールドバック情報=遠
S66
「遠すぎるよ」音声出力
S67
ユーザフィールドバック情報=左
S68
「左にはみ出してるよ」音声出力
S69
ユーザフィールドバック情報=右
S70
「右にはみ出してるよ」音声出力
ユーザフィールドバック情報=不適
S71
エラーメッセージを音声で呈示する
終了

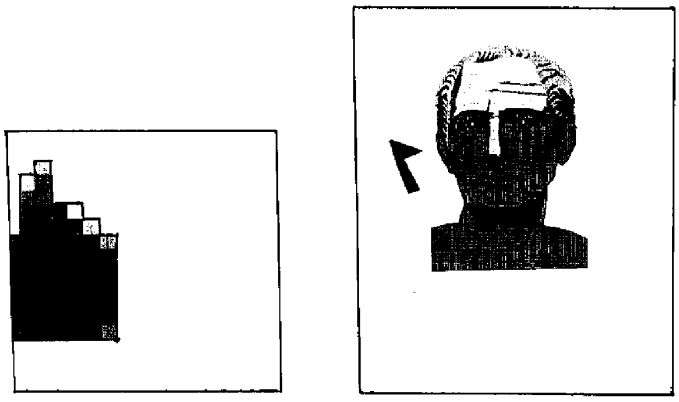
【図７】


(a)
(b)

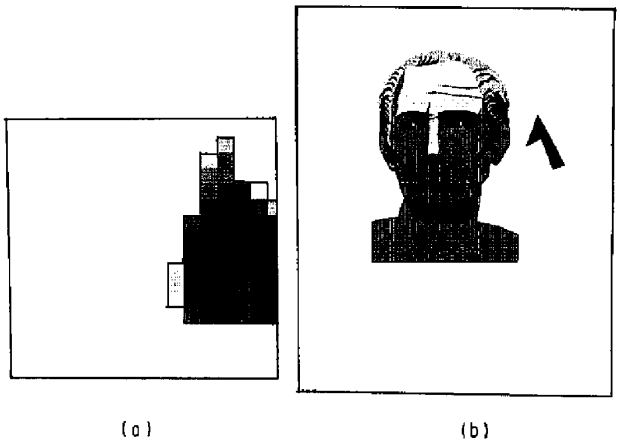
【図８】


(a)
(b)

【図９】



【図１０】



フロントページの続き

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PATENT ABSTRACTS OF JAPAN

(11)Publication number : **11-057216**
(43)Date of publication of application : **02.03.1999**

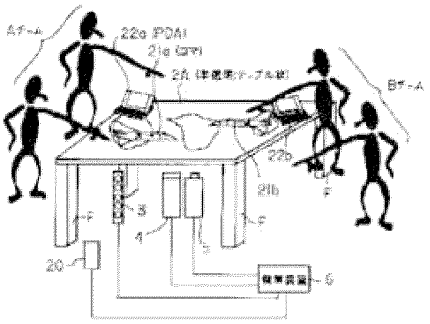
(51)Int.Cl. **A63F 9/22**
G06F 3/033

(21)Application number : **09-220498**
(22)Date of filing : **15.08.1997**

(71)Applicant : **SONY CORP**
(72)Inventor : **REKIMOTO JIYUNICHI**
MATSUSHITA NOBUYUKI

(54) **GAME DEVICE**

(57)Abstract:
PROBLEM TO BE SOLVED: To provide a game device which can create a realistic match-type game.
SOLUTION: This device displays the entire image of a game on a semitransparent surface 2A, and, when the ID pattern of a portable information terminal 22a placed in the display position of an element 21a on the semitransparent surface 2A coincides with the ID pattern of the element 21a, sends individual information such as is displayed only on the portable information terminal 22a, from a control device 6 via a transmitting/receiving part 20. Such a semitransparent surface 2A can be enlarged relatively easily because of its structure.



(19)日本国特許庁（ＪＰ）　(12) **公開特許公報（Ａ）**　(11)特許出願公開番号

特開平11－57216

(43)公開日　平成11年(1999)３月２日

(51)Int.Cl.[6]		識別記号	ＦＩ		
Ａ６３Ｆ	9/22		Ａ６３Ｆ	9/22	Ｇ
Ｇ０６Ｆ	3/033	３５０	Ｇ０６Ｆ	3/033	３５０Ｇ

審査請求　未請求　請求項の数２　ＯＬ　（全 15 頁）

(21)出願番号　特願平9－220498

(22)出願日　平成９年(1997)８月15日

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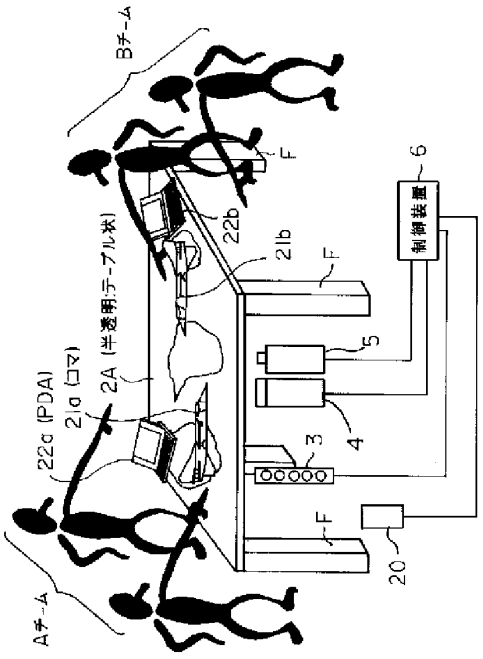
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(54)【発明の名称】　ゲーム装置

(57)【要約】
【課題】臨場感ある対戦型ゲームを実現することができるゲーム装置の提供。
【解決手段】半透明面２Ａ上にゲームの全体画像を表示すると共に、半透明面２Ａ上のコマ２１ａの表示位置に置かれた携帯情報端末２２ａのＩＤパターンが、このコマ２１ａのＩＤパターンと一致した場合は、制御装置６から送受信部２０を介して携帯情報端末２２ａにおいてのみ表示されるような個別情報を送信する。このような半透明面２Ａは、その構造上、比較的容易に大型化することが可能である。



1

【特許請求の範囲】
【請求項１】　半透明面と、
上記半透明面側の方向から入射する所定の波長帯域の光又は電磁波のみを像として捉える撮像手段と、
上記撮像手段が受像すべき所定の波長帯域の光又は電磁波を上記半透明面に対して輻射する輻射手段と、
上記撮像手段から入力された撮像信号に基づいて、上記半透明面に対して与えられた入力情報が反映される検出用画像情報を生成し、この検出用画像情報に基づいて画像入力情報を検出する画像入力情報検出手段と、
個体を識別可能な識別情報を有すると共に、ゲームに関する操作に応じた操作情報を出力可能な外部操作装置と、通信を行うことのできる通信手段と、
上記撮像手段が撮像すべき光又は電磁波の波長帯域を含まない可視光による画像を上記半透明面に対して投影表示可能に設けられる投影表示手段と、
上記通信手段を介して入力された上記外部操作装置からの操作情報、又は上記画像入力情報検出手段からの画像入力情報に基づいて、少なくとも、所定の規則に従ったゲーム用画像を投影表示させるための上記投影表示手段に対する表示制御を含む所要の制御処理を実行可能な制御処理手段とを備え、
上記制御処理手段は、上記画像入力情報又は上記操作情報として与えられる上記識別情報を認識可能に構成されると共に、識別情報に基づいて、上記外部操作装置ごとに対応して生成した個別情報を、その個別情報が対応する外部操作装置にてのみ受信入力可能なように送信するための、上記通信手段に対する制御を実行可能に構成されていることを特徴とするゲーム装置。
【請求項２】　上記識別情報は、外部操作装置ごとに固有の図柄とされ、
上記制御処理手段は、上記画像入力情報内において得られる上記図柄の画像に基づいて、上記識別情報をその位置情報と共に認識可能に構成されていることを特徴とする請求項１に記載のゲーム装置。
【発明の詳細な説明】
【０００１】
【発明の属する技術分野】本発明は、インタラクティブな入出力が可能な表示システムを利用して対戦型ゲームを行うことができるゲーム装置に関するものである。
【０００２】
【従来の技術】例えばコンピュータ装置などを利用したゲーム装置では、様々なプログラムやアプリケーションなどのもとで各種ゲームを実行できるようにされる。このようなゲームは、一般にユーザがコンピュータ装置のモニタ画面を見ながらマウスやキーボードあるいは専用のジョイスティック等の入力装置を操作することによって楽しむことができるようになっている。
【０００３】
【発明が解決しようとする課題】ところで、上記したようなコンピュータ装置等を利用したゲーム装置において、例えば複数のユーザが参加できる対戦型ゲームを実行する場合は、ジョイスティックなどの入力装置を複数用意することで、複数のユーザが参加することが可能とされる。しかしながら、この場合は一般にゲーム画像を表示するモニタ画面が一つしかないため、このモニタ画面には共通のゲーム画像しか表示することができず、例えば対戦するチーム単位の個別情報を表示するといったことはできなかった。

2

【０００４】また、近年インターネット等の通信ネットワークの普及に伴って、通信ネットワークを介して接続された複数のコンピュータ装置を利用して複数のユーザが参加するゲームなども提案されている。このような通信ネットワークを介して接続された複数のコンピュータ装置間で対戦型ゲームを実行した場合は、例えばチームごとの個別情報を各コンピュータ装置のモニタ画面上に表示させることが可能となる。
【０００５】しかしながら、この場合は各コンピュータ装置のモニタ画面は比較的小さいモニタ装置によって構成され、このようなモニタ画面上にゲームを進行していく上で必要な全てのゲーム画像を表示することになるため、このようにして行われるゲームは臨場感に欠けるものであった。
【０００６】また、例えばゲームの臨場感を高めるため、チームごとの個別情報を表示するモニタ装置と共に比較的大画面のモニタ装置を用意し、この大画面のモニタ装置に共通のゲーム画像を表示するといったことも考えられるが、大画面のモニタ装置を用意するためにはコストがかかると共に、設置するためのスペースなどが必要になるといった問題点があった。
【０００７】そこで本発明は、特に対戦型ゲームを実行する際に、チームごとの個別情報を表示することができると共に、全体のゲーム画像を比較的大画面で表示することができるゲーム装置を比較的簡易な構成により提供することを目的とする。
【０００８】
【課題を解決するための手段】本発明は上記した課題を考慮して、半透明面と、この半透明面側の方向から入射する所定の波長帯域の光又は電磁波のみを像として捉える撮像手段と、この撮像手段が受像すべき所定の波長帯域の光又は電磁波を半透明面に対して輻射する輻射手段と、撮像手段から入力された撮像信号に基づいて、半透明面に対して与えられた入力情報が反映される検出用画像情報を生成し、この検出用画像情報に基づいて画像入力情報を検出する画像入力情報検出手段と、個体を識別可能な識別情報を有すると共にゲームに関する操作に応じた操作情報を出力可能な外部操作装置と通信を行うことのできる通信手段と、撮像手段が撮像すべき光又は電磁波の波長帯域を含まない可視光による画像を半透明面に対して投影表示可能に設けられる投影表示手段と、通

信手段を介して入力された外部操作装置からの操作情報、又は画像入力情報検出手段からの画像入力情報に基づいて、少なくとも、所定の規則に従ったゲーム用画像を投影表示させるための投影表示手段に対する表示制御を含む所要の制御処理を実行可能な制御処理手段とを備え、制御処理手段は、画像入力情報又は操作情報として与えられる識別情報を認識可能に構成されると共に、識別情報に基づいて、外部操作装置ごとに対応して生成した個別情報を、その個別情報が対応する外部操作装置にてのみ受信入力可能なように送信するための、通信手段に対する制御を実行可能に構成されている。

【０００９】上記構成においては、例えば半透明面に近づいた物理的対象によって撮像手段に入射する光又は電磁波の状態が変化するのであるが、本発明ではこのような光又は電磁波の状態変化を画像情報として捉えることになる。そして、このようにして得られる操作情報に応じて外部操作装置に対して所要の情報信号を送信することが可能とされる。そして、半透明面に対して投影表示手段から画像を投影表示することによって半透明面を情報入力パネル兼表示パネルとして機能させることができる。また、この半透明面は、例えば単に半透明性を有するプレート状の材を用いれば良いことから、その材質の選定によっては容易に大型化を実現することができる。

【００１０】

【発明の実施の形態】先ず、図１及び図２を参照して、本発明の実施の形態の基本的な構成について説明する。本発明のゲーム装置は、これより説明する基本的な構成をもとに実現されるものである。

【００１１】図１は、本発明の実施の形態としてのゲーム装置の基本的構成を概念的に示している。本実施の形態としてのゲーム装置１は、半透明面２、赤外線発光ダイオード素子（ＬＥＤ：Light Emitted Diode）パネル３、ＣＣＤ(Charge Coupled Device) カメラ４、プロジェクタ５、及び制御装置６を備えて構成される。赤外線ＬＥＤパネル３、ＣＣＤカメラ４、及びプロジェクタ５は半透明面２の背面側に対して設けられる。

【００１２】半透明面２は、例えば透明なガラス板に対してトレーシングペーパーのような見え方をする半透明膜を貼り合わせる、あるいは磨りガラスのような半透明の性質を有するものを利用するなどして形成され、後述するようなユーザの操作によって入力情報が与えられる操作パネルと、入力情報に応じた各種応答表示が行われる表示パネルとの両者の機能を併せ持つものとされる。

【００１３】赤外線ＬＥＤパネル３は、例えばパネル面に対して多数の赤外線ＬＥＤが集合的に配列されることによって構成され、上記赤外線ＬＥＤから発光出力される赤外線光が半透明面の背面全体に対して照射されるように設けられる。上記赤外線ＬＥＤは制御装置６によって定常的に赤外線を発光するように駆動される。なお、赤外線ＬＥＤパネル３としては、発光出力される赤外線光が半透明面２全体に対して照射されるのに充分な数の赤外線ＬＥＤが設けられればよい。また、後述するように、初期の赤外線画像に対する現在の赤外線画像の差分に基づいて半透明面２側から反射してくる画像情報を得るようにされることから、半透明面２全体に対して照射される赤外線光量が一律であるべき必要もない。従って赤外線ＬＥＤパネル３のサイズは、半透明面２よりもはるかに小さいもので済ませることができる。

【００１４】ＣＣＤカメラ４は、撮像素子としてＣＣＤを用いたカメラ装置であり、この場合には、半透明面２に映る画像光として赤外線光の成分のみを撮像することにより、半透明面２に対して行われた操作を画像情報として認識するために設けられる。このため、ＣＣＤカメラ４の光学系の部分に対しては、赤外線領域の波長帯域のみを透過する赤外線透過フィルタ４ａが設けられる。また、ＣＣＤカメラ４により撮影される構図として半透明面２全体が含まれるようにその配置位置が設定される。

【００１５】プロジェクタ５は、制御装置６から供給される画像情報に基づいて、可視光による画像光を半透明面２の背面に対して投影表示する。例えばユーザは、半透明面２に投影表示されたプロジェクタ５の画像を、半透明面２の前面側から観察することができる。ここで、プロジェクタ５の光学系には赤外線領域の波長を遮断する赤外線遮断フィルタ５ａが設けられているが、これにより、半透明面２に投影表示される画像光には赤外線が含まれなくなるため、プロジェクタ５の投影画像は、ＣＣＤカメラ４からは不可視となる。

【００１６】制御装置６は、例えばマイクロコンピュータを備えて構成され、ＣＣＤカメラ４から供給される撮像信号から画像情報（映像データ）を得て、更にこの画像情報をもとに入力情報を得る。そして、この入力情報に基づいて、例えばプロジェクタ５により半透明面２に表示させる画像に関する表示制御を実行する他、各種所要の制御処理を行う。また、赤外線ＬＥＤパネル３の赤外線ＬＥＤの発光駆動を行う。なお、上記赤外線ＬＥＤパネル３、ＣＣＤカメラ４及びプロジェクタ５の配置位置は、それぞれが果たすべき役割が充分機能することを考慮して設定されればよい。

【００１７】図２は、上記制御装置６の内部構成例を示すブロック図である。この図に示す制御装置６において、ＬＥＤ駆動部１０は、赤外線ＬＥＤパネル３に設けられた複数の赤外線ＬＥＤを発光駆動するための回路部位である。

【００１８】画像入力部１１は、ＣＣＤカメラ４から供給された撮像信号について所要の信号処理を施すことによって映像信号を生成して入力画像処理部１２に供給する。つまり、画像入力部１１では、半透明面２側からＣＣＤカメラ４を介して入射してきた赤外線光を映像情報として出力する。

【００１９】入力画像処理部１２では、例えば画像入力部１１から供給された映像信号をデジタル信号による映像信号データに変換する。入力画像処理部１２においては、この映像信号データに基づいて得られる「画像情報（例えばフレーム単位の映像データ）」を利用して所要の解析処理等を実行することで、半透明面２に対して行われた操作等に基づく入力情報を得るようにされる。ここで画像情報に基づいて得られる入力情報としては、例えば、半透明面２に対して操作を行っている操作体の画像上の位置（座標）や画像の信号レベルなどが用いられる。この入力情報はデータベース駆動部１４に伝送される。また、上記映像信号データは、画像合成部１７に対しても供給可能とされている。

【００２０】しきい値制御部１３は、入力画像処理部１２にて実行される入力情報に関する処理に必要なしきい値を設定して入力画像処理部１２に伝送する。上記入力画像処理部１２では、しきい値制御部１３において設定されるしきい値を利用して画像情報について解析を行うなど所要の処理を実行することで逐次必要とされる入力情報を識別する。また、本実施の形態では後述するようにして入力画像データのフレーム差分を算出することにより、現在の半透明面２の画像状態（検出画像情報）を得るようにされるが、フレーム差分演算に利用する基準値（基準画像入力レベル）等の情報も、後述するようにして、しきい値制御部１３に格納されるものとする。

【００２１】データベース駆動部１４は、入力画像処理部１２により得られた入力情報を取り込み、この入力情報に基づいて適宜所要の処理を実行する。この際、データベース駆動部１４が実行すべき制御処理に必要なプログラムデータはデータベースメモリ１５に格納されており、データベース駆動部１４は、データベースメモリ１５に格納されたプログラムデータに基づいて所要の制御処理を実行することになる。

【００２２】画像生成部１６は、データベース駆動部１４の制御によって、必要な画像データ（デジタル信号による映像信号データ）を生成して画像合成部１７に出力する。画像合成部１７においては、必要があれば上記画像生成部１６から供給された映像信号データに対して、入力画像処理部１２から供給された映像信号データを合成してＲＧＢ信号生成部１８に対して出力する。ＲＧＢ信号生成部１８では、上記画像合成部１７から供給された映像信号データについて、例えばアナログによるＲＧＢ信号に変換してプロジェクタ５に対して出力する。これにより、プロジェクタ５からは、半透明面２に対して行われる操作に応答した映像による画像光が半透明面２に対して照射出力されることになる。

【００２３】次に、上記構成による本実施の形態のゲーム装置１における入力情報の検出方法について説明する。前述のように、図１に示す半透明面２全体に対しては、その背面から赤外線ＬＥＤパネル３により赤外線光が照射されるのであるが、この赤外線光は半透明面２が半透明性を有することから、全ての赤外線光が半透明面２を通過するのではなく、幾分かの赤外線光がその半透明性の作用によって反射されることになる。そして、本実施の形態においては半透明面２に対して何も操作が行われていないとされる状態のもとで、半透明面２にて反射される赤外線光をＣＣＤカメラ４により撮像して得られる映像信号データの初期レベルを「基準入力画像レベル」として記憶する。この基準入力画像レベルは、入力された映像信号データに基づいて例えば１フレームにおける画素ごとの信号レベルを検出することにより行うようにすればよい。この検出処理は、入力画像処理部１２により行われるものとされる。このようにして検出された基準入力画像レベルの情報はしきい値検出部１３に伝送され、ここで保持されることになる。

【００２４】上記基準入力画像レベルの検出処理は、例えば図３のフローチャートに示すものとなる。この図に示すように、先ず入力画像処理部１２では、ステップＳ１０１において、ＣＣＤカメラ４から画像入力部１１を介して供給された映像信号から得られる１フレーム分の画像データに基づいて、上述のようにして画素ごとに信号レベルを検出し、この検出結果を基準入力画像レベルＬｉｎｔとして得る。なお、具体的には画素ごとの輝度信号成分のレベルを検出してこれを基準入力画像レベルＬｉｎｔとすることが考えられる。入力画像処理部１２は、続くステップＳ１０２において、上記基準入力画像レベルＬｉｎｔをしきい値制御部１３に伝送して記憶させるように処理を実行する。

【００２５】なお、基準入力画像レベルＬｉｎｔを検出してしきい値制御部１３に記憶させる処理（上記図３に示す処理動作）は、例えば当該ゲーム装置１の電源オン時などに実行させたり、あるいは何らかのユーザの指示によって必要なときに基準入力画像レベルＬｉｎｔを更新させるように構成することが考えられる。

【００２６】上記のようにして基準入力画像レベルＬｉｎｔの情報が保持された状態のもとで、入力情報として扱われる画像情報は次のようにして得るようにされる。図４は、入力情報のもととなる画像情報（以下、この「画像情報」については特に「検出画像情報」という）を得るための入力画像処理部１２の処理動作を示すフローチャートである。この場合、入力画像処理部１２は、先ずステップＳ２０１において現在の入力画像レベルＬｐｒｓを検出する処理を実行する。ここでいう入力画像レベルＬｐｒｓは、現在においてＣＣＤカメラ４により撮像された、赤外線光に基づく半透明面２の画像についてのフレーム単位のデータであり、このフレーム単位の画像データにおける画素ごとの信号レベルを検出して得られる情報である。続いて、入力画像処理部１２はステップＳ２０２において、基準入力画像レベルＬｉｎｔと上記現在の入力画像レベルＬｐｒｓの差分を演算する

（Ｌ＝Ｌｐｒｓ－Ｌｉｎｔ）ことによって差分入力画像レベルＬを算出する。具体的には、基準入力画像レベルＬｉｎｔと上記入力画像レベルＬｐｒｓとして得られたデータ値を、同一位置の画素ごとに差分を求めることによって差分入力画像レベルＬを得るようにされる。従って、差分入力画像レベルＬとしては、常に基準入力画像レベルＬｉｎｔに対する現在の入力画像レベルＬｐｒｓとの信号レベル差が画素ごとに得られることになる。そして、入力画像処理部１２は、ステップＳ２０３に進み、上記差分入力画像レベルＬに基づいて、現在の検出画像情報（フレーム単位で画素ごとのレベル情報を有する形式の映像データ）を生成するようにされる。

【００２７】上記のごとき検出画像情報の検出動作を、実際のユーザの半透明面２の前面側での動きと共に説明する。例えばユーザは、半透明面２の前面側において赤外線を反射可能な何らかの物体を利用して半透明面２の前面側において操作を行うようにするのであるが、ここでは、説明の簡単のためにユーザ自身の指や身体を用いることとする。ここで、例えば図１に示すように半透明面２の前面側においてユーザが半透明面２から遠く離れた距離にいるときには、例えば半透明面２を通過してユーザの身体に反射するとされる赤外線光量は少ないことから、そのほとんどが半透明面２の前面から背面を通過して戻ることはない。このとき、上述した基準入力画像レベルＬｉｎｔと上記現在の入力画像レベルＬｐｒｓとは同等であり、入力画像処理部１２では、差分入力画像レベルＬとしてほぼ０であると検出することになる。つまり、差分入力画像レベルＬに基づいて生成される検出画像情報としては、初期状態と同様の変化の無いとされる状態が得られることになる。

【００２８】ここで、例えば上記の状態からユーザが徐々に半透明面２に対して近づいていったとすると、半透明面２を通過してユーザの身体に反射する赤外線光のうち、半透明面２を通過して背面側に到達する光量が次第に増加していくことになる。この状態を、入力画像処理部１２からみた場合には、ユーザの身体に対応する画像部分の基準入力画像レベルＬｉｎｔに対する現在の入力画像レベルＬｐｒｓのレベルが徐々に増加していく状態として捉えられる。これに応じて、検出画像情報としては算出される差分入力画像レベルＬに応じて、半透明面２に接近するユーザの姿が徐々に捉えられていくことになる。そして、半透明面２に対して例えばユーザの体が非常に接近した状態（しきい値の設定にもよるが例えば半透明面２から３０ｃｍ以内）では、その人体に反射した赤外線光がほとんど半透明面２を通過して背面側に到達することになるので、その身体形状がより鮮明な状態の検出画像情報が生成されることになる。

【００２９】また、ここでユーザがその身体を半透明面２からある程度距離を置いた状態で、例えば自身の指を手前にかざして半透明面２の非常に近い位置にあるようにしたとする。この場合、半透明面２に近接するユーザの指は他の身体部分よりも多くの赤外線光を反射するため、入力画像処理部１２において得られる画像情報としては、ユーザの指にあたる位置の画像領域のレベルが強く、その背景となる部分においてユーザの身体部分にあたる位置の画像領域のレベルは半透明面２からの距離に応じて弱くなることになる。そして、例えばこの状態のもとで、しきい値制御部１３にて設定された所定のしきい値と検出画像情報とを比較すれば、容易にユーザの指にあたる部分のみの画像を背景から分離させることが可能であり、同様にしきい値の設定によっては、半透明面２から離れた距離にあるユーザの身体部分のみを抽出した画像情報を得ることも可能である。このようなしきい値は、前述のように実際に必要とされる条件に応じた値がしきい値制御部１３において設定されるものである。

【００３０】このようにして、半透明面２の前面側の状態を検出する構成を採ることにより、この半透明面２を例えばインタラクティブなインターフェイスのための操作パネルとして機能させる場合には次のような利点が得られる。先ず、本実施の形態では半透明面２側からの赤外線の反射光量によって得られる画像に基づいて入力情報を得ることになるので、入力情報を与えるための物理的対象としては、特に特殊なポインティングデバイスを必要とせず、１つには、赤外線を反射する物体であればその種類は問わないことになる。つまり、操作体としては、上述のように人体全体もしくはその一部や、その他の何らかの物体を問題なく使用することができる。また、例えば黒色は赤外線光を反射せずに吸収する作用があることなど利用し、後述するようにして、例えば黒色による特定パターンの図柄を半透明面２に対して与えることで、この図柄のパターンを特定の意義を有する入力情報（ＩＤ情報）として扱うようにすることも可能となる。さらには、ＣＣＤカメラ４により赤外線光の光量変化が撮像さえされればこれを入力情報として扱えることになるので、入力情報として例えば赤外線を発光させるポインティングデバイスなどを用いて、積極的に半透明面２に対して赤外線光を与えるような方法を採ることも可能である。

【００３１】また、例えばタッチパネルなどでは操作パネル面に対して指などの操作体を接触させる必要があるが、本実施の形態の場合には操作体の位置や動きは赤外線光の反射として検出されればよいことから、半透明面２に操作体を接触させる必要性はなく、その前面の空間において操作を行うような方法を採ることができる。更に、本実施の形態では、半透明面２側からの赤外線の反射光により得られる画像に基づいて入力情報を得るために、画像認識さえ可能であれば複数の操作体（即ち入力情報）を同時に認識することが可能である。

【００３２】また、上述したように赤外線の反射光量は、操作体の半透明面２に対する距離に応じて変化する

ために、例えば操作体の半透明面２からの距離を入力情報として利用することも考えられる。

【００３３】更に、半透明面２は前述のように例えば透明のガラス板などに対してトレーシングペーパーのような半透明の薄膜を組み合わせたり、磨りガラスのようなものを利用するなどの簡略な手段により構成可能とされ、特にパネル構造として表示のための駆動回路などを設ける必要がないので、低コストで容易に大型化を実現することができ、この点で大型化が困難なタッチパネルなどとは大きく異なる。

【００３４】そして、半透明面２は画像表示パネルとしての機能も有することから、例えば後述するように操作対象となるメニュー画面のようなものを表示させた上で、ユーザがこのメニュー画面に対して指などにより操作を行えるようにするなどの直接的な操作を実現することも容易に可能となる。このように、本実施の形態としてのゲーム装置１では、その入力情報を入力するのに多くの可能性が得られるために、これまでには無かったようなインタラクティブな入出力環境を容易に構築することができる。

【００３５】これまでの説明による構成を踏まえて、半透明面２に対して行われた操作により得られた入力情報に応答した本実施の形態のゲーム装置１の動作として、ユーザがメニュー操作を行う場合を例に挙げ、これについて図５及び図６を参照して説明する。

【００３６】図５には、ユーザがゲーム装置１を利用してメニュー操作を行う場合が示されており、ここでは半透明面２を前面側からみた状態が示されている。例えばこの図に示すように、ユーザが半透明面２の前面に近づいたとすると、先ず、ゲーム装置１の制御装置６では、このときに得られる検出画像情報に基づいてユーザが近づいた半透明面２上の位置を認識する。そして、半透明面２上においてユーザが近づいたと認識された位置に対応させて、図のようにメニュー画面Ｍを表示するように表示制御を行う。このメニュー画面Ｍは当然のこととしてプロジェクタ５から半透明面２に対して投影された画像である。

【００３７】そして、ユーザ自身が位置している付近の半透明面２上にメニュー画面Ｍが表示された状態のもとで、例えばユーザは自身の指を用いて、メニュー画面Ｍにおいて操作項目が表示されている任意の領域を指さすように指定したとする。このとき、ユーザの指先は、半透明面２上から３ｃｍ～３０ｃｍ程度の範囲内の距離にあるようにされる。

【００３８】これにより、例えばメニュー画面Ｍにおいては、ユーザが指し示した操作項目の領域が選択されたことを示す何らかの指示表示（例えば選択領域に対するカーソルの配置表示や所定の形態による強調表示など）が行われることになる。この強調表示のための表示制御は、検出画像情報に基づいてユーザの指が指し示している領域の座標を検出することにより実現される。ここでは、上記のようにして指示表示が開始された状態から所定時間（例えば数秒程度）経過したときにエンター操作が行われたとみなすこととする。そして、ユーザがエンター操作を行った、つまり、特定の操作項目が強調表示された状態を所定時間以上維持させたとすると、指定された操作項目に従った所要の制御動作を実行することになる。例えば、指定された操作項目に従って、他の階層のメニュー画面を表示させたり、当該ゲーム装置１に対して所望の動作を実行させたりすることになる。あるいは、当該ゲーム装置１が何らかの外部機器を制御可能に構成されており、メニュー画面がその外部機器の動作についての操作制御を行うためのものであるとすれば、指定された操作項目に従って外部機器の動作を制御することになる。なお、ユーザが半透明面２の前面から離れていき、ユーザと半透明面２との間にある程度以上の距離があいた場合には、それまで表示されていたメニュー画面Ｍは自動的に消去されるものとされる。

【００３９】ここで、図６のフローチャートに、上記図５に示した利用例に対応して実行される制御装置６の処理動作を示す。この図に示す処理動作は、主として制御装置６内の入力画像処理部１２が検出画像情報に基づいて入力情報を認識すると共に、データベース駆動部１４がデータベースメモリ１５に格納されたプログラムに従って、上記入力情報に基づいて適宜処理動作を実行することにより実現されるものである。

【００４０】この図に示すルーチンにおいては、先ずステップＳ３０１において現在の検出画像情報から入力情報として「接近体」が検出されるか否かについて判別を行う。ここで、「接近体」とは半透明面２に対して所定の距離範囲まで接近した何らかの検出対象（図５ではユーザ自身の身体とされている）をいうものとされる。この「接近体」の検出は、例えば入力画像処理部１２が検出画像情報と接近体の検出用に設定されたしきい値（しきい値制御部１３により設定される）を比較して、例えば検出画像情報のある領域においてこのしきい値以上の値が得られた場合には「接近体有り」と検出し、しきい値以上の値が得られる領域がない場合には、「接近体無し」と検出することになる。上記接近体検出用のしきい値は、例えば通常、人体（ユーザ）が半透明面２にある程度（例えば数十ｃｍ）近づいたときに検出画像情報として得られる人体部分の画像レベルに基づいて設定されればよい。

【００４１】上記ステップＳ３０１において接近体が検出されなかった場合にはステップＳ３０８に進んで、ここで現在メニュー画面Ｍが表示中であるか否かについて判別が行われ、ここでメニュー画面Ｍが表示されていない場合には元のルーチンに戻る（即ち再度ステップＳ３０１の処理に移行する）が、メニュー画面Ｍが表示中の状態である場合にはステップＳ３０９に進み、メニュー

画面Mを消去するための制御処理を実行する。このメニュー画面Mの消去処理は、例えばデータベース駆動部１４が画像生成部１６に対するメニュー画面Mの画像データの生成処理を停止することで実現される。

【００４２】これに対して、ステップＳ３０１において接近体が検出された場合には、ステップＳ３０２に進んで、半透明面２上における上記接近体の位置を検出することが行われる。この処理は、例えば検出画像情報における接近体の部分が占有する領域の座標を検出することで可能となる。この場合、検出すべき座標としては接近体の領域の所定の一地点であっても、所定規則に従って求められる複数地点であっても構わなく実際の使用環境等に応じて任意に設定されればよい。

【００４３】続くステップＳ３０３においては、上記ステップＳ３０２にて検出された接近体の位置に応じた半透明面２の領域に対してメニュー画面Mを表示させるための制御を実行する。この制御処理は、例えばデータベース駆動部１４がデータベースメモリ１５に格納されているメニュー画面表示用のプログラムに基づいて、画像生成部１６において所要の種類のメニュー画面の画像データが作成されるように制御を行うことになる。

【００４４】この際、データベース駆動部１４は、ステップＳ３０２にて検出された接近体の位置に対応する表示領域に対して、例えばメニュー画面の画像データをマッピングするようにして、表示用画像データを作成する。この結果、最終的にプロジェクタ５から投影される画像としては、半透明面２におけるユーザが近づいた位置に対してメニュー画面Mが表示されたものとなる。

【００４５】上記ステップＳ３０３の処理が実行された後は、ステップＳ３０４において、現在表示中のメニュー画面Mの操作項目とされる表示領域内において、「操作体」が検出されたか否かについて判別が行われる。ここで、「操作体」とは半透明面２の前面において至近距離（しきい値の設定にもよるが３ｃｍ～３０ｃｍ程度）にある物体（検出対象）のことをいうものとされる。つまり、図５においてはメニュー画面Mを指し示す指が対象となる。そして、この「操作体」の検出処理は、先ず、操作体検出用としてしきい値制御部１３において設定されたしきい値と、検出画像情報の画像レベルとを比較することにより、操作体の有無を検出することが行われる。このとき設定されるしきい値としては、半透明面２の前面において至近距離にある物体を背景から分離して検出する必要上、前述した接近体検出用のしきい値よりも大きい値が設定される。そして、例えばしきい値と比較した結果、操作体が検出されたとすれば、その操作体が検出された検出画像情報上の座標位置を検出し、この検出位置とメニュー画面Mが表示されているとされる画像情報上の位置が一致しているか否かを判別することで、現在表示中のメニュー画面の表示領域内における操作体の有無を検出することになる。

【００４６】上記ステップＳ３０４においてメニュー画面Mの操作項目とされる表示領域内において操作体が検出されない場合とは、検出画像情報上に操作体が検出されなかった（ユーザが至近距離で半透明面２上を指し示していないような状態）か、或いは、検出画像情報上に操作体を検出したとしても、この操作体の検出位置（座標）がメニュー画面Mの表示領域内に対応する画像情報上の領域に無かった（ユーザが至近距離で半透明面２上を指し示していた位置がメニュー画面Mの操作項目以外の領域であったような状態）ことになるが、このような場合にはステップＳ３０１に戻るようにされる。

【００４７】なお、ここで操作体が人体の手又は指に特定されるような場合には、ステップＳ３０４における操作体の検出処理として、例えば、データベースメモリ１５に対して操作時に現れる人体の手又は指の形状の情報を記憶させておき、この手又は指の形状の情報と、検出画像情報として得られた画像形状とを比較して、その一致状態をみて操作体の検出の有無を識別するように構成することが可能である。即ち、本発明では、画像情報から入力情報を検出するために、検出画像情報に得られる画像の形状に基づいても、これを何らかの意義を有する入力情報の１つとして認識可能なわけである。

【００４８】ステップＳ３０４においてメニュー画面Mの操作項目とされる表示領域内において操作体が検出されたと判別された場合には、ステップＳ３０５に進んで、操作体が検出された位置に対応するメニュー画面Mの操作項目について指示表示が行われるように制御を実行してステップＳ３０６に進む。

【００４９】ステップＳ３０６の処理はエンター操作の待機処理となる。前述のように、ここでのエンター操作は、指示表示が開始された状態から所定時間経過したときに確定されるものと規定している。そこで、ステップＳ３０６においては、ステップＳ３０４にて検出された操作体の検出状態が所定時間以上維持されるか否かについて検出を行うようにしている。この検出処理は、入力画像処理部１２において現在の検出画像の状態遷移を監視することにより行われる。そして、例えば現在の検出画像情報上から操作体が検出されなくなったり、あるいは現在の検出画像情報上における操作体の検出位置が、ステップＳ３０４にて検出されたメニュー画面Mの操作項目とされる表示領域内から外れたことが検出されたような場合には、ステップＳ３０６からステップＳ３０１以降の処理に戻ることになる。（この処理により、例えばユーザがこれまでとは異なるメニュー画面M上の操作項目を指し示すように、その指定位置を変更した場合には、新たに指定されたメニュー画面M上の操作項目に対して指示表示が行われたりすることになる。）

【００５０】これに対して、ステップＳ３０６において、直前のステップＳ３０４にて検出された操作体の検出状態が所定時間以上維持されたと判別された場合に

は、エンター操作が行われたものとしてステップＳ３０７に進む。ステップＳ３０７においては、メニュー画面M上において操作体が検出された位置の操作項目に応じた所要の制御処理が実行される。このステップにおける処理は、データベース駆動部１４がデータベースメモリ１５に格納されたプログラムに従って実行する。

【００５１】以下、これまで説明してきた本実施の形態とされるゲーム装置１の基本的な構成及び入力情報の検出方法を踏まえて、実際に本実施の形態のゲーム装置によって実現可能なゲームの具体例について説明する。

【００５２】図７は、本実施の形態とされるゲーム装置１を利用してゲームを行っている様子が示されている。ここでは、後述するようにして複数のユーザがチームに分かれて参加する対戦型ゲームを行っているものとされる。なお、この図において図１と同一部分については同一番号を付して説明は省略する。また、この図７において赤外線透過フィルタ４ａと赤外線遮断フィルタ５ａの図示は省略されているが、図１の場合と同様にＣＣＤカメラ４とプロジェクタ５に対して備えられているものである。

【００５３】図７において、半透明面２Ａはテーブル面として設置されている。つまり、４本のテーブル脚Ｆ，Ｆ，Ｆ，Ｆにより支持される。この場合、半透明面２の下面側に対して図示するように赤外線ＬＥＤパネル３、ＣＣＤカメラ４、プロジェクタ５（及び制御装置６）、送受信部２０が設けられる。なお、この場合には制御装置６の設置位置は特に半透明面２Ａの下面側で有る必要はなく、例えば半透明面２Ａ（テーブル）の下面側のスペースに余裕を与えることを考慮して、これ以外の位置に設置することも考えられる。

【００５４】送受信部２０は、例えば次に説明する携帯情報端末（ＰＤＡ：Personal Digital Assistants ）２２から赤外線によって送信されてくるデータ信号を受信して制御装置６に伝送したり、あるいは携帯情報端末（以下、「ＰＤＡ」という）２２に対して制御装置６から伝送されてくるデータ信号を赤外線によって送信することが可能とされる。

【００５５】ＰＤＡ２２ａ，２２ｂは、この場合にはチームごとに１つづつ与えられ、主としてゲーム進行に関する操作を行うために備えられる。このＰＤＡ２２には、ユーザがゲームを進めるための所要の入力操作を行うことができる操作部と、所用の画像を表示することができる表示部が設けられている。また、赤外線により送受信を行うことができる例えば赤外線通信機能が備えられており、ユーザがゲームを進めるための所要の入力操作を行った場合は、その操作に対応した操作情報を上記制御装置６に対して送信したり、あるいは制御装置６から送受信部２０を介して送信されてくる各種データ信号を受信して表示部に表示することが可能とされる。

【００５６】また、このＰＤＡ２２には個体識別のためのＩＤパターンが底面に貼りつけられている。このＩＤパターンは、後述するようにして制御装置６においてＰＤＡ２２ａ，２２ｂの識別のために利用されるものである。

【００５７】ここで、ＰＤＡ２２ａ，２２ｂに底面に設けられているＩＤパターンの一例を図８に示す。この図８に示すＩＤパターン３０ａは、例えば白地のＰＤＡ２２に対して、黒色の特定のパターンによる、いわゆる２次元バーコードといわれる図柄により描かれている。そして、例えば図７に示されているユーザがＰＤＡ２２ａ，２２ｂを半透明面２上においたとすると、黒色は赤外線光を反射せずに吸収する作用を有することから、制御装置６で得られる検出画像情報としては、ちょうど図８に示したようなＩＤパターン３０ａの画像となる。

【００５８】ここで、このような送受信部２０を備えた本実施の形態とされるゲーム装置１の具体的な内部構成を図９に示す。なお、この図では半透明面２Ａが省略されているが当然のこととして赤外線ＬＥＤパネル３、ＣＣＤカメラ４、及びプロジェクタ５がその背面に有るように設けられているものとされる。また、図２と同一部分には同一番号を付し説明は省略するが、本実施の形態では対戦型ゲームの処理を実行するためのゲームプログラムがデータベースメモリ１５に格納されることになる。

【００５９】送受信部２０は、ＰＤＡ２２から赤外線によって送信されてくる操作情報を受信してデータベース駆動部１４に対して供給するようにされている。そして、データベース駆動部１４は、この操作情報に基づいて半透明面２Ａに表示するコマ２１やゲームの背景画像を画像生成部１６で生成するような処理を実行させることになる。また、データベース駆動部１４からデータ信号が伝送されてきた時は、このデータ信号をＰＤＡ２２に対して送信するようにされる。

【００６０】なお、本実施に形態における送受信部２０は、赤外線によってデータ信号を送信したり、ＰＤＡ２２からの操作情報を受信する送受信部とされているが、例えば送信先であるＰＤＡ２２に電波を送受信することができる送受信部が備えられている場合は、電波によって空間伝送を行うことができる送受信部するというように適宜変更することが可能とされる。

【００６１】図７に示すような対戦型ゲームは、例えば複数のユーザが２つのチーム（ＡチームとＢチーム）に別れて対戦形式で行うゲームとされており、この対戦型ゲームを開始するにあたっては、まずゲームを行うための初期設定を行う必要がある。このため、ユーザがＰＤＡ２２に対してゲームを開始するための操作を行った場合は初期設定モードに移行することになる。

【００６２】初期設定モードにおいては、例えば先ずゲームに使用するコマ２１ａ，２１ｂをＡチーム又はＢチームに分けるためのメッセージが表示される。そして、

ユーザが例えばＰＤＡ２２ａ，２２ｂからコマ２１ａ，２１ｂのチーム分けを行うための所定の入力操作を行うことで、制御装置６では、Ａチームとして設定されたコマ２１ａに対してＡチームに対応するグループＩＤを付与すると共に、Ｂチームとされたコマ２１ｂに対してはＢチームに対応するグループＩＤを付与して保持することになる。

【００６３】このようにして、ゲームに使用するコマ２１ａ，２１ｂに対してグループＩＤが付与されると、次に例えばゲームに使用されるＰＤＡ２２ａ，２２ｂのチーム分けを行うためのメッセージが表示される。この場合ゲーム装置では、例えば始めにＡチームに属することになるＰＤＡを設定するモードに移行するものとされ、このモード状態のもとでＡチームのユーザがメッセージに従ってＡチームが使用するＰＤＡ２２ａを、そのＰＤＡ２２ａの底面に貼りつけられているＩＤパターンを制御装置６が認識できるように半透明面２Ａ上に載置する。これにより、制御装置６はＡチームに属することになるＰＤＡ２２ａのＩＤパターンを認識して、このＩＤパターンとＡチームのグループＩＤを対応させて保持することになる。

【００６４】例えば、続いてＢチームが使用するＰＤＡを設定するモードでは、上記と同様にしてＢチームのユーザがＰＤＡ２２ｂの底面に貼りつけられているＩＤパターンを制御装置６が認識できるように半透明面２Ａ上に載置する。これにより、制御装置６はＰＤＡ２２ｂのＩＤパターンを認識してこのＩＤパターンとＢチームのグループＩＤを対応させて保持することになる。

【００６５】なお、上記したようなＰＤＡ２２ａ，２１ｂのグループＩＤの設定は、ユーザがＰＤＡ２２を半透明面２Ａ上に置くことなく、例えばＰＤＡ２２ａから所定の操作を行い、上記ＩＤパターンと同様、ＰＤＡを特定するためのＩＤコード情報を送信するようにして設定することも可能である。

【００６６】また、本実施の形態においては、ＰＤＡ２２ａ，２２ｂがチームごとに１つづつ与えられているものとして説明しているが、例えば各チームに複数のユーザが参加している場合は、各チームごとに複数のＰＤＡ２２ａ，２２ｂを設けるようにすることも可能とされる。

【００６７】このようにして初期設定が行われた後、ゲームが開始されるものとされ、例えば図７に示すような各チームのコマ２１ａ，２１ｂや背景画像といったゲーム画像が半透明面２Ａに表示されることになる。そして、各チームに別れたユーザがＰＤＡ２２を操作しながら、予め決められたルールに従ってゲームを進めていくことになる。このようなゲームの進行は、ＰＤＡ２２からの操作情報に基づいて、制御装置６が例えば半透明面２Ａに表示されるコマ２１を進めていく等の表示制御などを実行することで実現される。

【００６８】このようにゲームが進行している途中で、例えばＡチームのユーザが個別情報（チームごとに特有のゲームに関する情報で対戦相手チームに知られてはならない情報）を得たい場合は、Ａチームのユーザがそのまま、ＰＤＡ２２ａを自チームのコマ２１ａの上に載置にする。この場合制御装置６は、このＰＤＡ２２ａの底面に貼りつけられているＩＤパターン３０ａの画像を入力情報として識別し、この識別した入力情報の座標位置を検出する。そしてこの検出した入力情報の座標位置に基づいて、例えばＰＤＡ２２ａの座標位置が半透明面２Ａ上に表示されるコマ２１ａの座標位置と一致すると判別し、且つ、ＰＤＡ２２ａとコマ２１ａのチームが一致すると判別した時に、例えばそのコマ２１ａに与えられている個別情報をＰＤＡ２２ａにおいてのみ受信させるように送信することで、Ａチームの個別情報がＰＤＡ２２ａの表示画面にのみ表示されることになる。

【００６９】これは例えば制御装置６から送受信部２０を介して個別情報を送信する時に、ＰＤＡ２２ａに対して送信する個別情報に送信先のＰＤＡ２２ａを特定するためのＩＤ情報を付加すればよい。これによりＰＤＡ２２ａ，２２ｂは制御装置６からの送信信号を受信することになるが、ＰＤＡ２２ａ，２２ｂは先ず送信信号に含まれるＩＤ情報を識別する。ここで、例えばＢチームのＰＤＡ２２ｂにおいては識別したＩＤ情報が自身の有するＩＤと一致しないため、以降のデータ取り込み処理が行われない。これに対して、送信信号のＩＤ情報と自身のＩＤ情報が一致したＰＤＡ２２ａにおいては、受信信号から個別情報を抽出して取り込み個別情報を提示するための表示を行うように動作することになる。

【００７０】このように本実施の形態とされるゲーム装置においては、比較的大画面として構成することができる半透明面上２Ａに全体のゲーム画像を表示すると共に、各チームごとに関する個別情報をＰＤＡ２２の表示画面上に表示させるようにしている。このためユーザは通常、比較的大画面とされる半透明面２Ａ上に表示されるゲーム画像を見ながらゲームを進行させていくことになるため、臨場感のあるゲームを楽しむことができると共に、ＰＤＡ２２ａ，２２ｂの表示画面上にチームごとの個別情報が表示されるので、相手チームにわからないようにチームごとに作戦を立てるといったことが可能になり、対戦型ゲームをより楽しく行うことができるようになる。

【００７１】次に、上記したような対戦型ゲームを実行する場合の制御装置６の処理動作例について説明する。上記したような対戦型ゲームを実行するにあたっては、先ず前述したように初期設定としてゲームに使用するコマ２１（半透明面２Ａ上にプロジェクタ５から投影表示される）及びＰＤＡ２２を各チームごとに分けることが行われるが、先ずこの時の処理動作を図１０に示すフローチャートを参照して簡単に説明する。

【００７２】この場合、制御装置６は、先ずコマ２１のグループＩＤを付与するためのモードとなり、ステップＳ４０１において、半透明面２Ａ上にゲームに使用する全てのコマ２１に付与するための処理動作を実行する。このような処理動作は、制御装置６のデータベース駆動部１４がデータベースメモリ１５に格納されているプログラムに基づいて、画像生成部１６においてコマ２１の画像データを生成することで実現されることになる。

【００７３】そしてステップＳ４０２において、半透明面２Ａ上に表示されたコマ２１に対してチームのグループＩＤを付与するための処理動作を実行することになる。この処理動作としては、まずデータベース駆動部１４がデータベースメモリ１５に格納されているプログラムに基づいて、画像生成部１６においてゲームに使用するコマ２１をＡチーム又はＢチームに分けるためのメッセージ画像を生成し、このメッセージ画像をプロジェクタ５から半透明面２Ａに対して投影表示させるような制御を実行する。そして、これに応答して送受信部２０で受信された操作情報に基づいて、例えばＡチームとされたコマ２１ａに対してＡチームのグループＩＤを付与すると共に、Ｂチームとされたコマ２１ｂに対してはＢチームのグループＩＤを付与してデータベースメモリ１５に保持させることで実現することができる。

【００７４】上記のようにしてコマ２１に対してグループＩＤを付与した後は、ＰＤＡ２２に対してグループＩＤを付与するためのモードとなり、ステップＳ４０３に移行することになる。ステップＳ４０３において、データベース駆動部１４はゲームに使用するＰＤＡ２２に対してグループＩＤを付与するための処理動作を実行することになる。この処理動作としては、データベース駆動部１４がデータベースメモリ１５に格納されているプログラムに基づいて、画像生成部１６において例えばゲームに使用されるＰＤＡのチーム分けを行うためのメッセージ画像を生成し、このメッセージ画像をプロジェクタ５から半透明面２Ａに対して投影表示させるような制御を実行する。そして、これに応答してユーザがＰＤＡ２２ａ，２２ｂをＩＤパターン３０ａを認識できるように半透明面２Ａ上に載置することで入力画像処理部１２から得られることになるＰＤＡ２２ａ，２２ｂのＩＤパターンを認識して、このＩＤパターンのＩＤ情報とグループＩＤを対応させてデータベースメモリ１５に保持することで実現される。

【００７５】なお、各チームに属することになるＰＤＡ２２ａ，２２ｂが複数ある場合でも、当該ゲーム装置１の入力画像処理部１２において検出される検出画像情報は、先に説明したような半透明面２Ａ側から赤外線の反射光により得られるため、半透明面２Ａ上に複数のＰＤＡ２２ａ，２２ｂを載置した場合でも同時に複数のＩＤパターン３０ａを認識することが可能とされる。

【００７６】上記のようにして初期設定が行われた後、本実施の形態とされる対戦型ゲームが開始され、ユーザがＰＤＡ２２ａ，２２ｂの操作を行うと、ＰＤＡ２２ａ，２２ｂから操作情報が送信されることになる。そして、制御装置６はＰＤＡ２２ａ，２２ｂから送信されてくる操作情報に基づいて、対応するコマ２１ａ，２１ｂを進めるといった表示制御を実行することになる。このような処理動作は、データベース駆動部１４がＰＤＡ２２ａ，２２ｂから操作情報に含まれているＩＤ情報を識別し、データベースメモリ１５に保持しているＩＤ情報とグループＩＤとの対応テーブルから対応するグループのコマ２１ａ，２１ｂを判別して表示を制御することで実現される。

【００７７】ここで例えばＡチームのユーザがＰＤＡ２２ａをコマ２１ａ上に載置した場合、すなわち上述したようにユーザが自チームのコマ２１に与えられている個別情報を表示させるための操作が行われた場合の制御装置６における処理動作を図１１に示すフローチャートを参照して説明する。

【００７８】この場合ステップＳ５０１において、制御装置６は検出画像情報に基づいて得られる入力情報として何らかのＩＤパターン３０ａが認識されるのを待機しており、ここでＩＤパターン３０ａが認識されたと判別されると、ステップＳ５０２に進んでステップＳ５０１において認識したＩＤパターン３０ａの検出画像情報上における位置情報ｐｏｓを検出することになる。

【００７９】ステップＳ５０２において、ＩＤパターン３０ａの位置情報ｐｏｓを検出するとステップＳ５０３に進んで、この位置情報ｐｏｓと半透明面２Ａ上に表示しているコマ２１の座標位置が一致しているかどうか判別することになる。ここで、ＩＤパターン３０ａの位置情報ｐｏｓと半透明面２Ａ上に表示しているコマ２１の座標位置が一致すると判別した場合は、ステップＳ５０４に進んで、位置情報ｐｏｓを検出したＩＤパターン３０ａによって特定されるＰＤＡ２２のグループＩＤと、このＰＤＡ２２ａが載置された位置に対応するコマ２１のグループＩＤが一致するかどうかの判別を行うことになる。

【００８０】ステップＳ５０４において、ＰＤＡ２２ａとコマ２１のグループＩＤが一致すると判別した場合は、ステップＳ５０５に進んで対応するＰＤＡ２２ａに対してコマ２１ａの固有の個別情報を送信するような制御を実行することになる。この場合、制御装置６から送信される送信信号は、例えば対応するコマ２１ａに対する個別情報に、コマ２１ａの表示位置に置かれたＰＤＡ２２ａを示すＩＤ情報を付加して送信するようにされる。これにより前述したようにコマ２１ａの表示位置に置かれたＰＤＡのみ個別情報を受信して表示することができる。

【００８１】一方、ステップＳ５０３において、ＩＤパターン３０ａの位置情報ｐｏｓと表示するコマ２１の位

置情報が一致しないと判別した場合、あるいはステップＳ５０４において、ＰＤＡ２２ａと、このＰＤＡ２２ａが載置された位置に対応するコマ２１のグループＩＤが一致しないと判別した場合は、コマ２１ａの個別情報を送信することなくもとのルーチンに戻ることになる。

【００８２】ところで、上述したような本実施の形態では、テーブルの下側に少なくとも赤外線ＬＥＤパネル３、ＣＣＤカメラ４、プロジェクタ５を配置してやる必要があるが、例えば床からテーブル面（半透明面２Ａ）までの高さ（距離）はさほど多く取ることができないため、ＣＣＤカメラ４やプロジェクタ５が半透明面２Ａ全体をカバーできるのに必要な直線距離を得ることが難しい場合が生じる。そこで、この場合は図１１に示すように半透明面２Ａ（テーブル面）の下側に光路を反射により変更させるミラーＭＲを配置させ、赤外線ＬＥＤパネル３、ＣＣＤカメラ４、及びプロジェクタ５などの装置はテーブルの横側に配置することが考えられる。

【００８３】なお、ミラーＭＲの代わりに、所定の光透過率と反射率が設定されたハーフミラーＭＲを用いることも考えられる。このようなハーフミラーＭＲを用いた場合には、例えば、赤外線ＬＥＤパネル３はテーブルの横側に配置せずに、テーブル下部の床面部分に設置することなどが可能となってそれだけ設置自由度が高くなる。

【００８４】ところで、本実施の形態のゲーム装置に適用される表示装置１としては、図１に示す構成において、例えば赤外線ＬＥＤパネル３の代わりにマイクロ波発生器を設け、また、ＣＣＤカメラ４の代わりにマイクロ波受信器を設けて構成することも考えられる。この場合、図２に示す制御装置６においては、ＬＥＤ駆動部１０（図１参照）の代わりに、マイクロ波発生器を駆動するためのマイクロ波駆動回路が備えられる。また、マイクロ波受信器から供給される受信マイクロ波を入力して例えば所定形式のデータに変換して出力する画像信号入力回路と、この画像信号入力回路から供給されるマイクロ波の受信データを入力して所要の処理を行うことにより、例えば検出画像情報を得ると共にこの検出画像情報に基づいて操作情報を得る入力データ処理回路が設けられる必要がある。画像信号入力回路及び入力データ処理回路は、それぞれ図２に示す画像入力部１１及び入力画像処理部１２に代わる機能回路部である。また、操作情報検出用の媒体としてマイクロ波を利用するため、ＣＣＤカメラ４に備えられた赤外線透過フィルタ４ａや、プロジェクタ５に備えられた赤外線遮断フィルタ５ａは不要となる。

【００８５】このように、それが照射された物体に反射する性質を有するマイクロ波のような媒体を操作情報の検出に利用するように構成しても、これまで説明してきた実施の形態（赤外線を操作情報の検出に利用した例）と同様にして本発明としてのゲーム装置を構成することが可能である。

【００８６】なお、上記した本発明のゲーム装置で実行可能とされるゲームは、あくまでも一例であり、これに限定されることなく他にも各種考えられるものである。また、本実施の形態においては音声出力系の説明は省略したが、各種ゲーム音声の出力を行うことは可能である。また、本実施の形態においては、半透明面２が水平に設置してある状態（テーブル状）とした場合について説明したきたが、本発明としての半透明面２の機能（表示パネル機能及び操作パネル機能）を考慮すればこれに限定されることなく、半透明面２を球面状などの曲面として形成することも可能である。

【００８７】また、本実施の形態においては、制御装置６からデータ信号を送受信部２０から赤外線を用いて送信する場合について説明したが、例えば赤外線ＬＥＤパネル３から発光出力されるＬＥＤの発光強度を変化させることによって、赤外線ＬＥＤパネル３を送信部として機能させることも可能である。

【００８８】

【発明の効果】以上、説明したように本発明は、例えば半透明面に近づいた物理的対象によって撮像手段に入射する光又は電磁波の状態が変化するのであるが、このような光又は電磁波の状態変化を画像情報として捉えることになる。そして、このようにして得られる操作情報に応じて外部操作装置に対して所要の情報信号を送信することが可能とされる。そして、半透明面に対して投影表示手段から画像を投影表示することによって、情報入力パネル兼表示パネルとして機能させるようにしている。従って、この半透明面上にゲームの全体画像を表示すると共に、外部操作装置を半透明面上に載置した際に得られるＩＤパターンの認識情報（例えばその位置情報も含む）に基づいて、外部操作装置に個別情報を送信することができるようになり、対戦型ゲームをより楽しく行うことができるようになる。

【００８９】また、上記のように情報入力パネル兼表示パネルとされる半透明面としては、例えば単に半透明性を有するプレート状の材を用いれば良いことから、例えば従来のＣＲＴ、液晶ディスプレイなどの表示デバイスやタッチパネル（タブレット）などの入力装置を組み合わせて大型化を図る場合に比べて、より簡易な構成で実現することができる。

【図面の簡単な説明】

【図１】本発明の実施の形態としてのゲーム装置の基本的な構成例を示す概念図である。

【図２】図１に示すゲーム装置に備えられる制御装置の内部構成を示す図である。

【図３】基準入力画像レベルを検出及び保持するための処理動作を示すフローチャートである。

【図４】検出画像情報を生成するための処理動作を示すフローチャートである。

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【図５】図１に示すゲーム装置の利用例としてメニュー画面に対する操作例を示す説明図である。

【図６】図５に示すメニュー画面に対する操作を実現するための処理動作を示すフローチャートである。

【図７】本実施の形態のゲーム装置において対戦型ゲームを実行させた時に半透明面に表示される表面画像を示した図である。

【図８】ＩＤパターンの一例を示した図である。

【図９】本発明の実施の形態としてのゲーム装置に備えられる制御装置の内部構成を示す図である。

【図１０】本発明の実施の形態としてのゲーム装置で対戦型ゲームを実行した時の初期設定時の処理動作を示すフローチャートである。

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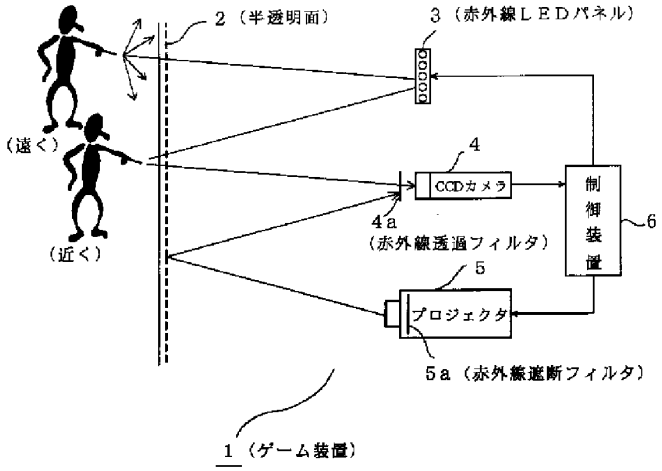
＊【図１１】本発明の実施の形態としてのゲーム装置で対戦型ゲームを実行した時の個別情報を表示させるための処理動作を示すフローチャートである。

【図１２】本実施の形態のゲーム装置に適用される表示装置の他の配置例を示した図である。

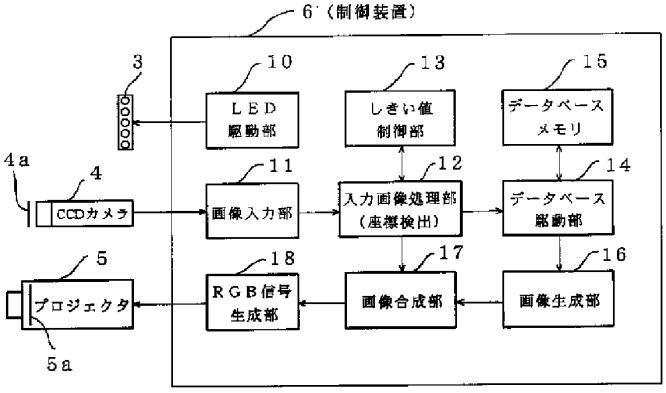
【符号の説明】

１　表示装置、２　半透明面、３　赤外線ＬＥＤパネル、４　ＣＣＤカメラ、５　プロジェクタ、６　制御装置、１０　ＬＥＤ駆動部、１１　画像入力部、１２　入力画像処理部、１３　しきい値制御部、１４　データベース駆動部、１５データベースメモリ、１６　画像生成部、１７　画像合成部、１８　ＲＧＢ信号生成部、２０　送受信部、２１　コマ、２２　ＰＤＡ

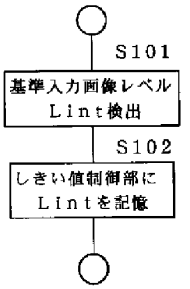
【図１】



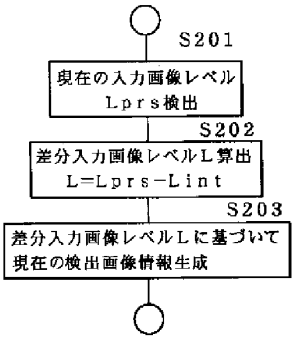
【図２】



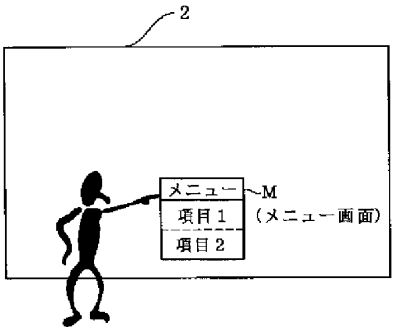
【図３】



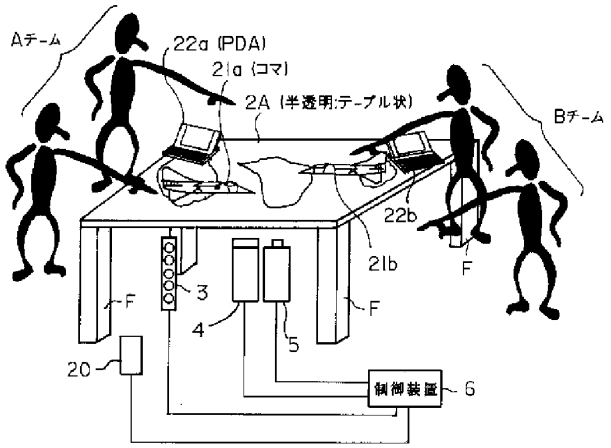
【図４】



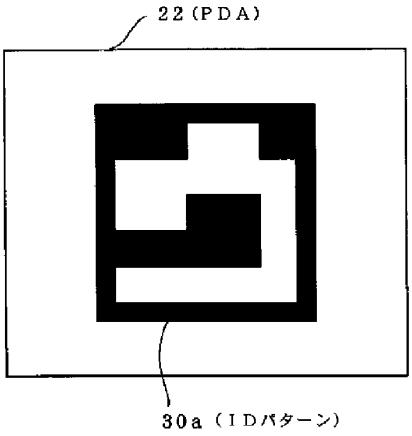
【図５】



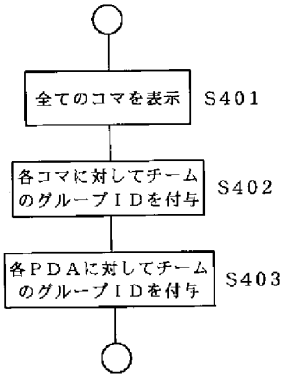
【図７】



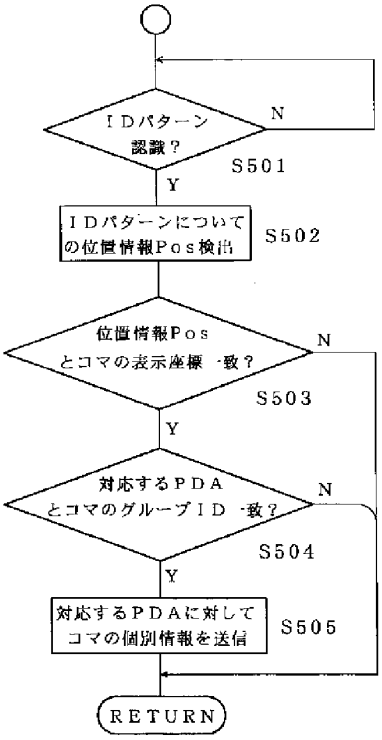
【図８】



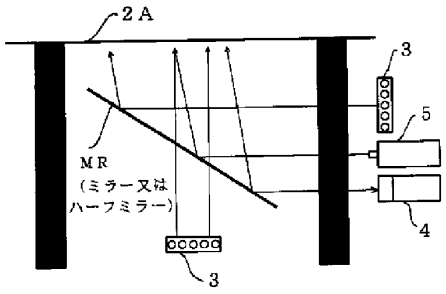
【図１０】



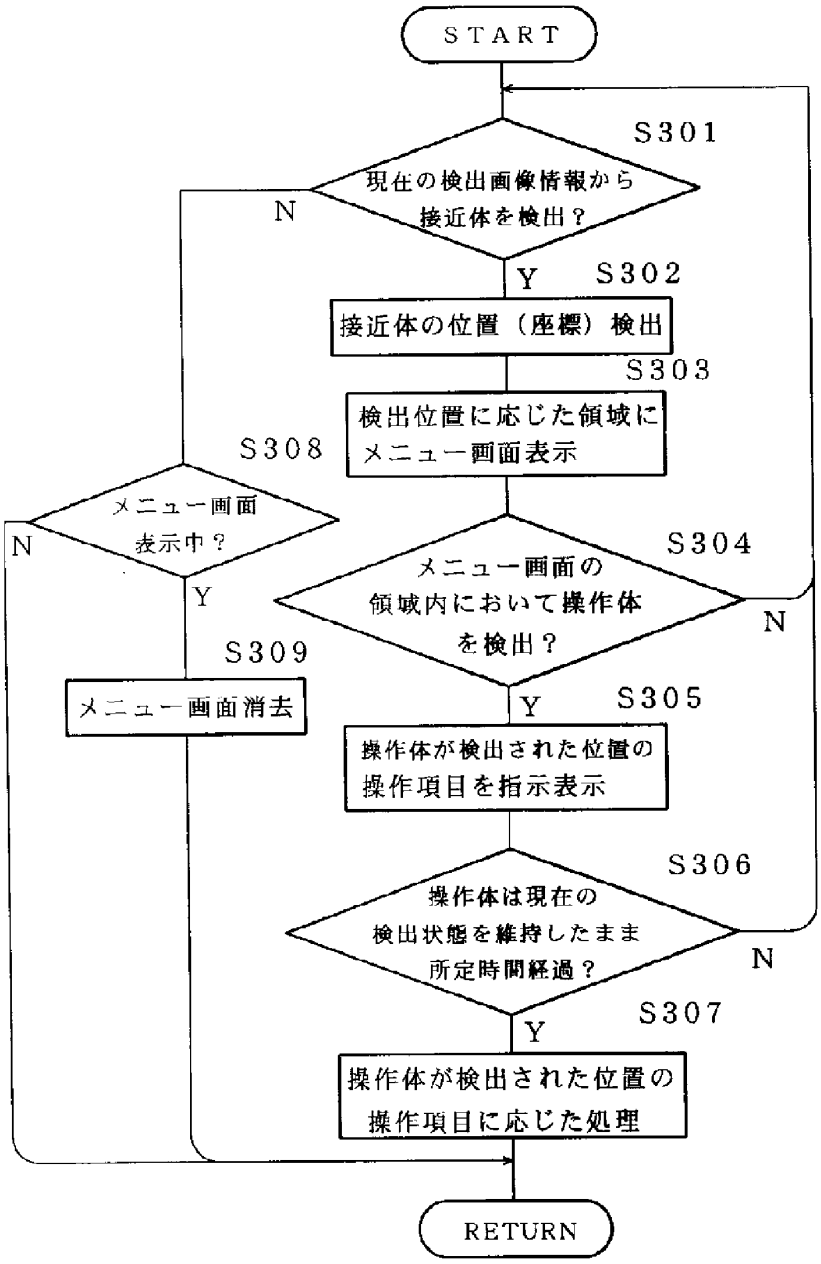
【図１１】



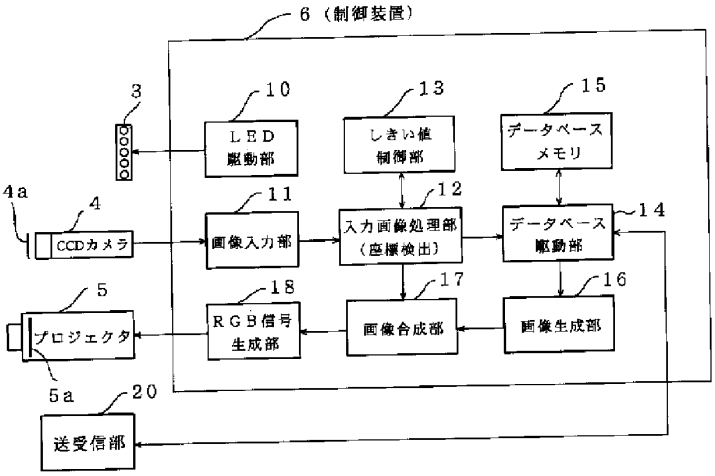
【図１２】



【図６】


START
S301
現在の検出画像情報から
接近体を検出？
N
Y
S302
接近体の位置（座標）検出
S303
検出位置に応じた領域に
メニュー画面表示
S308
メニュー画面
表示中？
N
Y
S304
メニュー画面の
領域内において操作体
を検出？
N
Y
S309
メニュー画面消去
S305
操作体が検出された位置の
操作項目を指示表示
S306
操作体は現在の
検出状態を維持したまま
所定時間経過？
N
Y
S307
操作体が検出された位置の
操作項目に応じた処理
RETURN

【図９】


6（制御装置）
3
10
LED
駆動部
13
しきい値
制御部
15
データベース
メモリ
4a
4
CCDカメラ
11
画像入力部
12
入力画像処理部
（座標検出）
14
データベース
駆動部
5
プロジェクタ
18
RGB信号
生成部
17
画像合成部
16
画像生成部
5a
20
送受信部

Electronic Acknowledgement Receipt

EFS ID:	13263142
Application Number:	13448321
International Application Number:	
Confirmation Number:	3370
Title of Invention:	LENS SYSTEM
First Named Inventor/Applicant Name:	Matthew Bell
Customer Number:	20995
Filer:	Don Neil Caceres Pua/Erica Van Sciver
Filer Authorized By:	Don Neil Caceres Pua
Attorney Docket Number:	KM2326.007D1
Receipt Date:	16-JUL-2012
Filing Date:	16-APR-2012
Time Stamp:	18:24:29
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		IDS2.pdf	118938 54dc0ba3e5062eed9e979fcd51a36b06cc375c38	yes	3

	Multipart Description/PDF files in .zip description				
	Document Description		Start	End	
	Transmittal Letter		1	2	
	Information Disclosure Statement (IDS) Form (SB08)		3	3	
Warnings:					
Information:					
2	Non Patent Literature	InterviewSummaryDecember202010.pdf	273407 933f3dbac248af1c4731a88b6c15e90536e045ee	no	7
Warnings:					
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3	Non Patent Literature	InterviewSummaryJuly62011.pdf	294875 9130639e88532b6dd1c44e6a5a0d95869bab5371	no	7
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4	Non Patent Literature	FinalOAdatedMay122011.pdf	898773 81bbaf6d4acde322b7fd8be702a4c4ecc4bbd841	no	22
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5	Non Patent Literature	InterviewSummaryJuly142011.pdf	319027 95fdf1e4d6b8fbed72d46380352e93f7c8bfb612	no	8
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6	Non Patent Literature	InterviewSummaryOct142011.pdf	380374 bcc304f340d2a622a185eb927566909f9cace408	no	9
Warnings:					
Information:					
7	Non Patent Literature	NOADec22011.pdf	465535 f53f64d9dd2242789ebdd1a28f9bb7186870c889	no	9
Warnings:					
Information:					
8	Non Patent Literature	OAdatedAug182011.pdf	403983 6acf6b79ea2981cc0bece91ba1a0e08f2fcf6e51	no	10
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Information:					

9	Non Patent Literature	OAdatedNovember122010.pdf	1835958 c7497de28971da825e521cfe4dfa78f5767d0268	no	30
Warnings:					
Information:					
10	Foreign Reference	JP10207619wAbstract.pdf	1328421 23e8aacef276e868436b03f8b74896541050ab4e	no	12
Warnings:					
Information:					
11	Foreign Reference	JP-11-057216-w-Abstract.pdf	2278359 0e4903b3ac6ea8bde2e18297b9787aed0924c8ff	no	16
Warnings:					
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		Total Files Size (in bytes):	8597650		

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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.

INFORMATION DISCLOSURE STATEMENT

Applicant	:	Matthew Bell
App. No.	:	13/448,321
Filed	:	April 16, 2012
For	:	LENS SYSTEM
Examiner	:	Unknown
Art Unit	:	2875
Conf. No.	:	3370

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

References and Listing

Submitted herewith in the above-identified application is an Information Disclosure Statement listing references for consideration. Copies of any listed foreign and non-patent literature references are being submitted.

For the cited Japanese patent references, Applicant has attached English abstracts and/or machine translations of the Japanese patent references obtained from the Japanese Patent Office website. Applicant makes no representation as to the accuracy of the English abstracts or machine translations. If the Examiner would like additional information regarding these references or if anything is unclear, the Examiner is invited to request such information, and Applicant will attempt to comply with any such request.

Timing of Disclosure

This Information Disclosure Statement is being filed before the receipt of a first Office Action on the merits, and presumably no fee is required. If a first Office Action on the merits was mailed before the mailing date of this Statement, the Commissioner is authorized to charge the fee set forth in 37 CFR 1.17(p) to Deposit Account No. 11-1410.

Respectfully submitted,

KNOBBE, MARTENS, OLSON & BEAR, LLP

Dated: July 16, 2012

By: _____

Don C. Pua
Registration No. 67,028
Attorney of Record
Customer No. 20995
(949) 760-0404

13609406

INFORMATION DISCLOSURE STATEMENT

Applicant	:	Matthew Bell
App. No.	:	13/448,321
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For	:	LENS SYSTEM
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P.O. Box 1450
Alexandria, VA 22313-1450

References and Listing

Submitted herewith in the above-identified application is an Information Disclosure Statement listing references for consideration. Listed references are of record in U.S. patent application No. 12/269,849, filed November 12, 2008, which is the parent of this application, and is relied upon for an earlier filing date under 35 USC 120. Copies of the references are not submitted pursuant to 37 CFR 1.98(d).

Timing of Disclosure

This Information Disclosure Statement is being filed before the receipt of a first Office Action on the merits, and presumably no fee is required. If a first Office Action on the merits was mailed before the mailing date of this Statement, the Commissioner is authorized to charge the fee set forth in 37 CFR 1.17(p) to Deposit Account No. 11-1410.

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Dated: July 16, 2012

By: _____

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Registration No. 67,028
Attorney of Record
Customer No. 20995
(949) 760-0404

13615055

PTO/SB/08 Equivalent

INFORMATION DISCLOSURE STATEMENT BY APPLICANT	Application No.	13/448,321
	Filing Date	April 16, 2012
	First Named Inventor	Matthew Bell
	Art Unit	2875
(Multiple sheets used when necessary)	Examiner	Unknown
SHEET 1 OF 19	Attorney Docket No.	KM2326.007D1

U.S. PATENT DOCUMENTS

Examiner Initials	Cite No.	Document Number *Number - Kind Code (if known)* Example: 1,234,567 B1	Publication Date MM-DD-YYYY	Name of Patentee or Applicant	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear
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	3	3,763,468	10-02-1973	Ovshinsky et al.	
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	22	5,442,252	08-15-1995	Golz, Thomas M.	
	23	5,454,043	09-26-1995	Freeman	
	24	5,497,269	03-05-1996	Gal, George	
	25	5,510,828	04-23-1996	Lutterbach et al.	
	26	5,526,182	06-11-1996	Jewell et al.	
	27	5,528,263	06-18-1996	Platzker et al.	
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	29	5,534,917	07-09-1996	MacDougall	
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Examiner Signature	Date Considered

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT	Application No.	13/448,321
	Filing Date	April 16, 2012
	First Named Inventor	Matthew Bell
	Art Unit	2875
(Multiple sheets used when necessary)	Examiner	Unknown
SHEET 2 OF 19	Attorney Docket No.	KM2326.007D1

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Examiner Initials	Cite No.	Document Number *Number - Kind Code (if known)* Example: 1,234,567 B1	Publication Date MM-DD-YYYY	Name of Patentee or Applicant	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear
	31	5,591,972	01-07-1997	Noble et al.	
	32	5,594,469	01-14-1997	Freeman et al.	
	33	5,633,691	05-27-1997	Vogeley et al.	
	34	5,703,637	12-30-1997	Miyazaki et al.	
	35	5,808,784	09-15-1998	Ando et al.	
	36	5,846,086	12-08-1998	Bizzi et al.	
	37	5,861,881	01-19-1999	Freeman et al.	
	38	5,882,204	03-16-1999	Iannazo et al.	
	39	5,923,380	07-13-1999	Yang et al.	
	40	5,923,475	07-13-1999	Kurtz et al.	
	41	5,953,152	09-14-1999	Hewlett	
	42	5,969,754	10-19-1999	Zeman	
	43	5,978,136	11-02-1999	Ogawa et al.	
	44	5,982,352	11-09-1999	Pryor	
	45	6,008,800	12-28-1999	Pryor	
	46	6,058,397	05-02-2000	Barrus et al.	
	47	6,075,895	06-16-2000	Qiao et al.	
	48	6,084,979	07-04-2000	Kanada et al.	
	49	6,088,612	07-11-2000	Blair	
	50	6,097,369	08-01-2000	Wambach	
	51	6,106,119	08-22-2000	Edwards	
	52	6,118,888	09-12-2000	Chino et al.	
	53	6,125,198	09-26-2000	Onda	
	54	6,166,744	12-26-2000	Jaszlics et al.	
	55	6,176,782	01-23-2001	Lyons et al.	
	56	6,191,773	02-20-2011	Maruno et al.	
	57	6,198,487	03-06-2001	Fortenbery et al.	
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	59	6,217,449	04-17-2001	Kaku	
	60	6,263,339	07-17-2001	Hirsh	

Examiner Signature	Date Considered

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	Filing Date	April 16, 2012
	First Named Inventor	Matthew Bell
	Art Unit	2875
(Multiple sheets used when necessary)	Examiner	Unknown
SHEET 3 OF 19	Attorney Docket No.	KM2326.007D1

U.S. PATENT DOCUMENTS

Examiner Initials	Cite No.	Document Number *Number - Kind Code (if known)* Example: 1,234,567 B1	Publication Date MM-DD-YYYY	Name of Patentee or Applicant	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear
	61	6,270,403	08-07-2001	Watanabe et al.	
	62	6,278,418	08-21-2001	Doi	
	63	6,292,171	09-18-2001	Fu et al.	
	64	6,304,267	10-16-2001	Sata	
	65	6,308,565	10-30-2001	French et al.	
	66	6,323,895	11-27-2001	Sata	
	67	6,333,735	12-25-2001	Anvekar	
	68	6,335,977	01-01-2002	Kage	
	69	6,339,748	01-15-2002	Hiramatsu	
	70	6,349,301	02-19-2002	Mitchell et al.	
	71	6,353,428	03-05-2002	Maggioni et al.	
	72	6,359,612	03-19-2002	Peter et al.	
	73	6,388,657	05-14-2002	Natoli	
	74	6,394,896	05-28-2002	Sugimoto	
	75	6,400,374	06-04-2002	Lanier	
	76	6,407,870	06-18-2002	Hurevich et al.	
	77	6,414,672	07-02-2002	Rekimoto et al.	
	78	6,445,815	09-03-2002	Sato	
	79	6,454,419	09-24-2002	Kitazawa	
	80	6,480,267	11-12-2002	Yanagi et al.	
	81	6,491,396	12-10-2002	Karasawa et al.	
	82	6,501,515	12-31-2002	Iwamura	
	83	6,522,312	02-18-2003	Ohshima et al.	
	84	6,545,706	04-08-2003	Edwards et al.	
	85	6,552,760	04-22-2003	Gotoh et al.	
	86	6,598,978	07-29-2003	Hasegawa	
	87	6,607,275	08-19-2003	Cimini et al.	
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Examiner Signature	Date Considered

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	Filing Date	April 16, 2012
	First Named Inventor	Matthew Bell
	Art Unit	2875
(Multiple sheets used when necessary)	Examiner	Unknown
SHEET 4 OF 19	Attorney Docket No.	KM2326.007D1

U.S. PATENT DOCUMENTS					
Examiner Initials	Cite No.	Document Number *Number - Kind Code (if known)* Example: 1,234,567 B1	Publication Date MM-DD-YYYY	Name of Patentee or Applicant	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear
	91	6,661,918	12-09-2003	Gordon et al.	
	92	6,677,969	01-13-2004	Hongo	
	93	6,707,054	03-16-2004	Ray	
	94	6,707,444	03-16-2004	Hendriks et al.	
	95	6,712,476	03-30-2004	Ito et al.	
	96	6,720,949	04-01-2004	Pryor et al.	
	97	6,732,929	05-11-2004	Good et al.	
	98	6,747,666	06-08-2004	Utterback	
	99	6,752,720	06-22-2004	Clapper et al.	
	100	6,754,370	06-22-2004	Hall-Holt et al.	
	101	6,791,700	09-14-2004	Omura et al.	
	102	6,808,293	10-26-2004	Watanabe et al.	
	103	6,826,727	11-30-2004	Mohr et al.	
	104	6,831,664	12-14-2004	Marmaropoulos et al.	
	105	6,871,982	03-29-2005	Holman et al.	
	106	6,877,882	04-12-2005	Haven et al.	
	107	6,912,313	06-28-2005	Li	
	108	6,965,693	11-15-2005	Kondo et al.	
	109	6,975,360	12-13-2005	Slatter	
	110	6,999,600	02-14-2006	Venetianer	
	111	7,015,894	03-21-2006	Morohoshi	
	112	7,042,440	06-27-2006	Pryor et al.	
	113	7,054,068	05-30-2006	Yoshida et al.	
	114	7,058,204	06-06-2006	Hildreth et al.	
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	Filing Date	April 16, 2012
	First Named Inventor	Matthew Bell
	Art Unit	2875
(Multiple sheets used when necessary)	Examiner	Unknown
SHEET 5 OF 19	Attorney Docket No.	KM2326.007D1

U.S. PATENT DOCUMENTS					
Examiner Initials	Cite No.	Document Number *Number - Kind Code (if known)* Example: 1,234,567 B1	Publication Date MM-DD-YYYY	Name of Patentee or Applicant	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear
	121	7,158,676	01-02-2007	Rainsford	
	122	7,170,492 (KM2326.3PPPCP1)	01-30-2007	Bell	
	123	7,190,832	03-13-2007	Frost et al.	
	124	7,193,608	03-20-2007	Stuerzlinger	
	125	7,227,526	06-05-2007	Hildreth et al.	
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	127	7,262,874	08-28-2007	Suzuki	
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	129	7,289,130	10-30-2007	Satoh et al.	
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	134	7,382,897	06-03-2008	Brown et al.	
	135	7,394,459	07-01-2008	Bathiche et al.	
	136	7,428,542 (KM2326.010A)	09-23-2008	Fink et al.	
	137	7,431,253	10-07-2008	Yeh	
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Examiner Signature	Date Considered
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	Filing Date	April 16, 2012
	First Named Inventor	Matthew Bell
	Art Unit	2875
(Multiple sheets used when necessary)	Examiner	Unknown
SHEET 6 OF 19	Attorney Docket No.	KM2326.007D1

U.S. PATENT DOCUMENTS					
Examiner Initials	Cite No.	Document Number *Number - Kind Code (if known)* Example: 1,234,567 B1	Publication Date MM-DD-YYYY	Name of Patentee or Applicant	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear
	148	7,737,636	06-15-2010	Li et al.	
	149	7,745,771	06-29-2011	Troxell et al.	
	150	7,809,167 (KM2326.005C1)	10-05-2010	Bell	
	151	7,834,846 (KM2326.003DV1)	11-16-2010	Bell	
	152	7,961,906	06-14-2011	Ruedin	
	153	7,971,156	06-28-2011	Albertson et al.	
	154	8,035,612 (KM2326.003CP4)	10-11-2011	Bell et al.	
	155	8,035,624 (KM2326.3CPCPC1)	10-11-2011	Bell et al.	
	156	8,085,293	12-27-2011	Brodsky et al.	
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	158	8,230,367 (KM2326.008A)	07-24-2012	Bell et al.	
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	160	2001/0012001	08-09-2001	Rekimoto et al.	
	161	2001/0033675	10-25-2001	Maurer et al.	
	162	2002/0006583	01-17-2002	Michiels et al.	
	163	2002/0032697	03-14-2002	French et al.	
	164	2002/0041327	04-11-2002	Hildreth et al.	
	165	2002/0064382	05-30-2002	Hildreth et al.	
	166	2002/0081032	06-27-2002	Chen et al.	
	167	2002/0103617	08-01-2002	Uchiyama et al.	
	168	2002/0105623	08-08-2002	Pinhanez	
	169	2002/0130839	09-19-2002	Wallace et al.	
	170	2002/0140633	10-03-2002	Rafii et al.	
	171	2002/0140682	10-03-2002	Brown et al.	
	172	2002/0178440	11-28-2002	Agnihorti et al.	
	173	2003/0032484	02-13-2003	Ohshima et al.	
	174	2003/0091724	05-15-2003	Mizoguchi	
	175	2003/0093784	05-15-2003	Dimitrova et al.	

Examiner Signature	Date Considered

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT	Application No.	13/448,321
	Filing Date	April 16, 2012
	First Named Inventor	Matthew Bell
	Art Unit	2875
(Multiple sheets used when necessary)	Examiner	Unknown
SHEET 7 OF 19	Attorney Docket No.	KM2326.007D1

U.S. PATENT DOCUMENTS					
Examiner Initials	Cite No.	Document Number *Number - Kind Code (if known)* Example: 1,234,567 B1	Publication Date MM-DD-YYYY	Name of Patentee or Applicant	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear
	176	2003/0098819	05-29-2003	Sukthankar et al.	
	177	2003/0103030	06-05-2003	Wu	
	178	2003/0113018	06-19-2003	Nefian et al.	
	179	2003/0122839	07-03-2003	Matraszek et al.	
	180	2003/0137494	07-24-2003	David J. Tulbert	
	181	2003/0161502	08-28-2003	Morihara et al.	
	182	2003/0178549	09-25-2003	Ray.	
	183	2004/0005924	01-08-2004	Watabe et al.	
	184	2004/0015783	01-22-2004	Lennon et al.	
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	188	2005/0028188	02-03-2005	Latona et al.	
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	190	2005/0086695	04-21-2005	Keele et al.	
	191	2005/0185828	04-25-2005	Semba et al.	
	192	2005/0088407 (KM2326.001A)	04-28-2005	Bell	
	193	2005/0104506	05-19-2005	Youh et al.	
	194	2005/0122308 (KM2326.003CP2)	06-09-2005	Bell et al.	
	195	2005/0132266	06-16-2005	Ambrosino et al.	
	196	2005/0147282	07-07-2005	Fujii	
	197	2005/0195598	09-08-2005	Dancs et al.	
	198	2005/0265587	12-01-2005	Schneider	
	199	2006/0010400	01-12-2006	Dehlin et al.	
	200	2006/0031786	02-09-2006	Hillis et al.	
	201	2006/0168515	07-27-2006	Dorsett, Jr. et al.	
	202	2006/0184993	08-17-2006	Goldthwaite et al.	
	203	2006/0187545	08-24-2006	Doi	
	204	2006/0227099	10-12-2006	Han et al.	

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	First Named Inventor	Matthew Bell
	Art Unit	2875
(Multiple sheets used when necessary)	Examiner	Unknown
SHEET 8 OF 19	Attorney Docket No.	KM2326.007D1

U.S. PATENT DOCUMENTS

Examiner Initials	Cite No.	Document Number *Number - Kind Code (if known)* Example: 1,234,567 B1	Publication Date MM-DD-YYYY	Name of Patentee or Applicant	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear
	205	2006/0242145	10-26-2006	Krishnamurthy et al.	
	206	2006/0256382	11-16-2006	Matraszek et al.	
	207	2006/0258397	11-16-2006	Kaplan et al.	
	208	2006/0294247	12-28-2006	Hinckley et al.	
	209	2007/0002039	01-04-2007	Pendleton et al.	
	210	2007/0019066	01-25-2007	Cutler	
	211	2007/0285419	02-13-2007	Givon	
	212	2008/0013826	01-17-2008	Hillis et al.	
	213	2008/0018595	01-24-2008	Hildreth et al.	
	214	2008/0030460	02-07-2008	Hildreth et al.	
	215	2008/0040692	02-14-2008	Sunday et al.	
	216	2008/0062123 (KM2326.3CP4CP1)	03-13-2008	Bell	
	217	2008/0062257	03-13-2008	Corson	
	218	2008/0090484	04-17-2008	Lee et al.	
	219	2008/0150890 (KM2326.3CP3C1)	06-26-2008	Bell et al.	
	220	2008/0252596 (KM2326.006A)	10-16-2008	Bell et al.	
	221	2009/0027337	01-29-2009	Hildreth	
	222	2009/0079813	03-26-2009	Hildreth	
	223	2009/0102788	04-23-2009	Nishida et al.	
	224	2009/0172606	07-02-2009	Dunn et al.	
	225	2009/0235295 (KM2326.001C1)	09-17-2009	Bell et al.	
	226	2010/0026624 (KM2326.011C1)	02-04-2010	Bell et al.	
	227	2010/0039500 (KM2326.013A)	02-18-2010	Bell et al.	
	228	2010/0060722 (KM2326.015A)	03-11-2010	Bell et al.	
	229	2010/0121866 (KM2326.012A)	05-13-2010	Bell et al.	

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	Filing Date	April 16, 2012
	First Named Inventor	Matthew Bell
	Art Unit	2875
(Multiple sheets used when necessary)	Examiner	Unknown
SHEET 9 OF 19	Attorney Docket No.	KM2326.007D1

Examiner Initials	Cite No.	Foreign Patent Document *Country Code-Number-Kind Code* Example: JP 1234567 A1	Publication Date MM-DD-YYYY	Name of Patentee or Applicant	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear	T[1]
	230	EP 0 055 366 A2	07-07-1982	Edgar		
	231	EP 0 626 636 A2	11-30-1994	Arai et al.		
	232	EP 0 913 790 A1	05-06-1999	Takenaka Corp.		
	233	EP 1 689 172 A1 (KM2326.3VR1EP)	06-04-2002	Bell		
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	235	JP 2000-105583	04-11-2000	Ricoh Co. Ltd.		
	236	JP 2002-014997	01-18-2002	NTT Comware Corp.		
	237	JP 2002-092023	03-29-2002	Nippon Telegr & Teleph Corp. (NTT)		
	238	JP 2002-171507	06-14-2002	Yokogawa Electric Corp.		
	239	JP 2003-271084	09-25-2003	Omron Corp.		
	240	JP 2003-517642	05-27-2003	Giraud et al.		
	241	KR 2003-0058894	07-07-2003	Cho Yeong Tark		X-Abs
	242	WO 98/38533 A1	09-03-1998	Maggioni et al.		
	243	WO 00/16562 A1	03-23-2000	General Instrument Corp.		
	244	WO 01/63916 A1	08-30-2001	Slaney et al.		
	245	WO 02/01537 A2	01-03-2002	Koninklijke Philips Electronics		
	246	WO 02/100094 A2 (KM2326.003VPC)	12-12-2002	Bell		
	247	WO 2004/055776 A1 (KM2326.011VPC)	07-01-2004	Reactrix Systems		
	248	WO 2004/097741 A1	11-11-2004	Fujitsu Ltd.		
	249	WO 2005/041578 A2 (KM2326.001VPC)	05-06-2005	Bell et al.		
	250	WO 2005/041579 A2 (KM2326.005VPC)	05-06-2005	Bell		
	251	WO 2005/057398 A2 (KM2326.003BPC)	06-23-2005	Bell et al.		
	252	WO 2005/057399 A2 (KM2326.003HPC)	06-23-2005	Bell et al.		
	253	WO 2005/057921 A2 (KM2326.003PPC)	06-23-2005	Bell et al.		
	254	WO 2005/091651 A2 (KM2326.003GPC)	09-02-2005	Reactrix Systems, Inc.		
	255	WO 2007/019443 A1 (KM2326.003FPC)	02-15-2007	Bell		

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	First Named Inventor	Matthew Bell
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(Multiple sheets used when necessary)	Examiner	Unknown
SHEET 10 OF 19	Attorney Docket No.	KM2326.007D1

FOREIGN PATENT DOCUMENTS						
Examiner Initials	Cite No.	Foreign Patent Document *Country Code-Number-Kind Code* Example: JP 1234567 A1	Publication Date MM-DD-YYYY	Name of Patentee or Applicant	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear	T[1]
	256	WO 2008/124820 A1 (KM2326.006VPC)	10-16-2008	Bell et al.		
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	Filing Date	April 16, 2012
	First Named Inventor	Matthew Bell
	Art Unit	2875
(Multiple sheets used when necessary)	Examiner	Unknown
SHEET 11 OF 19	Attorney Docket No.	KM2326.007D1

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	368	International Preliminary Report on Patentability for PCT/US2004/041318 (KM2326.003BPC), filed December 9, 2004	
	369	International Search Report for PCT/US2004/041318 (KM2326.003BPC), filed December 9, 2004	
	370	Written Opinion of the International Searching Authority for PCT/US2004/041318 (KM2326.003BPC), filed December 9, 2004	
	371	International Preliminary Report on Patentability for PCT/US2006/030720 (KM2326.003FPC), filed on August 4, 2006	
	372	International Search Report for PCT/US2006/030720 (KM2326.003FPC), filed August 4, 2006	
	373	Written Opinion of the International Searching Authority for PCT/US2006/030720 (KM2326.003FPC), filed August 4, 2006	
	374	International Preliminary Report on Patentability for PCT/US2005/008984 (KM2326.003GPC), filed March 18, 2005	
	375	International Search Report for PCT/US2005/008984 (KM2326.003GPC), filed March 18, 2005	
	376	Written Opinion of the International Searching Authority for PCT/US2005/008984 (KM2326.003GPC), filed March 18, 2005	
	377	International Preliminary Report on Patentability for PCT/US2004/041320 (KM2326.003HPC), filed December 9, 2004	
	378	International Search Report for PCT/US2004/041320 (KM2326.003HPC), filed December 9, 2004	
	379	Written Opinion of the International Searching Authority for PCT/US2004/041320 (KM2326.003HPC), filed December 9, 2004	
	380	International Preliminary Report on Patentability for PCT/US2004/041319 (KM2326.003PPC), filed December 9, 2004	
	381	International Search Report for PCT/US2004/041319 (KM2326.003PPC), filed December 9, 2004	
	382	Written Opinion of the International Searching Authority for PCT/US2004/041319 (KM2326.003PPC), filed December 9, 2004	
	383	Article 96(2) Communication dated in European Application No. 02739710.8 (KM2326.003VEP), March 31, 2004	
	384	Observation by third party Michael Saup cited during opposition of European Application No. 02739710.8 filed June 4, 2002 (KM2326.003VEP), dated January 17, 2005	
	385	Observation by third party Petra Trefzger cited during opposition of European Application No. 02739710.8 filed June 4, 2002 (KM2326.003VEP), dated January 17, 2005	
	386	Observation by third party Simon Penny cited during opposition of European Application No. 02739710.8 filed June 4, 2002 (KM2326.003VEP), dated January 17, 2005	

Examiner Signature	Date Considered

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

T[1] - Place a check mark in this area when an English language Translation is attached.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT	Application No.	13/448,321
	Filing Date	April 16, 2012
	First Named Inventor	Matthew Bell
	Art Unit	2875
(Multiple sheets used when necessary)	Examiner	Unknown
SHEET 18 OF 19	Attorney Docket No.	KM2326.007D1

NON PATENT LITERATURE DOCUMENTS			
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, page(s), volume-issue number(s), publisher, city and/or country where published.	T[1]
	387	Article 96(2) Communication in European Application No. 02739710.8 (KM2326.003VEP), dated February 25, 2005	
	388	Summons to Attend Oral Proceedings in European Application No. 02739710.8 (Attorney Docket No. KM2326.003VEP), dated August 12, 2005.	
	389	Notice of Opposition in European Application No. 02739710.8 (Attorney Docket No. KM2326.003VEP) dated May 14, 2007	
	390	Letter dated from Christian Zuckschwerdt regarding EffecTV, (partial machine translation), cited during opposition of European Application No. 02739710.8, filed June 4, 2002 (KM2326.003VEP), May 16, 2007	
	391	Summons to Attend Oral Proceedings in European Application No. 02739710.8 (Attorney Docket No. KM2326.003VEP), dated June 12, 2009	
	392	Decision revoking the European Patent in European Application No. 02739710.8 (KM2326.003VEP), dated December 28, 2009	
	393	Provision of a copy of the minutes in European Application No. 02739710.8 (KM2326.003VEP), dated December 28, 2009	
	394	Letter of the opponent O2 in European Application No. 02739710.8, filed June 4, 2002 (KM2326.003VEP), dated May 28, 2010	
	395	Notice of Opposition in European Application No. 02739710.8 (KM2326.003VEP), dated August 23, 2010	
	396	International Preliminary Examination Report for PCT/US2002/017843 (KM2326.003VPC), filed June 4, 2002	
	397	Written Opinion for PCT/US2002/017843 (KM2326.003VPC), filed June 4, 2002	
	398	International Search Report for PCT/US2002/017843, filed June 4, 2002 (KM2326.003VPC), dated February 5, 2003	
	399	Extended Search Report for European Application No. 06010825.5, filed June 4, 2002 (KM2326.3VR1EP), dated July 6, 2006	
	400	International Preliminary Report on Patentability for PCT/US2004/035478 (KM2326.005VPC), filed October 25, 2004	
	401	International Search Report for PCT/US2004/035478 (KM2326.005VPC), filed October 25, 2004	
	402	Written Opinion of the International Searching Authority for PCT/US2004/035478 (KM2326.005VPC), filed October 25, 2004	
	403	Invitation to Pay Additional Fees and Partial international Search Report on Patentability for PCT/US2004/035478 (KM2326.005VPC), filed October 25, 2004	
	404	International Preliminary Report on Patentability for PCT/US2008/059900 (KM2326.006VPC), filed on April 10, 2008	
	405	International Search Report for PCT/US2008/059900 (KM2326.006VPC), filed April 10, 2008	

Examiner Signature	Date Considered

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

T[1] - Place a check mark in this area when an English language Translation is attached.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT	Application No.	13/448,321
	Filing Date	April 16, 2012
	First Named Inventor	Matthew Bell
	Art Unit	2875
(Multiple sheets used when necessary)	Examiner	Unknown
SHEET 19 OF 19	Attorney Docket No.	KM2326.007D1

NON PATENT LITERATURE DOCUMENTS			
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, page(s), volume-issue number(s), publisher, city and/or country where published.	T[1]
	406	Written Opinion of the International Searching Authority for PCT/US2008/059900 (KM2326.006VPC), filed April 10, 2008	
	407	Official Report in Australian Application No. 2008299883 (KM2326.008VAU), dated December 8, 2010	
	408	International Preliminary Report on Patentability for PCT/US2008/10750 (KM2326.008VPC), filed September 15, 2008	
	409	International Search Report for PCT/US2008/10750 (KM2326.008VPC), filed September 15, 2008	
	410	International Search Report for PCT/US03/40321 (KM2326.011VPC), filed December 15, 2003	

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Examiner Signature	Date Considered

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

T[1] - Place a check mark in this area when an English language Translation is attached.

Electronic Acknowledgement Receipt

EFS ID:	13261706
Application Number:	13448321
International Application Number:	
Confirmation Number:	3370
Title of Invention:	LENS SYSTEM
First Named Inventor/Applicant Name:	Matthew Bell
Customer Number:	20995
Filer:	Don Neil Caceres Pua/Lori Larson
Filer Authorized By:	Don Neil Caceres Pua
Attorney Docket Number:	KM2326.007D1
Receipt Date:	16-JUL-2012
Filing Date:	16-APR-2012
Time Stamp:	18:25:35
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	1501057 6641e5b0feac43ecc7af0de1b2ca2565c685a9e0	no	20

Warnings:	
Information:	

This is not an USPTO supplied IDS fillable form	
Total Files Size (in bytes):	1501057

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.

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/448,321	04/16/2012	Matthew Bell	KM2326.007D1	3370

20995 7590 08/07/2012

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EXAMINER	
STOCK JR, GORDON J	

ART UNIT	PAPER NUMBER
2886	

NOTIFICATION DATE	DELIVERY MODE
08/07/2012	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):

jayna.cartee@knobbe.com
efiling@knobbe.com

Office Action Summary	Application No.	Applicant(s)	
	13/448,321	BELL, MATTHEW	
	Examiner	Art Unit	
	GORDON STOCK JR	2886	

-- 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 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, 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 *16 April 2012*.

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) *1-20* 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) *1-20* is/are rejected.

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

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

Application Papers

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

11)☒ The drawing(s) filed on *16 April 2012* 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).

12)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

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

a)☐ All b)☐ Some * c)☐ None of:

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) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *20120716-1;20120716-2*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Priority

1. The later-filed application must be an application for a patent for an invention which is also disclosed in the prior application (the parent or original nonprovisional application or provisional application). The disclosure of the invention in the parent application and in the later-filed application must be sufficient to comply with the requirements of the first paragraph of 35 U.S.C. 112. See *Transco Products, Inc. v. Performance Contracting, Inc.*, 38 F.3d 551, 32 USPQ2d 1077 (Fed. Cir. 1994).

The disclosure of the prior-filed application, Application No. 12/269,849, fails to provide adequate support or enablement in the manner provided by the first paragraph of 35 U.S.C. 112 for one or more claims of this application. 12/269,849 fails to provide adequate support with regards to **claims 15-20**. 12/269,849 fails to mention a tangible computer readable medium having instructions stored thereoon, the instructions configured for execution by a computing system having one or more hardware processors in order to perform operations comprising: the particular instructing and detecting operations. It appears to mention solely the determining operation with regards to a computer program stored in memory (page 5, first paragraph).

Since there is not adequate support for **claims 15-20** in **12/269,849, claims 15-20** have priority back to the original filing date of March 16, 2012.

Information Disclosure Statement

2. The information disclosure statements (IDS) submitted on July 16, 2012 have been considered by the examiner.

Drawings and Specification

3. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the camera and computing device of **claim 1** must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

4. The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction of the

following is required: it appears that all of **claim 15** lacks proper antecedent basis in the specification.

Claim Objections

5. **Claims 3, 4, 10, 11, and 17** are objected to for the following: 'cluster of lens' should read –cluster of lenses-. Corrections are required.

Claim Rejections - 35 USC § 112

6. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

The following is a quotation of the fourth paragraph of 35 U.S.C. 112:

> Subject to the following paragraph, a claim in dependent form shall contain a reference to a claim previously set forth and then specify a further limitation of the subject matter claimed. A claim in dependent form shall be construed to incorporate by reference all the limitations of the claim to which it refers.

7. **Claim 17** is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

'The condenser lens' lacks proper antecedent basis in the claim.

8. **Claims 16-20** are rejected under 35 USC 112 fourth paragraph as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. **Claims 16-20** do not further limit **claim 15** for they merely comprise the intended use recitation with regards to the instructions. It has been held that a recitation with respect to the manner in which a claimed apparatus is intended to be

employed does not differentiate the claimed apparatus from a prior art apparatus satisfying the claimed structural limitations. Ex Parte Masham, 2 USPQ F.2d 1647 (1987).

Claim Rejections - 35 USC § 102

9. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

10. **Claims 1, 2, 4, 7, 8, 9, 11, and 14** are rejected under 35 U.S.C. 102(e) as being anticipated by **Bell et al. (2008/0252296)-cited by applicant.**

The applied reference has a common inventor with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 102(e) might be overcome either by a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not the invention "by another," or by an appropriate showing under 37 CFR 1.131.

As for **claims 1 and 8**, Bell discloses the following: a system for projecting a pattern of infrared light (abstract; paragraph 0028), the system comprising: a light source including a plurality of emitters configured to emit infrared light (paragraph 0028 and 0030 with Fig. 1: 115), the plurality of emitters arranged in a pattern (paragraph 0030: grouped together or

spatially dispersed); a cluster of lenses located in front of the light source (Fig. 3: 315), the cluster of lenses configured to focus and project light from the emitters in a plurality of directions (Fig. 3: 315 with at least focusing in four different directions), the focused and projected light forming a pattern of light (Fig. 3: 315 with 320); a camera configured to detect the pattern of light on an object illuminated by the plurality of emitters (Fig. 1: 110); and a computing device configured to execute instructions stored in memory to determine a location of the object in space utilizing at least the detected pattern of light on the object (abstract; Fig. 1: 120).

As for **claims 2 and 9**, Bell discloses everything as above (see **claims 1 and 8**). In addition, he discloses wherein the plurality of emitters infrared light emitting diodes (paragraph 0030: grouped together or spatially dispersed) configured to generate infrared light that is detectable by the camera but not by the eye of a human observer interacting with the object (abstract; paragraph 0028 with paragraph 0024).

As for **claims 4 and 11,** Bell discloses everything as above (see **claims 1 and 8**). In addition, he discloses the cluster of lenses includes a Fresnel lens (paragraph 0034).

As for **claims 7 and 14**, Bell discloses everything as above (see **claims 1 and 8**). In addition, he suggests the pattern of light projected by the cluster of lenses is aperiodic along at least one dimension (paragraphs 0031: by virtue of the pattern being a random dot pattern).

11. **Claims 15-20** are rejected under 35 U.S.C. 102(b) as being anticipated by **Bell et al. (2008/0252296)-cited by applicant.**

As for **claims 15-20**, Bell discloses the following: a tangible computer readable medium having instructions stored thereon (paragraph 0065). As for 'configured for execution by a

computing system having one or more hardware processors' and 'in order to perform...' it has been held that a recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus satisfying the claimed structural limitations. Ex Parte Masham, 2 USPQ F.2d 1647 (1987).

With regards to 'instructions,' instructions are functional descriptive material which is non-statutory subject matter. Please see MPEP 2106 IV. B.

If treating the intended recitations as positively cited, with regards to **claims 15, 16, and 20**, Bell discloses the following: a tangible computer readable medium having instructions stored thereon wherein the instructions are executed by a computing system having one or more hardware processors that perform the following operations (**claim 15**) (paragraph 0065: one or more hardware processors demonstrated by plurality of integrated circuits) comprising: instructing a light source to emit light from a plurality of emitters arranged in a pattern, wherein the emitted light is focused in a plurality of directions by a cluster of lenses located in front of the light source in order to form a pattern of light (**claim 15**) (paragraphs 0065-0066 with paragraph 0028 and paragraph 0030 with Fig. 3: 315, 310); detecting the pattern of light on an object illuminated by at least a portion of the pattern of light (**claim 15**) (Fig. 1: 110); determine a location of the object in space utilizing at least the detected pattern of light on the object (**claim 15**) (abstract; Fig. 1: 120); wherein the plurality of emitters includes light emitting diodes (**claim 16**)(paragraph 0030: grouped together or spatially dispersed) configured to generate infrared light that is detectable by the camera but not by the eye of a human observer interacting with the object (**claim 16**)(abstract; paragraph 0028 with paragraph 0024); and

suggests the pattern of light projected by the cluster of lenses is aperiodic along at least one dimension (**claim 20**)(paragraphs 0031: by virtue of the pattern being a random dot pattern).

12. **Claims 15-20** are rejected under 35 U.S.C. 102(b) as being anticipated by **Bell et al. (2005/0110964)-cited by applicant.**

As for **claims 15-20**, Bell demonstrates the following: a tangible computer readable medium having instructions stored thereon (paragraphs 0053, 0054, 0246). As for 'configured for execution by a computing system having one or more hardware processors' and 'in order to perform...' it has been held that a recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus satisfying the claimed structural limitations. Ex Parte Masham, 2 USPQ F.2d 1647 (1987).

With regards to 'instructions,' instructions are functional descriptive material which is non-statutory subject matter. Please see MPEP 2106 IV. B.

Claim Rejections - 35 USC § 103

13. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

14. **Claims 3, 10, and 17** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Bell et al. (2008/0252296)-cited by applicant** in view of **Ogawa et al. (5,978,136)-cited by applicant.**

As for **claims 3, 10, and 17**, Bell discloses everything as above (see **claims 1, 8, and 15**). Bell is silent concerning a condenser lens located between the light source and the cluster of lenses wherein the condenser lens concentrates light from the light source to the cluster of lenses. Nevertheless, Ogawa discloses a condenser lens that concentrates light from a light source to a cluster of lenses (Fig. 1: 200, condenser lens, with 310). Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made to have a condenser lens that concentrates the light from the emitters to the cluster of lenses in order to guide the pattern of light to the cluster for projection.

With regards to **claims 3 and 10**, the applied reference has a common inventor with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art only under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 103(a) might be overcome by: (1) a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not an invention "by another"; (2) a showing of a date of invention for the claimed subject matter of the application which corresponds to subject matter disclosed but not claimed in the reference, prior to the effective U.S. filing date of the reference under 37 CFR 1.131; or (3) an oath or declaration under 37 CFR 1.130 stating that the application and reference are currently owned by the same party and that the inventor named in the application is the prior inventor under 35 U.S.C. 104, together with a terminal disclaimer in accordance with 37 CFR 1.321(c). This rejection might also be overcome by showing that the reference is disqualified under 35 U.S.C. 103(c) as prior art in a rejection under 35 U.S.C. 103(a). See MPEP § 706.02(l)(1) and § 706.02(l)(2).

15. **Claims 5, 12, and 18** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Bell et al. (2008/0252296)-cited by applicant** in view of **Bell et al. (2005/0110964)-cited by applicant.**

As for **claims 5, 12, and 18**, Bell ('296) discloses everything as above (see **claims 1, 8 and 15**). As for the emitters are arranged in an irregular pattern, Bell '296 does not explicitly state this. Nevertheless, he does imply this for the emitters may provide a random dot pattern (paragraphs 0030-0032). And Bell '964 suggests the emitters are arranged in a random pattern (paragraph 0186). Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made to have the emitters arranged in an irregular pattern in order to produce a random dot pattern to be detected.

With regards to **claims 5 and 12**, the applied reference has a common inventor with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art only under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 103(a) might be overcome by: (1) a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not an invention "by another"; (2) a showing of a date of invention for the claimed subject matter of the application which corresponds to subject matter disclosed but not claimed in the reference, prior to the effective U.S. filing date of the reference under 37 CFR 1.131; or (3) an oath or declaration under 37 CFR 1.130 stating that the application and reference are currently owned by the same party and that the inventor named in the application is the prior inventor under 35 U.S.C. 104, together with a terminal disclaimer in accordance with 37 CFR 1.321(c). This rejection might

also be overcome by showing that the reference is disqualified under 35 U.S.C. 103(c) as prior art in a rejection under 35 U.S.C. 103(a). See MPEP § 706.02(l)(1) and § 706.02(l)(2).

16. **Claims 6, 13, and 19** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Bell et al. (2008/0252296)-cited by applicant** in view of **Jewell (5,319,496)-cited by applicant.**

As for **claims 6, 13, and 19,** Bell discloses everything as above (see **claims 1, 8, and 15**). As for wherein the pattern of light projected by one of the lenses from the cluster of lenses overlaps with the pattern of light projected by another of the lenses from the cluster of lenses, Bell is silent. Nevertheless, Jewell does demonstrate the pattern of light projected by one of the lenses from the cluster of lenses overlapping with the pattern of light projected by another of the lenses from the cluster of lenses (Fig. 4: 60, 70 with two patterns of light overlapping as it is delivered to 74). Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made to have the pattern of light projected by one of the lenses from the cluster of lenses overlaps with the pattern of light projected by another of the lenses from the cluster of lenses in order to deliver a pattern of light to the object to be located.

With regards to **claims 6 and 13**, the applied reference has a common inventor with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art only under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 103(a) might be overcome by: (1) a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not an invention "by another"; (2) a showing of a date of invention for the claimed subject matter of the application which corresponds to subject matter disclosed but not claimed in the reference, prior to the effective U.S. filing date of the reference under 37 CFR 1.131; or (3) an oath or declaration

under 37 CFR 1.130 stating that the application and reference are currently owned by the same party and that the inventor named in the application is the prior inventor under 35 U.S.C. 104, together with a terminal disclaimer in accordance with 37 CFR 1.321(c). This rejection might also be overcome by showing that the reference is disqualified under 35 U.S.C. 103(c) as prior art in a rejection under 35 U.S.C. 103(a). See MPEP § 706.02(l)(1) and § 706.02(l)(2).

17. **Claims 1, 2, 5, 7-9, 12, 14-16, 18, and 20** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Bell et al. (2005/0110964)-cited by applicant** in view of **Li et al. (7,737,636)-cited by applicant.**

As for **claims 1 and 8**, Bell discloses the following: a system for projecting a pattern of infrared light (Fig. 17: 1700, IR LED array: 1710), the system comprising: a light source including a plurality of emitters configured to emit light, the plurality of emitters arranged in a pattern (Fig. 17: IR LED array: 1710); a camera configured to detect the pattern of light on an object illuminated by the plurality of emitters (Fig. 17: camera); and a computing device configured to execute instructions stored in memory to determine a location of the object in space utilizing at least the detected pattern of light on the object (Fig. 17: 1740; paragraph 0158, paragraph 0162).

As for a cluster of lenses located in front of the light source, the cluster of lenses configured to focus and project light from the emitters in a plurality of directions, the focused and projected light forming a pattern of light**,** Bell does not explicitly state this. Though, he does suggest that there is a cluster of lenses by showing conical shapes above the illuminator (Fig. 17: 1710) as well as showing that the rays from the illuminator are in different directions (Fig. 17: patterned light as well see Fig. 16: light rays diverging from illuminator). Nevertheless, Li

teaches that lens clusters are typically used with LED arrays (Fig. 7d: 5 with 2 as well see Fig. 6(h).) Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made to have a cluster of lenses located in front of the light source, the cluster of lenses configured to focus and project light from the emitters in a plurality of directions, the focused and projected light forming a pattern of light in order to direct and focus the light from the light source into a predetermined pattern of light.

As for **claims 2 and 9**, Bell in view of Li discloses everything as above (see **claims 1 and 8**). In addition, Bell discloses wherein the plurality of emitters infrared light emitting diodes (Fig. 17: 1710) and suggests it is configured to generate infrared light that is detectable by the camera but not by the eye of a human observer interacting with the object (paragraph 0057).

As for **claims 5, 7, 12, and 14,** Bell in view of Li discloses everything as above (see **claims 1 and 8**). In addition, Bell suggests the emitters are arranged in an irregular pattern and suggests in view of Li the pattern of light projected is aperiodic along at least one dimension (Bell: paragraphs 0074 and 0156; in view of Li there is a cluster of lenses)

If treating the intended recitations as positively cited, with regards to **claims 15**, **16, and 18**, Bell suggests the following: a tangible computer readable medium having instructions stored thereon wherein the instructions are executed by a computing system having one or more hardware processors that perform the following operations (**claim 15**) (paragraphs 0053, 0054, 0246) comprising: instructing a light source to emit light from a plurality of emitters arranged in a pattern (**claim 15**) (paragraph 0054 with Fig. 17: 1710); detecting the pattern of light on an object illuminated by at least a portion of the pattern of light (**claim 15**) (paragraph 0054 with Fig. 17: camera); determine a location of the object in space utilizing at least the detected pattern

of light on the object (**claim 15**) (abstract; Fig. 1: 120); wherein the plurality of emitters includes light emitting diodes (**claim 16**)(Fig. 17: 1710) and suggests it is configured to generate infrared light that is detectable by the camera but not by the eye of a human observer interacting with the object (**claim 16**)(paragraph 0057); and suggests the emitters are arranged in an irregular pattern (paragraph 0186).

As for wherein the emitted light is focused in a plurality of directions by a cluster of lenses located in front of the light source in order to form a pattern of light, Bell does not explicitly state this. Though, he does suggest that there is a cluster of lenses by showing conical shapes above the illuminator (Fig. 17: 1710) as well as showing that the rays from the illuminator are in different directions (Fig. 17: patterned light as well see Fig. 16: light rays diverging from illuminator). Nevertheless, Li teaches that lens clusters are typically used with LED arrays (Fig. 7d: 5 with 2 as well see Fig. 6(h).) Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made to have the emitted light be focused in a plurality of directions by a cluster of lenses located in front of the light source in order to form a pattern of light in order to direct and focus the light from the light source into a predetermined pattern of light.

As for **claim 20**, Bell in view of Li disclose everything as above (see **claim 15**). In addition, Bell suggests in view of Li the pattern of light projected is aperiodic along at least one dimension (Bell: paragraphs 0074 and 0156; in view of Li there is a cluster of lenses)

18. **Claims 3, 10, and 17** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Bell et al. (2005/0110964)-cited by applicant** in view of **Li et al. (7,737,636)-cited by applicant** in view of **Ogawa et al. (5,978,136)-cited by applicant.**

As for **claims 3, 10, and 17**, Bell in view of Li discloses everything as above (see **claims 1, 8 and 15**). Bell is silent concerning a condenser lens located between the light source and the cluster of lenses wherein the condenser lens concentrates light from the light source to the cluster of lenses. Nevertheless, Ogawa discloses a condenser lens that concentrates light from a light source to a cluster of lenses (Fig. 1: 200, condenser lens, with 310). Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made to have a condenser lens located between the light source and the cluster of lenses wherein the condenser lens concentrates light from the light source to the cluster of lenses in order to guide the pattern of light to the cluster for projection.

19. **Claims 4 and 11** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Bell et al. (2005/0110964)-cited by applicant** in view of **Li et al. (7,737,636)-cited by applicant** in view of **Troxell et al. (2008/0245952).**

As for **claims 4 and 11**, Bell in view of Li discloses everything as above (see **claims 1 and 8**). Bell in view of Li does not explicitly state the cluster of lens includes a Fresnel lens. Bell does teach having a Fresnel lens in the system (paragraph 0105). Nevertheless, Troxell teaches a cluster of lenses comprising Fresnel lenses (paragraph 0024, paragraph 0046, paragraph 0047).

Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made to have the cluster of lens includes a Fresnel lens in order to direct the light of the light emitting diode array to form a pattern of light to be detected.

20. **Claims 6, 13, and 19** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Bell et al. (2005/0110964)-cited by applicant** in view of **Li et al. (7,737,636)-cited by applicant** further in view of **Jewell (5,319,496)-cited by applicant.**

As for **claims 6, 13, and 19,** Bell in view of Li discloses everything as above (see **claims 1, 8, and 15**). As for wherein the pattern of light projected by one of the lenses from the cluster of lenses overlaps with the pattern of light projected by another of the lenses from the cluster of lenses, Bell in view of Li is silent. Nevertheless, Jewell does demonstrate the pattern of light projected by one of the lenses from the cluster of lenses overlapping with the pattern of light projected by another of the lenses from the cluster of lenses (Fig. 4: 60, 70 with two patterns of light overlapping as it is delivered to 74). Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made to have the pattern of light projected by one of the lenses from the cluster of lenses overlaps with the pattern of light projected by another of the lenses from the cluster of lenses in order to deliver a pattern of light to the object to be located.

Fax/Telephone Numbers

If the applicant wishes to send a fax dealing with either a proposed amendment or a discussion with a phone interview, then the fax should:

1) Contain either a statement "DRAFT" or "PROPOSED AMENDMENT" on the fax cover sheet; and

2) Should be unsigned by the attorney or agent.

This will ensure that it will not be entered into the case and will be forwarded to the examiner as quickly as possible.

Papers related to the application may be submitted to Group 2800 by fax transmission. The fax phone number for Patent Technology Center 2800 is 571-273-8300.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gordon J. Stock whose telephone number is (571) 272-2431. The examiner can normally be reached on Monday-Friday, 8:00 a.m. - 6:30 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tarifur R. Chowdhury, can be reached at 571-272-2287.

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/Gordon J Stock/

Examiner, Art Unit 2886

Notice of References Cited	Application/Control No. 13/448,321	Applicant(s)/Patent Under Reexamination BELL, MATTHEW	
	Examiner GORDON STOCK JR	Art Unit 2886	Page 1 of 1

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*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-2008/0245952	10-2008	Troxell et al.	250/208.1
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	C	US-			
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	J	US-			
	K	US-			
	L	US-			
	M	US-			

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*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
	O					
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	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
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*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	13448321	BELL, MATTHEW
	Examiner	Art Unit
	GORDON STOCK JR	2886

SEARCHED			
Class	Subclass	Date	Examiner

SEARCH NOTES		
Search Notes	Date	Examiner
references cited by applicant	7/28/12	gjs
356/600-624 (text only) see search history printout	7/28/12	gjs
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362/221,235,236,244,242,299,308,309,326-340 (text only) see search history printout	7/28/12	gjs
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353/79-81 (text only) see search history printout	7/28/12	gjs

INTERFERENCE SEARCH			
Class	Subclass	Date	Examiner

PTO/SB/08 Equivalent

INFORMATION DISCLOSURE STATEMENT BY APPLICANT	Application No.	13/448,321
	Filing Date	April 16, 2012
	First Named Inventor	Matthew Bell
	Art Unit	2875
(Multiple sheets used when necessary)	Examiner	Unknown
SHEET 1 OF 19	Attorney Docket No.	KM2326.007D1

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Examiner Initials	Cite No.	Document Number *Number - Kind Code (if known)* Example: 1,234,567 B1	Publication Date MM-DD-YYYY	Name of Patentee or Applicant	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT	Application No.	13/448,321
	Filing Date	April 16, 2012
	First Named Inventor	Matthew Bell
	Art Unit	2875
(Multiple sheets used when necessary)	Examiner	Unknown
SHEET 2 OF 19	Attorney Docket No.	KM2326.007D1

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	Filing Date	April 16, 2012
	First Named Inventor	Matthew Bell
	Art Unit	2875
(Multiple sheets used when necessary)	Examiner	Unknown
SHEET 3 OF 19	Attorney Docket No.	KM2326.007D1

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT	Application No.	13/448,321
	Filing Date	April 16, 2012
	First Named Inventor	Matthew Bell
	Art Unit	2875
(Multiple sheets used when necessary)	Examiner	Unknown
SHEET 4 OF 19	Attorney Docket No.	KM2326.007D1

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(Multiple sheets used when necessary)	Examiner	Unknown
SHEET 5 OF 19	Attorney Docket No.	KM2326.007D1

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Examiner Initials	Cite No.	Document Number *Number - Kind Code (if known)* Example: 1,234,567 B1	Publication Date MM-DD-YYYY	Name of Patentee or Applicant	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear
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PTO/SB/08 Equivalent

INFORMATION DISCLOSURE STATEMENT BY APPLICANT	Application No.	13/448,321
	Filing Date	April 16, 2012
	First Named Inventor	Matthew Bell
	Art Unit	2875
(Multiple sheets used when necessary)	Examiner	Unknown
SHEET 6 OF 19	Attorney Docket No.	KM2326.007D1

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	Filing Date	April 16, 2012
	First Named Inventor	Matthew Bell
	Art Unit	2875
(Multiple sheets used when necessary)	Examiner	Unknown
SHEET 7 OF 19	Attorney Docket No.	KM2326.007D1

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	First Named Inventor	Matthew Bell
	Art Unit	2875
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SHEET 8 OF 19	Attorney Docket No.	KM2326.007D1

U.S. PATENT DOCUMENTS

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	Filing Date	April 16, 2012
	First Named Inventor	Matthew Bell
	Art Unit	2875
(Multiple sheets used when necessary)	Examiner	Unknown
SHEET 9 OF 19	Attorney Docket No.	KM2326.007D1

Examiner Initials	Cite No.	Foreign Patent Document *Country Code-Number-Kind Code* Example: JP 1234567 A1	Publication Date MM-DD-YYYY	Name of Patentee or Applicant	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear	T[1]
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	Filing Date	April 16, 2012
	First Named Inventor	Matthew Bell
	Art Unit	2875
(Multiple sheets used when necessary)	Examiner	Unknown
SHEET 10 OF 19	Attorney Docket No.	KM2326.007D1

FOREIGN PATENT DOCUMENTS						
Examiner Initials	Cite No.	Foreign Patent Document *Country Code-Number-Kind Code* Example: JP 1234567 A1	Publication Date MM-DD-YYYY	Name of Patentee or Applicant	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear	T[1]
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NON PATENT LITERATURE DOCUMENTS			
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, page(s), volume-issue number(s), publisher, city and/or country where published.	T[1]
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	Filing Date	April 16, 2012
	First Named Inventor	Matthew Bell
	Art Unit	2875
(Multiple sheets used when necessary)	Examiner	Unknown
SHEET 11 OF 19	Attorney Docket No.	KM2326.007D1

NON PATENT LITERATURE DOCUMENTS			
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SHEET 12 OF 19	Attorney Docket No.	KM2326.007D1

NON PATENT LITERATURE DOCUMENTS			
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	Filing Date	April 16, 2012
	First Named Inventor	Matthew Bell
	Art Unit	2875
(Multiple sheets used when necessary)	Examiner	Unknown
SHEET 13 OF 19	Attorney Docket No.	KM2326.007D1

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EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S167	3	US-8081822-$.DID. OR US-8098277-$.DID. OR US-8159682-$.DID.	US-PGPUB; USPAT; USOCR	OR	OFF	2012/07/28 19:32
S168	1	("20090179733").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2012/07/28 19:33
S169	214	("20010012001" | "20010033675" | "20020006583" | "20020032697" | "20020041327" | "20020064382" | "20020081032" | "20020103617" | "20020105623" | "20020130839" | "20020140633" | "20020140682" | "20020178440" | "20020186221" | "20030032484" | "20030076293" | "20030091724" | "20030093784" | "20030098819" | "20030103030" | "20030113018" | "20030122839" | "20030137494" | "20030161502" | "20030178549" | "20040005924" | "20040015783" | "20040046736" | "20040046744" | "20040073541" | "20040091110" | "20040095768" | "20040183775" | "20050088407" | "20050089194" | "20050104506" | "20050110964" | "20050122308" | "20050132266" | "20050147282" | "20050162381" | "20050185828" | "20050195598" | "20050265587" | "20060010400" | "20060031786" | "20060132432" | "20060139314" | "20060168515" | "20060184993" | "20060187545" | "20060227099" | "20060242145" | "20060256382" | "20060258397" | "20060294247" | "20070285419" | "20080040692" | "20080062123" | "20080090484" | "20080150890" | "20080150913" | "20080170776" | "20080245952" | "20080252596" | "20090027337" | "20090077504" | "20090102788" | "20090225196" | "20090235295" | "20100026624" | "20100039500" | "20100060722" | "20100121866" | "2917980" | "3068754" | "3763468" | "4053208" | "4275395" | "4573191" | "4725863" | "4843568" | "4887898" | "4948371" | "5001558" | "5138304" | "5151718" | "5239373" | "5276609" | "5319496" | "5325472" | "5325473" | "5426474" | "5436639" | "5442252" | "5454043" | "5497269" | "5510828" | "5526182" | "5528263").PN. OR ("5528297"	US-PGPUB; USPAT; USOCR	OR	OFF	2012/07/28 19:33

		| "5534917" | "5548694" | "5591972" | "5594469" | "5633691" | "5703637" | "5808784" | "5861881" | "5882204" | "5923380" | "5923475" | "5953152" | "5969754" | "5978136" | "5982352" | "6008800" | "6058397" | "6075895" | "6084979" | "6088612" | "6097369" | "6106119" | "6118888" | "6125198" | "6166744" | "6176782" | "6191773" | "6198487" | "6198844" | "6263339" | "6292171" | "6308565" | "6323895" | "6333735" | "6335977" | "6339748" | "6349301" | "6353428" | "6359612" | "6388657" | "6400374" | "6407870" | "6414672" | "6445815" | "6454419" | "6480267" | "6491396" | "6501515" | "6522312" | "6545706" | "6552760" | "6598978" | "6607275" | "6611241" | "6654734" | "6658150" | "6661918" | "6677969" | "6707054" | "6707444" | "6712476" | "6720949" | "6732929" | "6747666" | "6752720" | "6754370" | "6791700" | "6826727" | "6831664" | "6871982" | "6877882" | "6912313" | "6965693" | "6975360" | "6999600" | "7015894" | "7042440" | "7054068" | "7058204" | "7068274" | "7069516" | "7084859" | "7088508" | "7149262" | "7158676" | "7170492" | "7190832" | "7193608" | "7227526" | "7259747" | "7262874" | "7289130" | "7330584" | "7339521" | "7348963" | "7379563" | "7382897" | "7394459" | "7428542" | "7432917" | "7536032" | "7559841" | "7576727" | "7598942" | "7619824" | "7665041" | "7710391" | "7737636" | "7809167" | "7834846" | "RE41685").PN.				
S170	14	(("5846086") or ("6217449") or ("6270403") or ("6278418") or ("6304267") or ("6394896") or ("6677969") or ("6808293") or ("7129927") or ("7170492") or ("7268950") or ("7431253") or ("7468742") or ("7728280")).PN.	USPAT; USOCR	OR	OFF	2012/07/28 20:02
S171	19	(("7745771") or ("7961906") or ("7971156") or ("80356128035624") or ("8085293") or ("8085994") or ("8230367") or ("20010012001") or ("20050028188") or ("20050039206") or ("20050086695") or ("20050185828") or ("20070002039") or ("20070019066") or ("20080013826") or ("20080018595") or ("20080030460") or ("20080062257") or ("20090079813") or ("20090172606")).PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2012/07/28 20:07
S172	26	(S167 S168 S169 S170 S171) and fresnel	US-PGPUB; USPAT; USOCR	OR	OFF	2012/07/28 20:08
S173	3898	(prismlet lenslet ((micro$1lens lens) near5 (cluster$3 array$3 fragment$3))) same ((project$3 light$3 illuminat$3) near5 pattern$3)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/07/28 20:24

S174	7100	(356/600-624).CCLS.	US-PGPUB; USPAT; USOCR	OR	OFF	2012/07/28 20:25
S175	1758	(359/454,455,721,737,796,797).CCLS.	US-PGPUB; USPAT; USOCR	OR	OFF	2012/07/28 20:25
S176	10309	(362/221,235,236,244,242,299,308,309,326-340).CCLS.	US-PGPUB; USPAT; USOCR	OR	OFF	2012/07/28 20:25
S177	1949	(382/151,159).CCLS.	US-PGPUB; USPAT; USOCR	OR	OFF	2012/07/28 20:25
S178	3306	(348/135-142,169-172).CCLS.	US-PGPUB; USPAT; USOCR	OR	OFF	2012/07/28 20:25
S179	1361	(353/79-81).CCLS.	US-PGPUB; USPAT; USOCR	OR	OFF	2012/07/28 20:25
S180	219	(S174 S175 S176 S177 S178 S179) and S173	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/07/28 20:25
S181	539	S173 and ((ir infrared infra$1red) near10 (emit$4 emiss$3 led))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/07/28 20:26
S182	541	S173 and ((ir infrared infra$1red) near10 (emit$4 emiss$3 led))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/07/28 20:26
S183	4243	(prismlet lenslet ((micro$1lens lens) near5 (cluster$3 array$3 fragment$3))) same ((project$3 light$3 illuminat$3) near5 pattern$3)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/07/28 20:26
S184	581	S183 and ((ir infrared infra$1red) near10 (emit$4 emiss$3 led))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/07/28 20:26
S185	31	(S174 S175 S176 S177 S178 S179) and S184	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/07/28 20:26

7/30/2012 12:59:03 PM
C:\Users\gstock\Documents\EAST\Workspaces\13448321.wsp

PTO/SB/08 Equivalent

INFORMATION DISCLOSURE STATEMENT BY APPLICANT	Application No.	13/448,321
	Filing Date	April 16, 2012
	First Named Inventor	Matthew Bell
	Art Unit	2875
(Multiple sheets used when necessary)	Examiner	Unknown
SHEET 1 OF 1	Attorney Docket No.	KM2326.007D1

U.S. PATENT DOCUMENTS

Examiner Initials	Cite No.	Document Number *Number - Kind Code (if known)* Example: 1,234,567 B1	Publication Date MM-DD-YYYY	Name of Patentee or Applicant	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear
/G.S./	1	8,081,822 (KM2326.002A)	12-20-2011	Bell	
/G.S./	2	8,098,277 (KM2326.009A)	01-17-2012	Bell	
/G.S./	3	8,159,682 (KM2326.007A)	04-17-2012	Bell	
/G.S./	4	2009/0179733	07-16-2009	Hattori et al.	

FOREIGN PATENT DOCUMENTS

Examiner Initials	Cite No.	Foreign Patent Document *Country Code-Number-Kind Code* Example: JP 1234567 A1	Publication Date MM-DD-YYYY	Name of Patentee or Applicant	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear	T[1]
/G.S./	5	JP 10-207619	08-07-1998	Toshiba Corp.		X
/G.S./	6	JP 11-057216	03-02-1999	Sony Corp.		X-Abstract

NON PATENT LITERATURE DOCUMENTS

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, page(s), volume-issue number(s), publisher, city and/or country where published.	T[1]
/G.S./	7	Office Action in U.S. Application No. 12/269,849 (KM2326.007A), dated November 12, 2010	
/G.S./	8	Examiner Interview Summary in U.S. Patent Application No. 12/269,849 (KM2326.007A), dated December 20, 2010	
/G.S./	9	Final Office Action in U.S. Application No. 12/269,849 (KM2326.007A), dated May 12, 2011	
/G.S./	10	Examiner Interview Summary in U.S. Patent Application No. 12/269,849 (KM2326.007A), dated July 6, 2011	
/G.S./	11	Examiner Interview Summary in U.S. Patent Application No. 12/269,849 (KM2326.007A), dated July 14, 2011	
/G.S./	12	Office Action in U.S. Application No. 12/269,849 (KM2326.007A), dated August 18, 2011	
/G.S./	13	Examiner Interview Summary in U.S. Patent Application No. 12/269,849 (KM2326.007A), dated October 14, 2011	
/G.S./	14	Notice of Allowance in U.S. Patent Application No. 12/269,849 (KM2326.007A), dated December 2, 2011	

13615161

Examiner Signature	/Gordon Stock Jr/	Date Considered	07/28/2012

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

T[1] - Place a check mark in this area when an English language Translation is attached.

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	13448321	BELL, MATTHEW
	Examiner	Art Unit
	GORDON STOCK JR	2886

✓	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	07/30/2012								
	1	✓								
	2	✓								
	3	✓								
	4	✓								
	5	✓								
	6	✓								
	7	✓								
	8	✓								
	9	✓								
	10	✓								
	11	✓								
	12	✓								
	13	✓								
	14	✓								
	15	✓								
	16	✓								
	17	✓								
	18	✓								
	19	✓								
	20	✓								

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United States Patent and Trademark Office
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Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
13/448,321	04/16/2012	Matthew Bell	KM2326.007D1

CONFIRMATION NO. 3370

20995
KNOBBE MARTENS OLSON & BEAR LLP
2040 MAIN STREET
FOURTEENTH FLOOR
IRVINE, CA 92614

PUBLICATION NOTICE



Title:LENS SYSTEM

Publication No.US-2012-0200843-A1
Publication Date:08/09/2012

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 (703) 308-9726 or (800) 972-6382, by facsimile at (703) 305-8759, 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

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/448,321	04/16/2012	Matthew Bell	KM2326.007D1	3370

20995 7590 10/05/2012

KNOBBE MARTENS OLSON & BEAR LLP
2040 MAIN STREET
FOURTEENTH FLOOR
IRVINE, CA 92614

EXAMINER	
STOCK JR, GORDON J	
ART UNIT	**PAPER NUMBER**
2886	

NOTIFICATION DATE	DELIVERY MODE
10/05/2012	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):

jayna.cartee@knobbe.com
efiling@knobbe.com

Applicant-Initiated Interview Summary	**Application No.** 13/448,321	**Applicant(s)** BELL, MATTHEW	
	Examiner GORDON STOCK JR	**Art Unit** 2886	

All participants (applicant, applicant's representative, PTO personnel):

(1) *GORDON STOCK JR*. (3) *ATTORNEY RUSSELL JEIDE*.

(2) *ATTORNEY DON PUA*. (4)_____.

Date of Interview: *21 September 2012*.

Type: ☒ Telephonic ☐ Video Conference
☐ Personal [copy given to: ☐ applicant ☐ applicant's representative]

Exhibit shown or demonstration conducted: ☐ Yes ☒ No.
If Yes, brief description: _____.

Issues Discussed ☐101 ☒112 ☒102 ☒103 ☐Others
(For each of the checked box(es) above, please describe below the issue and detailed description of the discussion)

Claim(s) discussed: *1,3,8,10 and 15-20*.

Identification of prior art discussed: *US 2008/0252596; US 20050110964; US 7737636; US 5978136; US 2008/0245952*.

Substance of Interview
(For each issue discussed, provide a detailed description and indicate if agreement was reached. Some topics may include: identification or clarification of a reference or a portion thereof, claim interpretation, proposed amendments, arguments of any applied references etc...)

See Continuation Sheet.

Applicant recordation instructions: The formal written reply to the last Office action must include the substance of the interview. (See MPEP section 713.04). If a reply to the last Office action has already been filed, applicant is given a non-extendable period of the longer of one month or thirty days from this interview date, or the mailing date of this interview summary form, whichever is later, to file a statement of the substance of the interview

Examiner recordation instructions: Examiners must summarize the substance of any interview of record. A complete and proper recordation of the substance of an interview should include the items listed in MPEP 713.04 for complete and proper recordation including the identification of the general thrust of each argument or issue discussed, a general indication of any other pertinent matters discussed regarding patentability and the general results or outcome of the interview, to include an indication as to whether or not agreement was reached on the issues raised.

☒ Attachment

/Gordon J Stock/ Examiner, Art Unit 2886	

Summary of Record of Interview Requirements

Manual of Patent Examining Procedure (MPEP), Section 713.04, Substance of Interview Must be Made of Record
A complete written statement as to the substance of any face-to-face, video conference, or telephone interview with regard to an application must be made of record in the application whether or not an agreement with the examiner was reached at the interview.

Title 37 Code of Federal Regulations (CFR) § 1.133 Interviews
Paragraph (b)

In every instance where reconsideration is requested in view of an interview with an examiner, a complete written statement of the reasons presented at the interview as warranting favorable action must be filed by the applicant. An interview does not remove the necessity for reply to Office action as specified in §§ 1.111, 1.135. (35 U.S.C. 132)

37 CFR §1.2 Business to be transacted in writing.
All business with the Patent or Trademark Office should be transacted in writing. The personal attendance of applicants or their attorneys or agents at the Patent and Trademark Office is unnecessary. The action of the Patent and Trademark Office will be based exclusively on the written record in the Office. No attention will be paid to any alleged oral promise, stipulation, or understanding in relation to which there is disagreement or doubt.

———

The action of the Patent and Trademark Office cannot be based exclusively on the written record in the Office if that record is itself incomplete through the failure to record the substance of interviews.

It is the responsibility of the applicant or the attorney or agent to make the substance of an interview of record in the application file, unless the examiner indicates he or she will do so. It is the examiner's responsibility to see that such a record is made and to correct material inaccuracies which bear directly on the question of patentability.

Examiners must complete an Interview Summary Form for each interview held where a matter of substance has been discussed during the interview by checking the appropriate boxes and filling in the blanks. Discussions regarding only procedural matters, directed solely to restriction requirements for which interview recordation is otherwise provided for in Section 812.01 of the Manual of Patent Examining Procedure, or pointing out typographical errors or unreadable script in Office actions or the like, are excluded from the interview recordation procedures below. Where the substance of an interview is completely recorded in an Examiners Amendment, no separate Interview Summary Record is required.

The Interview Summary Form shall be given an appropriate Paper No., placed in the right hand portion of the file, and listed on the "Contents" section of the file wrapper. In a personal interview, a duplicate of the Form is given to the applicant (or attorney or agent) at the conclusion of the interview. In the case of a telephone or video-conference interview, the copy is mailed to the applicant's correspondence address either with or prior to the next official communication. If additional correspondence from the examiner is not likely before an allowance or if other circumstances dictate, the Form should be mailed promptly after the interview rather than with the next official communication.

The Form provides for recordation of the following information:
- Application Number (Series Code and Serial Number)
- Name of applicant
- Name of examiner
- Date of interview
- Type of interview (telephonic, video-conference, or personal)
- Name of participant(s) (applicant, attorney or agent, examiner, other PTO personnel, etc.)
- An indication whether or not an exhibit was shown or a demonstration conducted
- An identification of the specific prior art discussed
- An indication whether an agreement was reached and if so, a description of the general nature of the agreement (may be by attachment of a copy of amendments or claims agreed as being allowable). Note: Agreement as to allowability is tentative and does not restrict further action by the examiner to the contrary.
- The signature of the examiner who conducted the interview (if Form is not an attachment to a signed Office action)

It is desirable that the examiner orally remind the applicant of his or her obligation to record the substance of the interview of each case. It should be noted, however, that the Interview Summary Form will not normally be considered a complete and proper recordation of the interview unless it includes, or is supplemented by the applicant or the examiner to include, all of the applicable items required below concerning the substance of the interview.

A complete and proper recordation of the substance of any interview should include at least the following applicable items:
1) A brief description of the nature of any exhibit shown or any demonstration conducted,
2) an identification of the claims discussed,
3) an identification of the specific prior art discussed,
4) an identification of the principal proposed amendments of a substantive nature discussed, unless these are already described on the Interview Summary Form completed by the Examiner,
5) a brief identification of the general thrust of the principal arguments presented to the examiner,
   (The identification of arguments need not be lengthy or elaborate. A verbatim or highly detailed description of the arguments is not required. The identification of the arguments is sufficient if the general nature or thrust of the principal arguments made to the examiner can be understood in the context of the application file. Of course, the applicant may desire to emphasize and fully describe those arguments which he or she feels were or might be persuasive to the examiner.)
6) a general indication of any other pertinent matters discussed, and
7) if appropriate, the general results or outcome of the interview unless already described in the Interview Summary Form completed by the examiner.

Examiners are expected to carefully review the applicant's record of the substance of an interview. If the record is not complete and accurate, the examiner will give the applicant an extendable one month time period to correct the record.

Examiner to Check for Accuracy

If the claims are allowable for other reasons of record, the examiner should send a letter setting forth the examiner's version of the statement attributed to him or her. If the record is complete and accurate, the examiner should place the indication, "Interview Record OK" on the paper recording the substance of the interview along with the date and the examiner's initials.

Continuation of Substance of Interview including description of the general nature of what was agreed to if an agreement was reached, or any other comments: With regards to claims 1 and 8 Examiner stated that 'to execute instructions stored in memory/executing instructions stored in memory' should be cancelled from the claims to have priority back to filing date of 60/987,315. With regards to claim 15 Examiner stated that in view of Applicant's disclosure page 3 that it appears that the 'tangible computer readable medium' refers only to a determining operation and not an instructing and detecting operation. In addition, Applicant's parent application does not provide support for 'one or more hardware processors.' In addition, with regards to claims 15-20 to have priority back to the filing date of 60/987,315 Examiner suggested drafting claims 15-20 as a computer vision device/apparatus or computing device rather than a tangible computer readable medium. Examiner also suggested removing intended use recitations from claim 15. It was suggested to incorporate limitations of claim 3 into claim 1 and limitations of claim 10 into claim 8. Examiner agreed that the proposal with regards to claims 1 and 3 and claims 8 and 10 overcomes the prior art of record rejection; however, further search and consideration are necessary. In addition, Examiner mentioned that it appears that a new grounds of rejection might be possible if claim 3 and claim 10's limitations are incorporated into claim 1 and 8 with a new grounds of rejection with regards to US 2008/0252596, 20050110964 with 7737636, 5978136, and 2008/0245952. To overcome a potential rejection under 103(a) with 2008/0252596, Examiner suggested showing that the reference is disqualified under 35 USC 103(c). It was also proposed to the Examiner to further clarify Applicant's invention over the prior art of record with regards to the condensing lens; again, Examiner stated that incorporating the limitations of claims 3 and 10 into claims 1 and 8 overcomes the prior art rejection; however, further search and consideration are necessary. Examiner stated that he would call the attorneys after a formal response is submitted.

Knobbe Martens
INTELLECTUAL PROPERTY LAW

KNOBBE MARTENS OLSON & BEAR LLP

2040 Main St., 14th Fl. Irvine, CA 92614
T (949) 760-0404

Don C. Pua
Don.Pua@knobbe.com

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TO:	Gordon J Stock Jr.		
FIRM:	USPTO		
FACSIMILE NO.:	571-273-2431		
OUR REF.:	KM2326.007D1		
YOUR REF.:	Application No. 13/448,321; Atty Docket No.: KM2326.007D1		
FROM:	Don Pua		
OPERATOR:	Mireya Velez	NO. OF PAGES: 4	(incl. cover sheet)
DATE:	September 17, 2012	TIME:	5:05pm PST

IF YOU DID NOT RECEIVE ALL OF THE PAGES PLEASE CALL BACK IMMEDIATELY
OPERATOR PHONE NO.: (949) 760-0404 FACSIMILE NO.: (949) 760-9502

MESSAGE:

DEAR EXAMINER STOCK,

ATTACHED PLEASE FIND AN INTERVIEW REQUEST FORM FROM MR. DON PUA. SHOULD YOU HAVE ANY QUESTIONS, PLEASE DON'T HESITATE TO CONTACT US.

13989319
091712

PTOL-413A (08-10)
Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE

Doc Code: M865 or FAI.REQ.INTV

Applicant Initiated Interview Request Form

Application No.: 13/448,321 First Named Applicant: Matthew Bell
Examiner: Gordon J. Stock, Jr. Art Unit: 2162 Status of Application: Pending

Tentative Participants:
(1) Examiner Gordon J. Stock, Jr. (2) Don Pua
(3) Russell Jeide (4)

Proposed Date of Interview: September 18 **Proposed Time:** 1:00PM EDT (AM/PM)

Type of Interview Requested:
(1) [✓] Telephonic (2) [ ] Personal (3) [ ] Video Conference

Exhibit To Be Shown or Demonstrated: [ ] YES [✓] NO
If yes, provide brief description:

Issues To Be Discussed

Issues (Rej., Obj., etc)	Claims/ Fig. #s	Prior Art	Discussed	Agreed	Not Agreed
(1) Rej. 112/ Priority	15-20		[X]	[ ]	[ ]
(2) Rej. 102/103	All	Bell et al.	[X]	[ ]	[ ]
(3) Drawings	Fig. 1		[ ]	[ ]	[ ]
(4)			[ ]	[ ]	[ ]

[ ] Continuation Sheet Attached [ ] Proposed Amendment or Arguments Attached

Brief Description of Arguments to be Presented: The Bell '737 reference and the present '321 application were commonly owned by Reactrix at the time the invention was made. Claim 3 is not disclosed by the cited art. Further, claims 15-20 are entitled to the earlier priority date.

An interview was conducted on the above-identified application on 09/21/12

NOTE: This form should be completed and filed by applicant in advance of the interview (see MPEP § 713.01). If this form is signed by a registered practitioner not of record, the Office will accept this as an indication that he or she is authorized to conduct an interview on behalf of the principal (37 CFR 1.32(a)(3)) pursuant to 37 CFR 1.34. This is not a power of attorney to any above named practitioner. See the Instruction Sheet for this form, which is incorporated by reference. By signing this form, applicant or practitioner is certifying that he or she has read the Instruction Sheet. After the interview is conducted, applicant is advised to file a statement of the substance of this interview (37 CFR 1.133(b)) as soon as possible. This application will not be delayed from issue because of applicant's failure to submit a written record of this interview.

/Gordon J Stock/
Examiner/SPE Signature

Applicant/Applicant's Representative Signature

Don C. Pua
Typed/Printed Name of Applicant or Representative

67,028
Registration Number, if applicable

This collection of information is required by 37 CFR 1.133. 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 24 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.

PTOL-413A (08-10)
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 displays a valid OMB control number.

Instruction Sheet for:
APPLICANT INITIATED INTERVIEW REQUEST FORM

(Not to be Submitted to the USPTO)

1. If this form is signed by a registered practitioner not of record, the authority to submit the Applicant Initiated Interview Request Form is pursuant to limited authority to act in a representative capacity under 37 CFR 1.34 and further proof of authority to act in a representative capacity may be required. *See* 37 CFR 1.34.

   The Office will accept the signed form as an indication that the registered practitioner not of record is authorized to conduct an interview on behalf of the principal in pursuant to 37 CFR 1.34.

   For more information, see the "Conducting an Interview with a Registered Practitioner Acting in a Representative Capacity" notice which is available on the USPTO Web site at: http://www.uspto.gov/patents/law/notices/2010.jsp.

2. This is not a power of attorney to any named practitioner. Accordingly, any registered practitioner not of record named on the form does not have authority to sign a request to change the correspondence address, a request for express abandonment, a disclaimer, a power of attorney, or other document requiring the signature of the applicant, assignee of the entire interest or an attorney of record. If appropriate, a separate power of attorney to the named practitioner should be executed and filed in the US Patent and Trademark Office.

3. Any interview concerning an unpublished application under 35 U.S.C. § 122(b) with a registered practitioner not of record, pursuant to 37 CFR 1.34, will be conducted based on the information and files supplied by the practitioner in view of the confidentiality requirements of 35 U.S.C. § 122(a).

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.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant	:	Bell
App. No.	:	13/448,321
Filed	:	April 16, 2012
For	:	LENS SYSTEM
Examiner	:	Stock Jr, Gordon J
Art Unit	:	2886
Conf No.	:	3370

RESPONSE TO NON-FINAL OFFICE ACTION MAILED AUGUST 7, 2012

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

In response to the Non-final Office Action mailed August 7, 2012, please consider the following:

Amendments to the Specification begin on page 2 of this paper.

Amendments to the Claims are reflected in the listing of claims which begins on page 3 of this paper.

Amendments to the Drawings begin on page 6 of this paper. A "New Sheet" for FIG. 5 of the drawings can be found in the Appendix.

Summary of Interview begins on page 7 of this paper.

Remarks begin on page 8 of this paper.

AMENDMENTS TO THE SPECIFICATION

Changes to the specification are shown below, where insertions appear as underlined text (e.g., insertions) while deletions appear as strikethrough text (e.g., ~~deletions~~) or double brackets (e.g., [[~~deletions~~]]).

Please insert the following paragraph indicated below after paragraph 12 (as numbered in the publication of the present application).

[0012] FIG. 4 illustrates a cross-sectional illustration of light as created by an LED in an illuminator light source.

FIG. 5 is a block diagram illustrating light emitted in a cone from an LED in an infrared LED cluster.

Please insert the following paragraph indicated below after paragraph 36 (as numbered in the publication of the present application).

[0036] The use of infrared light (or other types of non-visible or substantially invisible light) may prove useful in that it may be invisible (or nearly invisible) to the human eye of an observer interacting with an illuminated object. In this way, the illuminated object is not obscured by an illumination pattern nor or does the overall appearance of the object appear to have been altered. Notwithstanding, a computing device coupled to a camera may detect the pattern in order to track the object and interactions with the same with an increased degree of accuracy.

FIG. 5 is a block diagram illustrating light emitted in a cone from an LED in the infrared LED cluster 110, which corresponds to lighting source 110 of FIG. 1. The light path is redirected toward the center of the lens cluster by the condenser lens 120, which likewise corresponds to the optional condenser lens of FIG. 1. When the light cone hits the lens cluster 130 (which corresponds to cluster 130 of FIG. 1), different parts of the LED light are focused onto different locations on a distant plane. This causes several bright spots to be created from the light of a single LED. When all the light from all the LEDs is tracked, the result is a dense overlapping pattern of focused light beams creating a discernable pattern that may be detected by a camera(s) 510 and processed by a corresponding computing device 515.

AMENDMENTS TO THE CLAIMS

1. (Currently amended) A system for projecting a pattern of light, the system comprising:

a light source including a plurality of emitters configured to emit light, the plurality of emitters arranged in a pattern;

a cluster of lenses located in front of the light source, the cluster of lenses configured to focus and project light from the emitters in a plurality of directions, the focused and projected light forming a pattern of light;

a condenser lens located between the light source and the cluster of lenses, wherein the condenser lens is configured to concentrate light from each of the plurality of emitters towards a center of the cluster of lenses;

a camera configured to detect the pattern of light on an object illuminated by at least a portion of the pattern of light; and

a computing device configured to ~~execute instructions stored in memory to~~ determine a location of the object in space based on at least the detected pattern of light on the object.

2. (Original) The system of claim 1, wherein the plurality of emitters includes light emitting diodes configured to generate infrared light that is detectable by the camera but not by an eye of a human observer interacting with the object.

3. (Canceled).

4. (Currently amended) The system of claim 1, wherein the cluster of lenses includes a Fresnel lens.

5. (Original) The system of claim 1, wherein the emitters are arranged in an irregular pattern.

6. (Original) The system of claim 1, wherein a first pattern of light projected by one of the lenses from the cluster of lenses overlaps with a second pattern of light projected by another of the lenses from the cluster of lenses.

7. (Original) The system of claim 1, wherein the pattern of light projected by the cluster of lenses is aperiodic along at least one dimension.

8. (Currently amended) A method ~~for projecting a pattern of infrared light, the method~~ comprising:

emitting light from a light source including a plurality of emitters~~, the plurality of emitters~~ arranged in a pattern;

concentrating light from each of the plurality of emitters towards a center of a cluster of lenses using a condenser lens located between the light source and the cluster of lenses;

focusing the emitted light in a plurality of directions using ~~a~~ the cluster of lenses located in front of the light source, the focused light forming a pattern of light;

detecting the pattern of light on an object illuminated by at least a portion of the pattern of light; and

determining a location of the object in space based on at least the detected pattern of light on the object, wherein the location of the object is determined by a computing device ~~executing instructions stored in memory~~.

9. (Original) The method of claim 8, wherein the plurality of emitters includes light emitting diodes configured to generate infrared light that is not detectable by an eye of a human observer interacting with the object.

10. (Canceled).

11. (Currently amended) The method of claim 8, wherein the cluster of lenses includes a Fresnel lens.

12. (Original) The method of claim 8, wherein the emitters are arranged in an irregular pattern.

13. (Original) The method of claim 8, wherein a first pattern of light projected by one of the lenses from the cluster of lenses overlaps with a second pattern of light projected by another of the lenses from the cluster of lenses.

14. (Original) The method of claim 8, wherein the pattern of light projected by the cluster of lenses is aperiodic along at least one dimension.

15-20. (Canceled).

21. (New) A system for projecting a pattern of light, the system comprising:

a computing device configured to analyze images of a pattern of light on an object to determine a location of the object in space based on at least the pattern of light on the object; and

a condenser lens located between a light source including a plurality of emitters configured to emit light and a cluster of lenses, wherein the condenser lens concentrates light from each of the plurality of emitters towards the center of the cluster of lenses;

wherein the light source and cluster of lenses are configured to generate the pattern of light.

22. (New) The system of claim 21, wherein the plurality of emitters includes light emitting diodes configured to generate infrared light that is not detectable by an eye of a human observer interacting with the object.

AMENDMENTS TO THE DRAWINGS

The Office Action objected to the figures as not showing every feature of the invention specified in the claims. In response to an indication by the Examiner (in the below-discussed interview) that having a figure showing these claim features would be required in order to advance prosecution, the Applicant has added FIG. 5 to address the objection to the figures. Applicant therefore respectfully requests the withdrawal of this objection.

The attached New Sheet of drawings includes the added FIG. 5. No new matter has been added by these amendments. Support for FIG. 5 can be found at least in FIG. 4 and in paragraph 35 of the publication, which recites:

> [0035] In FIG. 4, light is emitted in a cone from an LED in the infrared LED cluster 110, which corresponds to lighting source 110 of FIG. 1. The light path is redirected toward the center of the lens cluster by the condenser lens 120, which likewise corresponds to the optional condenser lens of FIG. 1. When the light cone hits the lens cluster 130 (which corresponds to cluster 130 of FIG. 1), different parts of the LED light are focused onto different locations on a distant plane. This causes several bright spots to be created from the light of a single LED. When all the light from all the LEDs is tracked, the result is a dense overlapping pattern of focused light beams creating a discernable pattern that may be detected by a camera(s) and processed by a corresponding computing device.

SUMMARY OF INTERVIEW

A telephone interview was conducted on September 21, 2012 and attended by Examiner Gordon Stock and Applicant's representatives Russell Jeide and Don Pua. Applicant thanks the Examiner for his willingness to discuss claims 1 and 3 and the rejections over U.S. Publication No. 2008/0252296 to Bell and U.S. Patent No. 5,978,136 to Ogawa. Examiner Stock indicated that an amendment proposed during the interview, which is reflected in the amended claims, would overcome the current rejections, subject to further search.

Applicant requests that this paper constitute the Interview Summary. If the Examiner notices any deficiencies in this regard, the Examiner is encouraged to contact the undersigned representative to correct such deficiencies.

REMARKS

The Applicant would like to thank Examiner Stock for the interview extended to the Applicant's counsels of record, representative Russell Jeide and Don Pua. This Amendment is responsive to the Office Action mailed on August 7, 2012 ("Office Action").

In the present amendment, the Applicant amended the specification, amended the drawings, canceled claims, amended the claims, and added new claims. Please reconsider the application in view of the foregoing amendments and the following remarks.

Status of the Claims

Prior to entry of the foregoing amendments, claims 1-20 were pending in this application. Claims 1, 4, 8 and 11 are hereby amended. Claims 3, 10 and 15-20 are canceled. New claims 21-22 are hereby added. Accordingly, claims 1-2, 4-9, 11-14, and 21-22 are currently pending.

New Claims

New claims 21-22 have been added and are believed to be fully distinguished over the cited art of record. The Applicant respectfully submits that no new matter is introduced by way of these new claims.

Objections to the Drawings and Specification

As discussed above, the Applicant has added FIG. 5 to address the objection to the figures.

With respect to the objection to the specification for failure to provide proper antecedent basis, Applicant believes this objection is now moot with the cancellation of claim 15. Applicant therefore respectfully requests the withdrawal of these objections.

Claim Objections

Claims 3, 4, 10, 11 and 17 are objected to for reciting "cluster of lens." The above claims have been amended as requested or canceled. Applicant therefore respectfully requests the withdrawal of these objections.

Claim Rejections under 35 U.S.C. § 112

Applicant believes the amendment to independent claim 8 addresses the rejection of dependent claim 17 for lack of antecedent basis.

In light of their cancellation, the rejections of claim 16-20 are now moot. Applicant therefore respectfully requests the withdrawal of these § 112 rejections.

Claim Rejection under 35 U.S.C. § 102(e)

Independent claims 1 and 8 stand rejected as being anticipated by US Patent Application Publication No. 20080252296 to Bell ("Bell"). Claims 1 and 8 have been amended to recite limitations based on previously pending claim 3 (now canceled). Claim 3 was rejected as obvious over Bell in view of U.S. Patent No. 5,978,136 to Ogawa ("Ogawa").

Further, Applicant would like bring to the Examiner's attention that the present application and Bell were, at the time the invention of the present application was made, owned by Reactrix Systems, Inc, as recorded in Reel 024214, Frame 0121 for the present application and Reel 020974, Frame 0285 for Bell.

Each independent claim is discussed below.

Independent claim 1

With respect to amended claim 1, the Office Action fails to point to teachings in Bell and Ogawa of at least the following features:

> a condenser lens located between the light source and the cluster of lenses, wherein the condenser lens concentrates light from each of the plurality of emitters towards a center of the cluster of lenses.

Based on the discussions with the Examiner, Applicant submits that claim 1 is in condition for allowance.

Independent claim 8

With respect to amended claim 8, the Office Action fails to point to teachings in Bell and Ogawa of at least the following features:

> concentrating light from each of the plurality of emitters towards a center of a cluster of lenses using a condenser lens located between the light source and the cluster of lenses.

Based on the discussions with the Examiner, Applicant submits that claim 8 is in condition for allowance.

Dependent claims

Applicant respectfully submits that the rejections of the dependent claims are improper in view of the respective dependency of each such claim from an allowable independent claim. In addition, the dependent claims recite features that represent additional patentable distinctions over the cited art.

Conclusion

Applicant respectfully submits that the claims are in condition for allowance. The Examiner has issued several rejections and objections in the Office Action. Applicant respectfully traverses the rejections and objections and disagrees with the rejections and objections and with the characterization of the claims. Applicant also respectfully disagrees with any explicit or implicit Official Notice taken to support the rejections and objections.

Furthermore, any remarks in support of patentability of one claim should not be imputed to any other claim, even if similar terminology is used. Any remarks referring to only a portion of a claim should not be understood to base patentability on that portion or that the limitation discussed is essential or critical; rather, patentability must rest on each claim taken as a whole.

In addition, should there be any questions or issues that could be resolved via a telephone conversation, the Applicant invites the Examiner to contact the undersigned at the number shown below.

No Disclaimers or Disavowals

Although the present communication may include alterations to the application or claims, or characterizations of claim scope or referenced art, Applicant is not conceding in this application that previously pending claims are not patentable over the cited references. Rather, any alterations or characterizations are being made to facilitate expeditious prosecution of this application. Applicant reserves the right to pursue at a later date any previously pending or other broader or narrower claims that capture any subject matter supported by the present disclosure, including subject matter found to be specifically disclaimed herein or by any prior prosecution. Accordingly, reviewers of this or any parent, child or related prosecution history shall not reasonably infer that

Applicant has made any disclaimers or disavowals of any subject matter supported by the present application.

Please charge any additional fees, including any fees for additional extension of time, or credit overpayment to Deposit Account No. 11-1410.

Respectfully submitted,

KNOBBE, MARTENS, OLSON & BEAR, LLP

Dated: November 6, 2012

By: _____

Don C. Pua
Registration No. 67,028
Attorney of Record
Customer No. 20995
(949) 721-7629

13754405

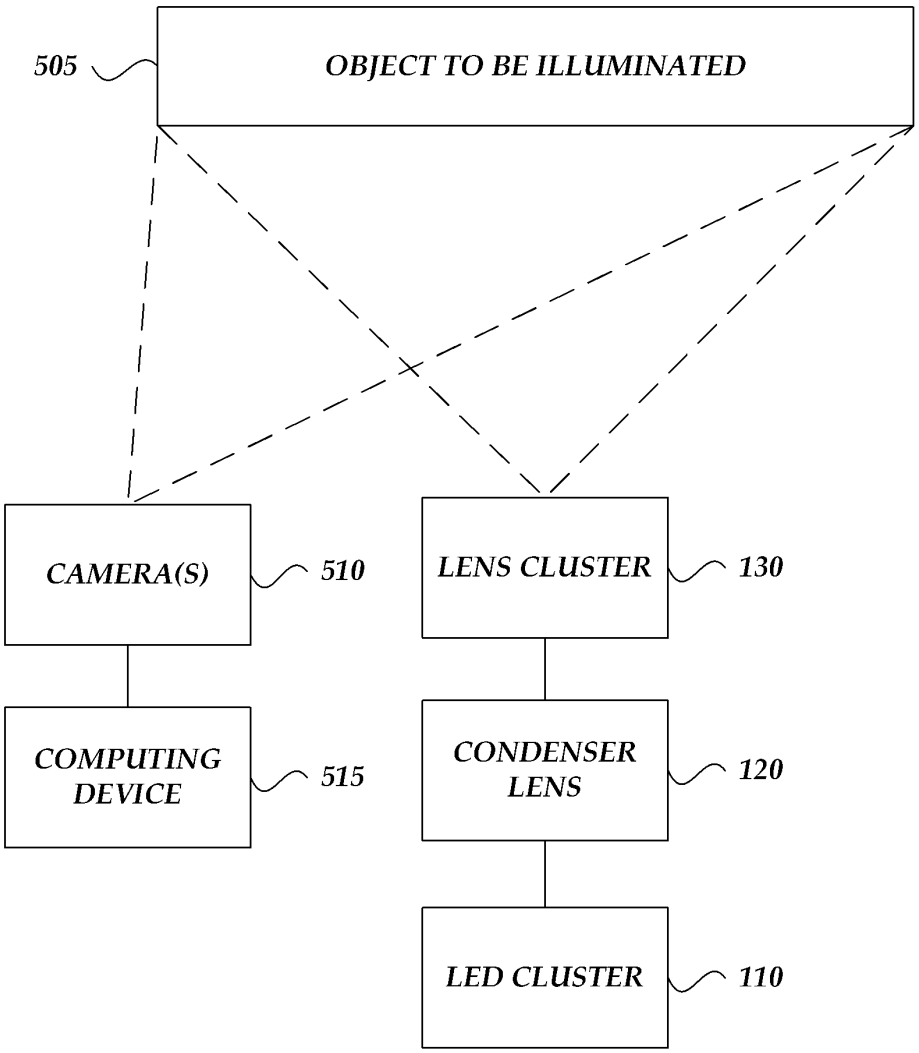

505
OBJECT TO BE ILLUMINATED
CAMERA(S)
510
LENS CLUSTER
130
COMPUTING DEVICE
515
CONDENSER LENS
120
LED CLUSTER
110

Fig. 5

INFORMATION DISCLOSURE STATEMENT

Inventor	:	Matthew Bell
App. No.	:	13/448,321
Filed	:	April 16, 2012
For	:	LENS SYSTEM
Examiner	:	Stock Jr, Gordon J.
Art Unit	:	2886
Conf. No.	:	3370

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

References and Listing

Submitted herewith in the above-identified application is an Information Disclosure Statement listing references for consideration. Copies of any listed foreign and non-patent literature references are being submitted.

Pursuant to 37 C.F.R § 1.97(g) and (h), Applicant makes no representation that the information is considered to be material to patentability. Additionally, inclusion on this list is not an admission that any of the cited documents are prior art in this application. Further, Applicant makes no representation regarding the completeness of this list, or that better art does not exist.

Timing of Disclosure

This Information Disclosure Statement is being filed after receipt of a first office action, but before the mailing date of a final action and before the mailing date of a Notice of Allowance. This Statement is accompanied by the fees set forth in 37 C.F.R. § 1.17(p). The

Application No.: **13/448,321**
Filing Date: **April 16, 2012**

Commissioner is hereby authorized to charge any additional fees which may be required or to credit any overpayment to Account No. 11-1410.

Respectfully submitted,

KNOBBE, MARTENS, OLSON & BEAR, LLP

Dated: November 6, 2012

By: /

Don C. Pua
Registration No. 67,028
Attorney of Record
Customer No. 20995
(949) 721-7629

14280101

PTO/SB/08 Equivalent

INFORMATION DISCLOSURE STATEMENT BY APPLICANT	Application No.	13/448,321
	Filing Date	April 16, 2012
	First Named Inventor	Matthew Bell
	Art Unit	2886
(Multiple sheets used when necessary)	Examiner	Gordon J. Stock Jr.
SHEET 1 OF 1	Attorney Docket No.	KM2326.007D1

U.S. PATENT DOCUMENTS					
Examiner Initials	Cite No.	Document Number *Number - Kind Code (if known)* Example: 1,234,567 B1	Publication Date MM-DD-YYYY	Name of Patentee or Applicant	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear
	1	4,769,697	09-06-1988	Gilley et al.	
	2	5,771,307	06-23-1998	Lu et al.	
	3	5,966,696	10-12-1999	Giraud	
	4	6,873,710	03-29-2005	Cohen-Solal et al.	
	5	7,738,725	06-15-2010	Raskar et al.	
	6	8,199,108 (KM2326.011C1)	06-12-2012	Bell et al.	
	7	8,259,163 (KM2326.015A)	09-04-2012	Bell et al.	
	8	2002/0046100	04-18-2002	Kinjo	
	9	2002/0073417	06-13-2002	Kondo et al.	
	10	2003/0065563	04-03-2003	Elliott et al.	
	11	2002/0078441	06-20-2002	Drake et al.	
	12	2003/0126013	07-03-2003	Shand	
	13	2011/0157316	06-30-2011	Okamoto et al.	

14098617

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

T[1] - Place a check mark in this area when an English language Translation is attached.

Electronic Patent Application Fee Transmittal

Application Number:	13448321
Filing Date:	16-Apr-2012
Title of Invention:	LENS SYSTEM
First Named Inventor/Applicant Name:	Matthew Bell
Filer:	Don Neil Caceres Pua/Will Nguyen
Attorney Docket Number:	KM2326.007D1

Filed as Large Entity

Utility under 35 USC 111(a) Filing Fees

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($)
Miscellaneous:				
Submission- Information Disclosure Stmt	1806	1	180	180
		Total in USD ($)		**180**

Electronic Acknowledgement Receipt

EFS ID:	14162682
Application Number:	13448321
International Application Number:	
Confirmation Number:	3370
Title of Invention:	LENS SYSTEM
First Named Inventor/Applicant Name:	Matthew Bell
Customer Number:	20995
Filer:	Don Neil Caceres Pua/Daniela Lopez
Filer Authorized By:	Don Neil Caceres Pua
Attorney Docket Number:	KM2326.007D1
Receipt Date:	06-NOV-2012
Filing Date:	16-APR-2012
Time Stamp:	17:15:10
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$180
RAM confirmation Number	16103
Deposit Account	111410
Authorized User	KNOBBE MARTENS OLSON AND BEAR

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

Charge any Additional Fees required under 37 C.F.R. Section 1.16 (National application filing, search, and examination fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.17 (Patent application and reexamination processing fees)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		KM2326-007D1_RESPONSE.pdf	441663 330043d6682530a2b0c4d92b794ddeb73cf24364	yes	11

Multipart Description/PDF files in .zip description

Document Description	Start	End
Amendment/Req. Reconsideration-After Non-Final Reject	1	1
Specification	2	2
Claims	3	5
Drawings-only black and white line drawings	6	6
Applicant summary of interview with examiner	7	7
Applicant Arguments/Remarks Made in an Amendment	8	11

Warnings:

Information:

2	Drawings-only black and white line drawings	KM2326-007D1_DRAW.pdf	39727 1fbac436d876f6d9369b52bf7b2f754c39d822d6	no	1

Warnings:

Information:

3		KM2326-007D1_IDS.pdf	92536 c13fe1f020e13c1e0eaf7c5aae5ca61ceddc6707	yes	3

Multipart Description/PDF files in .zip description

Document Description	Start	End
Transmittal Letter	1	2
Information Disclosure Statement (IDS) Form (SB08)	3	3

Warnings:

Information:

4	Fee Worksheet (SB06)	fee-info.pdf	30218 8eeeb83f4426f91b83ebb70e22753843816 3095d	no	2

Warnings:

Information:

Total Files Size (in bytes):	604144

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/06 (07-06)
Approved for use through 1/31/2007. 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 13/448,321	Filing Date 04/16/2012	☐ To be Mailed

APPLICATION AS FILED – PART I

	(Column 1)	(Column 2)	SMALL ENTITY ☐		OR	OTHER THAN SMALL ENTITY	
FOR	NUMBER FILED	NUMBER EXTRA	RATE ($)	FEE ($)		RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A			N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X $ =		OR	X $ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X $ =			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 $250 ($125 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			TOTAL	

APPLICATION AS AMENDED – PART II

		(Column 1)		(Column 2)	(Column 3)	SMALL ENTITY		OR	OTHER THAN SMALL ENTITY	
AMENDMENT	11/06/2012	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 14	Minus	** 20	= 0	X $ =		OR	X $62=	0
	Independent (37 CFR 1.16(h))	* 3	Minus	***3	= 0	X $ =		OR	X $250=	0
	☐ 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	0

		(Column 1)		(Column 2)	(Column 3)					
AMENDMENT		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)		RATE ($)	ADDITIONAL FEE ($)
	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 number found in the appropriate box in column 1.

Legal Instrument Examiner:
/JACQUELINE COUPLIN/

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

NOTICE OF ALLOWANCE AND FEE(S) DUE

20995 7590 03/11/2013

KNOBBE MARTENS OLSON & BEAR LLP
2040 MAIN STREET
FOURTEENTH FLOOR
IRVINE, CA 92614

EXAMINER
STOCK JR, GORDON J

ART UNIT	PAPER NUMBER
2886	

DATE MAILED: 03/11/2013

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/448,321	04/16/2012	Matthew Bell	KM2326.007D1	3370

TITLE OF INVENTION: LENS SYSTEM

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	$1770	$300	$0	$2070	06/11/2013

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 SMALL ENTITY status shown above.

If the SMALL ENTITY is shown as YES, verify your current SMALL ENTITY status:

A. If the status is the same, pay the TOTAL FEE(S) DUE shown above.

B. If the status above is to be removed, check box 5b on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and twice the amount of the ISSUE FEE shown above, or

If the SMALL ENTITY is shown as NO:

A. Pay TOTAL FEE(S) DUE shown above, or

B. If applicant claimed SMALL ENTITY status before, or is now claiming SMALL ENTITY status, check box 5a on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and 1/2 the ISSUE FEE shown above.

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: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.

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)

20995 7590 03/11/2013

KNOBBE MARTENS OLSON & BEAR LLP
2040 MAIN STREET
FOURTEENTH FLOOR
IRVINE, CA 92614

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.
13/448,321	04/16/2012	Matthew Bell	KM2326.007D1	3370

TITLE OF INVENTION: LENS SYSTEM

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	$1770	$300	$0	$2070	06/11/2013

EXAMINER	ART UNIT	CLASS-SUBCLASS
STOCK JR, GORDON J	2886	356-614000

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 credit any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

5. **Change in Entity Status** (from status indicated above)

❑ a. Applicant claims SMALL ENTITY status. See 37 CFR 1.27.

❑ b. Applicant is no longer claiming SMALL ENTITY status. See 37 CFR 1.27(g)(2).

NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____

This collection of information 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.

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/448,321	04/16/2012	Matthew Bell	KM2326.007D1	3370

20995 7590 03/11/2013

KNOBBE MARTENS OLSON & BEAR LLP
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FOURTEENTH FLOOR
IRVINE, CA 92614

EXAMINER	
STOCK JR, GORDON J	

ART UNIT	PAPER NUMBER
2886	

DATE MAILED: 03/11/2013

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(application filed on or after May 29, 2000)

The Patent Term Adjustment to date is 5 day(s). If the issue fee is paid on the date that is three months after the mailing date of this notice and the patent issues on the Tuesday before the date that is 28 weeks (six and a half months) after the mailing date of this notice, the Patent Term Adjustment will be 5 day(s).

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 Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

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.	Applicant(s)	
	13/448,321	BELL, MATTHEW	
	Examiner	Art Unit	
	GORDON STOCK JR	2886	

-- 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 *amendment received on 11/6/12*.

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 *1,2,4-9,11-14,21 and 22*. 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).
   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 20121106
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 _____.

DETAILED ACTION

1. The Amendment received on November 6, 2012 has been entered into the record.

Drawings

2. The Drawing received on November 6, 2012 is accepted by the Examiner.

Information Disclosure Statement

3. The information disclosure statement (IDS) submitted on November 6, 2012 has been considered by the examiner.

Allowable Subject Matter

4. **Claims 1, 2, 4-9, 11-14, and 21-22** are allowed.

The following is an examiner's statement of reasons for allowance:

As to **claim 1**, the prior art of record, taken alone or in combination, fails to disclose or render obvious in a system for projecting a pattern of light 'a condenser lens located between the light source and the cluster of lenses, wherein the condenser lens is configured to concentrate light from each of the plurality of emitters towards a center of the cluster of lenses' and 'a computing device configured to determine a location of the object in space based on at least the detected pattern of light on the object,' in combination with the rest of the limitations of **claim 1.** **Claims 2 and 4-7** are allowed by virtue of their dependency from **claim 1.**

As to **claim 8**, the prior art of record, taken alone or in combination, fails to disclose or render obvious in a method 'concentrating light from each of the plurality of emitters towards a center of a cluster of lenses using a condenser lens located between the light source and the cluster of lenses' and 'determining a location of the object in space based on at least the detected pattern of light on the object, wherein the location of the object is determined by a computing

device' in combination with the rest of the limitations of **claim 8. Claims 9 and 11-14** are allowed by virtue of their dependency from **claim 8.**

As to **claim 21**, the prior art of record, taken alone or in combination, fails to disclose or render obvious in a system for projecting a pattern of light 'a computing device configured to analyze images of a pattern of light on an object to determine a location of the object in space based on at least the pattern of light on the object' and 'a condenser lens located between a light source including a plurality of emitters configured to emit light and a cluster of lenses, wherein the condenser lens concentrates light from each of the plurality of emitters towards the center of the cluster of lenses' in combination with the rest of the limitations of **claim 21. Claim 22** is allowed by virtue of their dependency from **claim 21.**

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Please refer to attached PTO-892.

Fax/Telephone Numbers

If the applicant wishes to send a fax dealing with either a proposed amendment or a discussion with a phone interview, then the fax should:

1) Contain either a statement "DRAFT" or "PROPOSED AMENDMENT" on the fax cover sheet; and

2) Should be unsigned by the attorney or agent.

This will ensure that it will not be entered into the case and will be forwarded to the examiner as quickly as possible.

Papers related to the application may be submitted to Group 2800 by fax transmission. The fax phone number for Patent Technology Center 2800 is 571-273-8300.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gordon J. Stock whose telephone number is (571) 272-2431. The examiner can normally be reached on Monday-Friday, 8:00 a.m. - 6:30 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tarifur R. Chowdhury, can be reached at 571-272-2287.

Information regarding the status of an application may be obtained from the Patent Application lnformation 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).

/Gordon J Stock/

Primary Examiner, Art Unit 2886

Notice of References Cited	Application/Control No. 13/448,321	Applicant(s)/Patent Under Reexamination BELL, MATTHEW	
	Examiner GORDON STOCK JR	Art Unit 2886	Page 1 of 2

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-2012/0293625	11-2012	SCHNEIDER et al.	348/46
*	B	US-2012/0080411	04-2012	MIZUYAMA et al.	219/121.6
*	C	US-2006/0132725	06-2006	Terada et al.	353/102
*	D	US-2006/0078015	04-2006	Franck, Jerome B.	372/030
*	E	US-2006/0001760	01-2006	Matsumura et al.	348/335
*	F	US-2005/0147135	07-2005	Kurtz et al.	372/023
*	G	US-7,671,321	03-2010	Perlman et al.	250/216
*	H	US-6,902,310	06-2005	Im, Yong-seok	362/558
*	I	US-6,882,480	04-2005	Yanagisawa, Yoshiyuki	359/634
*	J	US-6,513,953	02-2003	Itoh, Yoshitaka	362/331
*	K	US-6,464,375	10-2002	Wada et al.	362/268
*	L	US-6,254,246	07-2001	Tiao et al.	362/614
*	M	US-5,900,982	05-1999	Dolgoff et al.	359/619

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Notice of References Cited	Application/Control No. 13/448,321	Applicant(s)/Patent Under Reexamination BELL, MATTHEW	
	Examiner GORDON STOCK JR	Art Unit 2886	Page 2 of 2

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*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-5,662,401	09-1997	Shimizu et al.	353/38
*	B	US-5,473,396	12-1995	Okajima et al.	353/122
*	C	US-5,418,583	05-1995	Masumoto, Yoshihiro	353/38
	D	US-			
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	I	US-			
	J	US-			
	K	US-			
	L	US-			
	M	US-			

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*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
	O					
	P					
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	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
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*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

PTO/SB/08 Equivalent

INFORMATION DISCLOSURE STATEMENT BY APPLICANT	Application No.	13/448,321
	Filing Date	April 16, 2012
	First Named Inventor	Matthew Bell
	Art Unit	2886
(Multiple sheets used when necessary)	Examiner	Gordon J. Stock Jr.
SHEET 1 OF 1	Attorney Docket No.	KM2326.007D1

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Examiner Initials	Cite No.	Document Number *Number - Kind Code (if known)* Example: 1,234,567 B1	Publication Date MM-DD-YYYY	Name of Patentee or Applicant	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear
	1	4,769,697	09-06-1988	Gilley et al.	
	2	5,771,307	06-23-1998	Lu et al.	
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	6	8,199,108 (KM2326.011C1)	06-12-2012	Bell et al.	
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	9	2002/0073417	06-13-2002	Kondo et al.	
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Examiner Signature	/Gordon Stock Jr/	Date Considered	02/01/2013

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

[1] - Place a check mark in this area when an English language Translation is attached.

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /G.S./

/GS/

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	1188	(lenslet cluster microlens) near5 (lens near5 (converg$4 focus$4))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2013/02/21 17:09
L2	68	L1 and (pattern$3 near5 (computer camera))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2013/02/21 17:09
L3	1	2009-P55882.NRAN.	DERWENT	OR	OFF	2013/02/21 17:09
L4	3274	(356/614-620).CCLS.	US-PGPUB; USPAT; USOCR	OR	OFF	2013/02/21 17:16
L5	3	1 and 4	US-PGPUB; USPAT; USOCR	OR	OFF	2013/02/21 17:16
L6	127	(lenslet cluster microlens) near5 (lens near5 (converg$4 focus$4))	FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2013/02/21 17:17
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L10	6427	(lenslet cluster microlens (lens near1 array)) near5 (lens near5 (converg$4 focus$4))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2013/02/21 18:44
L11	1406	(353/79-81).CCLS.	US-PGPUB; USPAT; USOCR	OR	OFF	2013/02/21 18:51
L12	13930	(356/3-22,600-624).CCLS.	US-PGPUB; USPAT; USOCR	OR	OFF	2013/02/21 18:51
L13	10789	(362/221,235,236,244,242,299,308,309,326-340).CCLS.	US-PGPUB; USPAT; USOCR	OR	OFF	2013/02/21 18:52
L14	2125	(382/151,159).CCLS.	US-PGPUB; USPAT; USOCR	OR	OFF	2013/02/21 18:52
L15	10152	(348/135-152,169-172).CCLS.	US-PGPUB; USPAT; USOCR	OR	OFF	2013/02/21 18:52
L16	3652	(348/135-142,169-172).CCLS.	US-PGPUB; USPAT; USOCR	OR	OFF	2013/02/21 18:52
L17	2818	(250/203.1-203.7,202,341.7).CCLS.	US-PGPUB; USPAT; USOCR	OR	OFF	2013/02/21 18:55
L18	148	10 and (11 12 13 14 15 16 17)	US-PGPUB; USPAT; USOCR	OR	OFF	2013/02/21 18:55
L19	31	18 and (((determin$5 detect$3 sens$3 calculat$3 comput$3) near4 (position$3 orient$5 locat$3 distance coordinate)) same pattern$3)	US-PGPUB; USPAT; USOCR	OR	OFF	2013/02/21 19:15
L20	148	10 and (11 12 13 14 15 16 17)	US-PGPUB; USPAT; USOCR	OR	ON	2013/02/21 19:36
L21	33	18 and (((determin$5 detect$3 sens$3 calculat$3 comput$3) near4 (position$3 orient$5 locat$3 distance coordinate)) same pattern$3)	US-PGPUB; USPAT; USOCR	OR	ON	2013/02/21 19:36
L22	8118	(lenslet cluster microlens (lens near1 array)) near5 (lens near5 (condens$3 converg$4 focus$4))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2013/02/21 19:37
L23	189	22 and (11 12 13 14 15 16 17)	US-PGPUB; USPAT; USOCR	OR	OFF	2013/02/21 19:37
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L31	104841	("382").CLAS.	US-PGPUB; USPAT; USOCR	OR	OFF	2013/02/21 20:22
L32	186341	("348").CLAS.	US-PGPUB; USPAT; USOCR	OR	OFF	2013/02/21 20:22
L33	151391	("250").CLAS.	US-PGPUB; USPAT; USOCR	OR	OFF	2013/02/21 20:22
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L35	359	26 and (30 31 32 33)	US-PGPUB; USPAT;	OR	ON	2013/02/21 20:27

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L37	943	((lenslet cluster microlens (lens near1 array)) same ((laser light led emitter) near2 array)) and (((determin$5 detect$3 sens$3 calculat$3 comput$3) near4 (position$3 orient$5 locat$3 distance coordinate)) same pattern$3)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2013/02/21 20:46
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EAST Search History (Interference)

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L45	25	43 and (pattern$3 same light).clm.	US-PGPUB; USPAT; UPAD	OR	ON	2013/02/21 21:17

2/21/2013 9:27:15 PM
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BIB DATA SHEET

CONFIRMATION NO. 3370

SERIAL NUMBER	FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
13/448,321	04/16/2012 RULE	356	2886	KM2326.007D1

APPLICANTS
Matthew Bell, Palo Alto, CA;

**** CONTINUING DATA **************************
This application is a DIV of 12/269,849 11/12/2008 PAT 8,159,682 ok /GS/ 2/21/13
which claims benefit of 60/987,315 11/12/2007
(*)Data provided by applicant is not consistent with PTO records.

**** FOREIGN APPLICATIONS ************************** none /GS/ 2/21/13

**** IF REQUIRED, FOREIGN FILING LICENSE GRANTED ****
04/26/2012

Foreign Priority claimed	STATE OR COUNTRY	SHEETS DRAWINGS	TOTAL CLAIMS	INDEPENDENT CLAIMS
☐ Yes ☑ No 35 USC 119(a-d) conditions met ☐ Yes ☑ No Verified and Acknowledged /GORDON J STOCK JR/ Examiner's Signature	CA	5 ~~4~~	14 ~~20~~	3

☐ Met after Allowance
Initials

ADDRESS /GS/ 2/21/13 /GS/ 2/21/13

KNOBBE MARTENS OLSON & BEAR LLP
2040 MAIN STREET
FOURTEENTH FLOOR
IRVINE, CA 92614
UNITED STATES

TITLE

LENS SYSTEM

FILING FEE RECEIVED		
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Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	13448321	BELL, MATTHEW
	Examiner	Art Unit
	GORDON STOCK JR	2886

CPC- SEARCHED		
Symbol	Date	Examiner

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner

SEARCH NOTES		
Search Notes	Date	Examiner
references cited by applicant	2/21/13	gjs
356/600-624,3-22 (text only) see search history printout	2/21/13	gjs
parent application 12/269,849	2/21/13	gjs
359/454,455,721,737,796,797 (text only) see search history printout	2/21/13	gjs
362/221,235,236,244,242,299,308,309,326-340 (text only) see search history printout	2/21/13	gjs
382/151,159 (text only) see search history printout	2/21/13	gjs
348/135-142,169-172 (text only) see search history printout	2/21/13	gjs
353/79-81 (text only) see search history printout	2/21/13	gjs
250/203.1-203.7,202,341.7 (text only) see search history printout	2/21/13	gjs

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner
	interference search printout	2/21/13	gjs

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
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	Examiner	Art Unit
	GORDON STOCK JR	2886

CPC		
Symbol	Type	Version

CPC Combination Sets				
Symbol	Type	Set	Ranking	Version

US ORIGINAL CLASSIFICATION		INTERNATIONAL CLASSIFICATION									
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356	614	G	0	1	B	11 / 14 (2006.01.01)					
CROSS REFERENCE(S)											
CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)										

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	14	
/GORDON STOCK JR/ Primary Examiner.Art Unit 2886	02/21/2013	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	5

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	13448321	BELL, MATTHEW
	Examiner	**Art Unit**
	GORDON STOCK JR	2886

NONE		**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	14	
/GORDON STOCK JR/ Primary Examiner.Art Unit 2886	02/21/2013	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	5

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	13448321	BELL, MATTHEW
	Examiner	**Art Unit**
	GORDON STOCK JR	2886

☐ 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												
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	15														
	16														

NONE (Assistant Examiner)	(Date)	**Total Claims Allowed:** 14	
/GORDON STOCK JR/ Primary Examiner.Art Unit 2886 (Primary Examiner)	02/21/2013 (Date)	O.G. Print Claim(s) 1	O.G. Print Figure 5

Doc code: RCEX
Doc description: Request for Continued Examination (RCE)

PTO/SB/30EFS (07-09)
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.

REQUEST FOR CONTINUED EXAMINATION(RCE)TRANSMITTAL
(Submitted Only via EFS-Web)

Application Number	13448321	Filing Date	2012-04-16	Docket Number (if applicable)	KM2326.007D1	Art Unit	2886
First Named Inventor	Matthew Bell			Examiner Name	Stock Jr, Gordon J.		

This is a Request for Continued Examination (RCE) under 37 CFR 1.114 of the above-identified application.
Request for Continued Examination (RCE) practice under 37 CFR 1.114 does not apply to any utility or plant application filed prior to June 8, 1995, or to any design application. The Instruction Sheet for this form is located at WWW.USPTO.GOV

SUBMISSION REQUIRED UNDER 37 CFR 1.114

Note: If the RCE is proper, any previously filed unentered amendments and amendments enclosed with the RCE will be entered in the order in which they were filed unless applicant instructs otherwise. If applicant does not wish to have any previously filed unentered amendment(s) entered, applicant must request non-entry of such amendment(s).

☐ Previously submitted. If a final Office action is outstanding, any amendments filed after the final Office action may be considered as a submission even if this box is not checked.

☐ Consider the arguments in the Appeal Brief or Reply Brief previously filed on _____

☐ Other _____

☒ Enclosed

☒ Amendment/Reply

☒ Information Disclosure Statement (IDS)

☐ Affidavit(s)/ Declaration(s)

☐ Other _____

MISCELLANEOUS

☐ Suspension of action on the above-identified application is requested under 37 CFR 1.103(c) for a period of months _____
(Period of suspension shall not exceed 3 months; Fee under 37 CFR 1.17(i) required)

☐ Other _____

FEES

☒ **The RCE fee under 37 CFR 1.17(e) is required by 37 CFR 1.114 when the RCE is filed.**
The Director is hereby authorized to charge any underpayment of fees, or credit any overpayments, to Deposit Account No 111410

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT REQUIRED

☒ Patent Practitioner Signature

☐ Applicant Signature

PTO/SB/30EFS (07-09)
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.

Signature of Registered U.S. Patent Practitioner			
Signature	/CHRISTOPHER M. DILEO/	Date (YYYY-MM-DD)	2013-06-10
Name	Christopher M. DiLeo	Registration Number	61738

This collection of information is required by 37 CFR 1.114. 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.

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 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 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.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant	:	Bell, Matthew
App. No.	:	13/448,321
Filed	:	April 16, 2012
For	:	LENS SYSTEM
Examiner	:	Stock Jr., Gordon J.
Art Unit	:	2886
Conf. No.	:	3370

AMENDMENT AND REMARKS ACCOMPANYING A REQUEST FOR CONTINUED EXAMINATION

Mail Stop RCE
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Commissioner:

In response to the Notice of Allowance mailed March 11, 2013, Applicant requests continued examination in view of the following:

Amendments to the Claims as reflected in the listing of claims which begins on page 2 of this paper; and

Remarks beginning on page 6 of this paper.

AMENDMENTS TO THE CLAIMS

The listing of claims below replaces and supersedes all previous listing of claims in this application.

LISTING OF CLAIMS:

1. (Currently Amended) A system for projecting a pattern of light, the system comprising:

a light source including a plurality of emitters configured to emit light, the plurality of emitters arranged in a pattern;

a cluster of lenses located in front of the light source, the cluster of lenses configured to focus and project light from the emitters in a plurality of directions, the focused and projected light forming [[a]] the pattern of light; and

a condenser lens located between the light source and the cluster of lenses, wherein the condenser lens is configured to concentrate light from each of the plurality of emitters towards a center of the cluster of lenses;

~~a camera configured to detect the pattern of light on an object illuminated by at least a portion of the pattern of light; and~~

~~a computing device configured to determine a location of the object in space based on at least the detected pattern of light on the object.~~

2. (Currently Amended) The system of claim 1, wherein the plurality of emitters includes light emitting diodes configured to generate infrared light that is detectable by ~~the~~ a camera but not by an eye of a human observer interacting with ~~the~~ an object illuminated by at least a portion of the pattern of light.

3. (Canceled).

4. (Previously Presented) The system of claim 1, wherein the cluster of lenses includes a Fresnel lens.

5. (Original) The system of claim 1, wherein the emitters are arranged in an irregular pattern.

6. (Original) The system of claim 1, wherein a first pattern of light projected by one of the lenses from the cluster of lenses overlaps with a second pattern of light projected by another of the lenses from the cluster of lenses.

7. (Original) The system of claim 1, wherein the pattern of light projected by the cluster of lenses is aperiodic along at least one dimension.

8. (Currently Amended) A method comprising:

emitting a plurality of lights ~~from a light source including a plurality of emitters~~ arranged in a pattern;

concentrating the plurality of lights towards a central location ~~from each of the plurality of emitters towards a center of a cluster of lenses using a condenser lens located between the light source and the cluster of lenses~~; and

focusing the emitted light in a plurality of directions from the central location ~~using the cluster of lenses located in front of the light source~~, the focused light forming a pattern of light~~;~~

~~detecting the pattern of light on an object illuminated by at least a portion of the pattern of light; and~~

~~determining a location of the object in space based on at least the detected pattern of light on the object, wherein the location of the object is determined by a computing device~~.

9. (Currently Amended) The method of claim 8, wherein said emitting ~~the plurality of emitters~~ includes ~~light emitting diodes configured to generate~~ generating infrared light that is not detectable by an eye of a human observer interacting with ~~the~~ an object illuminated by at least a portion of the pattern of light.

10. (Canceled).

11. (Currently Amended) The method of claim 8, wherein said concentrating comprises concentrating the plurality of lights towards a center of a ~~the~~ cluster of lenses ~~includes~~ including a Fresnel lens.

12. (Currently Amended) The method of claim 8, wherein the pattern of light comprises ~~emitters are arranged in~~ an irregular pattern.

13. (Currently Amended) The method of claim 8, wherein the pattern of light includes a first pattern of light ~~projected by one of the lenses from the cluster of lenses overlaps~~ overlapping with a second pattern of light ~~projected by another of the lenses from the cluster of lenses~~.

14. (Currently Amended) The method of claim 8, wherein the pattern of light ~~projected by the cluster of lenses~~ is aperiodic along at least one dimension.

15–20. (Canceled).

21. (Currently Amended) A system for projecting a pattern of light, the system comprising:

~~a computing device configured to analyze images of a pattern of light on an object to determine a location of the object in space based on at least the pattern of light on the object; and~~

a light source including a plurality of emitters configured to emit light;

a cluster of lenses configured to receive the emitted light; and

a condenser lens located between [[a]] said light source ~~including a plurality of emitters configured to emit light~~ and [[a]] said cluster of lenses, ~~wherein~~ the condenser lens ~~concentrates~~ concentrating light from each of the plurality of emitters towards the center of the cluster of lenses;

wherein the light source and cluster of lenses are configured to generate ~~the~~ a pattern of light.

22. (Previously Presented) The system of claim 21, wherein the plurality of emitters includes light emitting diodes configured to generate infrared light that is not detectable by an eye of a human observer interacting with the object.

23. (New) The system of claim 21, further comprising a computing device configured to analyze images of the pattern of light on an object to determine a location of the object in space based on at least the pattern of light on the object.

24. (New) The system of claim 1, further comprising:

a camera configured to detect the pattern of light on an object illuminated by at least a portion of the pattern of light; and

a computing device configured to determine a location of the object in space based on at least the detected pattern of light on the object.

25. (New) The method of claim 8, further comprising:

detecting the pattern of light on an object illuminated by at least a portion of the pattern of light; and

determining a location of the object in space based on at least the detected pattern of light on the object

REMARKS

In the Notice of Allowance dated March 11, 2013, the Examiner allowed Claims 1, 2, 4–9, 11–14, 21, and 22. Applicant thanks the Examiner for the statement of allowance of the previously pending claims. By this paper, Claims 1, 2, 8, 9, 11–14, and 21 are amended and Claims 23–25 are introduced. The amendments are supported at least by the previously pending claims. No new matter is added. Applicant requests reconsideration of the claims in light of the amendments above and remarks that follow.

Discussion of Amended Independent Claims

Applicant has amended independent Claims 1, 8, and 21 to further clarify the subject matter recited therein. Specifically, Applicant has clarified the aspects of the lens system and method recited in the claims.

Applicant submits that the prior art of record does not disclose the combination of features in the independent claims at least for similar reasons as indicated in the Examiner's statement of reasons for allowance. *Notice of Allowance* item 4, p. 2. Accordingly, Applicant respectfully submits the claims are still in condition for allowance.

Discussion of Dependent Claims

The remaining claims each depend directly or indirectly from one of the independent claims discussed above. Applicant respectfully submits that these dependent claims are in condition for allowance for at least the same reasons discussed with respect to the independent claims, and for their own patentable features.

Rescission of Any Prior Disclaimers and Request to Revisit Art

The claims of the present application as amended may be broader in scope than the claims previously pursued during prosecution of this application. To the extent that any prior amendments or characterizations of the scope of any claim or referenced art

could be construed as a disclaimer of any subject matter supported by the present disclosure, Applicants hereby rescind and retract such disclaimer. Accordingly, the references previously considered during prosecution may need to be re-visited.

No Disclaimers or Disavowals

Although the present communication may include alterations to the application or claims, or characterizations of claim scope or referenced art, Applicant is not conceding in this application that previously pending claims are not patentable over the cited references. Rather, any alterations or characterizations are being made to facilitate expeditious prosecution of this application. Applicant reserves the right to pursue at a later date any previously pending or other broader or narrower claims that capture any subject matter supported by the present disclosure, including subject matter found to be specifically disclaimed herein or by any prior prosecution. Accordingly, reviewers of this or any parent, child or related prosecution history shall not reasonably infer that Applicant has made any disclaimers or disavowals of any subject matter supported by the present application.

Conclusion

In view of the forgoing, Applicant respectfully submits that Claims , as presented herein, define subject matter that is patentable over the references of record. Accordingly, Applicant respectfully submits that the indicated claims remain in condition for immediate allowance and such prompt allowance of the same is respectfully requested. If the Examiner finds any remaining impediment to the prompt allowance of these claims that could be clarified with a telephone conference, the Examiner is respectfully requested to initiate the same with the undersigned.

Please charge any additional fees, including any fees for additional extension of time, or credit overpayment to Deposit Account No. 11-1410.

Respectfully submitted,

KNOBBE, MARTENS, OLSON & BEAR, LLP

Dated: June 10, 2013

By: /CHRISTOPHER M. DILEO/
Christopher M. DiLeo
Registration No. 61,738
Attorney of Record
Customer No. 20,995
(858) 707-4000

15563959 // 061013

INFORMATION DISCLOSURE STATEMENT

Inventor	:	Matthew Bell
App. No.	:	13/448,321
Filed	:	April 16, 2012
For	:	LENS SYSTEM
Examiner	:	Stock Jr, Gordon J.
Art Unit	:	2886
Conf. No.	:	3370

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

References and Listing

Submitted herewith in the above-identified application is an Information Disclosure Statement listing references for consideration. Copies of any listed foreign and non-patent literature references are being submitted.

For certain cited non-English patent and/or non-patent references, machine translations of the references (and/or Abstracts) are included, and inclusion is indicated in the last column. Applicant makes no representation as to the accuracy of the English machine translations. If the Examiner would like additional information regarding these references or if anything is unclear, the Examiner is invited to request such information, and Applicant will attempt to comply with any such request.

Pursuant to 37 C.F.R. § 1.97(g) and (h), Applicant makes no representation that the information is considered to be material to patentability. Additionally, inclusion on this list is not an admission that any of the cited documents are prior art in this application. Further, Applicant makes no representation regarding the completeness of this list, or that better art does not exist.

Timing of Disclosure

This Information Disclosure Statement is being filed within three months of the filing date or date of national phase entry, with an RCE or before receipt of a First Office Action after an RCE and no fee is required.

The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment, to Account No. 11-1410.

Respectfully submitted,

KNOBBE, MARTENS, OLSON & BEAR, LLP

Dated: June 10, 2013

By: /CHRISTOPHER M. DILEO/
Christopher M. DiLeo
Registration No. 61,738
Attorney of Record
Customer No. 20,995
(858) 707-4000

15556346 sma060713

PTO/SB/08 Equivalent

INFORMATION DISCLOSURE STATEMENT BY APPLICANT	Application No.	13/448,321
	Filing Date	April 16, 2012
	First Named Inventor	Matthew Bell
	Art Unit	2886
(Multiple sheets used when necessary)	Examiner	Stock Jr, Gordon J.
SHEET 1 OF 1	Attorney Docket No.	KM2326.007D1

U.S. PATENT DOCUMENTS					
Examiner Initials	Cite No.	Document Number *Number - Kind Code (if known)* Example: 1,234,567 B1	Publication Date MM-DD-YYYY	Name of Patentee or Applicant	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear
	1	6,351,222	02-26-2002	Swan et al.	
	2	8,018,579	09-13-2011	Krah	
	3	2008/0036732	02-14-2008	Wilson et al.	
	4	2012/0287044 (KM2326.008D1)	11-15-2012	Bell et al.	
	5	2012/0317511 (KM2326.015C1)	12-13-2012	Bell et al.	

FOREIGN PATENT DOCUMENTS						
Examiner Initials	Cite No.	Foreign Patent Document *Country Code-Number-Kind Code* Example: JP 1234567 A1	Publication Date MM-DD-YYYY	Name of Patentee or Applicant	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear	T[1]
	6	JP 2004-246578	09-02-2004	Nippon Telegr & Teleph Corp. (NTT)		X-Abs
	7	JP 2007-514242	05-31-2007	Bell et al.		X-Abs
	8	WO 2005/003948	01-13-2005	Sony Computer Entertainment Inc.		X-Abs

NON PATENT LITERATURE DOCUMENTS			
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, page(s), volume-issue number(s), publisher, city and/or country where published.	T[1]

15559476

Examiner Signature	Date Considered

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

T[1] - Place a check mark in this area when an English language Translation is attached.

PATENT ABSTRACTS OF JAPAN

(11)Publication number : 2004-246578
(43)Date of publication of application : 02.09.2004

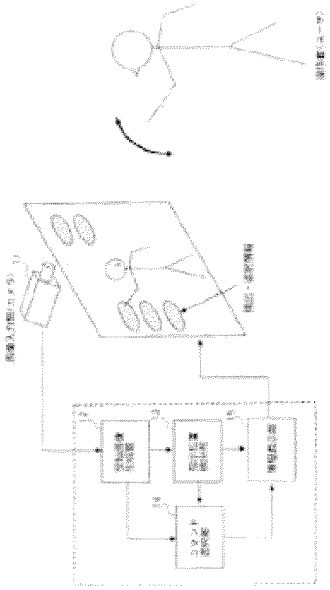
(51)Int.Cl. G06T 11/80
G06F 3/03
G06F 3/033
G06T 1/00
G06T 7/20

(21)Application number : 2003-035122
(22)Date of filing : 13.02.2003

(71)Applicant : NIPPON TELEGR & TELEPH CORP <NTT>
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ONOZAWA AKIRA
NOJIMA HISAO
HARADA IKUO
SATO HIDENORI
KITAHASHI YOSHINORI

(54) INTERFACE METHOD AND DEVICE USING SELF-IMAGE DISPLAY, AND PROGRAM

(57)Abstract:
PROBLEM TO BE SOLVED: To provide a highly convenient interface device capable of detecting an operation in a non-contact status and in an arbitrary place.
SOLUTION: An image including an operator is designated by an image inputting part 11. An image(inverted image) photographed by the image inputting part 11, and inverted right and left is generated by an inverted image generating part 12. A position(user instructed position) shown by a user with the site of the body such as the finger is detected on the inverted image by an instructed position detection part 13. A command selecting part 14 collates the user instructed position obtained by the instructed position detecting part 13 with the display position of a plurality of command information displayed at an information display part 15, and retrieves and selects the command information to be instructed by the user from their positional relation.



(19)日本国特許庁(JP)　(12)公開特許公報(A)　(11)特許出願公開番号
特開2004-246578
(P2004-246578A)
(43)公開日　平成16年9月2日(2004.9.2)

(51)Int.Cl.[7]	F I			テーマコード（参考）
G06T 11/80	G06T	11/80	E	5B050
G06F 3/03	G06F	3/03	330Z	5B057
G06F 3/033	G06F	3/03	380R	5B068
G06T 1/00	G06F	3/033	310Y	5B087
G06T 7/20	G06T	1/00	340B	5L096

審査請求 未請求　請求項の数 5　ＯＬ　（全 11 頁）　最終頁に続く

(21)出願番号　特願2003-35122(P2003-35122)
(22)出願日　平成15年2月13日(2003.2.13)

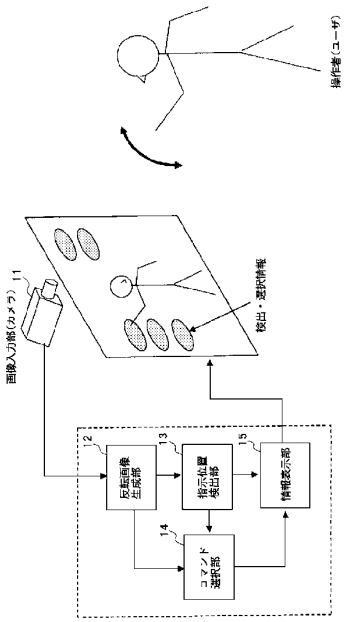
（特許庁注：以下のものは登録商標）
フロッピー

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最終頁に続く

(54)【発明の名称】自己画像表示を用いたインタフェース方法、装置、およびプログラム

(57)【要約】
【課題】非接触で、かつ任意の場所での動作検出が可能で、利便性が向上したインタフェース装置を提供する。
【解決手段】画像入力部１１によって操作者を含む画像が指定される。反転画像生成部１２によって、画像入力部１１で撮影された左右反転させた画像（反転画像）が生成される。指示位置検出部１３は反転画像上で、ユーザが手指等の体の部位で指し示す位置（ユーザ指示位置）を検出する。コマンド選択部１４は、指示位置検出部１３で得られたユーザ指示位置と、情報表示部１５で表示される複数のコマンド情報の表示位置を照らし合わせ、両者の位置関係からユーザが指示しようとするコマンド情報を探索し選択する。
【選択図】　図１



【特許請求の範囲】
【請求項１】
カメラからの画像を入力し、人間の動作を認識するインタフェース方法であって、
操作者を含む画像を撮影する画像入力ステップと、
入力された画像を左右反転した反転画像を生成するステップと、
該反転画像上で、操作者の指定する位置を検出するステップと、
該反転画像上で、操作者の指定するコマンドを選択するステップと、
該指定された位置とコマンドに基づき該反転画像上に情報を表示するステップとを有するインタフェース方法。
【請求項２】
前記コマンドを選択するステップは、
該反転画像上に表示された実空間が撮影された画像中において、予め任意に実物体位置を登録するステップと、
該反転画像上で、操作者の指定する実物体を予め登録された複数の実物体の中から検出するステップとを含む請求項１記載のインタフェース方法。
【請求項３】
カメラからの画像を入力し、人間の動作を認識するインタフェース装置であって、
操作者を含む画像を撮影する画像入力手段と、
入力された画像を左右反転した反転画像を生成する手段と、
該反転画像上で、操作者の指定する位置を検出する手段と、
該反転画像上で、操作者の指定するコマンドを選択する手段と、
該指定された位置とコマンドに基づき該反転画像上に情報を表示する手段とを有するインタフェース装置。
【請求項４】
前記コマンドを選択する手段は、該反転画像上に表示された実空間が撮影された画像中において、予め任意の実物体位置を登録する手段と、該反転画像上で、操作者の指定する実物体を予め登録された複数の実物体の中から検出する手段とを含む請求項３記載のインタフェース装置。
【請求項５】
請求項１または２に記載のインタフェース方法をコンピュータに実行させるためのインタフェースプログラム。
【発明の詳細な説明】
【０００１】
【発明の属する技術分野】
本発明は、カメラからの画像を入力とし、人間の動作に基づき画面上でメニューを選択するインタフェース方法および装置に関する。
【０００２】
【従来の技術】
従来、コンピュータと人間とのインタフェースにおいて、カメラからの画像を入力とし、人間の動作に基づき、画面上でメニュー選択するインタフェース装置としては、キーボードやマウス等のポインティング装置を用いる装置がある。また、体にマーカーを装着しカメラからの画像情報から動きを検出する方法や、体にセンサを装着し直接その動きを検出する方法がある。さらには、体に何も装着せずに、カメラからの入力画像等の情報から人間の動きを検出する方法もある。
【０００３】
このような方法を用いたインタフェース装置の第１の従来例として、現在一般のコンピュータに接続可能で市販されている装置として、キーボード、マウス、タッチパネル型のディスプレイがある。これらはいずれもユーザの手の動きを検出し、入力情報に変換するものである。
【０００４】

また、第２の従来例として、モーションキャプチャシステム関連の製品で、体にマーカーを装着し画像処理によって動きを検出する装置がある。例えば、Ｖｉｃｏｎ　Ｍｏｔｉｏｎ　Ｓｙｓｔｅｍｓ　Ｌｔｄ．社の「３次元動作解析システムＶｉｃｏｎ」（販売元：株式会社ナックイメージテクノロジー）は、体の複数の部位に球形の反射マーカーを貼付け、複数台のカメラからの入力画像から画像処理により各マーカーの３次元座標を算出する方法である。

【０００５】

また、第３の従来例として、体に動作計測可能なセンサを装着し、センサ情報から動きを検出する装置、例えば、磁気センサを用いた装置（ＡＳＣＥＮＳＩＯＮ社の「Ｍｏｔｉｏｎ　Ｓｔａｒ」等）や、機械式センサを用いた装置（スパイス社の「Ｇｙｐｓｙ」、Ｉｍｍｅｒｓｉｏｎ社の「Ｃｙｂｅｒ　Ｇｌｏｖｅ」等）などがある。

【０００６】

また、第４の従来例として、体に何も装着せずにカメラ入力画像のみから動きを検出する装置がある（非特許文献１）。本方法は、画像処理によりマーカーやセンサを装着することなく人物の身振り認識をする方法で、画像から人物の動作に関わる特徴の抽出を行い動作認識を行う。

【０００７】

また、第５の従来例として、Ｖｉｖｉｄ　Ｇｒｏｕｐ社のＧｅｓｔｕｒｅ　Ｘｔｒｅｍｅ　Ｓｏｆｔｗａｒｅ関連製品（例えばＳｏｃｃｅｒ　ＧＸ，　Ｖｏｌｌｅｙｂａｌｌ等）がある。本製品は、ＣＧ背景画像上に自己画像を重ね合わせ、画像上でＣＧのボール等とユーザの体との接触判定を行い、その結果に基づいてゲーム等のＣＧソフトとユーザとのインタフェースを実現している。

【０００８】

また、第６の従来例として、非特許文献２に記載の方法がある。本方法は、自画像上にＣＧのアイコンを表示させ、カメラに向かって行った動作に基づき希望のアイコンを選択（実行）するものである。

【０００９】

【非特許文献１】

桐島ら、“注視点の学習と選択制御による身振りの実時間画像認識”、　ＰＲＭＵ２００１－２０３，　２００２．１

【非特許文献２】

佐木ら、“パソコン映像入力を用いたアクション・インタフェースの試み”、第１２回ヒューマン・インタフェース・シンポジウム論文集、ｐｐ．２１－２１８，　１９９６．

【００１０】

【発明が解決しようとする課題】

しかしながら、上述した従来の方法では、以下に示す問題があった。

【００１１】

第１の従来例は、操作者（ユーザ）の手の動きを検出する際に装置に接触する必要があることと、装置を利用するための固定し限定された場所が必要であることのため、接触型であることと、任意の場所での動作検出を行うことが困難であることである。

【００１２】

第２、第３の従来例は、非接触型でありカメラ画像に写る範囲の任意の場所での動作を検出できるが、体の部位に常に何らかのマーカーまたはセンサを装着する必要があるため、家庭や職場等の通常生活におけるインタフェース装置としての利便性に欠ける。

【００１３】

第４の従来例は、体に何も装着せずに動きを検出できるが、ユーザの動きが認識されているかどうか、目視で確認できないため、ユーザの利便性に欠ける。

【００１４】

第５の従来例では、自画像を見ながら同じディスプレイに表示されたＣＧに体が触れることでユーザの位置を検出できるが、ユーザの体全体で接触判定を行うので、手指以外の部

分（頭、腰、足等）がアイコン（接触すべきＣＧ）に触っても区別なく接触とみなされることから、誤認識する可能性が高いため、認識精度が低い。また、ユーザの背後にアイコン（接触すべきＣＧ）を置くことができないことから、インタフェース用のアイコンを任意の位置に置けないため、アイコン位置およびユーザ動作の自由度に制限がある。

【００１５】

第５、第６の従来例は、自画像を見ながら同じディスプレイに表示されたＣＧの手指等を触れる（重ねる）ことでユーザの動きを検出できるが、背景に写っている実空間上の物体を指示することはできないため、応用範囲に制限がある。

【００１６】

本発明の目的は、接触型である問題、任意の場所での動作検出を行うことが困難である問題、インタフェース装置としての利便性に欠ける問題を解決したインタフェース方法および装置を提供することにある。

【００１７】

本発明の他の目的は、アイコン位置およびユーザの動作の自由度に制限がなく、かつ応用範囲に制限のないインタフェース方法および装置を提供することにある。

【００１８】

【課題を解決するための手段】

上記目的を達成するために、本発明のインタフェース装置は、

操作者を含む画像（自己画像）を撮影する画像入力手段と、

入力された画像を左右反転した反転画像を生成する手段と、

該反転画像上で、操作者の指定する位置を検出する手段と、

該反転画像上で、操作者の指定するコマンドを選択する手段と、

該指定された位置とコマンドに基づき該反転画像上に情報を表示する手段とを有している。

【００１９】

そのため、ユーザが装置と非接触で指定するコマンドを選択できるので、前記課題の（１）（２）（３）を解決できる。

【００２０】

また、本発明の実施様態では、コマンドを選択する手段は、反転画像上に表示された実空間が撮影された画像中において、予め任意の実物体位置を登録する手段と、反転画像上で、操作者の指定する実物体を予め登録された複数の実物体の中から検出する手段とを有している。

【００２１】

そのため、画像上に表示されたＣＧだけでなく実空間を撮影した画像中の実物体を指定することができるので、前記課題の（４）（５）を解決できる。

【００２２】

【発明の実施の形態】

次に、本発明の実施の形態について図面を参照して説明する。

【００２３】

図１を参照すると、本発明の第１の実施形態のインタフェース装置は、操作者（ユーザ）を含む画像（自己画像）を入力画像とし、ユーザが自己画像を自分で見ながら、ユーザの動作に基づき、画像上でコマンド選択を実行するもので、画像入力部１１と反転画像生成部１２と指示位置検出部１３と情報表示部１４とコマンド選択部１５で構成される。

【００２４】

画像入力部１１としては、図１のように１台のカメラを用いる。カメラは一般に用いられるビデオカメラでよく、白黒でもカラーでもよい。ただし下記で述べる色情報を使用した方法を用いる場合はカラーカメラが必要である。

【００２５】

反転画像生成部１２は、画像入力部１１で入力された画像（入力画像）を入力し、左右反転させた画像（反転画像）を生成する（ステップ２１）。コンピュータ内へ取り込んだ入

力画像に対し汎用の画像処理ソフトウェア（例：ＨＡＬＣＯＮ）により、リアルタイムに反転画像を生成することができる。または、入力画像を入力し反転画像をリアルタイムに生成する機器（例：（株）朋栄の画面左右反転装置ＵＰＩ―１００ＬＲＦ、またはカメラ一体型でＳＯＮＹのＥＶＹ―Ｄ１００）で実現できる。

【００２６】

指示位置検出部１３は、反転画像生成部１２で得られた該反転画像上において、ユーザが手指等の体の部位で指し示す位置（ユーザ指示位置）を検出する（ステップ２２）。

【００２７】

指示位置検出部１３の１つ目の例として、ユーザがマーカを持ち、反転画像中のマーカーを画像処理により検出する方法がある。例えば、まず、赤色（他の色でもよいが、背景画像中に少ない色が好ましい）の物体を手に持ちもしくは装着し、それをカメラ１１の前で手振りして動かす。得られたカラー画像のＲＧＢ等の色情報の値から赤色成分を抽出し（ステップ２１）、ラベリング処理（固まり毎にグループに分ける一般的な画像処理方法）を行い（ステップ２２）、その中で最も面積の大きい赤色部分を１つ選び（ステップ２３）、その位置の重心位置（ｘ，　ｙ）を求め、得られた（ｘ，　ｙ）座標をユーザ指示位置とする（ステップ２４）。ここで、赤色の物体の代わりに、赤色（前記物体同様、他の色でもよい）の発光ダイオード（ＬＥＤ）を発光させた状態で、手に持ちもしくは装着し、当該色を抽出して同様に行う方法も可能である。（ｘ，　ｙ）は重心位置（抽出した部分の全画素値のｘ座標の合計値の平均値、およびｙ座標の合計値の平均値）でなく、中心位置（抽出した部分のｘ座標の最大値と最小値の中心値、およびｙ座標の最大値と最小値の中心値）でもよい。

【００２８】

指示位置検出部１３の２つ目の例として、ユーザがマーカを持たずに、反転画像中の手の位置を画像処理により直接検出する方法がある。例えば、まず、得られたカラー画像のＲＧＢ等色情報の値から肌色成分を抽出し（ステップ３１）、ラベリング処理を行う（ステップ３２）。得られた複数の肌色部分の中から、手の大きさや位置等の制約情報を利用して、目的とする手を選択する。その選択する具体的な方法としては、通常ユーザが衣服を着ているとすると、肌色部分の候補となる可能性が高いのは両手と顔と考えられ、また最も面積の大きいのは顔と考えられるので、２つ目と３つ目の面積が大きい肌色部分を手の候補として選択する（ステップ３３）。ユーザ指定位置が両手両方とした場合、その２つの肌色部分の候補に対する重心位置を、各々左右の手のユーザ指定位置とすればよい。また、ユーザ指定位置を１つとすると、２つの候補から１つ選ぶ必要があるが、予め例えば右手を指定する手としたら、体より右手側にある候補を（右手の可能性が高いことから）右手の肌色部分として選び、その重心位置を右手のユーザ指定位置とすればよい（ステップ３４）。左手の場合も同様である。

【００２９】

指示位置検出部１３のこれらの例では、前述した検出処理をする前に、差分画像を用いた処理を加えることにより、精度を上げることもできる。差分画像を用いた処理とは、例えば、反転画像上で、予め撮影した背景画像（ユーザのいない状態で撮影した画像）と、現在撮影している現画像（ユーザがいる状態の画像）との間で差分画像を作成する。差分画像とは、例えば、全画素について、画素毎に背景画像の画素値と（同じ画素位置の）現画像の画素値の差の絶対値を求めることにより作成できる。この差分画像を用いることにより、予め体等の動く物体だけを抽出しておき、その後前述したような画像処理（例えば、体に付けたマーカを抽出する方法や、肌色を抽出する方法等）によりユーザ指定位置を検出しその座標を取得すれば、背景画像に含まれるマーカの色や肌色に似た色の誤検出を減らせることが容易に推測できる。

【００３０】

このような指示位置検出部１３により、コマンド選択のために、体全体を対象とせず、マーカや手のみを接触判定部位に用いることができるので、コマンド選択のためのアイコン等を任意の位置におけるその位置およびユーザ動作に関して高い自由度が得られる。

【００３１】
コマンド選択部１４は、指示位置検出部１３で得られたユーザ指示位置と、情報表示部１５で表示される複数のコマンド情報の表示位置を照らし合わせ、両者の位置関係からユーザが指示しようとするコマンド情報を探索し選択する（ステップ２３）。例えば、ユーザ指示位置からある一定の距離範囲に表示されたコマンドがあればそれを選択すればよい。指示位置検出部１３では、体全体で接触判定を行わずユーザの希望する体の部位で接触判定を行うので、情報表示部１５で表示するコマンド情報の表示位置は、ユーザの体の部位で接触判定を行わない部位の後ろに隠れてもかまわないため、コマンド情報の表示位置も、ユーザ自身の位置も画面上で任意の位置に配置することができる。

【００３２】
情報表示部１５は、反転画像生成部１２で得られた反転画像と、コマンド選択部１４で選択されたコマンド情報とを重ね合わせてディスプレイに表示する（ステップ２４）。ディスプレイは、コンピュータ用に使われる汎用のディスプレイでよく、コンピュータの画面とカメラ画像を表示できるものであればよい。コマンド情報としては、コンピュータで作成したＣＧで選択可能なコマンドを各々表示すればよい。

【００３３】
ユーザは、自己画像が映った画面を見ながら、同じ画面上にＣＧ表示されているコマンド情報に手指等を重ね合わせるだけでコマンド選択が可能であるため、わかりやすく間違いの少ない指示が可能になる。

【００３４】
図４を参照すると、本発明の第２の実施形態のインタフェース装置は、操作者（ユーザ）を含む画像（自己画像）を入力画像とし、ユーザが自己画像を自分で見ながら、ユーザの動作に基づき、画像上に含まれる実空間中の実物体を選択するもので、画像入力部１１と反転画像生成部１２と指示位置検出部１３と実物体検出部１６と実物体登録部１９と情報表示部１５で構成される。

【００３５】
本実施形態では第１の実施形態で示したコマンド選択部１４に、実物体の検出ができる仕組みを装備する。具体的には、第１の実施形態のコマンド選択部１４を実物体検出部１６と実物体登録部１９で構成する。実物体登録部１９は実物体登録処理部１７と実物体位置データ１８で構成される。他の画像入力部１１、反転画像生成部１２、指示位置検出部１３、情報表示部１５は、第１の実施形態と同様である。

【００３６】
実物体登録処理部１７は、反転画像上に含まれている任意の実物体（例えば家の中とすると、テレビ、エアコン、コンピュータ、時計、窓、棚、椅子、机、引出し、書類、オーディオ機器、照明機器等）について、予め、該反転画像上での表示位置を各々求め、実物体位置データ１８へ各々登録・保存する（ステップ２５）。もしくは、予め固定の位置を求めておくのではなく、対象とする実物体毎に位置認識可能なセンサ（市販されている磁気センサや超音波センサ等）と取り付けておくことにより、各々の物体の位置をリアルタイムに認識することができるので、それらにより得られた位置情報から該実物体位置データを算出し、常時実物体位置データを更新していくことも可能である。この場合、物体を移動させてもその位置も移動させることができる。

【００３７】
実物体位置データ１８は、物体の中心座標（ｘ，　ｙ）１個でもよいが、範囲を示す情報（例えば、矩形枠の始点座標（ｘ１，　ｙ１）と終点座標（ｘ２，　ｙ２）や、中心座標（ｘ，　ｙ）と半径値ｒや、または物体の存在する全ドットの座標リスト等）を持たせておいてもよい。第１の実施形態の指示位置検出部１３の処理と同様に中心座標は重心座標でもよい。

【００３８】
実物体検出部１９は、実物体位置データ１８に保存されている複数の位置データと、指示位置検出部１３で得られたユーザ指示位置とを照らし合わせ、第１の実施形態のコマンド

選択部１４と同様に、両者の位置関係に基づきユーザが指示しようとする実物体を検出し、選択する（ステップ２６）。例えば、ユーザ指示位置からある一定の距離範囲に実物体の位置データがあればそれを選択すればよい。または、実物体位置データとして範囲を持たせておいた場合は、ユーザ指示位置の座標がその範囲に含まれる実物体を検出し選択する。

【００３９】

図６に本実施形態によるインタフェース動作の例を示す。

【００４０】

ユーザが見ている自己画像上に映っている実物体について、予め表示位置を求め、各々実物体位置データ１８へ登録しておく（前述したように位置認識センサ等を用いた場合は自動的に実物体位置を検出し物体位置データ１８へ登録更新させることもできる）。ユーザが指示動作をしていないときは何も反応しないが、ユーザがアクセスしたい実物体に手（やマーカ）等を重ねる動作を行い、実物体検出部１６で実物体を検出したと判定したとき、検出された実物体の位置が明示される。その明示の仕方は、図のように、例えば実物体と同じ形もしくはほぼ同じ大きさのアイコン（必要に応じ色を変えたものや半透明もしくは透明にしたものや点滅させたもの等）を該実物体の上に重ねて表示する方法や、実物体の中心付近や実物体周囲にＣＧによるマーカ（必要に応じ色を変えたものや半透明もしくは透明にしたものや点滅させたもの等）を表示する方法など容易に考えられる。すなわち、実際は実物体位置上の仮想のアイコン、もしくは表示した（透明や半透明もしくはその他の色の）ＣＧアイコンを触ることとなる。また、検出された実物体の周囲等に、関連する情報（名称や状態等）を表示してもよい。さらに、図のように、検出された実物体の位置の周囲等に、その後続けて選択すべきメニューリストをＣＧ表示し、ユーザはそのメニューリストから同様の選択方法（すなわち手などを選択したいメニューアイコンに重ね合わせて選択する方法）等によりメニューを選択し実行することも可能である。

【００４１】

これにより、ユーザは、画像上に表示されたＣＧアイコンを指定してコマンド選択できるだけでなく、実空間画像中の実物体を直接選択することも可能となる。第１の実施形態のようにＣＧコマンド選択と組み合わせれば、例えば、テレビ等を指し示して選択すると、テレビのスイッチやチャンネル等を制御するコマンド選択のためのＣＧメニューが該実物体（テレビ）の周辺に表示され、ユーザは続けてコマンド選択を行い、テレビ等を制御することが可能である。

【００４２】

また、図６ではユーザが指示動作をしていないときは何も反応していないが、例えば、図７のように、実物体側でユーザに提示すべき情報が獲得していた場合、自己画像上の該実物体上または周囲に該情報を表示したり、もしくはアイコン（色を変えたものや半透明にしたものや点滅させたもの等）を該実物体上に重ねたりして明示し、見ているユーザに知らせるようにすることも考えられる。その後は前述と同様に、ユーザが該実物体を選択すると、必要な情報やメニューリストが表示される。

【００４３】

なお、本発明は専用のハードウェアにより実現されるもの以外に、その機能を実現するためのプログラムを、コンピュータ読み取り可能な記録媒体に記録して、この記録媒体に記録されたプログラムをコンピュータシステムに読み込ませ、実行するものであってもよい。コンピュータ読み取り可能な記録媒体とは、フロッピーディスク、光磁気ディスク、ＣＤ―ＲＯＭ等の記録媒体、コンピュータシステムに内蔵されるハードディスク装置等の記憶装置を指す。さらに、コンピュータ読み取り可能な記録媒体は、インターネットを介してプログラムを送信する場合のように、短時間の間、動的にプログラムを保持するもの（伝送媒体もしくは伝送波）、その場合のサーバとなるコンピュータシステム内部の揮発性メモリのように、一定時間プログラムを保持しているものも含む。

【００４４】

【発明の効果】

請求項１、３、５の発明によれば、ユーザは何も装着せずに、また直接何も触れずに、ユーザが指令するコマンドを選択できるため、非接触で、かつ任意の場所での動作検出を行うことが可能である。また、ユーザが自己画像上において、自分の体の任意の部位（手指等）を直接見ながら、該画像上に表示されたコマンドを選択できるため、ユーザにとって直感的なインタフェース装置を実現でき、利便性が向上する。

【００４５】

請求項２、４、５の発明によれば、画像上に表示されたＣＧだけでなく実空間を撮影した画像中の実物体を指定することができるため、ＣＧによるコマンド選択だけでなく、実物体の直接選択すること可能であり、応用範囲を拡大することができる。

【図面の簡単な説明】

【図１】本発明の第１の実施形態のインタフェース装置のブロック図である。

【図２】第１の実施形態の全体の処理の流れを示すフローチャートである。

【図３】指定位置検出部１３の処理の流れを示すフローチャートである。

【図４】本発明の第２の実施形態のインタフェース装置のブロック図である。

【図５】第２の実施形態の処理の流れを示すフローチャートである。

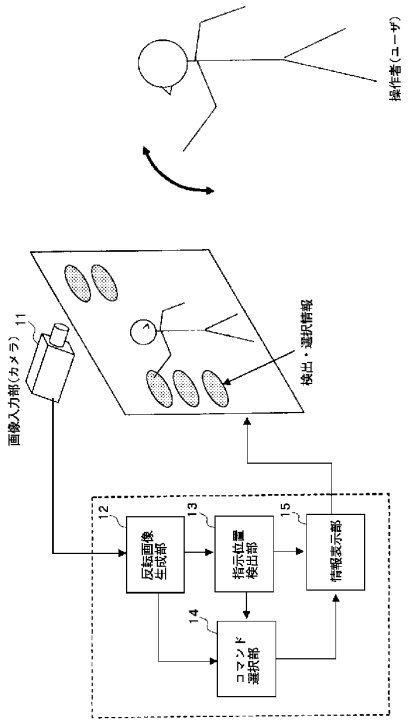
【図６】第２の実施形態におけるインタフェース動作の例を説明する図である。

【図７】第２の実施形態における実物体の情報表示の例を説明する図である。

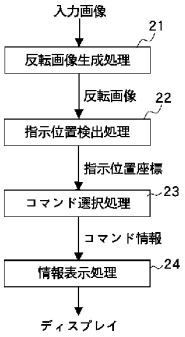
【符号の説明】

１１　画像入力部
１２　反転画像生成部
１３　指示位置検出部
１４　コマンド選択部
１５　情報表示部
１６　実物体検出部
１７　実物体登録処理部
１８　実物体位置データ
１９　実物体登録部
２１～２６、３１～３４　ステップ

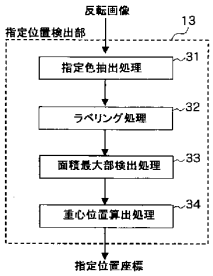
【図１】


操作者（ユーザ）
画像入力部（カメラ）
11
検出・選択情報
12
反転画像生成部
13
指示位置検出部
14
コマンド選択部
15
情報表示部

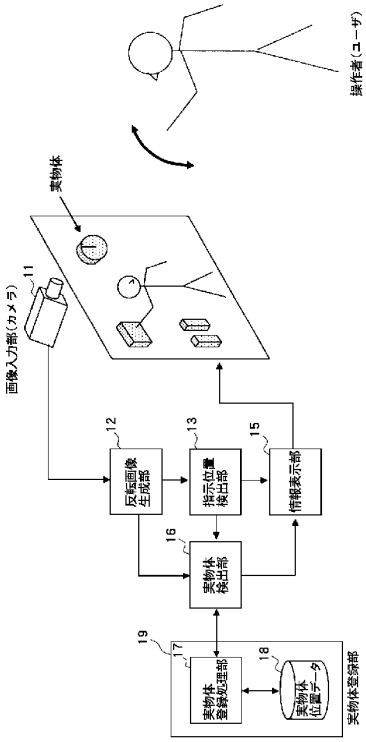
【図２】


入力画像
反転画像生成処理
21
反転画像
指示位置検出処理
22
指示位置座標
コマンド選択処理
23
コマンド情報
情報表示処理
24
ディスプレイ

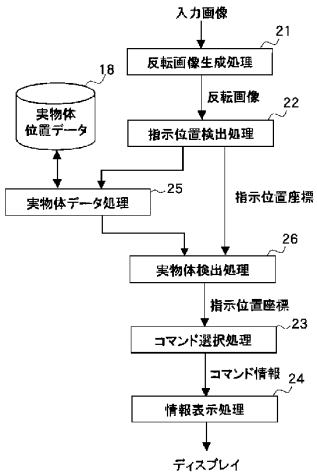
【図３】


反転画像
指定位置検出部
13
指定色抽出処理
31
ラベリング処理
32
面積最大部検出処理
33
重心位置算出処理
34
指定位置座標

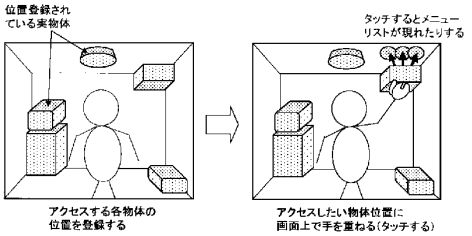
【図４】


操作者（ユーザ）
実物体
画像入力部（カメラ）
11
12
反転画像生成部
13
指示位置検出部
15
情報表示部
16
実物体検出部
19
17
実物体登録処理部
18
実物体位置データ
実物体登録部

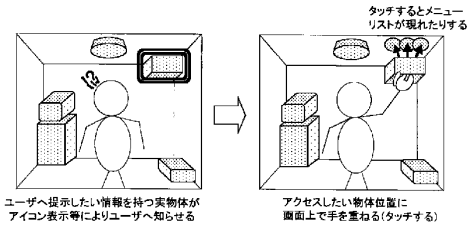
【図５】


入力画像
反転画像生成処理
21
18
実物体位置データ
反転画像
22
指示位置検出処理
25
実物体データ処理
指示位置座標
26
実物体検出処理
指示位置座標
コマンド選択処理
23
コマンド情報
24
情報表示処理
ディスプレイ

【図６】


位置登録されている実物体
タッチするとメニューリストが現れたりする
アクセスする各物体の位置を登録する
アクセスしたい物体位置に画面上で手を重ねる（タッチする）

【図７】


タッチするとメニューリストが現れたりする
ユーザへ提示したい情報を持つ実物体がアイコン表示等によりユーザへ知らせる
アクセスしたい物体位置に画面上で手を重ねる（タッチする）

フロントページの続き

(51)Int.Cl.[7]	FI	テーマコード（参考）
	Ｇ０６Ｔ　7/20　３００Ａ	

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Ｆターム(参考)　5B050 AA10 BA06 BA09 BA13 CA07 CA09 EA19 EA26 FA02 FA06
FA09
5B057 AA20 CA13 CB13 CE08 CH16 DA07 DA16
5B068 AA05 AA21 BB18 BE06 CC12
5B087 AA09 AB09 BC01 BC32 DD13
5L096 AA09 BA20 DA02 FA69 HA02

No documents available for this priority number.

Espacenet

Bibliographic data: JP2007514242 (A) — 2007-05-31

SELF-CONTAINED INTERACTIVE VIDEO DISPLAY SYSTEM

Inventor(s):

Applicant(s):

Classification:
- **international:** ***G03B21/00; G03B21/14; G03B21/62; G06F3/00; G06F3/01; G06F3/033; G06F3/042; G06K9/00; G06K9/20; G09G5/00***
- **cooperative:** G06F3/011; G06F3/017; G06F3/0425; G06F3/0428; G06K9/00375; G06K9/2036; G06F2203/04109

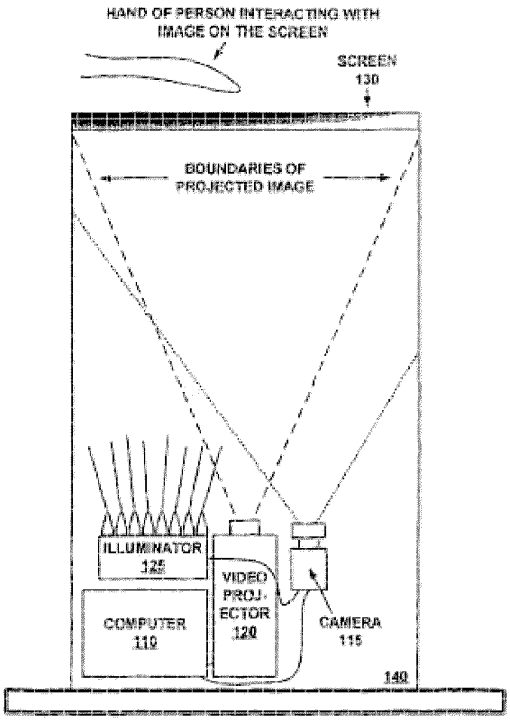
Application number: JP20060543993 20041209

Priority number (s): US20030528439P 20031209 ; US20040554520P 20040318 ; US20040946084 20040920 ; WO2004US41320 20041209

Also published as: WO2005057399 (A2) WO2005057399 (A3) US2005122308 (A1) KR20120058613 (A) KR20060127861 (A) more

Abstract not available for JP2007514242 (A)
Abstract of corresponding document: WO2005057399 (A2)

A self-contained interactive video display system. A flat-panel display screen displays a visual image for presentation to a user on a front side of the flat-panel display screen. A first illuminator illuminates the flat-panel display screen with viisible light. A second illuminator illuminates an object. A camera detects interaction of an illuminated object with the visual image, wherein the camera is operable to view the object through the flat-panel display screen. A computer system directs the projector to change the visual image in response to the interaction.



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Last updated: 19.12.2012 Worldwide Database 5.8.4; 92p

(19)日本国特許庁(JP)　(12)公表特許公報(A)　(11)特許出願公表番号
特表2007-514242
(P2007-514242A)
(43)公表日　平成19年5月31日(2007.5.31)

(51)Int.Cl.		F I			テーマコード（参考）
G06F 3/033	(2006.01)	G06F	3/033	310Y	2H021
G03B 21/00	(2006.01)	G03B	21/00	D	2K103
G03B 21/62	(2006.01)	G03B	21/62		5B087

審査請求 未請求　予備審査請求 未請求　（全 60 頁）

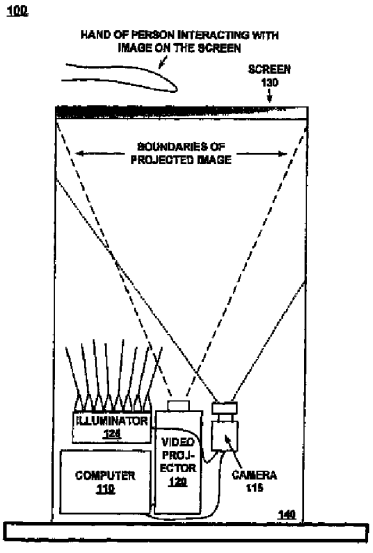
(21)出願番号　特願2006-543993 (P2006-543993)
(86)(22)出願日　平成16年12月9日 (2004.12.9)
(85)翻訳文提出日　平成18年7月20日 (2006.7.20)
(86)国際出願番号　PCT/US2004/041320
(87)国際公開番号　WO2005/057399
(87)国際公開日　平成17年6月23日 (2005.6.23)
(31)優先権主張番号　60/528,439
(32)優先日　平成15年12月9日 (2003.12.9)
(33)優先権主張国　米国(US)
(31)優先権主張番号　60/554,520
(32)優先日　平成16年3月18日 (2004.3.18)
(33)優先権主張国　米国(US)
(31)優先権主張番号　10/946,084
(32)優先日　平成16年9月20日 (2004.9.20)
(33)優先権主張国　米国(US)

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最終頁に続く

(54)【発明の名称】内蔵型インタラクティブ・ビデオ・ディスプレイ・システム

(57)【要約】
内蔵型インタラクティブ・ビデオ・ディスプレイ・システム。フラットパネル・ディスプレイ・スクリーンは、フラットパネル・ディスプレイ・スクリーンの前側のユーザへの提示のために、視覚イメージを表示する。第１のイルミネータは、可視光で前記ディスプレイ・スクリーンを照らす。第２のイルミネータは、対象を照らす。カメラは、照らされた対象と前記視覚イメージとの相互作用を検知し、前記カメラが、前記スクリーンを通して前記対象を見ることができるように作動する。コンピュータシステムは、前記ディスプレイ・スクリーンに、前記相互作用に応じて前記視覚イメージを変えるように指示する。



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【特許請求の範囲】
【請求項１】
フラットパネル・ディスプレイ・スクリーンの前側のユーザへの提示のために、視覚イメージを表示するディスプレイ・スクリーンと、
可視光で前記ディスプレイ・スクリーンを照らす第１のイルミネータと、
対象を照らす第２のイルミネータと、
照らされた対象と前記視覚イメージとの相互作用を検知するカメラであって、前記カメラが、前記スクリーンを通して前記対象を見ることができるカメラと、
前記ディスプレイ・スクリーンに、前記相互作用に応じて前記視覚イメージを変えるように指示するコンピュータシステムと、
を備える内蔵型インタラクティブ・ビデオ・ディスプレイ・システム。
【請求項２】
前記ディスプレイ・スクリーンがフラットパネル・ディスプレイ・スクリーンである、請求項１に記載のシステム。
【請求項３】
前記フラットパネル・ディスプレイ・スクリーンが液晶ディスプレイ（ＬＣＤ）パネルである、請求項２に記載の内蔵型インタラクティブ・ビデオ・ディスプレイ・システム。
【請求項４】
前記第２のイルミネータは、赤外線照明で前記対象を照らす赤外線イルミネータであり、前記カメラは、赤外線照明を検知する赤外線カメラである、請求項１または請求項２に記載の内蔵型インタラクティブ・ビデオ・ディスプレイ・システム。
【請求項５】
前記第１のイルミネータの光を拡散させる拡散スクリーンをさらに備える、請求項１または請求項２に記載の内蔵型インタラクティブ・ビデオ・ディスプレイ・システム。
【請求項６】
前記カメラ、前記第１のイルミネータ、前記第２のイルミネータ及び前記コンピュータシステムが１つのエンクロージャ内に備えられており、前記エンクロージャの一つの側部が前記フラットパネル・ディスプレイ・スクリーンを備える、請求項１または請求項２に記載の内蔵型インタラクティブ・ビデオ・ディスプレイ・システム。
【請求項７】
前記第２のイルミネータが、前記フラットパネル・ディスプレイ・スクリーンを通して前記対象に照明を投影し、前記第２のイルミネータが、前記カメラに対するグレアの影響を低減するように配置されている、請求項１または請求項２に記載の内蔵型インタラクティブ・ビデオ・ディスプレイ・システム。
【請求項８】
前記第２のイルミネータは、前記第２のイルミネータが、前記フラットパネル・ディスプレイ・スクリーンを通して照明を投影しないように、前記フラットパネル・ディスプレイ・スクリーンに隣接して配置されている請求項１または請求項２に記載の内蔵型インタラクティブ・ビデオ・ディスプレイ・システム。
【請求項９】
複数の前記第２のイルミネータを備え、前記イルミネータは、前記フラットパネル・ディスプレイ・スクリーンに隣接して配置されており、また、前記フラットパネル・ディスプレイ・スクリーンを通して照明を投影せず、また、前記スクリーンの後ろに配置されている、請求項１または請求項２に記載の内蔵型インタラクティブ・ビデオ・ディスプレイ・システム。
【請求項１０】
前記カメラは、前記フラットパネル・ディスプレイ・スクリーンの後ろに配置され、かつ前記スクリーンの方に向けられており、前記カメラが、前記スクリーン上及び前記スクリーンの前の領域を見ることができるようになっている、請求項１または請求項２に記載の内蔵型インタラクティブ・ビデオ・ディスプレイ・システム。

【請求項１１】
前記カメラの視野の歪みを補正するために、前記スクリーンから一定距離に配置された一連のミラーストリップをさらに備える、請求項１または請求項２に記載の内蔵型インタラクティブ・ビデオ・ディスプレイ・システム。
【請求項１２】
前記カメラの視野の歪みを補正するために、前記スクリーンに隣接して配置されたフレネルレンズをさらに備える、請求項１または請求項２に記載の内蔵型インタラクティブ・ビデオ・ディスプレイ・システム。
【請求項１３】
前記フラットパネル・ディスプレイ・スクリーンに隣接して配置された波長ベースの拡散板をさらに備える、請求項１または請求項２に記載の内蔵型インタラクティブ・ビデオ・ディスプレイ・システム。
【請求項１４】
前記波長ベースの拡散板が、赤外光に対して実質的に透過性であり、また、可視光に対して実質的に半透過性である、請求項１３に記載の内蔵型インタラクティブ・ビデオ・ディスプレイ・システム。
【請求項１５】
前記波長ベースの拡散板は、レイリー散乱を引き起こす材料である、請求項１３に記載の内蔵型インタラクティブ・ビデオ・ディスプレイ・システム。
【請求項１６】
前記フラットパネル・ディスプレイ・スクリーンに隣接して配置された拡散板をさらに備え、前記拡散板は、斜角で前記拡散板を通過する光に対しては実質的に半透過性であり、また、実質的に直角で前記拡散板を通過する光に対しては実質的に透過性であり、前記第１のイルミネータが、前記拡散板に対して斜角で配置されている、請求項１または請求項２に記載の内蔵型インタラクティブ・ビデオ・ディスプレイ・システム。
【請求項１７】
前記フラットパネル・ディスプレイ・スクリーンに隣接して配置され、かつ前記第１のイルミネータからの光を散乱させる散乱偏光子をさらに備え、前記カメラが、前記散乱偏光子によって散乱されない偏光の光に対して感度が良い、請求項１または請求項２に記載の内蔵型インタラクティブ・ビデオ・ディスプレイ・システム。
【請求項１８】
前記フラットパネル・ディスプレイが液晶ディスプレイパネルであり、前記散乱偏光子は、前記散乱偏光子が光を散乱させる方向に偏光された光が、前記液晶ディスプレイパネルを通過し、前記散乱偏光子が光を散乱させない方向に偏光された光が、前記液晶ディスプレイパネルによって吸収されるように方向付けされている、請求項１７に記載の内蔵型インタラクティブ・ビデオ・ディスプレイ・システム。
【請求項１９】
前記カメラが、前記散乱偏光子によって散乱された光を無視できるように、前記カメラが敏感な波長で、前記カメラで受光された光を偏光する直線偏光子をさらに備える、請求項１７に記載の内蔵型インタラクティブ・ビデオ・ディスプレイ・システム。
【請求項２０】
実質的に半透過性から実質的に透過性に変化することができる拡散材料をさらに備え、前記拡散材料は、前記第１のイルミネータが、前記フラットパネル・ディスプレイ・スクリーンの前記前側の人であるユーザに対して見える場合に実質的に半透過性であり、前記カメラが、前記フラットパネル・ディスプレイ・スクリーンの前の対象を検知している場合に実質的に透過性であり、前記拡散材料は、前記フラットパネル・ディスプレイ・スクリーンの後ろに配置されている、請求項１または請求項２に記載の内蔵型インタラクティブ・ビデオ・ディスプレイ・システム。
【請求項２１】
前記第２のイルミネータは、前記カメラの露出に合わせてストローブされる、請求項１