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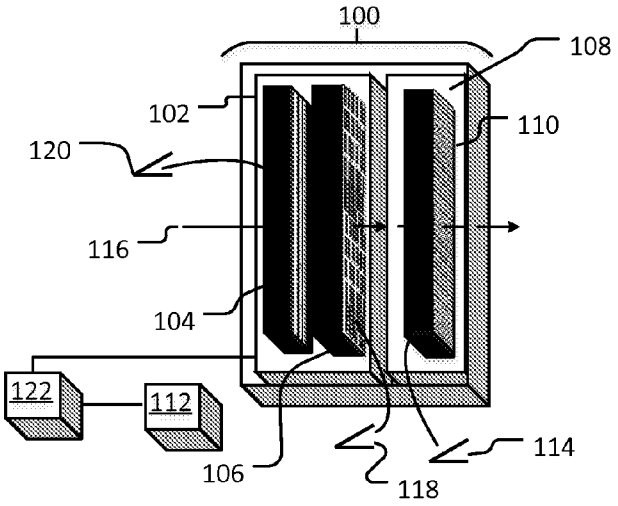

Fig. 1

(57) Abstract: A system has a first lens including a first polarization filter and a light polarization layer, a second lens including a second polarization filter and a polarization angle control module coupled to the first lens. The polarization angle control module operatively enables determination of an angle of polarization of the second polarization filter and adjusts an angle of polarization of the light polarization layer such that an image may be viewed when looking through the first lens and the second lens.

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SECURE TRANSPARENT DISPLAY

BACKGROUND

[0001] Unless otherwise indicated herein, the approaches described in this section are not prior art to the claims in this application and are not admitted to be prior art by inclusion in this section.

[0002] Current transparent head-up displays present text/images on a transparent medium wherein the displayed images may be visible on either side of the transparent medium. Because the images are visible from both sides of the transparent medium, such visibility may be inconvenient to a user who is using a head-up display to view confidential, private, personal, or other types of text/images.

SUMMARY

[0003] According to some examples, a system comprising, a first lens including a first polarization filter and a light polarization layer, a second lens including a second polarization filter and a polarization angle control module coupled to the first lens. The polarization angle control module may be operatively enabled to determine an angle of polarization of the second polarization filter and adjust an angle of polarization of the light polarization layer based at least in part on the determined angle of polarization of the second polarization filter to enable an image to be viewed through the first lens and the second lens.

[0004] According to some examples, a method to display an image with a transparent display device that includes a first polarization filter and a light polarization layer and that is configured to operate in conjunction with a second polarization filter. The method may comprise determining an angle of polarization of the second polarization filter and adjusting an angle of polarization of the light polarization layer based at least in part on the determined angle of polarization of the second polarization filter to enable an image to be viewed with the transparent display device.

[0005] According to some examples, a machine readable non-transitory medium having stored therein instructions that, in response to execution by one or more processors, operatively enable a polarization angle control module to perform a method to display an image with a transparent display device that includes a first polarization filter and a light polarization layer and that is configured to operate in conjunction with a second polarization filter. The method may comprise determining an angle of polarization of the second polarization filter and adjusting an angle of polarization of the light polarization

layer based at least in part on the determined angle of polarization of the second polarization filter to enable an image to be viewed with the transparent display device.

[0006] According to some examples, a transparent display may include a first polarization filter, a light polarization layer, and a polarization angle control module coupled to the transparent display. The polarization angle control module may be operatively enabled to determine an angle of polarization of the first polarization filter and a second polarization filter and may adjust an adjustable angle of polarization of the light polarization layer based at least in part on the determined angle of polarization of at least one of the first polarization filter and the second polarization filter such that content displayed on the transparent display may be viewed with the transparent display.

[0007] The foregoing summary is illustrative only and not intended to be in any way limiting. In addition to the illustrative aspects, embodiments, and features described above, further aspects, embodiments, and features will become apparent by reference to the drawings and the following detailed description.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] Subject matter is particularly pointed out and distinctly claimed in the concluding portion of the specification. The foregoing and other features of the present disclosure will become more fully apparent from the following description and appended claims, taken in conjunction with the accompanying drawings. Understanding that these drawings depict only several embodiments in accordance with the disclosure, and are therefore, not to be considered limiting of its scope. The disclosure will be described with additional specificity and detail through use of the accompanying drawings.

In the drawings:

Fig. 1 illustrates an example of a secure transparent display;

Fig. 2 illustrates an example of a secure transparent display;

Fig. 3 illustrates an example of a secure transparent display;

Fig. 4 illustrates a flow diagram of an example process to securely display an image on a transparent display;

Fig. 5 illustrates an example computer program product to securely display an image on a transparent display; and

Fig. 6 illustrates a block diagram of an example computing device, all arranged in accordance with at least some embodiments described herein.

DETAILED DESCRIPTION

[0009] The following description sets forth various examples along with specific details to provide a thorough understanding of claimed subject matter. The subject matter may be practiced without some or more of the specific details disclosed herein. Further, in some circumstances, well-known methods, procedures, systems, components and/or circuits have not been described in detail, in order to avoid unnecessarily obscuring the subject matter.

[0010] In the following detailed description, reference is made to the accompanying drawings, which form a part hereof. In the drawings, similar symbols typically identify similar components, unless context dictates otherwise. The illustrative embodiments described in the detailed description, drawings, and claims are not meant to be limiting. Other embodiments may be utilized, and other changes may be made, without departing from the spirit or scope of the subject matter presented here. The aspects of the present disclosure, as generally described herein, and illustrated in the Figures, can be arranged, substituted, combined, and designed in a wide variety of different configurations, all of which are explicitly contemplated and made part of this disclosure.

[0011] This disclosure is drawn, inter alia, to technologies including methods, devices, systems, and computer readable media related to a secure transparent display that includes a first polarization filter and a light polarization layer, and that operates in conjunction with a second polarization filter. In one example, a polarization angle control module may determine an angle of polarization of the second polarization filter and adjust an angle of polarization of the light polarization layer based at least in part on the determined angle of polarization of the second polarization filter so as to display an image such that the image may be visible if viewed through both the first polarization filter and the second polarization filter of the transparent display device.

[0012] Fig. 1 illustrates an example of a secure transparent display **100**, arranged in accordance with at least some embodiments. In an example, transparent display **100** may be a head-up display and may comprise a first screen **102** including a first polarization filter **104** and an adjustable light polarization layer **106**. First polarization filter **104** may be configured to polarize light **116** at a first polarization angle **120**, for example, in a vertical direction. In another example, first polarization filter **104** may polarize light **116** in a horizontal direction and/or any other direction. Adjustable light polarization layer **106** may comprise a liquid crystal display panel and may be configured to change a polarization angle for light **116** after it passes through first polarization filter **104**. Adjustable light polarization layer **106** may comprise any of a variety of liquid crystal

display technologies, for example, passive-matrix, active-matrix, twisted nematic, super twisted nematic, in-plane switching, super in-plane switching, fringe field switching, advanced fringe field switching, vertical alignment, blue phase mode, and/or others or any combinations thereof.

[0013] In an example, transparent display **100** may comprise a second screen **108** including a second polarization filter **110**. Second polarization filter **110** may be configured to polarize light **116** at a second polarization angle **114**, for example, in a horizontal direction. In another example, second polarization filter **110** may polarize light **116** in a vertical direction and/or any other direction. First screen **102** and second screen **108** may be separate such that an orientation of second screen **108** may change with respect to first screen **102**.

[0014] In an example, transparent display **100** may comprise a polarization angle control module **112** coupled to a processor **122** configured to control the display of an image and/or text or other content on transparent display **100**. In another example, polarization angle control module **112** may be coupled directly to first screen **102**. Polarization angle control module **112** may be configured to determine the second polarization angle **114** of second polarization filter **110** and may be configured to adjust a third polarization angle **118** of adjustable light polarization layer **106** based at least in part on the determined second polarization angle **114**.

[0015] In an example, third polarization angle **118** may be adjusted such that an image displayed on adjustable light polarization layer **106** may be visible when looking through first screen **102** and second screen **108** simultaneously and invisible when viewed through first screen **102** alone. In an example, first polarization filter **104**, adjustable light polarization layer **106**, and/or second polarization filter **110** may be separate or may be disposed together or in any combination. For example, first polarization filter **104** and adjustable light polarization layer **106** may be embedded in one or more of: a windshield of an automobile, a computer display screen, goggles, a window, eyeglasses, a television display screen, a billboard, a marquee, a movie screen, clear dry erase board and/or other applications/implementations whereas second polarization filter **110** may be embedded in one or more wearable lenses (e.g., a pair of glasses and/or contact lenses). Thus, transparent display **100** may be visible to a user wearing lenses including second screen **108** and invisible to all other viewers.

[0016] FIG. 2 is an exploded view of an example of secure transparent display **100**, arranged in accordance with at least some embodiments. Secure transparent display **100** may comprise first screen **102** including first polarization filter **104** and adjustable light

polarization layer **106**. Adjustable light polarization layer **106** may comprise a plurality of pixels, for example, pixel **212**. Adjustable light polarization layer **106** may include a liquid crystal layer **202** disposed between first glass layer **204** and a second glass layer **206**.

[0017] In an example, liquid crystal molecules of liquid crystal layer **202** may be aligned with a first alignment layer **214** and a second alignment layer **216**. First alignment layer **214** and second alignment layer **216** may each comprise grooves configured to align the liquid crystal molecules. First alignment layer **214** may form a part of first glass layer **204** or may be separate from first glass layer **204**. Second alignment layer **216** may form a part of second glass layer **206** or may be separate from second glass layer **206**. In an example, first grooves of first alignment layer may be etched into an outside surface of first glass layer and second grooves of second alignment layer may be etched into an outside surface of second glass layer.

[0018] In an example, first grooves of first alignment layer **214** may be oriented in a different direction than second grooves of second alignment layer **216**. First alignment layer **214** and second alignment layer **216** may be configured to arrange liquid crystal molecules to rotate in a helix having a twist. A degree of twist may be determined by an orientation of first grooves **222** of first alignment layer **214** and second grooves **224** of second alignment layer **216** with respect to one another. Liquid crystal molecules may be configured to rotate in a helix having a twist of greater than 90°. In an example, liquid crystal layer **202** may be configured to rotate light between approximately -90° up to approximately +90° and/or approximately 0° up to approximately 180°. In another example, liquid crystal layer **202** may rotate light **116** up to approximately 270°.

[0019] In an example, first glass layer **204** may comprise a plurality of electrodes, for example, an electrode **208**. Second glass layer **206** may comprise a plurality of electrodes, for example, an electrode **210** configured to correspond to electrode **208**. Electrodes **208** and **210** may be transparent. In an example, electrodes **208** and **210** may be disposed in pixel **212**.

[0020] In an example, a helical arrangement **230** of liquid crystal molecules of liquid crystal layer **202** may be adjusted by applying various voltages across electrodes **208** and **210** to change the helical arrangement **230** of liquid crystal molecules of liquid crystal layer **202**. A degree of rotation of helical arrangement **230** of liquid crystal molecules of liquid crystal layer **202** may be inversely proportional or otherwise inversely related to an applied voltage. For example, if no electrical field is applied, liquid crystal molecules may be fully aligned with alignment layers **214** and **216** and may be fully rotated. If an electric field is applied to liquid crystal molecules of liquid crystal layer **202**, liquid crystal

molecules of liquid crystal layer **202** may align with the applied electrical field causing the helical arrangement **230** to untwist which may change third polarization angle **118**. An orientation of light **116** passing through liquid crystal layer **202** may change as the helical arrangement **230** of liquid crystal molecules of liquid crystal layer **202** changes based on the applied voltage.

[0021] In an example, an amount of light **116** that is re-oriented after passing through first filter **104** such that it may pass through second polarization filter **110** may depend on at least one or more of: a voltage supplied, first polarization angle **120**, second polarization angle **114**, third polarization angle **118**, and/or an orientation of the grooves of first alignment layer **214** and the grooves of second alignment layer **216** with respect to one another. Thus, an amount of opacity or transparency of pixel **212** may depend at least on these factors and/or other factor(s).

[0022] In an example, first polarization filter **104** may be a vertical filter and second polarization filter **110** may be a horizontal filter. When light **116** passes through first polarization filter **104** the vertical element of light **116** may remain. Liquid crystal molecules of liquid crystal layer **202** may rotate an angle of light **116** passing through pixel **212** according to third polarization angle **118**. Third polarization angle **118** of liquid crystal molecules of liquid crystal layer **202** may correspond to helical arrangement **230** of liquid crystal molecules of liquid crystal layer **202**.

[0023] In an example, liquid crystal molecules of liquid crystal layer **202** may rotate light **116** horizontally to substantially match a second polarization angle **114** of second polarization filter **110**. Light **116** may thus pass through second polarization filter **110**. In such an example, pixel **212** may appear illuminated when viewed through first polarization filter **104** and second polarization filter **110** thus pixel **212** may be visible on secure transparent display **100**.

[0024] Fig. 3 illustrates an example of a secure transparent display system **300**, arranged in accordance with at least some embodiments. System **300** may comprise a pair of glasses **302** and one or more contact lenses **304**. In an example, a lens **308** of glasses **302** may comprise first screen **102** including a first polarization filter **104** and adjustable light polarization layer **106**. In one example, adjustable light polarization layer **106** may comprise a plurality of pixels (see FIG. 2). Contact lens **304** may comprise second screen **108** including second polarization filter **110**. In an example, because first screen **102** and second screen **108** are separate, an orientation of second screen **108** may change with respect to first screen **102**.

[0025] In an example, glasses **302** may comprise polarization angle control module **112** coupled to processor **122**. Glasses **302** may also comprise a sensor **306** coupled to either or both of polarization angle control module **112** and processor **122**. Sensor **306** may be a plurality of sensors. Sensor **306** may be configured to sense and/or capture position and/or orientation data corresponding to a position of contact lens **304** and/or glasses **302**. In an example, sensor **306** may comprise, an absolute position sensor and/or a relative position sensor (e.g., a displacement sensor). Position and/or orientation data may be communicated to polarization angle control module **112** and/or processor **122** to be analyzed to determine second polarization angle **114** of second polarization filter **110**.

[0026] In an example, sensor **306** may be coupled to or in communication with a level **350** and may communicate level data to polarization angle control module **112**. Level **350** may be coupled to the polarization angle control module **112**. Level **350** may be configured to communicate level data to polarization angle control module **112** directly or via sensor **306.** Polarization angle control module **112** may be operatively enabled to determine a first polarization angle **120** of first polarization filter **104** and a second polarization angle **114** of second polarization filter **110** based at least in part on the level data.

[0027] In an example, polarization angle control module **112** may be coupled to sensor **306** and first screen **102**. Polarization angle control module **112** may be configured to receive sensor data from sensor **306**. Polarization angle control module **112** and may derive a position and/or orientation of second polarization filter **110** based on the sensor data. Polarization angle control module **112** may determine second polarization angle **114** of second polarization filter **110** based on sensor data and/or the determined position and/or orientation second polarization filter **110** by a variety of methods. Polarization angle control module **112** may be configured to modify third polarization angle **118** of adjustable light polarization layer **106** based on the determined second polarization angle **114.**

[0028] In one example, sensor **306** may be a camera configured to capture an image of some portion of contact lens **304**. In another example, sensor **306** may be any of a variety of sensing instruments configured to detect position in reference to a fixed point and/or arbitrary reference. Sensor **306** may be a linear, angular, and/or multi-axis sensor. Contact lens **304** may include a mark **310**. Mark **310** may be, for example, an arrow, a dot, a solid or perforated line, a hollow or solid circle, and/or some other type of mark, or any combinations thereof. Mark **310** may be visible or invisible, an impression, an embossing, and/or the other mark, or any combinations thereof. Mark **310** may comprise any of a variety of compounds, for example ink, a metal, a reflective compound, and/or other

material, or any combinations thereof. Mark **310** may have a particular orientation. For example, mark **310** may be linear and may be oriented at a particular angle and/or may have a top and bottom. In an example, sensor **306** may continuously track second polarization angle **114** based at least in part on the position and/or orientation of mark **310.**

[0029] In an example, mark **310** may be an arrow **370** having a direction associated with second polarization angle **114** of second polarization filter **110**. Sensor **306** may be a camera and may be configured to capture an image of contact lens **304** including arrow **370**. Sensor **306** may communicate image data associated with the image to polarization angle control module **112** which may be configured to identify and analyze arrow **370** from the image data to determine a direction and/or orientation of arrow **370**. Polarization angle control module **112** may be configured to determine second polarization angle **114** based at least in part on the image data.

[0030] In another example, mark **310** may comprise dot **380**. During contact lens **304** manufacturing, contact lens **304** may be produced including dot **380** at 0 degrees or at a twelve o'clock position. Second polarization angle **114** may be added or applied to contact lens 304 such that it is perpendicular to a plane extending from dot **380**. If contact lens **340** is worn, the lens may be continuously rotating its position on a user's eye. Polarization angle control module **112** may be configured to continuously track dots **380** to continuously monitor second polarization angle **114**. For example, polarization angle control module **112** may be configured to capture one or more images of contact lens **304**, identify dot **380**, analyze an angle of rotation of contact lens **304** based at least in part on a position and/or orientation of dot **380**, and determine second polarization angle **114** based at least in part on the determined angle of rotation of contact lens **304**. In an example, if dot **380** is detected at a three o'clock position, then a second polarization angle **114** may be determined to be horizontal. Such determination of second polarization angle **114** may occur on a continuous and/or real time basis, periodically, irregularly, randomly, repeatedly, and/or may be manually triggered. As noted above, polarization angle control module **112** may be configured to modify third polarization angle **118** of adjustable light polarization layer **106** based on the determined second polarization angle **114.**

[0031] In one example, polarization angle control module **112** may adjust third polarization angle **118** by varying an applied voltage to liquid crystal layer **202** based on the determined second polarization angle **114** such that an image displaying on adjustable light polarization layer **106** may be visible to a user when looking through first screen **102** and second screen **108** simultaneously.

[0032] In one example, third polarization angle **118** may be adjusted between approximately -90° up to approximately +90° (or, approximately 0° up to approximately 180°). For example, if first polarization filter **104** is vertical (approximately 0°) and second polarization angle **114** is identified to be approximately 30°, one or more pixels of adjustable light polarization layer **106** may be controlled to modify a degree of transparency of the one or more pixels in order to display an image on secure transparent display **100**. Although, transparency of the one or more pixels may be of varying degrees between opaque and transparent, for simplicity, only two states, opaque and transparent, are described herein. In order to render one or more pixels opaque, polarization angle control module **112** may substantially prevent polarized light from passing through second polarization filter **110** of contact lens **304** by adjusting third polarization angle **118** to approximately -60°. Whereas, in order to render one or more pixels transparent, polarization angle control module **112** may allow polarized light to pass through second polarization filter **110** of contact lens **304** by adjusting third polarization angle **118** to approximately 30°. In another example, if second polarization angle **114** is identified to be approximately 15°, in order to render one or more pixels opaque, polarization angle control module **112** may substantially prevent polarized light from passing through second polarization filter **110** of contact lens **304** by adjusting third polarization angle **118** to approximately -75°. Whereas, in order to render one or more pixels transparent, polarization angle control module **112** may allow polarized light to pass through second polarization filter **110** of contact lens **304** by adjusting third polarization angle **118** to approximately 15°. Thus, by controlling a voltage applied liquid crystal layer **202**, polarization angle control module **112** may adjust third polarization angle **118** of adjustable light polarization layer **106** to be any angle, for example, perpendicular or horizontal to the determined second polarization angle **114** of second polarization filter **110**.

[0033] In an example, polarization angle control module **112** may adjust third polarization angle **118** for a plurality of pixels of adjustable light polarization layer **106** simultaneously. One or more of the plurality of pixels may be adjusted to polarization angles that are different from third polarization angle **118** in order to vary opacity of different pixels and to display an image on secure transparent display **100** properly.

[0034] FIG. 4 is a flow diagram illustrating an example of a process **400** that may be utilized to securely display an image on a transparent display device, arranged in accordance with at least some embodiments described herein. FIG. 4 employs block diagrams to illustrate the example method(s) detailed therein. These block diagrams may

set out various functional blocks or actions that may be described as processing steps, functional operations, events and/or acts, etc., and may be performed by hardware, software, firmware, and/or combination thereof, and need not necessarily be performed in the exact order shown. Numerous alternatives or additions to the functional blocks detailed (and/or combinations thereof) may be practiced in various implementations. For example, intervening actions not shown in FIG. 4 and/or additional actions not shown in FIG. 4 may be employed and/or some of the actions shown in the figures may be eliminated. In some examples, the actions shown in FIG. 4 may be operated using techniques discussed with respect to another figure. Additionally, in some examples, the actions shown FIG. 4 may be operated using parallel techniques. The above described and other rearrangements, substitutions, changes, modifications, etc., may be made without departing from the scope of the subject matter.

[0035] A transparent display device (such as transparent display **100** et seq. previously described above) for process **400** may include a sensor **306**, a polarization angle control module **112**, processor **122**, a first polarization filter **104** and an adjustable light polarization layer **106**, and may operate in conjunction with a second polarization filter **110**. As depicted, process **400** may start at operation **402**, where polarization angle control module **112** and/or processor **122** may receive orientation and/or position data from sensor **306**. In an example, the position data may comprise sensor data including an image of a mark **310** on second polarization filter **110** and/or other position/orientation data. Process **400** may proceed to operation **404** where polarization angle control module **112** and/or processor **122** may analyze orientation and/or position data. Process **400** may move to operation **406** where polarization angle control module **112** and/or processor **122** may determine second polarization angle **114** of the second polarization filter **110** based on the analysis. Process **400** may proceed to operation **408** where polarization angle control module **112** and/or processor **122** may adjust one or more pixels **212** of adjustable light polarization layer **106** having third polarization angle **118** based on the determined first polarization angle **120** of first polarization filter **104** and/or second polarization angle **114** of second polarization filter **110**. Process **400** may proceed to operation **410** where polarization angle control module **112** and/or processor **122** may make an image viewable on a transparent display device **100**, responsive to adjusting third polarization angle **118** of the one or more pixels **212** of adjustable light polarization layer **106**. In an example, polarization angle control module **112** and/or processor **122** may cause a voltage to be applied to one or more pixels of the light polarization layer **106** to change an orientation of liquid crystal molecules in a helical structure within adjustable

light polarization layer **106**. Adjusting third polarization angle **118** of adjustable light polarization layer **106** may alter an opacity of one or more pixels **212** of adjustable light polarization layer **106** such that an image may be viewed when looking through the transparent display device **100**.

[0036] Fig. 5 is a block diagram illustrating one example of a computer program product 500, arranged in accordance with at least some embodiments described herein. As depicted, computer program product **500** a machine readable non-transitory medium having stored therein instructions that, in response to execution by one or more processors, operatively enable a polarization angle control module to perform a method to display an image with a transparent display device that includes a first polarization filter and a light polarization layer and that is configured to operate in conjunction with a second polarization filter. Computer program product **500** may include a signal bearing medium 502. Signal bearing medium **502** may include one or more machine-readable instructions 504, which, when executed by one or more processors, may operatively enable a computing device to provide the functionality described herein. In various examples, the devices discussed herein may use some or all of the machine-readable instructions.

[0037] In one example, the machine-readable instructions **504** may include, determining an angle of polarization of the second polarization filter. In some examples, the machine-readable instructions **504** may include and adjusting an angle of polarization of the light polarization layer based at least in part on the determined angle of polarization of the second polarization filter to enable an image to be viewed with the transparent display device.

[0038] In one example, signal bearing medium **502** may encompass a computer-readable medium 506, such as, but not limited to, a hard disk drive, a Compact Disc (CD), a Digital Versatile Disk (DVD), a digital tape, memory, etc. In some implementations, signal bearing medium **502** may encompass a recordable medium 508, such as, but not limited to, memory, read/write (R/W) CDs, R/W DVDs, etc. In some implementations, signal bearing medium **502** may encompass a communications medium 510, such as, but not limited to, a digital and/or an analog communication medium (e.g., a fiber optic cable, a waveguide, a wired communication link, a wireless communication link, etc.). In some examples, signal bearing medium **502** may encompass a machine readable non-transitory medium.

[0039] In general, the method described with respect to Figs. 1-5, and elsewhere herein may be implemented in any suitable server and/or computing system. Example systems may be described with respect to Fig. 6 and elsewhere herein. In general, the computer system may be configured to determine an angle of polarization **114** of a second

polarization filter **110** and adjust an angle of polarization **118** of the light polarization layer **106** to display the image such that the image may be visible if viewed through the transparent display device **100**.

[0040] Fig. 6 is a block diagram illustrating an example of a computing device 600, arranged in accordance with at least some embodiments of the present disclosure. In various examples, computing device **600** may be configured to facilitate detecting an angle of polarization of a remote (or non-remote) polarization filter and adjusting an angle of polarization of a local (or non-local) adjustable light polarization layer based on the detected angle to display an image on a transparent display when viewed through the remote polarization filter and the local polarization filter simultaneously as discussed herein. In one example of a basic configuration 601, computing device **600** may include one or more processors **610** and a system memory 620. A memory bus **630** can be used for communicating between one or more processors **610** and system memory 620.

[0041] Depending on the desired configuration, one or more processors **610** may be of any type including but not limited to a microprocessor (μP), a microcontroller (μC), a digital signal processor (DSP), or any combination thereof. One or more processors **610** may include one or more levels of caching, such as a level one cache **611** and a level two cache 612, a processor core 613, and registers 614. Processor core **613** can include an arithmetic logic unit (ALU), a floating point unit (FPU), a digital signal processing core (DSP Core), or any combination thereof. A memory controller **615** can also be used with one or more processors 610, or in some implementations memory controller **615** can be an internal part of processor 610.

[0042] Depending on the desired configuration, system memory **620** may be of any type including but not limited to volatile memory (such as RAM), non-volatile memory (such as ROM, flash memory, etc.) or any combination thereof. System memory **620** may include an operating system 621, one or more applications 622, and program data 624. One or more applications **622** may include a polarization angle control module application **623** that may be arranged to perform the functions, actions, and/or operations as described herein including the functional blocks, actions, and/or operations for may be configured to facilitate detecting an angle of polarization of a remote polarization filter and adjusting an angle of polarization of an adjustable local polarization layer based on the detected angle to display an image on a transparent display when viewed through the remote polarization filter and the local polarization filter simultaneously as described herein. Program data **624** may include, among other data, sensor data **625** or the like for use with polarization angle control module application **623**, as described herein. In some

example embodiments, one or more applications **622** may be arranged to operate with program data **624** on operating system **621**. This described basic configuration **601** is illustrated in Fig. 6 by those components within dashed lines.

[0043] The computing device **600** may have additional features or functionality, and additional interfaces to facilitate communications between basic configuration **601** and any required devices and interfaces. For example, a bus/interface controller **640** may be used to facilitate communications between basic configuration **601** and one or more data storage devices **650** via a storage interface bus **641**. One or more data storage devices **650** may be removable storage devices **651**, non-removable storage devices **652**, or a combination thereof. Examples of removable storage and non-removable storage devices include magnetic disk devices such as flexible disk drives and hard-disk drives (HDDs), optical disk drives such as compact disk (CD) drives or digital versatile disk (DVD) drives, solid state drives (SSDs), and tape drives to name a few. Example computer storage media may include volatile and nonvolatile, removable and non-removable media implemented in any method or technology for storage of information, such as computer readable instructions, data structures, program modules, or other data. System memory **620**, removable storage **651** and non-removable storage **652** are all examples of computer storage media. The computer storage media includes, but is not limited to, RAM, ROM, EEPROM, flash memory or other memory technology, CD-ROM, digital versatile disks (DVDs) or other optical storage, magnetic cassettes, magnetic tape, magnetic disk storage or other magnetic storage devices, or any other medium which may be used to store the desired information and which may be accessed by computing device **600**. Any such computer storage media may be part of computing device **600**.

[0044] The computing device **600** may also include an interface bus **642** for facilitating communication from various interface devices (e.g., output interfaces, peripheral interfaces, and communication interfaces) to basic configuration **601** via bus/interface controller **640**. Example output interfaces **660** may include a graphics processing unit **661** and an audio processing unit **662**, which may be configured to communicate to various external devices such as a display or speakers via one or more A/V ports 663. Example peripheral interfaces **670** may include a serial interface controller **671** or a parallel interface controller **672**, which may be configured to communicate with external devices such as input devices (e.g., keyboard, mouse, pen, voice input device, touch input device, etc.) or other peripheral devices (e.g., printer, scanner, etc.) via one or more I/O ports **673**. An example communication interface **680** includes a network controller **681**, which may be arranged to facilitate communications with one or more other computing devices **683**

over a network communication via one or more communication ports **682**. A communication connection is one example of a communication media. Communication media may typically be embodied by computer readable instructions, data structures, program modules, or other data in a modulated data signal, such as a carrier wave or other transport mechanism, and may include any information delivery media. A "modulated data signal" may be a signal that has one or more of its characteristics set or changed in such a manner as to encode information in the signal. By way of example, and not limitation, communication media may include wired media such as a wired network or direct-wired connection, and wireless media such as acoustic, radio frequency (RF), infrared (IR) and other wireless media. The term computer readable media as used herein may include both storage media and communication media.

[0045] The computing device **600** may be implemented as a portion of a small-form factor portable (or mobile) electronic device such as a cell phone, a mobile phone, a tablet device, a laptop computer, a personal data assistant (PDA), a personal media player device, a wireless web-watch device, a personal headset device, an application specific device, or a hybrid device that includes any of the above functions. Computing device **600** may also be implemented as a personal computer including both laptop computer and non-laptop computer configurations. In addition, computing device **600** may be implemented as part of a wireless base station or other wireless system or device.

[0046] Some portions of the foregoing detailed description are presented in terms of algorithms or symbolic representations of operations on data bits or binary digital signals stored within a computing system memory, such as a computer memory. These algorithmic descriptions or representations are examples of techniques used by those of ordinary skill in the data processing arts to convey the substance of their work to others skilled in the art. An algorithm is here, and generally, is considered to be a self-consistent sequence of operations or similar processing leading to a desired result. In this context, operations or processing involve physical manipulation of physical quantities. Typically, although not necessarily, such quantities may take the form of electrical or magnetic signals capable of being stored, transferred, combined, compared or otherwise manipulated. It has proven convenient at times, principally for reasons of common usage, to refer to such signals as bits, data, values, elements, symbols, characters, terms, numbers, numerals or the like. It should be understood, however, that all of these and similar terms are to be associated with appropriate physical quantities and are merely convenient labels. Unless specifically stated otherwise, as apparent from the following discussion, it is appreciated that throughout this specification discussions utilizing terms such as

"processing," "computing," "calculating," "determining" or the like refer to actions or processes of a computing device, that manipulates or transforms data represented as physical electronic or magnetic quantities within memories, registers, or other information storage devices, transmission devices, or display devices of the computing device.

[0047] The claimed subject matter is not limited in scope to the particular implementations described herein. For example, some implementations may be in hardware, such as employed to operate on a device or combination of devices, for example, whereas other implementations may be in software and/or firmware. Likewise, although claimed subject matter is not limited in scope in this respect, some implementations may include one or more articles, such as a signal bearing medium, a storage medium and/or storage media. This storage media, such as CD-ROMs, computer disks, flash memory, or the like, for example, may have instructions stored thereon, that, when executed by a computing device, such as a computing system, computing platform, or other system, for example, may result in execution of a processor in accordance with the claimed subject matter, such as one of the implementations previously described, for example. As one possibility, a computing device may include one or more processing units or processors, one or more input/output devices, such as a display, a keyboard and/or a mouse, and one or more memories, such as static random access memory, dynamic random access memory, flash memory, and/or a hard drive.

[0048] The use of hardware or software is generally (but not always, in that in certain contexts the choice between hardware and software can become significant) a design choice representing cost vs. efficiency tradeoffs. There are various vehicles by which processes and/or systems and/or other technologies described herein can be affected (e.g., hardware, software, and/or firmware), and that the preferred vehicle will vary with the context in which the processes and/or systems and/or other technologies are deployed. For example, if an implementer determines that speed and accuracy are paramount, the implementer may opt for a mainly hardware and/or firmware vehicle; if flexibility is paramount, the implementer may opt for a mainly software implementation; or, yet again alternatively, the implementer may opt for some combination of hardware, software, and/or firmware.

[0049] The foregoing detailed description has set forth various embodiments of the devices and/or processes via the use of block diagrams, flowcharts, and/or examples. Insofar as such block diagrams, flowcharts, and/or examples contain one or more functions and/or operations, it will be understood by those within the art that each function and/or operation within such block diagrams, flowcharts, or examples can be implemented,

individually and/or collectively, by a wide range of hardware, software, firmware, or virtually any combination thereof. In one embodiment, several portions of the subject matter described herein may be implemented via Application Specific Integrated Circuits (ASICs), Field Programmable Gate Arrays (FPGAs), digital signal processors (DSPs), or other integrated formats. However, those skilled in the art will recognize that some aspects of the embodiments disclosed herein, in whole or in part, can be equivalently implemented in integrated circuits, as one or more computer programs running on one or more computers (e.g., as one or more programs running on one or more computer systems), as one or more programs running on one or more processors (e.g., as one or more programs running on one or more microprocessors), as firmware, or as virtually any combination thereof, and that designing the circuitry and/or writing the code for the software and or firmware would be well within the skill of one of skill in the art in light of this disclosure. In addition, those skilled in the art will appreciate that the mechanisms of the subject matter described herein are capable of being distributed as a program product in a variety of forms, and that an illustrative embodiment of the subject matter described herein applies regardless of the particular type of signal bearing medium used to actually carry out the distribution. Examples of a signal bearing medium include, but are not limited to, the following: a recordable type medium such as a flexible disk, a hard disk drive (HDD), a Compact Disc (CD), a Digital Versatile Disk (DVD), a digital tape, a computer memory, etc.; and a transmission type medium such as a digital and/or an analog communication medium (e.g., a fiber optic cable, a waveguide, a wired communications link, a wireless communication link, etc.).

[0050] Those skilled in the art will recognize that it is common within the art to describe devices and/or processes in the fashion set forth herein, and thereafter use engineering practices to integrate such described devices and/or processes into data processing systems. That is, at least a portion of the devices and/or processes described herein can be integrated into a data processing system via a reasonable amount of experimentation. Those having skill in the art will recognize that a typical data processing system generally includes one or more of a system unit housing, a video display device, a memory such as volatile and non-volatile memory, processors such as microprocessors and digital signal processors, computational entities such as operating systems, drivers, graphical user interfaces, and applications programs, one or more interaction devices, such as a touch pad or screen, and/or control systems including feedback loops and control motors (e.g., feedback for sensing position and/or velocity; control motors for moving and/or adjusting components and/or quantities). A typical data processing system may be

implemented utilizing any suitable commercially available components, such as those typically found in data computing/communication and/or network computing/communication systems.

[0051] The herein described subject matter sometimes illustrates different components contained within, or connected with, different other components. It is to be understood that such depicted architectures are merely exemplary, and that in fact many other architectures can be implemented which achieve the same functionality. In a conceptual sense, any arrangement of components to achieve the same functionality is effectively "associated" such that the desired functionality is achieved. Hence, any two components herein combined to achieve a particular functionality can be seen as "associated with" each other such that the desired functionality is achieved, irrespective of architectures or intermedial components. Likewise, any two components so associated can also be viewed as being "operably connected", or "operably coupled", to each other to achieve the desired functionality, and any two components capable of being so associated can also be viewed as being "operably couplable", to each other to achieve the desired functionality. Specific examples of operably couplable include but are not limited to physically mateable and/or physically interacting components and/or wirelessly interactable and/or wirelessly interacting components and/or logically interacting and/or logically interactable components.

[0052] With respect to the use of substantially any plural and/or singular terms herein, those having skill in the art can translate from the plural to the singular and/or from the singular to the plural as is appropriate to the context and/or application. The various singular/plural permutations may be expressly set forth herein for sake of clarity.

[0053] It will be understood by those within the art that, in general, terms used herein, and especially in the appended claims (e.g., bodies of the appended claims) are generally intended as "open" terms (e.g., the term "including" should be interpreted as "including but not limited to," the term "having" should be interpreted as "having at least," the term "includes" should be interpreted as "includes but is not limited to," etc.). It will be further understood by those within the art that if a specific number of an introduced claim recitation is intended, such an intent will be explicitly recited in the claim, and in the absence of such recitation no such intent is present. For example, as an aid to understanding, the following appended claims may contain usage of the introductory phrases "at least one" and "one or more" to introduce claim recitations. However, the use of such phrases should not be construed to imply that the introduction of a claim recitation by the indefinite articles "a" or "an" limits any particular claim containing such introduced

claim recitation to subject matter containing only one such recitation, even when the same claim includes the introductory phrases "one or more" or "at least one" and indefinite articles such as "a" or "an" (e.g., "a" and/or "an" should typically be interpreted to mean "at least one" or "one or more"); the same holds true for the use of definite articles used to introduce claim recitations. In addition, even if a specific number of an introduced claim recitation is explicitly recited, those skilled in the art will recognize that such recitation should typically be interpreted to mean at least the recited number (e.g., the bare recitation of "two recitations," without other modifiers, typically means at least two recitations, or two or more recitations). Furthermore, in those instances where a convention analogous to "at least one of A, B, and C, etc. " is used, in general such a construction is intended in the sense one having skill in the art would understand the convention (e.g., "a system having at least one of A, B, and C" would include but not be limited to systems that have A alone, B alone, C alone, A and B together, A and C together, B and C together, and/or A, B, and C together, etc.). In those instances where a convention analogous to "at least one of A, B, or C, etc. " is used, in general such a construction is intended in the sense one having skill in the art would understand the convention (e.g., "a system having at least one of A, B, or C" would include but not be limited to systems that have A alone, B alone, C alone, A and B together, A and C together, B and C together, and/or A, B, and C together, etc.). It will be further understood by those within the art that virtually any disjunctive word and/or phrase presenting two or more alternative terms, whether in the description, claims, or drawings, should be understood to contemplate the possibilities of including one of the terms, either of the terms, or both terms. For example, the phrase "A or B" will be understood to include the possibilities of "A" or "B" or "A and B."

[0054] Reference in the specification to "an example," "one example," “some examples,” or "other examples" may mean that a particular feature, structure, or characteristic described in connection with one or more examples may be included in at least some examples, but not necessarily in all examples. The various appearances of “an example,” “one example,” or “some examples” in the preceding description are not necessarily all referring to the same example.

[0055] While certain exemplary techniques have been described and shown herein using various methods and systems, it should be understood by those skilled in the art that various other modifications may be made, and equivalents may be substituted, without departing from claimed subject matter. Additionally, many modifications may be made to adapt a particular situation to the teachings of claimed subject matter without departing from the central concept described herein. Therefore, it is intended that claimed subject

matter not be limited to the particular examples disclosed, but that such claimed subject matter also may include all implementations falling within the scope of the appended claims, and equivalents thereof.

WHAT IS CLAIMED IS/ARE:

1. A system comprising:

a first lens including a first polarization filter and a light polarization layer;

a second lens including a second polarization filter; and

a polarization angle control module coupled to the first lens, the polarization angle control module operatively enabled to:

determine an angle of polarization of the second polarization filter; and

adjust an angle of polarization of the light polarization layer based at least in part on the determined angle of polarization of the second polarization filter to enable an image to be viewed through the first lens and the second lens.

2. The system of claim 1, wherein the second lens includes a contact lens.

3. The system of claim 2, further comprising a camera coupled to the polarization angle control module and wherein the contact lens includes a mark, the polarization angle control module being further operatively enabled to:

receive an image of the contact lens from the camera; and

identify a position of the mark based at least in part on the received image; and

wherein the polarization angle control module is operatively enabled to determine the angle of polarization of the second polarization filter based at least in part on the identified position of the mark.

4. The system of claim 3, wherein the mark includes an arrow.

5. The system of claim 1, wherein to adjust the angle of polarization of the light polarization layer, the polarization angle control module is operatively enabled to:

adjust the angle of polarization of the light polarization layer to be perpendicular relative to the determined angle of polarization of the second polarization filter.

6. The system of claim 1, wherein to adjust the angle of polarization of the light polarization layer, the polarization angle control module is operatively enabled to:

adjust the angle of polarization of the light polarization layer to be horizontal relative to the determined angle of polarization of the second polarization filter.

7. The system of claim 1, wherein the light polarization layer includes a plurality of pixels and the polarization angle control module is further operatively enabled to:

adjust an angle of polarization of one or more of the plurality of pixels of the light polarization layer to be perpendicular relative to the determined angle of polarization of the second polarization filter; and

adjust the angle of polarization of one or more of the plurality of pixels of the light polarization layer to be horizontal relative to the determined angle of polarization of the second polarization filter.

8. The system of claim 7, wherein the polarization angle control module is further operatively enabled to:

adjust the angle of polarization of one or more of the plurality of pixels of the light polarization layer to be more than horizontal but less than perpendicular relative to the determined angle of polarization of the second polarization filter.

9. A method to display an image with a transparent display device that includes a first polarization filter and a light polarization layer and that is configured to operate in conjunction with a second polarization filter, the method comprising:

determining an angle of polarization of the second polarization filter; and

adjusting an angle of polarization of the light polarization layer based at least in part on the determined angle of polarization of the second polarization filter to enable an image to be viewed with the transparent display device.

10. The method of claim 9, wherein determining the angle of polarization of the second polarization filter includes determining the angle of polarization of the second polarization filter incorporated into a contact lens.

11. The method of claim 10, wherein the contact lens includes a mark, the method further comprising:

receiving an image of the contact lens; and

identifying a position of the mark based at least in part on the received image; and

wherein determining the angle of polarization of the second polarization filter includes determining the angle of polarization of the second polarization filter based at least in part on the identified position of the mark.

12. The method of claim 11, wherein the mark includes an arrow.

13. The method of claim 9, wherein adjusting the angle of polarization of the light polarization layer includes:

adjusting the angle of polarization of the light polarization layer to be perpendicular relative to the determined angle of polarization of the second polarization filter.

14. The method of claim 9, wherein adjusting the angle of polarization of the light polarization layer includes:

adjusting the angle of polarization of the light polarization layer to be horizontal relative to the determined angle of polarization of the second polarization filter.

15. The method of claim 9, wherein the light polarization layer includes a plurality of pixels, the method further comprising:

adjusting an angle of polarization of one or more of the plurality of pixels of the light polarization layer to be perpendicular relative to the determined angle of polarization of the second polarization filter; and

adjusting the angle of polarization of one or more of the plurality of pixels of the light polarization layer to be horizontal relative to the determined angle of polarization of the second polarization filter.

16. The method of claim 15, further comprising:

adjusting the angle of polarization of one or more of the plurality of pixels of the light polarization layer to be more than horizontal but less than perpendicular relative to the determined angle of polarization of the second polarization filter.

17. A machine readable non-transitory medium having stored therein instructions that, in response to execution by one or more processors, operatively enable a polarization angle control module to perform the method of any one or more of claims 9-16.

18. An apparatus, comprising:

a transparent display including a first polarization filter and a light polarization layer; and

a polarization angle control module coupled to the transparent display, the polarization angle control module operatively enabled to:

determine an angle of polarization of the first polarization filter and a second polarization filter; and

adjust an adjustable angle of polarization of the light polarization layer based at least in part on the determined angle of polarization of at least one of the first polarization filter and the second polarization filter such that content displayed on the transparent display may be viewed with the transparent display.

19. The apparatus of claim 18, further comprising a level coupled to the polarization angle control module, wherein the polarization angle control module is operatively enabled to determine the angle of polarization of the first polarization filter and the second polarization filter based at least in part on the level.

20. The apparatus of claim 18, wherein the transparent display is incorporated into a contact lens.

21. The apparatus of claim 18, wherein the transparent display includes the second polarization filter.

22. The apparatus of claim 18, wherein the transparent display is formed in at least one of eyeglasses, goggles, a windshield, a computer screen, a window, a billboard, a marquee, a movie screen and a clear dry erase board.

23. The apparatus of claim 18, wherein the light polarization layer comprises:

a liquid crystal layer comprising liquid crystal molecules disposed between a first glass layer and a second glass layer, wherein the liquid crystal molecules are configured to adjust the adjustable angle of polarization of the light polarization layer to orient light to varying degrees of alignment with either or both of the first polarization filter or the second polarization filter;

a first alignment layer comprising first grooves; and

a second alignment layer comprising second grooves, wherein the liquid crystal molecules of the liquid crystal layer are aligned with the first grooves of the first alignment layer and the second grooves of the second alignment layer.

24. The apparatus of claim 23, wherein the first grooves are etched in a first outside surface of the first glass layer and the second groves are etched into a second outside surface of the second glass layer.

25. The apparatus of claim 23, wherein the first grooves of the first alignment layer are oriented in a different direction than the second grooves of the second alignment layer.

26. The apparatus of claim 23, wherein the first alignment layer and the second alignment layer are configured to arrange the liquid crystal molecules of the liquid crystal layer such that they rotate in a helix having a twist wherein a degree of the twist corresponds to an orientation of the first grooves and the second grooves with respect to one another.

27. The apparatus of claim 26, wherein the liquid crystal molecules are arranged to rotate greater than 90°.

28. The apparatus of claim 26, wherein the liquid molecules are arranged to rotate light between approximately -90° up to approximately +90° and/or between approximately 0° up to approximately 180°.

29. The apparatus of claim 26, wherein the liquid crystal molecules are arranged to rotate light up to approximately 270°.

30. The apparatus of claim 23, wherein the first glass layer comprises a first electrode and the second glass layer comprises a second electrode configured to correspond to the first electrode, wherein a helical arrangement of one or more of the liquid crystal molecules of the liquid crystal layer are adjusted by applying a voltage across the first electrode and the second electrode to change the helical arrangement.

31. The apparatus of claim 30, wherein a degree of rotation of the helical arrangement of the one or more of the liquid crystal molecules of the liquid crystal layer is inversely related to a strength of the applied voltage.

32. The apparatus of claim 31, wherein the degree of rotation of the helical arrangement of the one or more of the liquid crystal molecules of the liquid crystal layer corresponds to

the adjustable angle of polarization of the light polarization layer, wherein the liquid crystal layer is configured to rotate light in proportion to the degree of rotation of the helical arrangement of the one or more of the liquid crystal molecules of the liquid crystal layer based on the applied voltage.

33. The apparatus of claim 18, wherein the content is displayed horizontally on the transparent display.

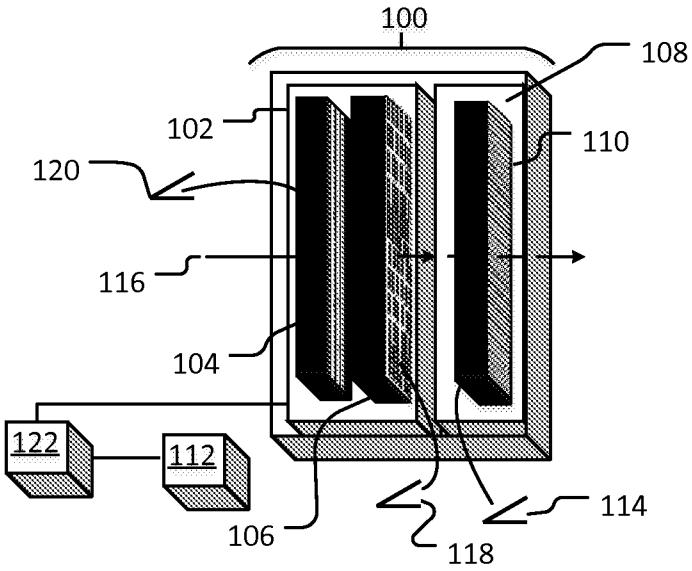

FIG. 1

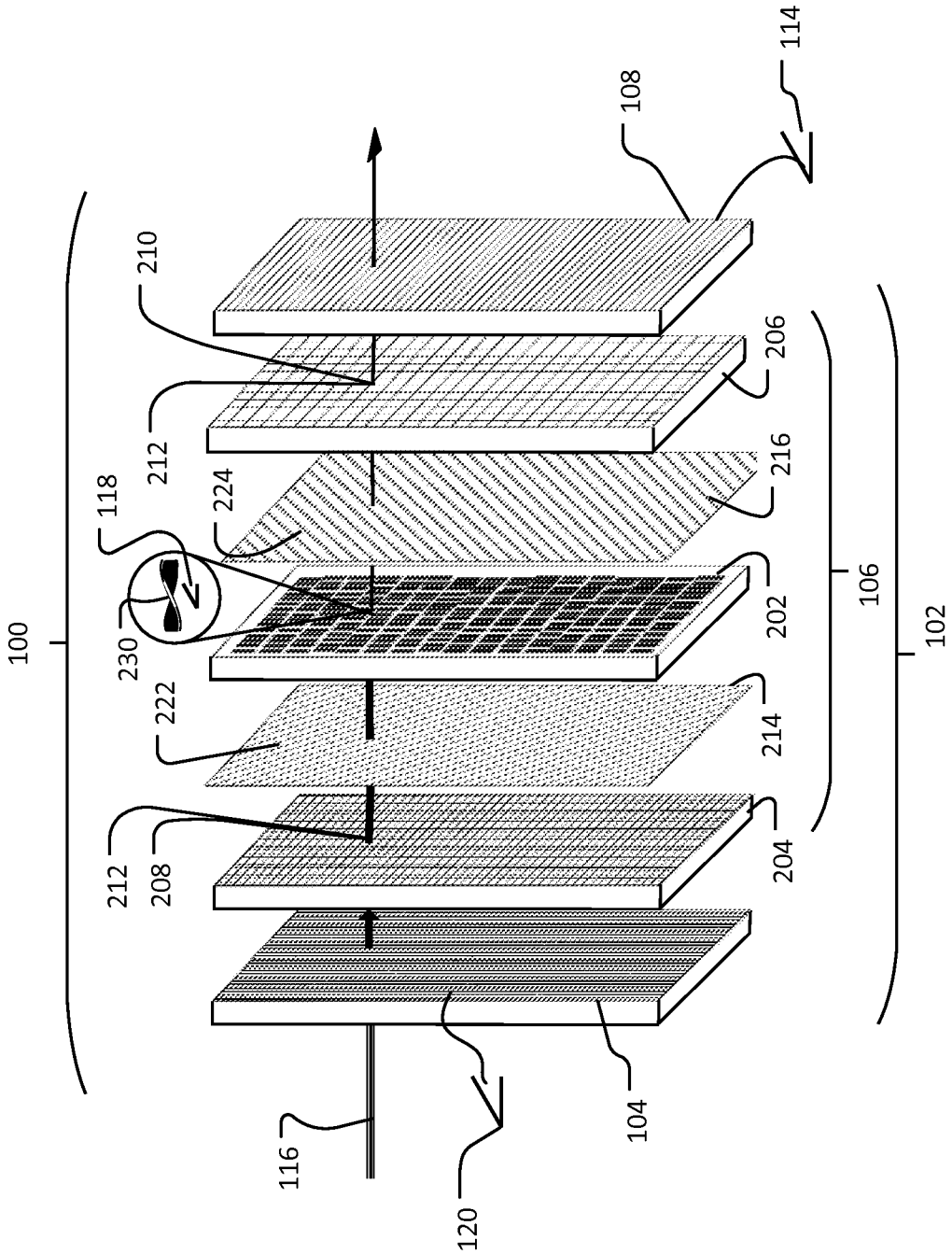
100
102
104
106
108
114
116
118
120
202
204
206
208
210
212
214
216
222
224
230

FIG.2

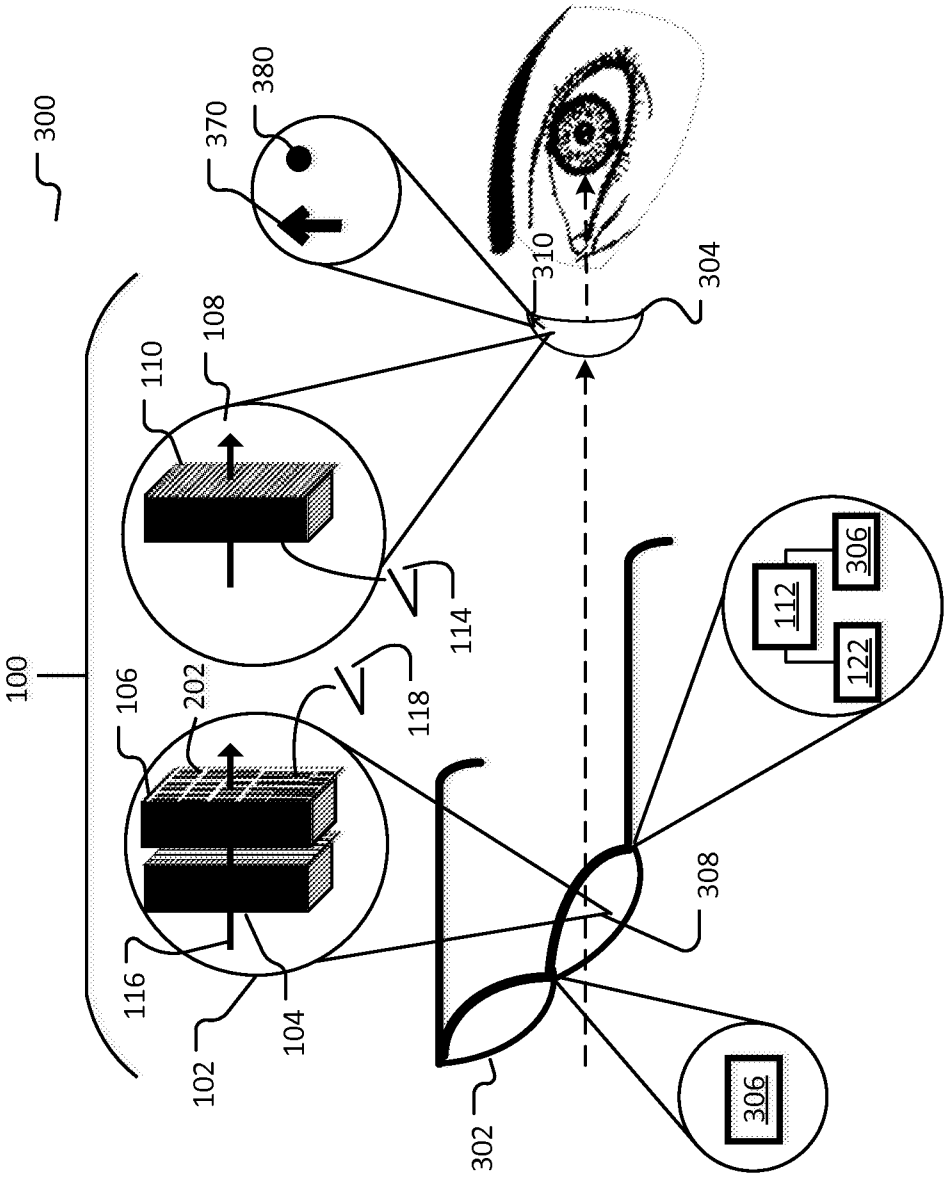
300
380
370
310
304
108
110
114
118
202
106
100
116
102
104
308
112
306
122
306
302

FIG.3

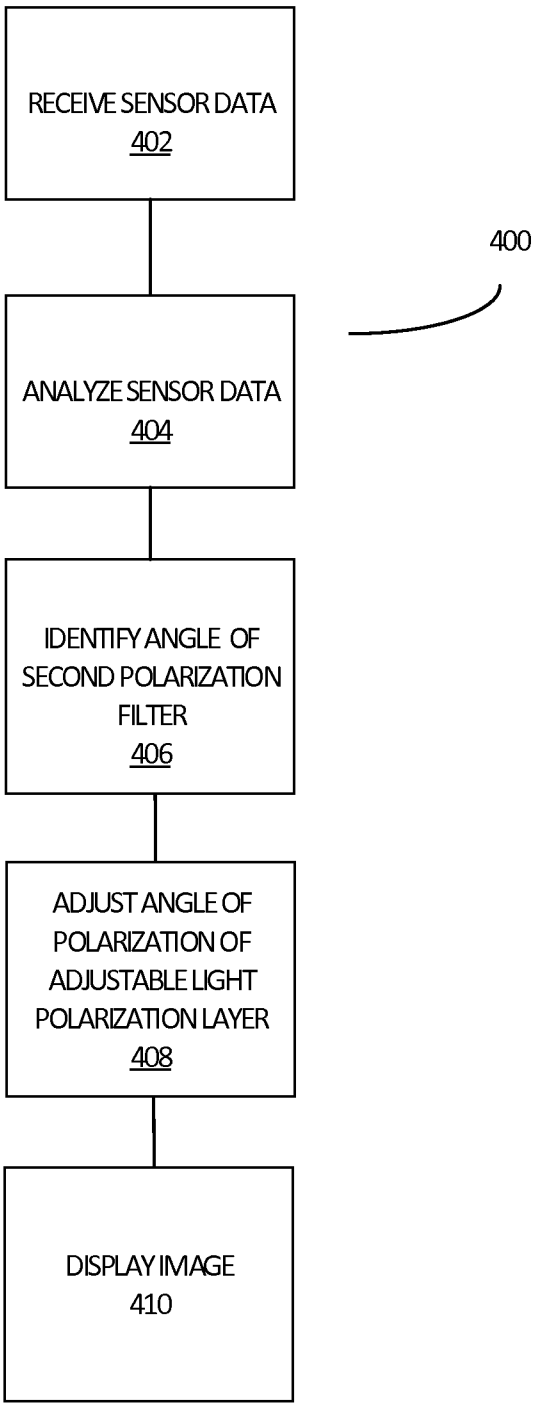
RECEIVE SENSOR DATA
402
400
ANALYZE SENSOR DATA
404
IDENTIFY ANGLE OF SECOND POLARIZATION FILTER
406
ADJUST ANGLE OF POLARIZATION OF ADJUSTABLE LIGHT POLARIZATION LAYER
408
DISPLAY IMAGE
410

FIG. 4

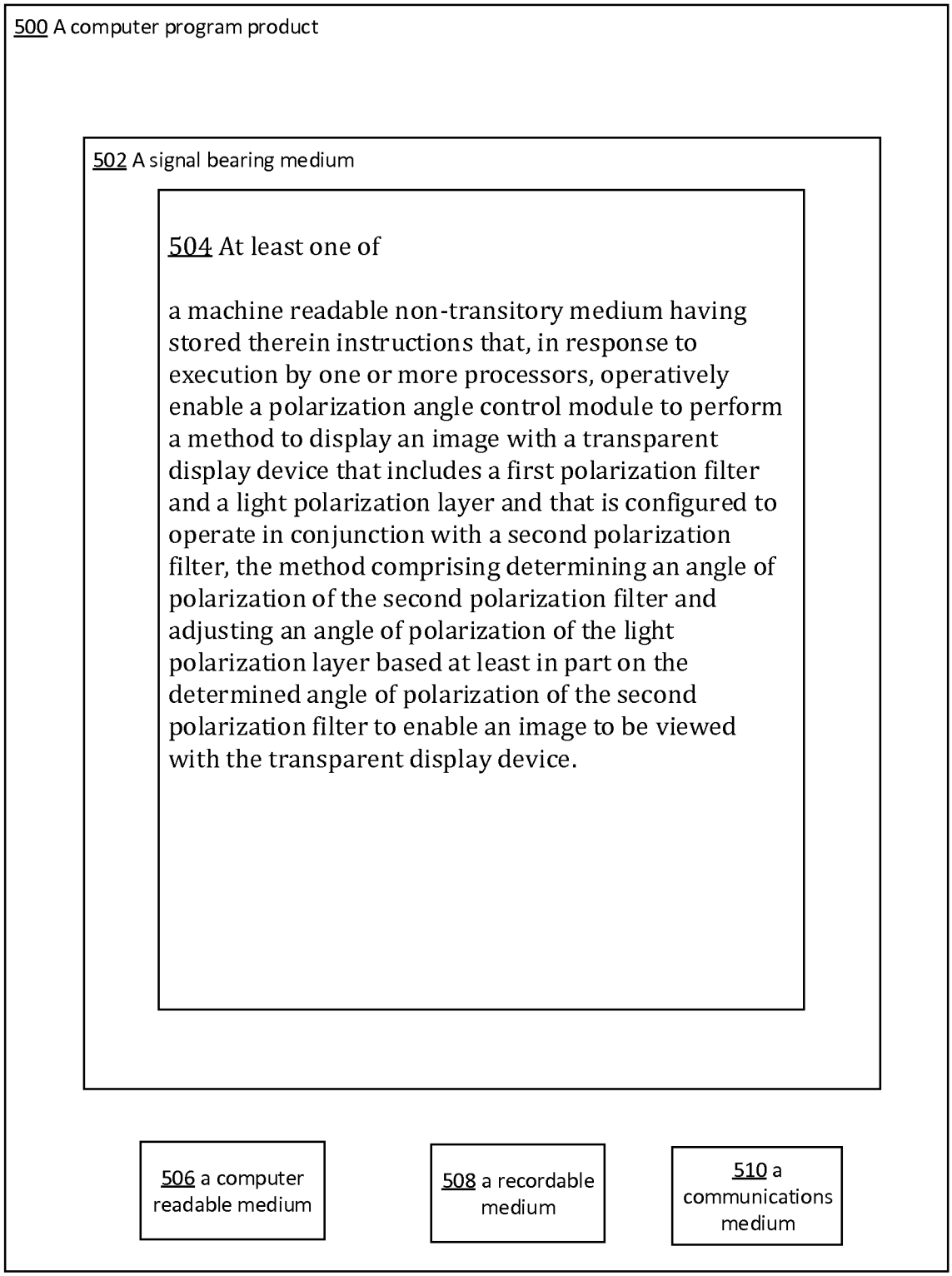
500 A computer program product
502 A signal bearing medium
504 At least one of
a machine readable non-transitory medium having stored therein instructions that, in response to execution by one or more processors, operatively enable a polarization angle control module to perform a method to display an image with a transparent display device that includes a first polarization filter and a light polarization layer and that is configured to operate in conjunction with a second polarization filter, the method comprising determining an angle of polarization of the second polarization filter and adjusting an angle of polarization of the light polarization layer based at least in part on the determined angle of polarization of the second polarization filter to enable an image to be viewed with the transparent display device.
506 a computer readable medium
508 a recordable medium
510 a communications medium

FIG. 5

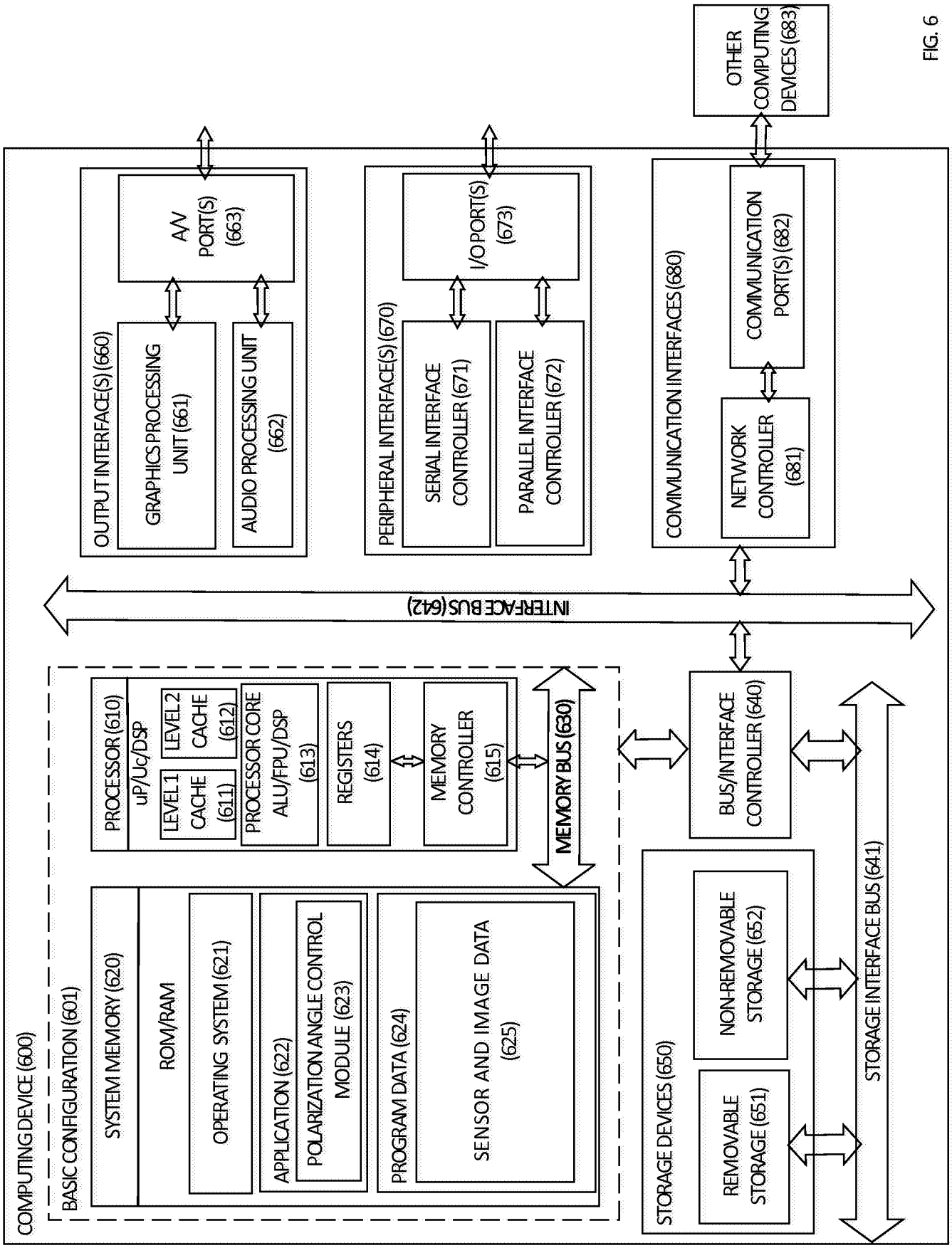
COMPUTING DEVICE (600)
BASIC CONFIGURATION (601)
PROCESSOR (610)
uP/Uc/DSP
LEVEL 1 CACHE (611)
LEVEL 2 CACHE (612)
PROCESSOR CORE ALU/FPU/DSP (613)
REGISTERS (614)
MEMORY CONTROLLER (615)
MEMORY BUS (630)
SYSTEM MEMORY (620)
ROM/RAM
OPERATING SYSTEM (621)
APPLICATION (622)
POLARIZATION ANGLE CONTROL MODULE (623)
PROGRAM DATA (624)
SENSOR AND IMAGE DATA (625)
OUTPUT INTERFACE(S) (660)
GRAPHICS PROCESSING UNIT (661)
AUDIO PROCESSING UNIT (662)
A/V PORT(S) (663)
PERIPHERAL INTERFACE(S) (670)
SERIAL INTERFACE CONTROLLER (671)
PARALLEL INTERFACE CONTROLLER (672)
I/O PORT(S) (673)
COMMUNICATION INTERFACES (680)
NETWORK CONTROLLER (681)
COMMUNICATION PORT(S) (682)
OTHER COMPUTING DEVICES (683)
INTERFACE BUS (642)
BUS/INTERFACE CONTROLLER (640)
STORAGE DEVICES (650)
REMOVABLE STORAGE (651)
NON-REMOVABLE STORAGE (652)
STORAGE INTERFACE BUS (641)

FIG. 6

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2013/071311

A. CLASSIFICATION OF SUBJECT MATTER
IPC(8) - G02C 7/02 (2014.01)
USPC - 349/13
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC(8) - G02B 1/00, 1/08; G02C 7/02, 7/04, 7/10 (2014.01)
USPC -349/1, 13, 76, 95, 99, 101, 104, 123

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
CPC - G02C 7/00, 7/02, 7/027, 7/04 (2013.01)

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
Orbit, Google Patents, Google Scholar, EAST

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 2009/0059103 A1 (AZOR et al) 05 March 2009 (05.03.2009) entire document	1-33
Y	US 6,115,177 A (VOSSLER) 05 September 2000 (05.09.2000) entire document	1-33
Y	US 2012/0281181 A1 (CHEN et al) 08 November 2012 (08.11.2012) entire document	2-4,10-12,20
Y	US 2007/0206140 A1 (TING et al) 06 September 2007 (06.09.2007) entire document	23-32
A	US 6,108,064 A (MINOURA et al) 22 August 2000 (22.08.2000) entire document	1-33
A	US 2012/0068913 A1 (BAR-ZEEV et al) 22 March 2012 (22.03.2012) entire document	1-33
A	US 2013/0166025 A1 (PUGH et al) 27 June 2013 (27.06.2013) entire document	1-33
A	US 6,097,451 A (PALMER et al) 01 August 2000 (01.08.2000) entire document	1-33

☐ Further documents are listed in the continuation of Box C. ☐

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
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Date of the actual completion of the international search	Date of mailing of the international search report
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