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(54) **RENDERING VIRTUAL CONTENT BASED ON ITEMS RECOGNIZED IN A REAL-WORLD ENVIRONMENT**

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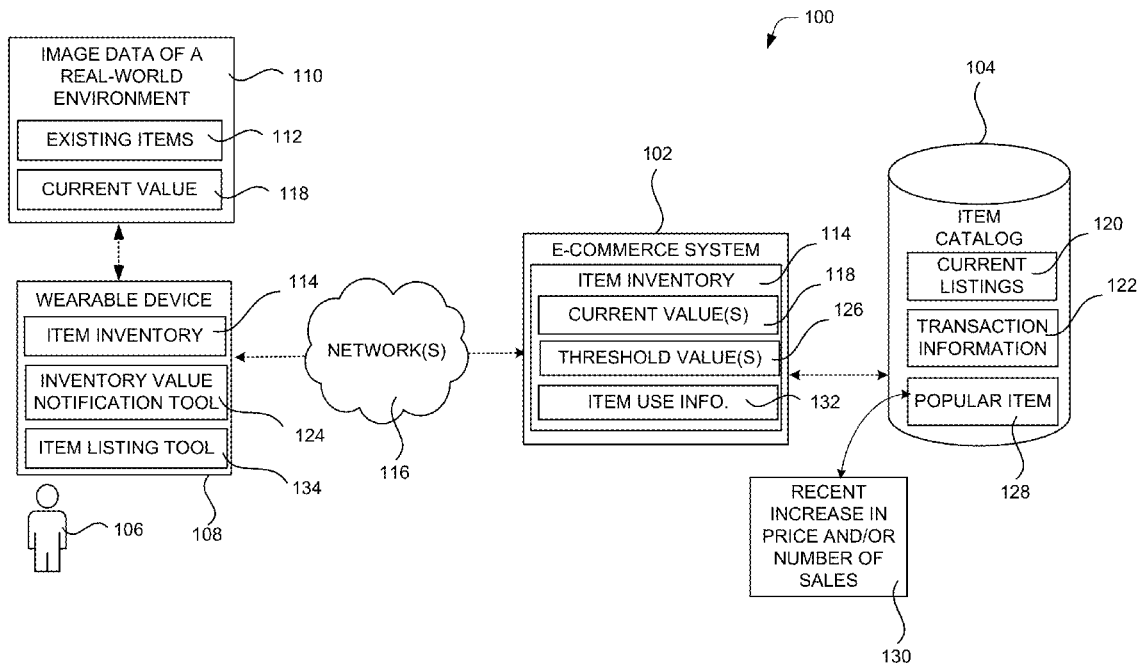
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(57) **ABSTRACT**

The disclosed technologies recognize items owned by the user. For instance, the items may be items found in a kitchen of a user's house, an office space at the user's place of work, a workshop in a user's garage, etc., which can be recognized by a wearable device as the user casually goes about a day's activities. Based on the recognition, the wearable device is configured to create and maintain an inventory of items owned by a user. The wearable device can also access an item catalog to determine an estimated current value of an item. Once the estimated current value is determined, the wearable device can generate and display the estimated current value of the item so the user is made aware of this information. This information can be useful to a user if the user is thinking about and/or willing to sell the item.



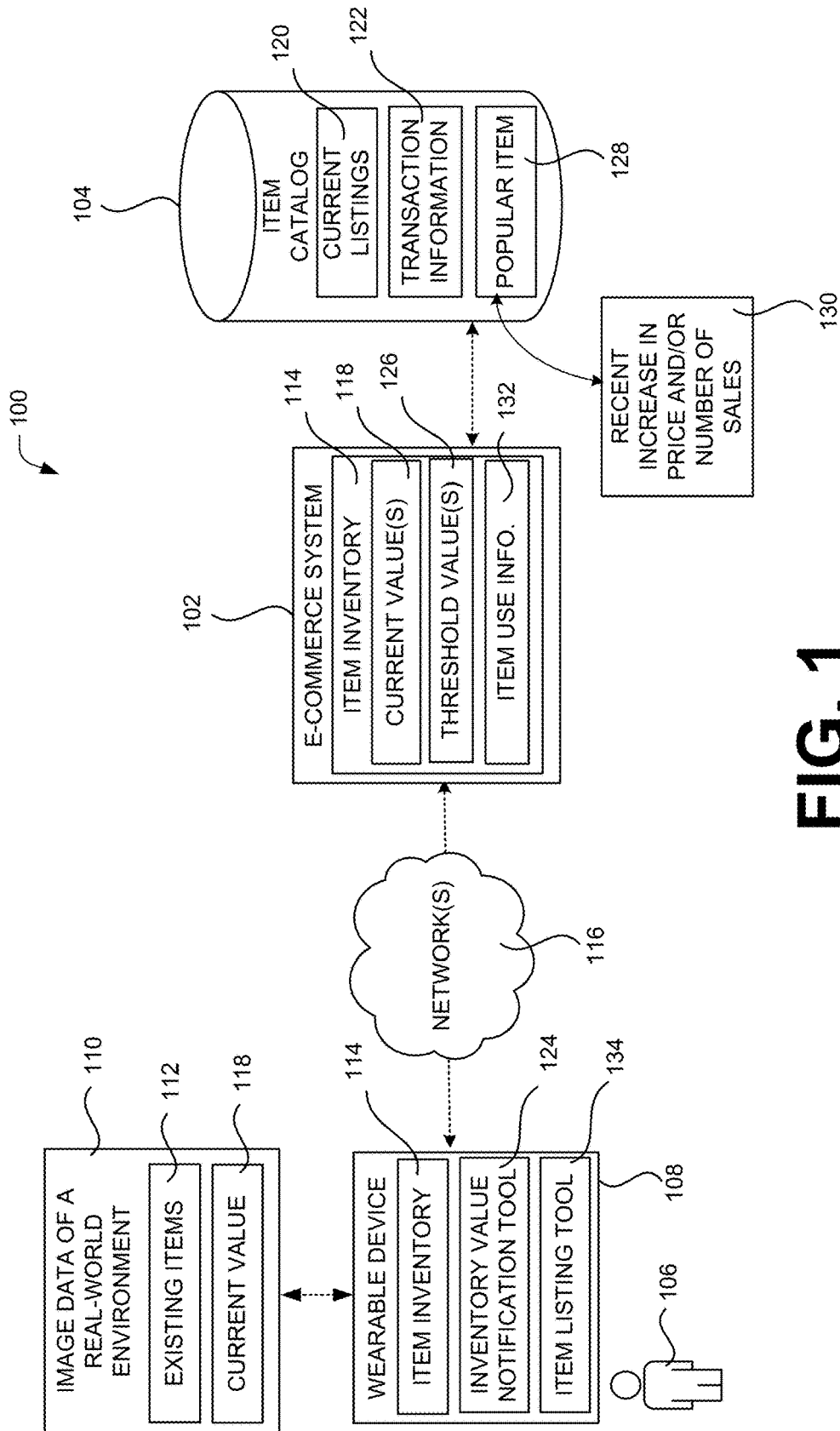


FIG. 1

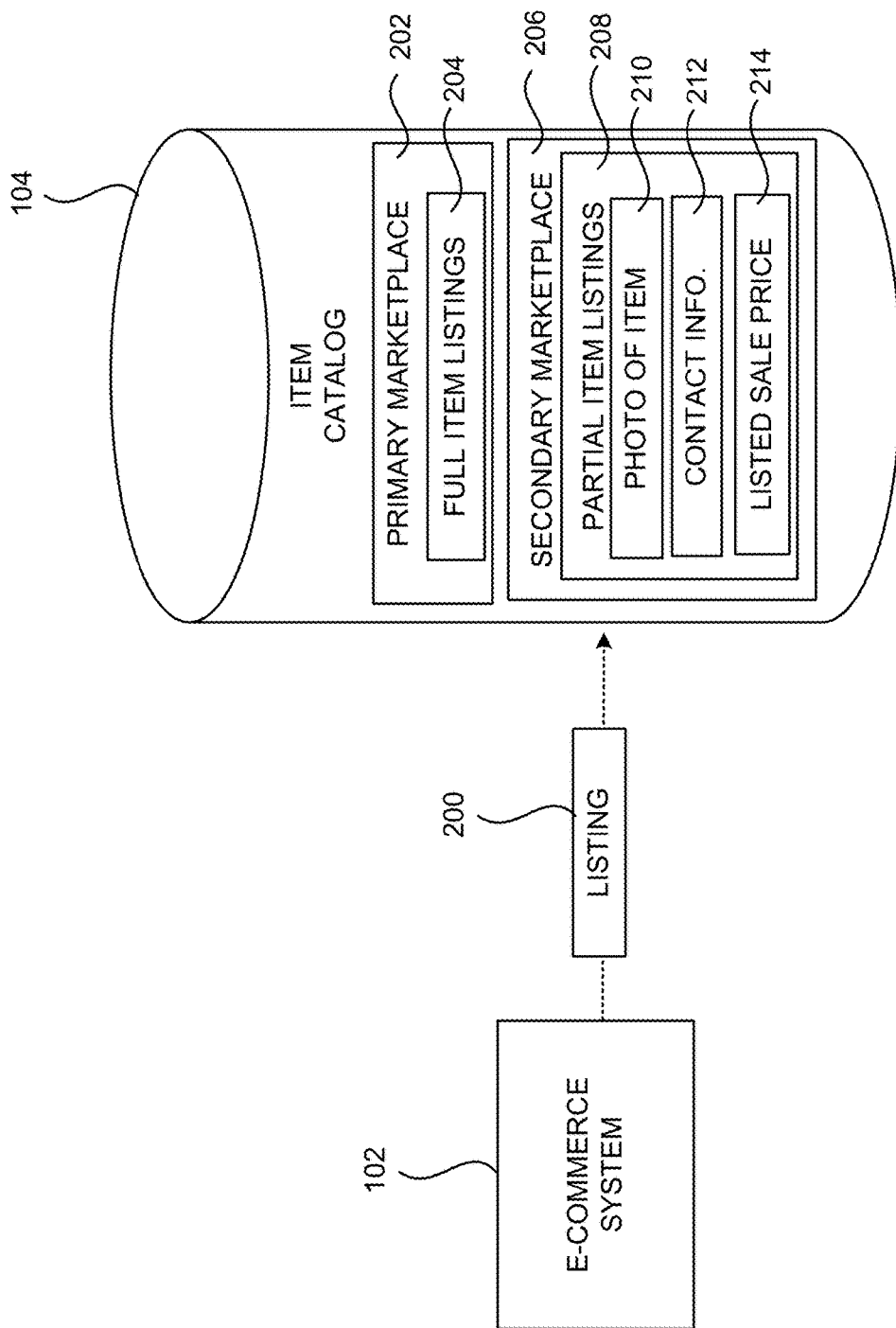
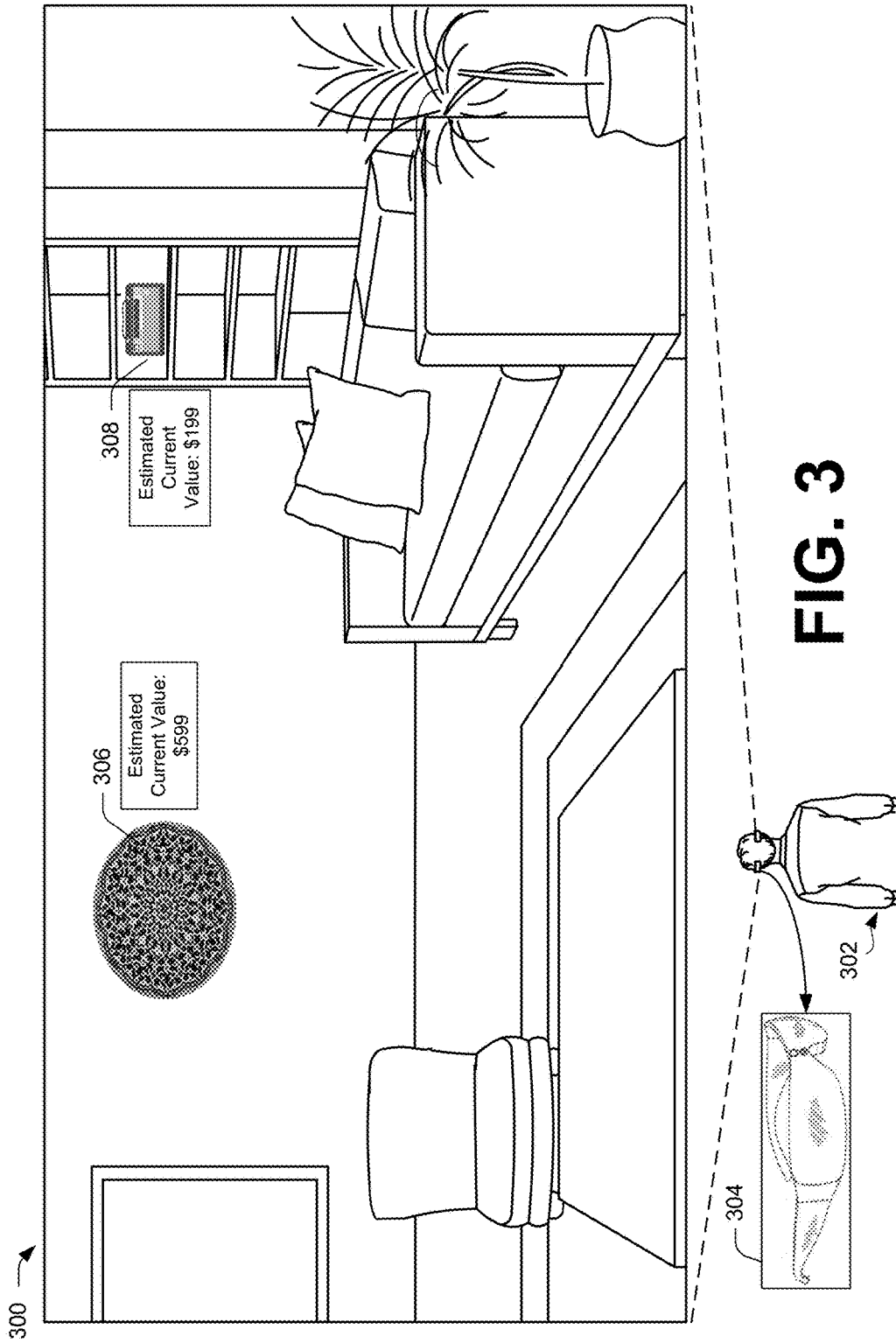
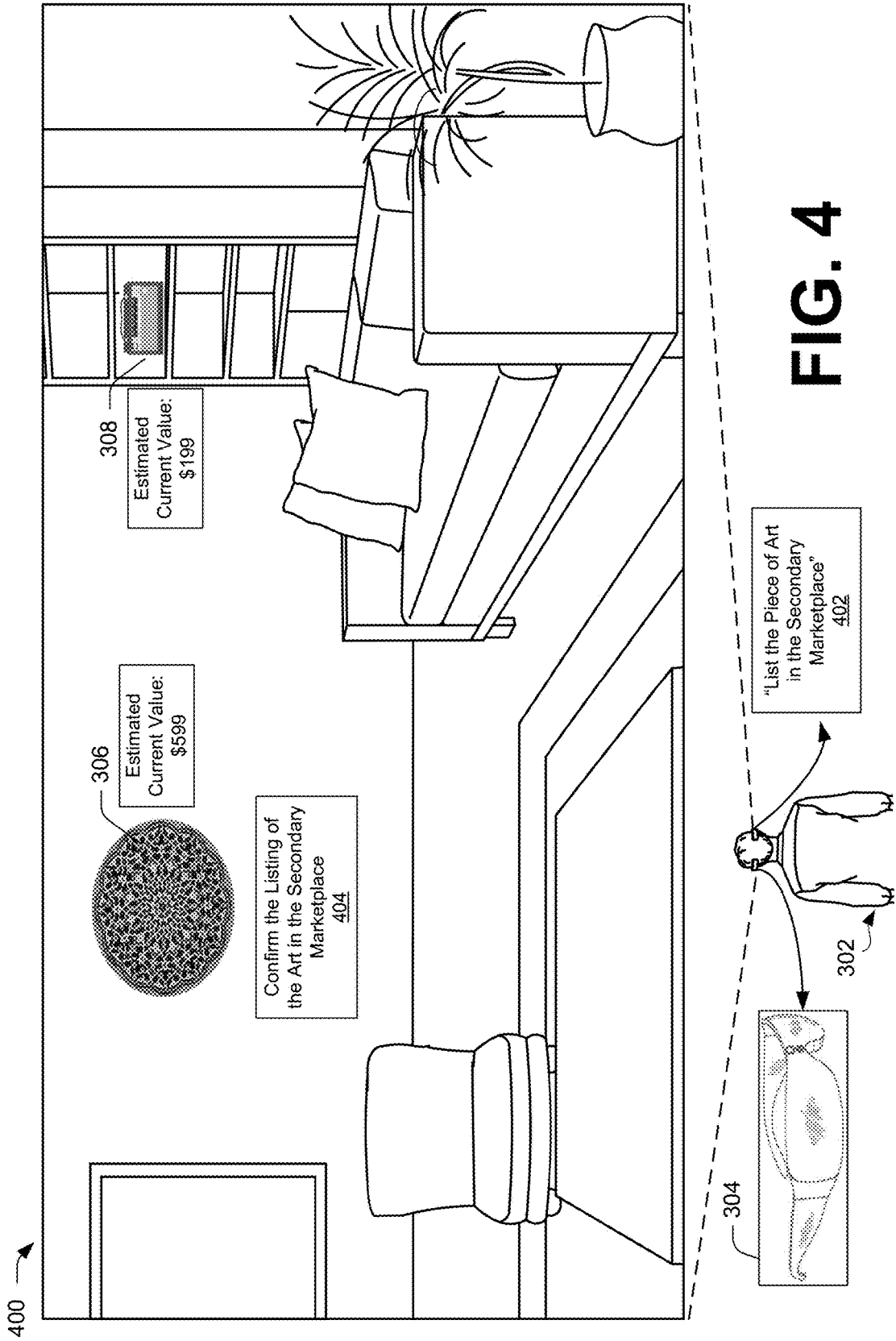


FIG. 2





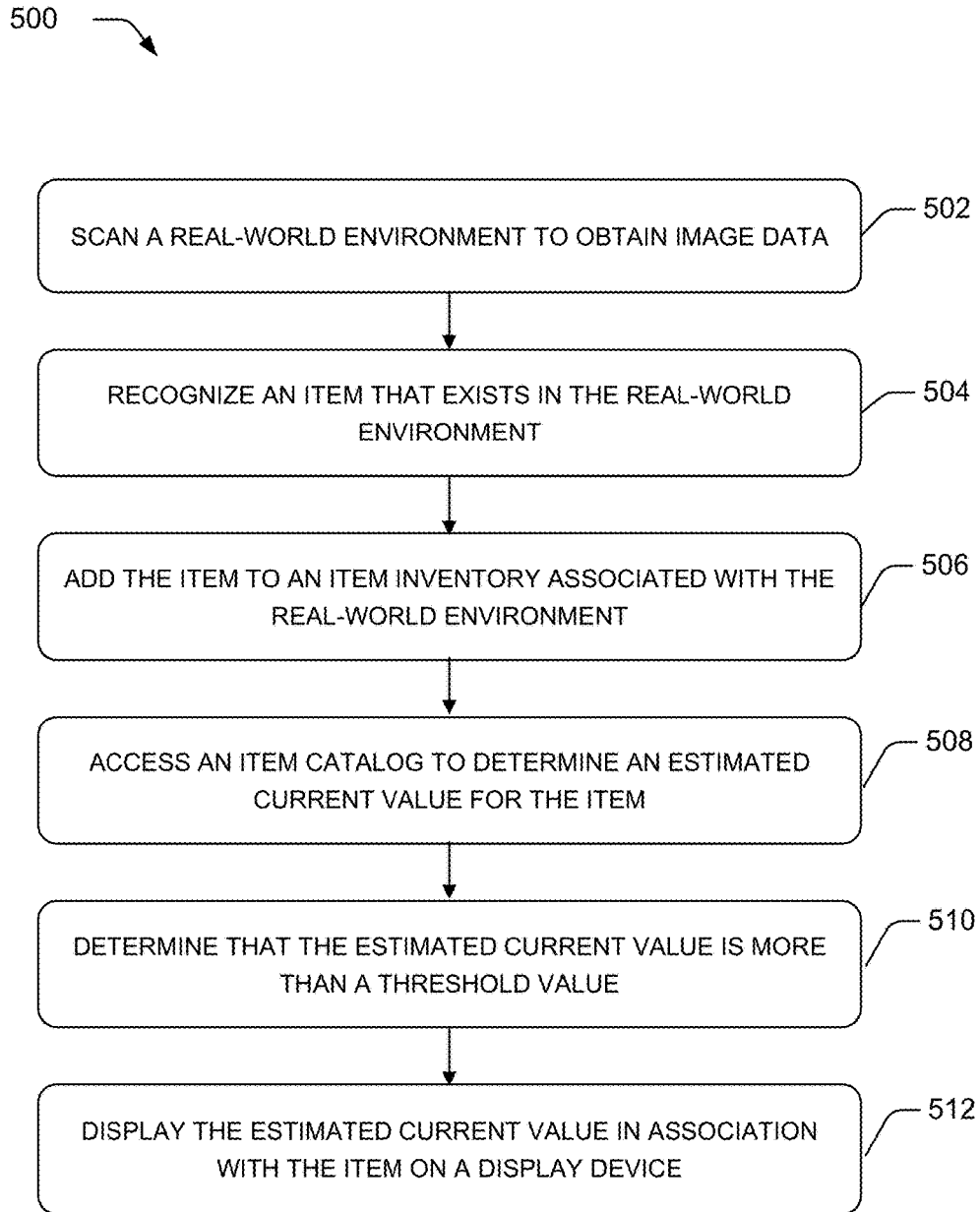


FIG. 5

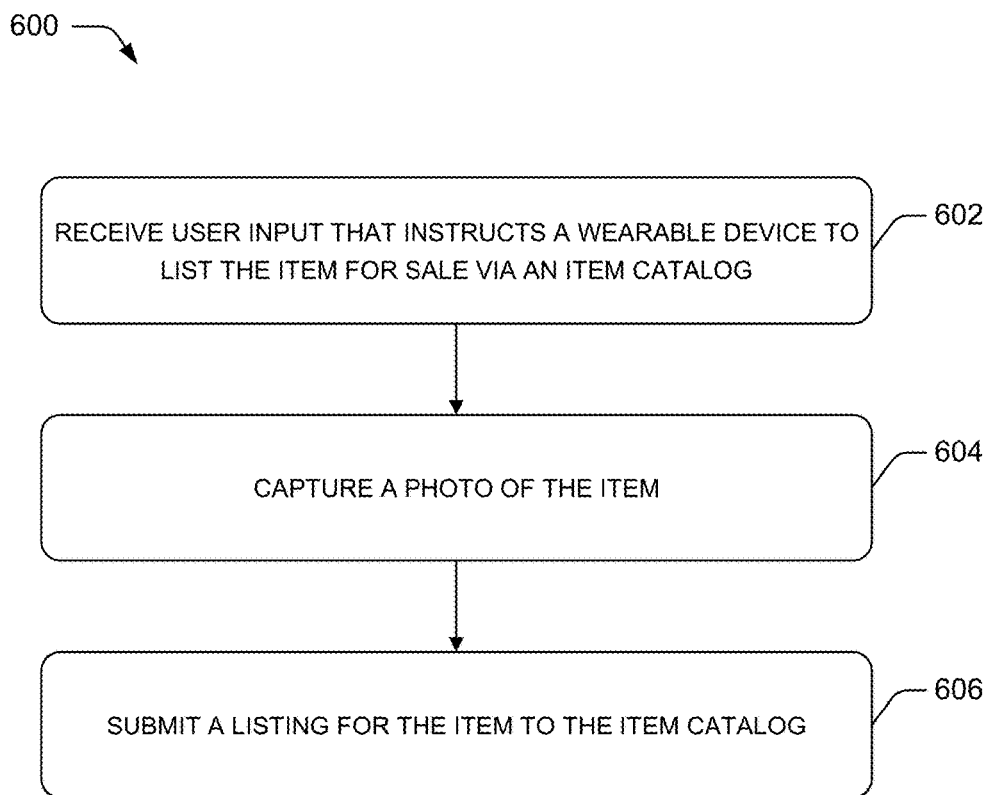


FIG. 6

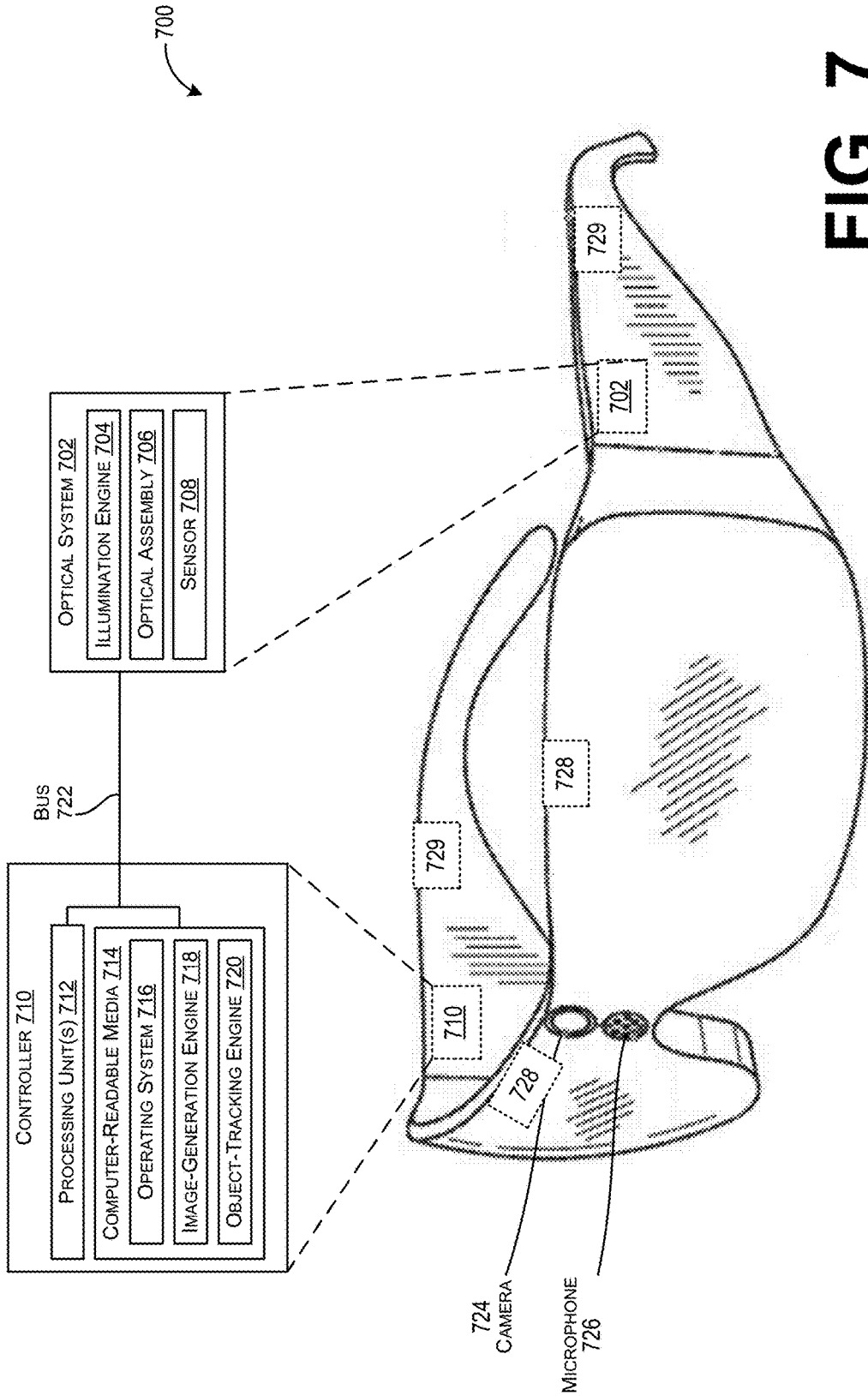


FIG. 7

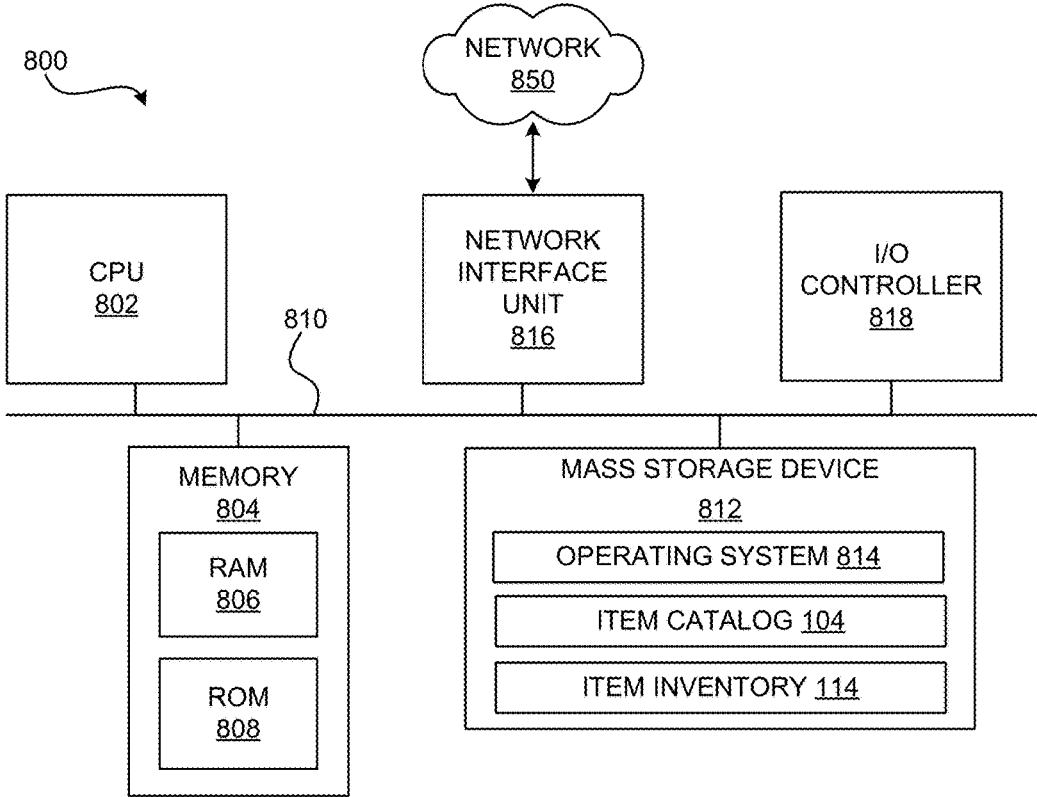


FIG. 8

RENDERING VIRTUAL CONTENT BASED ON ITEMS RECOGNIZED IN A REAL-WORLD ENVIRONMENT

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims the benefit of and priority to U.S. Provisional Application No. 62/588,189, filed Nov. 17, 2017 and entitled “Augmented Reality, Mixed Reality, and Virtual Reality Experiences,” the entire contents of which are incorporated herein by reference.

BACKGROUND

[0002] Users often own a large number of items. Some of these items may be valuable items that are marketable and that are capable of providing a return to the users (e.g., other users may have an interest in purchasing the item). In many cases, the users may be unaware of the value of items, and even further, the user may even forget they actually own certain items. Consequently, users often miss out on opportunities to receive a return (e.g., a monetary return) on an item with which they are willing to part. In some cases, this item may be an item that they no longer use or that they rarely use.

[0003] A wearable device has the ability to display virtual content to a user, in an augmented reality (“AR”) environment, as the user goes about a day’s activities within a household or another type of environment in which items owned by the user are present. As use of wearable devices becomes more prevalent, it has become difficult to effectively identify information, associated with a user’s items, that is of interest to the user and to display relevant virtual content representative of the information. Consequently, the user can spend a considerable amount of time sorting through and/or understanding virtual content that is of no interest, or little interest, to the user. This may unnecessarily utilize computing resources such as processing cycles, memory, and network bandwidth. Moreover, this might result in inadvertent or incorrect user input to the wearable device rendering virtual content in an immersive real-world environment, which can also unnecessarily utilize computing resources such as processing cycles, memory, and network bandwidth.

[0004] It is with respect to these and other technical challenges that the disclosure made herein is presented.

SUMMARY

[0005] The techniques described herein identify, render, and display relevant virtual content as a user casually wears a wearable device while performing a day’s activities within a household or another type of environment in which items owned by the user are present. The relevant content is content in which the user is interested. By identifying virtual content in which the user is interested, a wearable device avoids the aimless display of various content in which the user is not interested. In this way, the disclosed technologies tangibly improve computing efficiencies with respect to a wide variety of computing resources that would otherwise be consumed and/or utilized by improving human-computer interaction and by reducing the amount of processing cycles and storage required.

[0006] The virtual content can be associated with items that are present in a real-world environment, and the virtual

content rendered for display is relevant in the sense that the virtual content is likely to be of interest to the user. For example, the virtual content can include an estimated current value of an item that, for various reasons, has become a popular item. That is, the item is in higher demand than it was previously, and there are more potential buyers of the item than there are potential sellers.

[0007] Aspects of the technologies disclosed herein can be implemented by a wearable device, such as an augmented reality (“AR”) device. For example, a user of such a device might provide input indicating an interest to enter or activate a mode enabling the techniques described herein to be implemented. Moreover, the wearable device may communicate with a system, over a network, to implement the techniques described herein.

[0008] A wearable device described herein can recognize items owned by the user. For instance, the items may be items found in a kitchen of a user’s house, an office space at the user’s place of work, a workshop in a user’s garage, etc. Based on the recognition, the wearable device is configured to create and maintain an inventory of items owned by a user. Accordingly, when the wearable device recognizes an item, the wearable device can check the inventory of items to determine if the recognized item has already been inventoried. If not, the wearable device adds the recognized item to the inventory of items. This process can be implemented over a period of time in order to continuously maintain and update the inventory of items.

[0009] The inventory of items can include some or all items owned by a user. Moreover, the inventory of items can be organized so that the items owned by the user are sorted based on different environments in which they are present (e.g., a home inventory, a work or office inventory, a vacation place inventory, a kitchen inventory, a garage inventory, a master bedroom inventory, a secondary bedroom, etc.).

[0010] A wearable device described herein is further configured to access an item catalog to determine an estimated current value of an item. The item catalog includes current listings of items for sale, and also information associated with transactions during which items are exchanged between a seller and a buyer. This information can include a number of sales of an item, a price for each sale, a buyer identification, a seller identification, item characteristics, etc.

[0011] In one example, the estimated current value of an item owned by a user can be the most recent price at which the same item or a similar item is sold via the item catalog. In another example, the estimated current value of an item owned by a user can be an average price at which the same item and/or similar items are sold using multiple recent sales (e.g., the average price of a predetermined number of sales such as the last five item sales or the last ten item sales). Once the estimated current value is determined, the wearable device can generate and display the estimated current value of the item so the user is made aware of this information. This information can be useful to a user if the user is thinking about and/or willing to sell the item.

[0012] In various embodiments, as a precondition to displaying the estimated current value of the item, the wearable device is configured to compare the estimated current value to a threshold value. In one example, the wearable device may use a policy to establish the threshold value for an item. The policy may calculate the threshold value as a predetermined percentage of an average sales price of an item. The

average sales price may be calculated for a predefined period of time (e.g., the last week, the last month, the last three months, etc.). Thus, if the average sales price of the item for the last three months is \$100, and the predetermined percentage used to calculate the threshold value is one hundred forty percent (140%), then the threshold value is \$140.

[0013] Using the inventory of items, the wearable device is configured to track or check the estimated current value of the item over a period of time as the price fluctuates based on market conditions. If the estimated current value meets or exceeds the threshold value, the wearable device can generate and display a notification informing the user of the recent price increase. The notification can be displayed while the user is located in an environment in which the item is present.

[0014] Consequently, the techniques described herein can inform the user of ownership of a “hot”, or popular, item that is in demand on an electronic commerce (e-commerce) site. Demand for an item can spike in response to an occurrence of a particular event. For example, a recently announced change in a law that will go into effect in the near future may spike demand for an item (e.g., the law may limit sales of the item). Thus, the estimated current value of the item may increase dramatically.

[0015] In another example, the death of a celebrity (e.g., a musician) may spike demand for an item associated with the late celebrity (e.g., old musical records that are no longer produced). Thus, the estimated current value of the item may increase dramatically. In yet another example, a recent accolade or achievement by a celebrity such as a sports star (e.g., MVP of a big game) may spike demand for an item associated with the celebrity (e.g., signed memorabilia such as a football, a jersey, a helmet, etc.). Again, this type of event may cause the estimated current value of the item to increase dramatically. Accordingly, the techniques described herein can help people take advantage of a recent event that causes the value of an item they own to increase dramatically. If a user is willing to sell such an item, the user may realize a monetary return that they may not have realized prior to the event occurring.

[0016] In some instances, the threshold value can be established based on contextual data. For example, the contextual data can comprise a condition of the item. The wearable device can recognize item characteristics that are indicative of the condition of the item (e.g., excellent, good, fair, poor, etc.) and adjust a threshold value based on the condition of the item. More specifically, the threshold value may be increased if the item is in excellent condition (e.g., shows little wear and tear, is not chipped or broken, etc.) and the threshold value may be decreased if the item is in poor condition (e.g., shows a large amount of wear and tear, is chipped or broken, etc.).

[0017] In another example, the contextual data can comprise a sales history for the user. For instance, if a number of previous sales associated with a user account indicate that the user sells items at higher prices and rarely adjusts the prices lower, then the threshold value can be adjusted higher. In contrast, if a number of previous sales associated with a user account indicate that the user sells items at lower prices (e.g., commonly discounts the sales prices to move an item quickly), then the threshold value can be adjusted lower.

[0018] In a further example, the contextual data can comprise a total number of sales for the user over a period of time. That is, the user may have previously indicated that he

or she would like to sell a predetermined number of items for a defined period of time (e.g., two items per month). Provided that the user has not sold the predetermined number of items and the predefined time period is about to expire or end, then the threshold value can be adjusted lower so that the user is presented with more selling opportunities as he or she looks around an environment filled with items he or she owns. Furthermore, if the user is close to meeting or has already met the predetermined number of items to sell for the defined period of time, then the threshold value can be adjusted higher.

[0019] In some embodiments, the estimated current value of an item can be determined based on item characteristics shared between different items. That is, an item the user owns may not be the exact same as one or more items used to determine the estimated current value, but they may be similar in that they share one or more item characteristics that contribute to an increase in a value. For example, a shared item characteristic can include a particular manufacturer or producer that is going out of business, and thus, not making items anymore. Consequently, different types of items manufactured or produced by the same company may increase in value.

[0020] In another example, a shared item characteristic can include an authenticated signature of a celebrity (e.g., an estimated current price for a player’s signed football helmet can be determined based on a recent sales price of the player’s signed jersey). Therefore, the technologies described herein can recognize characteristics of a particular item owned by the user and determine an estimated current value for the particular item based on sales of the same item and/or sales of similar items, where an item is similar if it contains a shared item characteristic that contributes to an increase in value.

[0021] In further embodiments, the wearable device can be configured to determine and/or track use characteristics of an item in the inventory. For example, as part of maintaining an inventory of items, the wearable device can determine a total number of uses of an item, a frequency of use of an item, etc. The total number of uses of an item and/or the frequency of use may be indicative of whether the user is still interested in owning the item. For example, if the user never or rarely uses the item and the item is not a collectible item, then the user likely has little interest in owning the item. Consequently, the user is likely more willing to part with, or sell, the item. Accordingly, using the inventory of items, the wearable device can analyze the total number of uses and/or the frequency of use to determine that an item is rarely used and/or likely no longer of interest to the user. The wearable device can display the estimated current value and recommend that the user sell the item that is rarely used.

[0022] The use of an item may be determined based on whether the item has been moved from one location in an environment to another location in the same environment or in a different environment. Over time, the wearable device can track a number of times an item has been moved. For instance, if the wearable device determines that a user stores or places golf clubs in different locations, then the wearable device can store information indicating that the user still plays golf.

[0023] In some examples, the threshold value described above can be established based on use characteristics (e.g., use characteristics can be part of the contextual data). For

instance, if a user never or rarely uses an item, then the threshold value can be adjusted lower. If the user often uses the item (e.g., the user enjoys the item), then the threshold value can be adjusted higher.

[0024] In additional embodiments, the wearable device can be used as an effective mechanism to efficiently list the item for sale. That is, a user can look at an item he or she owns while wearing the wearable device, see an estimated current value, and provide input for the wearable device to capture a photo of the item. In response to the input, the wearable device can create a listing for the item in an e-commerce site.

[0025] In some scenarios, the listing may be posted to a “secondary” marketplace of the e-commerce site that includes items that a user is willing to sell without having to spend a considerable amount of time to complete a full listing for a “primary” marketplace. For example, an item listing in the secondary marketplace is a limited listing that may only include a photo of an item, a seller’s identification, and/or piece of contact information (e.g., an email, a phone number, etc.). In contrast, to complete a full listing, an e-commerce system may require a seller to submit much more information such as an item title, an item category, an item description, item specifications, a price, multiple images, etc. before the full listing is posted in an item catalog. Some potential buyers may prefer to browse through the secondary market place to find a photo that captures an item of interest.

[0026] If found, a potential buyer can contact the seller and make an offer to purchase the item. Consequently, by using the wearable device and the secondary marketplace, a minimal amount of work is required by the seller to submit an item listing to an e-commerce site, where the item listing corresponds to an item the user is willing to sell (e.g., due to a recent spike in demand and price) but does not necessarily need to sell.

[0027] The disclosed technologies improve a user experience by identifying relevant opportunities to display virtual content that is of interest to a user in a three-dimensional immersive environment as the user goes about a day’s activities. That is, using the techniques described herein, a user can look at an item he or she owns, see an estimated current value, and provide input for the wearable device to submit a listing with a limited amount of information to a marketplace. This can all be done in an efficient manner without interrupting the user’s activities. Moreover, the wearable device avoids the aimless display of various content in which the user is not interested. In this way, the disclosed technologies tangibly improve computing efficiencies with respect to a wide variety of computing resources that would otherwise be consumed and/or utilized by improving human-computer interaction and by reducing the amount of processing cycles and storage required by previous solutions. Technical benefits other than those specifically identified herein might also be realized through implementations of the disclosed technologies.

[0028] It should be appreciated that the above-described subject matter can be implemented as a computer-controlled apparatus, a computer-implemented method, a computing device, or as an article of manufacture such as a computer-readable medium. These and various other features will be apparent from a reading of the following Detailed Description and a review of the associated drawings.

[0029] This Summary is provided to introduce a selection of concepts in a simplified form that are further described below in the Detailed Description. This Summary is not intended to identify key features or essential features of the claimed subject matter, nor is it intended that this Summary be used to limit the scope of the claimed subject matter. Furthermore, the claimed subject matter is not limited to implementations that solve any or all disadvantages noted in any part of this disclosure.

BRIEF DESCRIPTION OF THE DRAWINGS

[0030] The Detailed Description is described with reference to the accompanying figures. In the figures, the left-most digit(s) of a reference number identifies the figure in which the reference number first appears. The same reference numbers in different figures indicate similar or identical items.

[0031] FIG. 1 illustrates aspects of an exemplary computing environment in which a wearable device and/or a system can create and maintain an inventory of items owned by a user and access an item catalog to determine an estimated current value of an item owned by the user.

[0032] FIG. 2 illustrates example marketplaces of an item catalog to which a listing for an item can be submitted.

[0033] FIG. 3 illustrates an example where a user is looking at a portion of a real-world environment (e.g., a living room) while wearing a wearable device configured to recognize existing items, add the existing item to an item inventory, determine estimated current values for the existing items, and/or display the estimated current values in association with the existing items.

[0034] FIG. 4 illustrates an example where a user can provide input to submit a listing to a secondary marketplace.

[0035] FIG. 5 is a flow diagram that illustrates an example process describing aspects of the technologies disclosed herein for displaying an estimated current value of an item in a real-world environment via a wearable device.

[0036] FIG. 6 is a flow diagram that illustrates an example process describing aspects of the technologies disclosed herein for listing an item for sale via an item catalog (e.g., an e-commerce site).

[0037] FIG. 7 shows an illustrative configuration of a wearable device capable of implementing aspects of the technologies disclosed herein.

[0038] FIG. 8 illustrates additional details of an example computer architecture for a computer capable of implementing aspects of the technologies described herein.

DETAILED DESCRIPTION

[0039] This Detailed Description describes identifying, rendering, and displaying relevant virtual content as a user casually wears a wearable device while performing a day’s activities within a household or another type of environment in which items owned by the user are present. The virtual content can be associated with the items that are present in a real-world environment, and the virtual content rendered for display is relevant in the sense that the virtual content is likely to be of interest to the user.

[0040] A wearable device described herein can recognize items owned by the user. For instance, the items may be items found in a kitchen of a user’s house, an office space at the user’s place of work, a workshop in a user’s garage, etc. Based on the recognition, the wearable device is configured

to create and maintain an inventory of items owned by a user. The wearable device can also access an item catalog to determine an estimated current value of an item. Once the estimated current value is determined, the wearable device can generate and display the estimated current value of the item so the user is made aware of this information. This information can be useful to a user if the user is thinking about and/or willing to sell the item.

[0041] Referring now to the FIGURES, technologies for determining and displaying an estimated current value of an item to a user will be described.

[0042] FIG. 1 illustrates aspects of an exemplary computing environment 100 in which a wearable device and/or a system can create and maintain an inventory of items owned by a user and access an item catalog to determine an estimated current value of an item owned by the user. As illustrated, the exemplary system may comprise an electronic commerce (“e-commerce”) system 102 that includes an item catalog 104 where users and/or merchants can list real-world items for sale. A real-world item can be any type of item including, but not limited to, electronics, home goods, automobiles or automotive parts, clothing, musical instruments, art, jewelry, and so forth. In various examples, the e-commerce system 102 can be implemented on one or more server computers operating in conjunction with of an e-commerce site.

[0043] A user 106 can utilize a wearable device 108, such as that described in further detail below with respect to FIG. 7, to obtain image data 110 of the real-world environment in which the user 106 is currently located. For instance, the wearable device 108 can include an optical device configured to scan the real-world environment of the user 106 to obtain the image data 110 (e.g., recognize objects in the real-world environment). In various examples, the image data 110 of the real-world environment includes recognizable existing items 112 that are physically present in the real-world environment. In some embodiments, the wearable device 108 can send the image data 110 to the e-commerce system 102 and the e-commerce system 102 can recognize the existing items 112.

[0044] The wearable device 108 and/or the e-commerce system 102 are configured to create and maintain an inventory of items owned and/or possessed by the user (i.e., the item inventory 114). The item inventory 114 can be maintained in association with a user account. Upon recognizing an item 112, the wearable device 108 is configured to check the item inventory 114 to determine if the recognized item has already been added. If not, the wearable device 108 adds the recognized item to the item inventory 114.

[0045] In one example, the user 106 can activate an “item inventory” operation mode for the wearable device 108, and based on the activation, the inventorying process can continually be implemented over a period of time in order to ensure the item inventory 114 is accurate. The item inventory 114 can include all items owned and/or possessed by the user 106 and/or a group of people associated with the user 106 (e.g., other family members). Moreover, the item inventory 114 can be organized so that the items owned and/or possessed by the user 106 are sorted based on different real-world environments in which they are present (e.g., a home inventory, a work or office inventory, a vacation place inventory, a kitchen inventory, a garage inventory, a master bedroom inventory, a secondary bedroom, etc.).

[0046] The wearable device 108, via one or more network(s) 116 and the e-commerce system 102, is further configured to access the item catalog 104 to determine an estimated current value 118 of an item in the item inventory 114. The item may be an item 112 located in the real-world environment in which the user 106 is currently located. As described above, the item catalog 104 includes current listings 120 of items for sale via an e-commerce site operated by the e-commerce system 102, for example. The item catalog 104 may also store transaction information 122 associated with exchanges of items between sellers and buyers. The transaction information 122 can include a number of sales of an item, a price for each sale, a buyer identification, a seller identification, item characteristics, etc.

[0047] The estimated current value 118 of an item 112 can be the most recent price at which the same item or a similar item is sold via the item catalog 104. Alternatively, the estimated current value 118 of an item 112 can be an average price at which the same item and/or similar items are sold using multiple recent sales (e.g., the average price of a predetermined number of sales such as the last five item sales or the last ten item sales).

[0048] Once the estimated current value 118 is determined, an inventory value notification tool 124 (e.g., a software component or module) of the wearable device 108 can compare the estimated current value 118 to a threshold value 126. If the estimated current value 118 (e.g., \$160) is greater than the threshold value 126 (e.g., \$140), the inventory value notification tool 124 can display the estimated current value 118 of the item 112 in the user’s view of the real-world environment so the user 106 is made aware of this information. This information can be useful to a user 106 if the user 106 is thinking about and/or willing to sell the item 112.

[0049] In some examples, the user 106 can specifically define the threshold value 126 at which he or she is willing to sell an item 112. Based on market conditions that cause the price of the item 112 to fluctuate (e.g., increase and/or decrease over a period of time), the user 106 can be notified when the estimated current value 118 of the item 112 is more than the threshold value 126 defined by the user 106.

[0050] In alternative examples, the threshold value 126 can be established by the e-commerce system 102 and/or the wearable device 108. For instance, the threshold value 126 can be calculated as a predetermined percentage of an average sales price of an item. The average sales price may be calculated for a predefined period of time (e.g., the last week, the last month, the last three months, etc.). Thus, if the average sales price of the item for the last three months is \$100, and the predetermined percentage used to calculate the threshold value is one hundred and forty percent (140%), then the threshold value is \$140.

[0051] The predetermined percentage is typically more than one hundred percent (e.g., 120%, 150%, 200%, etc.) and can be established by the e-commerce system 102 and/or the wearable device 108 to determine when a price increase is substantial. Further, the e-commerce system 102 and/or the wearable device 108 can define different predetermined percentages for different categories of items, and use the appropriate predetermined percentage to determine a threshold value 126 based on a category to which the item 112 belongs. This accounts for the possibility that a substantial price increase for one category of items may be

different than a substantial price increase for another category of items. In some instances, the user **106** can define the predetermined percentage used to calculate the threshold value **126** for the items **112** the user owns and/or possesses.

[0052] A current estimated price **118** exceeding the threshold value **126** may be a condition for displaying relevant virtual content. For example, while wearing the wearable device **108**, the user **106** may not want to know the estimated current prices of all the items in an immersive real-world environment, as this may be distraction. Moreover, this can cause unnecessary consumption of computer resources. Instead, the user **106** may only desire to see estimated current prices that have recently increased dramatically.

[0053] Consequently, the item **112** for which the estimated current value **118** is determined and/or displayed may be a popular item **128**. A popular item **128** can be an item that is in high demand due to a recent event. For example, a recently announced change in a law that will go into effect in the near future may spike demand for an item (e.g., the law may limit sales of the item). In another example, the death of a celebrity (e.g., a musician) may spike demand for an item associated with the late celebrity (e.g., old musical records that are no longer produced). In yet another example, a recent accolade or achievement by a celebrity such as a sports star (e.g., MVP of a big game) may spike demand for an item associated with the celebrity (e.g., signed memorabilia such as a football, a jersey, a helmet, etc.).

[0054] Based on an occurrence of a recent unexpected event, the price of the popular item **128** increases because there are many more potential buyers than there are potential sellers. Moreover, the popular item **128** may have experienced a recent increase in the number of sales, as referenced by **130**.

[0055] In some instances, the threshold value **126** can be established based on contextual data. For example, the contextual data can comprise a condition of the item. The wearable device can recognize item characteristics that are indicative of the condition of the item (e.g., excellent, good, fair, poor, etc.) and adjust a threshold value **126** based on the condition of the item. More specifically, the threshold value **126** may be increased if the item is in excellent condition (e.g., shows little wear and tear, is not chipped or broken, etc.) and the threshold value **126** may be decreased if the item is in poor condition (e.g., shows a large amount of wear and tear, is chipped or broken, etc.).

[0056] In another example, the contextual data can comprise a sales history for the user. For instance, if a number of previous sales associated with a user account indicate that the user sells items at higher prices and rarely adjusts the prices lower, then the threshold value **126** can be adjusted higher. In contrast, if a number of previous sales associated with a user account indicate that the user sells items at lower prices (e.g., commonly discounts the sales prices to move an item quickly), then the threshold value **126** can be adjusted lower.

[0057] In a further example, the contextual data can comprise a total number of sales for the user over a period of time. That is, the user may have previously indicated that he or she would like to sell a predetermined number of items for a defined period of time (e.g., two items per month). Provided that the user has not sold the predetermined number of items and the predefined time period is about to expire or end, then the threshold value **126** can be adjusted

lower so that the user is presented with more selling opportunities as he or she looks around an environment filled with items he or she owns. Furthermore, if the user is close to meeting or has already met the predetermined number of items to sell for the defined period of time, then the threshold value **126** can be adjusted higher.

[0058] As an alternative to using threshold values to display estimated current values, the transaction information **122** in the item catalog **104** can be accessed to determine that a number of sales of the item during a recent predefined period of time (e.g., the last three days, the last week, the last month) is greater than a threshold number of sales of the item. In one example, the threshold number of sales is established as a predetermined percentage of a number of sales of the item during a predefined period of time that precedes the recent predefined period of time (e.g., the three days before the last three days, the week before the last week, the month before the last month).

[0059] Similar to the discussion above, the predetermined percentage associated with a number of sales is typically more than one hundred percent (e.g., 120%, 150%, 200%, etc.) so that the e-commerce system **102** and/or the wearable device **108** can determine when a number of sales dramatically increases from one time period to the next. The e-commerce system **102** and/or the wearable device **108** can define different predetermined percentages for different categories of items, and use the appropriate predetermined percentage to determine when sales of an item have greatly increased. Accordingly, the inventory value notification tool **124** can display the estimated current value **118** of the item **112** in the user's view of the real-world environment based on an increased number of sales of the item.

[0060] In some embodiments, the estimated current value **118** of an item **112** can be determined based on item characteristics shared between different items. That is, item **112** may not be the exact same as one or more items used to determine the estimated current value **118**, but they may be similar in that they share one or more item characteristics that contribute to an increase in a value. For example, a shared item characteristic can include a particular manufacturer or producer that is going out of business, and thus, not making items anymore. Consequently, different types of items manufactured or produced by the same company may increase in value.

[0061] In another example, a shared item characteristic can include an authenticated signature of a celebrity (e.g., an estimated current price for a player's signed football helmet can be determined based on a recent sales price of the player's signed jersey). Therefore, the technologies described herein can recognize characteristics of a particular item owned by the user and determine an estimated current value for the particular item based on sales of the same item and/or sales of similar items, where an item is similar if it contains a shared item characteristic that contributes to an increase in value.

[0062] In additional embodiments, the wearable device **108** can be configured to determine and/or track use characteristics of an item **112** and store the user characteristics as item use information **132** in the item inventory **114**. For example, the wearable device **108** can determine a total number of uses of an item **112**, a frequency of use of an item **112**, etc. The use of an item may be determined based on whether the item has been moved from one location in an environment to another location in the same environment or

in a different environment. The total number of uses of an item **112** and/or the frequency of use of the item **112** may be indicative of whether the user is still interested in owning the item **112**. For example, if the user never or rarely uses the item **112** and the item **112** is not a collectible item, then the user likely has little interest in owning the item **112**. Consequently, the user is likely more willing to part with, or sell, the item. It follows that the determination and display of the estimated current value **118** can be based on a determination that the item **112** has not been used in a predefined period of time (e.g., the last month, the last three months, the last year). Alternatively, the determination and display of the estimated current value **118** can be based on a determination that the item **112** has been used a number of times in a predefined period of time (e.g., once in a year), the number of times being less than a threshold number of times established for infrequent use (e.g., five times in a year).

[0063] In some examples, the threshold value **126** described above can be established based on use characteristics (e.g., use characteristics can be part of the contextual data). For instance, if a user never or rarely uses an item, then the threshold value **126** can be adjusted lower. If the user often uses the item (e.g., the user enjoys the item), then the threshold value **126** can be adjusted higher. In some embodiments, the threshold value **126** can be based on a frequency of use of an item, e.g., a frequency that an item is moved from one position to another over the course of a time period. In some embodiments, the threshold value **126** can be increased or decreased based on contextual data indicating a frequency of use or a frequency of movement of an item. For instance, an increased frequency in use can decrease the threshold value **126**. Alternatively, a decreased frequency in use can increase the threshold value **126**. In some embodiments, a decreased frequency in use can decrease the threshold value **126**. In other embodiments, increased frequency in use can increase the threshold value **126**.

[0064] FIG. 1 further illustrates that the wearable device **108** can include an item listing tool **134** (e.g., a software component or module). The item listing tool **134** implements functionality that enables the user **106** to create a listing for the item **112** in the item catalog **104** (e.g., on an e-commerce site). For example, the item listing tool **134** can configure a control that enables a user **106** of the wearable device **108** to provide input instructing the wearable device **108** to create the listing for the item. The control can be a displayed graphical element configured to receive user input (e.g., a user reaches out to virtually touch a selectable menu option), or the control can be configured to receive an audible command as the user input.

[0065] Based on the user input, the item listing tool **134** can locate the item **112**, focus on the item **112**, capture a photo of the item using a camera of the wearable device **108**. The item listing tool **134** can then submit the listing for the item **112** along with the photo to the e-commerce system **102** and/or the item catalog **104**. In some examples, the item listing tool can use the previously obtained image data **110** to locate the item **112**, and submit the image data corresponding to the item **112** along with the listing for the item.

[0066] FIG. 2 illustrates example marketplaces of the item catalog **104** to which the listing **200** for the item **112** can be submitted. In FIG. 2, the item catalog **104** includes a primary

marketplace **202** that includes full item listings **204** and a secondary marketplace **206** that includes partial item listings **208**.

[0067] In various embodiments, a partial item listing **208** in the secondary marketplace **206** is a limited listing that may only include a photo of an item **210**, a seller's identification along with piece of contact information **212** (e.g., an email, a phone number, etc.), and/or a suggested sale price **214**. In contrast, to place a full item listing **204** in the primary marketplace **202**, the e-commerce system **102** may require a seller to submit much more information such as an item title, an item category, an item description, item specifications, a price, multiple images, etc. before the full listing is posted in an item catalog. Consequently, using the techniques described herein, a user can look at an item he or she owns, see an estimated current value, and provide input for the wearable device to submit a listing with a limited amount of information to a marketplace. This can all be done in an efficient manner without interrupting the user's activities.

[0068] An example of a wearable device **108** can include an augmented reality ("AR") device. An AR device is a computing device capable of providing a view of the real-world environment within which physical objects are augmented or supplemented by computer-generated ("CG") sensory input (e.g., sound, video, graphics, etc.). For instance, an AR device might provide a view of the real-world environment with a rendering of virtual content as an overlay. Additional details regarding the configuration and operation of a wearable device **108** capable of providing this functionality is provided below with regard to FIG. 7. In this regard, it is to be appreciated that the virtual content can be displayed in an AR environment, as well as other types of environments, such as mixed reality ("MR") environments or virtual reality ("VR") environments. It is also to be appreciated that the configurations disclosed herein are not limited to use with an AR device. Rather, the technologies disclosed herein can be utilized with any type of computing device that can provide a view of a real-world environment.

[0069] It is to be further appreciated that the technologies described herein can be implemented on a variety of different types of wearable devices **108** configured with a variety of different operating systems, hardware components, and/or installed applications. In various configurations, for example, the wearable device **108** can be implemented by the following example wearable devices: GOOGLE GLASS, MAGIC LEAP ONE, MICROSOFT HOLOLENS, META 2, SONY SMART EYEGLASS, HTC VIVE, OCULUS GO, PLAYSTATION VR, or WINDOWS mixed reality headsets. Thus, embodiments of the present disclosure can be implemented in any AR-capable device, which is different than goggles or glasses that obstruct a user's view of real-world objects, e.g., actual reality. The techniques described herein can be device and/or operating system agnostic.

[0070] FIG. 3 illustrates an example **300** where a user **302** (e.g., user **106**) is looking at a portion of a real-world environment (e.g., a living room) while wearing a wearable device **304** (e.g., wearable device **108**) configured to recognize existing items, add the existing item to an item inventory, determine estimated current values for the existing items, and/or display the estimated current values in association with the existing items. The view into the living room provided via the wearable device **304** comprises a real-world

view from the perspective of the user **302**. As shown, the living room includes a piece of art **306** on a wall and a record player **308** sitting on a shelf.

[0071] As described above, the wearable device **304** can recognize the piece of art **306** and the record player **308** and add the items to an inventory of items owned and/or possessed by the user **302** (e.g., a home inventory of items, a living room inventory of items, etc.). Furthermore, when the items are in the view of the user **302**, as illustrated, the wearable device **304** can access an item catalog to determine estimated current values for the same or similar items. In some examples, the wearable device **304** compares the estimated current values to threshold values, and if the estimated current values are greater than the threshold values, the wearable device **304** displays the estimated current values close to the items. As shown, the piece of art **306** on the wall has an estimated current value of \$599 and the record player **308** sitting on the shelf has an estimated current value of \$199.

[0072] The displayed values may aid the user **302** in making a decision to sell an item. In some examples, the wearable device **302** can configure a control that receives input (e.g. an instruction) from the user to submit an item listing to an item catalog **104**. FIG. 4 illustrates an example **400** where the user **302** provides an audible command **402** to “list the piece of art in the secondary marketplace”. In response, the wearable device **304** is configured to capture a photo of the piece of art **306** and display a prompt **404** for the user **302** to confirm the listing of the art **306** in the secondary marketplace **206**. Accordingly, the wearable device **302**, via a user account, can create a partial item listing that includes the photo of the art **306**, an identification of the user, contact information of the user, and/or the estimated current value, and submit the partial item listing to the secondary marketplace **206**.

[0073] To implement some of the described techniques on the wearable device **108**, a user may be required to enable a feature and/or enter a particular operation mode. For example, the user **106** may need to provide permission and/or authorization for the wearable device **108** to implement the described techniques.

[0074] FIGS. 5 and 6 are flow diagrams that each illustrate an example process describing aspects of the technologies presented herein with reference to FIGS. 1-4. A process is illustrated as a collection of blocks in a logical flow graph, which represent a sequence of operations that can be implemented in hardware, software, or a combination thereof. In the context of software, the blocks represent computer-executable instructions that, when executed by one or more processors, perform the recited operations.

[0075] The particular implementation of the technologies disclosed herein is a matter of choice dependent on the performance and other requirements of a computing device such as a wearable device. Accordingly, the logical operations described herein may be referred to variously as states, operations, structural devices, acts, or modules. These states, operations, structural devices, acts, and modules can be implemented in hardware, software (i.e. computer-executable instructions), firmware, in special-purpose digital logic, and any combination thereof. Generally, computer-executable instructions include routines, programs, objects, components, data structures, and the like that perform or implement particular functions. It should be appreciated that more or fewer operations can be performed than shown in the

figures and described herein. These operations can also be performed in a different order than those described herein. Other processes described throughout this disclosure shall be interpreted accordingly.

[0076] FIG. 5 is a flow diagram that illustrates an example process **500** describing aspects of the technologies disclosed herein for displaying an estimated current value of an item in a real-world environment via a wearable device.

[0077] The process **500** begins at block **502**, where a real-world environment is scanned by a wearable device to obtain image data. The process **500** proceeds to block **504** where the wearable device uses the image data to recognize an item that exists in the real-world environment. At block **506**, the item is added on an item inventory associated with the real-world environment. At block **508**, the wearable device accesses an item catalog to determine an estimated current value for the item.

[0078] The process **500** proceeds to block **510** where it is determined that the estimated current value is more than a threshold value. At block **512**, the estimated current value is displayed in association with the item via a display device of the wearable device.

[0079] FIG. 6 is a flow diagram that illustrates an example process **600** describing aspects of the technologies disclosed herein for listing an item for sale via an item catalog (e.g., an e-commerce site).

[0080] The process **600** begins at block **602**, where user input that instructs the wearable device to list the item for sale via an item catalog is received. As described above, the instruction can specify that the listing be submitted to the secondary marketplace so the user does not have to interrupt a current activity to complete a full item listing.

[0081] The process proceeds to block **604** where the wearable device captures a photo of the item. At block **606**, the wearable device submits the listing for the item to the item catalog. The listing can include the photo of the item, the seller's identification and a piece of contact information, and/or the estimated current value as a suggested sales price.

[0082] FIG. 7 shows an illustrative configuration of a wearable device **700** (e.g., a headset system, a head-mounted display, etc.) capable of implementing aspects of the technologies disclosed herein. The wearable device **700** includes an optical system **702** with an illumination engine **704** to generate electro-magnetic (“EM”) radiation that includes both a first bandwidth for generating computer-generated (“CG”) images and a second bandwidth for tracking physical objects. The first bandwidth may include some or all of the visible-light portion of the EM spectrum whereas the second bandwidth may include any portion of the EM spectrum that is suitable to deploy a desired tracking protocol.

[0083] In the example configuration, the optical system **702** further includes an optical assembly **706** that is positioned to receive the EM radiation from the illumination engine **704** and to direct the EM radiation (or individual bandwidths of thereof) along one or more predetermined optical paths. For example, the illumination engine **704** may emit the EM radiation into the optical assembly **706** along a common optical path that is shared by both the first bandwidth and the second bandwidth. The optical assembly **706** may also include one or more optical components that are configured to separate the first bandwidth from the second bandwidth (e.g., by causing the first and second bandwidths

to propagate along different image-generation and object-tracking optical paths, respectively).

[0084] The optical assembly **706** includes components that are configured to direct the EM radiation with respect to one or more components of the optical assembly **706** and, more specifically, to direct the first bandwidth for image-generation purposes and to direct the second bandwidth for object-tracking purposes. In this example, the optical system **702** further includes a sensor **708** to generate object data in response to a reflected-portion of the second bandwidth, i.e. a portion of the second bandwidth that is reflected off an object that exists within a real-world environment.

[0085] In various configurations, the wearable device **700** may utilize the optical system **702** to generate a composite view (e.g., from a perspective of a user **106** that is wearing the wearable device **700**) that includes both one or more CG images and a view of at least a portion of the real-world environment that includes the object. For example, the optical system **702** may utilize various technologies such as, for example, AR technologies to generate composite views that include CG images superimposed over a real-world view. As such, the optical system **702** may be configured to generate CG images via a display panel. The display panel can include separate right eye and left eye transparent display panels.

[0086] Alternatively, the display panel can include a single transparent display panel that is viewable with both eyes and/or a single transparent display panel that is viewable by a single eye only. Therefore, it can be appreciated that the technologies described herein may be deployed within a single-eye Near Eye Display (“NED”) system (e.g., GOOGLE GLASS) and/or a dual-eye NED system (e.g., OCULUS RIFT). The wearable device **700** is an example device that is used to provide context and illustrate various features and aspects of the user interface display technologies and systems disclosed herein. Other devices and systems may also use the interface display technologies and systems disclosed herein.

[0087] The display panel may be a waveguide display that includes one or more diffractive optical elements (“DOEs”) for in-coupling incident light into the waveguide, expanding the incident light in one or more directions for exit pupil expansion, and/or out-coupling the incident light out of the waveguide (e.g., toward a user’s eye). In some examples, the wearable device **1200** may further include an additional see-through optical component.

[0088] In the illustrated example of FIG. 7, a controller **710** is operatively coupled to each of the illumination engine **704**, the optical assembly **706** (and/or scanning devices thereof,) and the sensor **708**. The controller **710** includes one or more logic devices and one or more computer memory devices storing instructions executable by the logic device(s) to deploy functionalities described herein with relation to the optical system **702**. The controller **710** can comprise one or more processing units **712**, one or more computer-readable media **714** for storing an operating system **716** and data such as, for example, image data that defines one or more CG images and/or tracking data that defines one or more object tracking protocols.

[0089] The computer-readable media **714** may further include an image-generation engine **718** that generates output signals to modulate generation of the first bandwidth of EM radiation by the illumination engine **704** and also to control the scanner(s) to direct the first bandwidth within the

optical assembly **706**. Ultimately, the scanner(s) direct the first bandwidth through a display panel to generate CG images that are perceptible to a user, such as a user interface.

[0090] The computer-readable media **714** may further include an object-tracking engine **720** that generates output signals to modulate generation of the second bandwidth of EM radiation by the illumination engine **704** and also the scanner(s) to direct the second bandwidth along an object-tracking optical path to irradiate an object. The object tracking engine **720** communicates with the sensor **708** to receive the object data that is generated based on the reflected-portion of the second bandwidth.

[0091] The object tracking engine **720** then analyzes the object data to determine one or more characteristics of the object such as, for example, a depth of the object with respect to the optical system **702**, an orientation of the object with respect to the optical system **702**, a velocity and/or acceleration of the object with respect to the optical system **702**, or any other desired characteristic of the object. The components of the wearable device **700** are operatively connected, for example, via a bus **722**, which can include one or more of a system bus, a data bus, an address bus, a PCI bus, a Mini-PCI bus, and any variety of local, peripheral, and/or independent buses.

[0092] The wearable device **700** may further include various other components, for example cameras (e.g., camera **724**), microphones (e.g., microphone **726**), accelerometers, gyroscopes, magnetometers, temperature sensors, touch sensors, biometric sensors, other image sensors, energy-storage components (e.g. battery), a communication facility, a GPS receiver, etc. Furthermore, the wearable device **700** can include one or more eye gaze sensors **728**. In at least one example, an eye gaze sensor **728** is user facing and is configured to track the position of at least one eye of a user. Accordingly, eye position data (e.g., determined via use of eye gaze sensor **728**), image data (e.g., determined via use of the camera **724**), and other data can be processed to identify a gaze path of the user. That is, it can be determined that the user is looking at a particular section of a hardware display surface, a particular real-world object or part of a real-world object in the view of the user, and/or a rendered object or part of a rendered object displayed on a hardware display surface.

[0093] In some configurations, the wearable device **700** can include an actuator **729**. The processing units **712** can cause the generation of a haptic signal associated with a generated haptic effect to actuator **729**, which in turn outputs haptic effects such as vibrotactile haptic effects, electrostatic friction haptic effects, or deformation haptic effects. Actuator **729** includes an actuator drive circuit. The actuator **729** may be, for example, an electric motor, an electro-magnetic actuator, a voice coil, a shape memory alloy, an electroactive polymer, a solenoid, an eccentric rotating mass motor (“ERM”), a linear resonant actuator (“LRA”), a piezoelectric actuator, a high bandwidth actuator, an electroactive polymer (“EAP”) actuator, an electrostatic friction display, or an ultrasonic vibration generator.

[0094] In alternate configurations, wearable device **700** can include one or more additional actuators **729**. The actuator **729** is an example of a haptic output device, where a haptic output device is a device configured to output haptic effects, such as vibrotactile haptic effects, electrostatic friction haptic effects, or deformation haptic effects, in response to a drive signal. In alternate configurations, the actuator **729**

can be replaced by some other type of haptic output device. Further, in other alternate configurations, wearable device 700 may not include actuator 729, and a separate device from wearable device 700 includes an actuator, or other haptic output device, that generates the haptic effects, and wearable device 700 sends generated haptic signals to that device through a communication device.

[0095] The processing unit(s) 712, can represent, for example, a CPU-type processing unit, a GPU-type processing unit, a field-programmable gate array (“FPGA”), another class of digital signal processor (“DSP”), or other hardware logic components that may, in some instances, be driven by a CPU. For example, and without limitation, illustrative types of hardware logic components that can be used include Application-Specific Integrated Circuits (“ASICs”), Application-Specific Standard Products (“ASSPs”), System-on-a-Chip Systems (“SOCs”), Complex Programmable Logic Devices (“CPLDs”), etc.

[0096] As used herein, computer-readable media, such as computer-readable media 714, can store instructions executable by the processing unit(s) 722. Computer-readable media can also store instructions executable by external processing units such as by an external CPU, an external GPU, and/or executable by an external accelerator, such as an FPGA type accelerator, a DSP type accelerator, or any other internal or external accelerator. In various examples, at least one CPU, GPU, and/or accelerator is incorporated in a computing device, while in some examples one or more of a CPU, GPU, and/or accelerator is external to a computing device.

[0097] In various examples, the wearable device 700 is configured to interact, via network communications, with a network device (e.g., a network server or a cloud server) to implement the configurations described herein. For instance, the wearable device 700 may collect data and send the data over network(s) to the network device. The network device may then implement some of the functionality described herein. Subsequently, the network device can cause the wearable device 700 to display an item and/or instruct the wearable device 700 to perform a task.

[0098] Computer-readable media can include computer storage media and/or communication media. Computer storage media can include one or more of volatile memory, nonvolatile memory, and/or other persistent and/or auxiliary computer storage media, removable and non-removable computer storage media implemented in any method or technology for storage of information such as computer-readable instructions, data structures, program modules, or other data. Thus, computer storage media includes tangible and/or physical forms of media included in a device and/or hardware component that is part of a device or external to a device, including but not limited to random access memory (“RAM”), static random-access memory (“SRAM”), dynamic random-access memory (“DRAM”), phase change memory (“PCM”), read-only memory (“ROM”), erasable programmable read-only memory (“EPROM”), electrically erasable programmable read-only memory (“EEPROM”), flash memory, rotating media, optical cards or other optical storage media, magnetic storage, magnetic cards or other magnetic storage devices or media, solid-state memory devices, storage arrays, network attached storage, storage area networks, hosted computer storage or any other storage

memory, storage device, and/or storage medium that can be used to store and maintain information for access by a computing device.

[0099] In contrast to computer storage media, communication media can embody computer-readable instructions, data structures, program modules, or other data in a modulated data signal, such as a carrier wave, or other transmission mechanism. As defined herein, computer storage media does not include communication media. That is, computer storage media does not include communications media consisting solely of a modulated data signal, a carrier wave, or a propagated signal, per se.

[0100] In accordance with examples described herein, the wearable device 108 can also be configured to use network communications to interact with an e-commerce provider of an electronic marketplace. To implement the electronic marketplace, the e-commerce provider creates and maintains catalog(s) of items. The items can be bought and/or sold by registered users and/or merchants. Accordingly, the e-commerce provider can comprise resources to collect and store information related to an item, to display the information related to the item to a potential buyer, to conduct online auctions of an item, to match a buyer of an item with a seller of the item, to process a transaction, etc.

[0101] FIG. 8 shows additional details of an example computer architecture for a computer capable of executing the functionalities described herein such as, for example, those described with reference to FIGS. 1-7, or any program components thereof as described herein. Thus, the computer architecture 800 illustrated in FIG. 8 illustrates an architecture for a server computer, or network of server computers, or any other type of computing device suitable for implementing the functionality described herein. The computer architecture 800 may be utilized to execute any aspects of the software components presented herein, such as software components for implementing the e-commerce system 102.

[0102] The computer architecture 800 illustrated in FIG. 8 includes a central processing unit 802 (“CPU”), a system memory 804, including a random-access memory 806 (“RAM”) and a read-only memory (“ROM”) 808, and a system bus 810 that couples the memory 804 to the CPU 802. A basic input/output system containing the basic routines that help to transfer information between elements within the computer architecture 800, such as during startup, is stored in the ROM 808. The computer architecture 800 further includes a mass storage device 812 for storing an operating system 814, other data, and one or more application programs. For example, the mass storage device 812 may store the item catalog 104 and/or the user’s item inventory 114.

[0103] The mass storage device 812 is connected to the CPU 802 through a mass storage controller (not shown) connected to the bus 810. The mass storage device 812 and its associated computer-readable media provide non-volatile storage for the computer architecture 800. Although the description of computer-readable media contained herein refers to a mass storage device, such as a solid-state drive, a hard disk or CD-ROM drive, it should be appreciated by those skilled in the art that computer-readable media can be any available computer storage media or communication media that can be accessed by the computer architecture 800.

[0104] According to various implementations, the computer architecture 800 may operate in a networked environ-

ment using logical connections to remote computers through a network **850**. The computer architecture **800** may connect to the network **850** through a network interface unit **816** connected to the bus **810**. It should be appreciated that the network interface unit **816** also may be utilized to connect to other types of networks and remote computer systems. The computer architecture **800** also may include an input/output controller **818** for receiving and processing input from a number of other devices, including a keyboard, mouse, or electronic stylus. Similarly, the input/output controller **818** may provide output to a display screen, a printer, or other type of output device. It should also be appreciated that a computing system can be implemented using the disclosed computer architecture **800** to communicate with other computing systems.

[**0105**] It should be appreciated that the software components described herein may, when loaded into the CPU **802** and executed, transform the CPU **802** and the overall computer architecture **800** from a general-purpose computing system into a special-purpose computing system customized to facilitate the functionality presented herein. The CPU **802** may be constructed from any number of transistors or other discrete circuit elements, which may individually or collectively assume any number of states. More specifically, the CPU **802** may operate as a finite-state machine, in response to executable instructions contained within the software modules disclosed herein. These computer-executable instructions may transform the CPU **802** by specifying how the CPU **802** transitions between states, thereby transforming the transistors or other discrete hardware elements constituting the CPU **802**.

[**0106**] Encoding the software modules presented herein also may transform the physical structure of the computer-readable media presented herein. The specific transformation of physical structure may depend on various factors, in different implementations of this description. Examples of such factors may include, but are not limited to, the technology used to implement the computer-readable media, whether the computer-readable media is characterized as primary or secondary storage, and the like. For example, if the computer-readable media is implemented as semiconductor-based memory, the software disclosed herein may be encoded on the computer-readable media by transforming the physical state of the semiconductor memory. For example, the software may transform the state of transistors, capacitors, or other discrete circuit elements constituting the semiconductor memory. The software also may transform the physical state of such components in order to store data thereupon.

[**0107**] As another example, the computer-readable media disclosed herein may be implemented using magnetic or optical technology. In such implementations, the software presented herein may transform the physical state of magnetic or optical media, when the software is encoded therein. These transformations may include altering the magnetic characteristics of particular locations within given magnetic media. These transformations also may include altering the physical features or characteristics of particular locations within given optical media, to change the optical characteristics of those locations. Other transformations of physical media are possible without departing from the scope and spirit of the present description, with the foregoing examples provided only to facilitate this discussion.

[**0108**] In light of the above, it should be appreciated that many types of physical transformations take place in the computer architecture **800** in order to store and execute the software components presented herein. It also should be appreciated that the computer architecture **800** may include other types of computing devices, including smartphones, embedded computer systems, tablet computers, other types of wearable computing devices, and other types of computing devices known to those skilled in the art. It is also contemplated that the computer architecture **800** may not include all of the components shown in FIG. **8**, may include other components that are not explicitly shown in FIG. **8**, or may utilize an architecture completely different than that shown in FIG. **8**.

ILLUSTRATIVE CONFIGURATIONS

[**0109**] The following clauses described multiple possible configurations for implementing the features described in this disclosure. The various configurations described herein are not limiting nor is every feature from any given configuration required to be present in another configuration. Any two or more of the configurations may be combined together unless the context clearly indicates otherwise. As used herein in this document “or” means and/or. For example, “A or B” means A without B, B without A, or A and B. As used herein, “comprising” means including listed all features and potentially including addition of other features that are not listed. “Consisting essentially of” means including the listed features and those additional features that do not materially affect the basic and novel characteristics of the listed features. “Consisting of” means only the listed features to the exclusion of any feature not listed.

[**0110**] The disclosure presented herein also encompasses the subject matter set forth in the following example clauses.

[**0111**] Example Clause A, a method comprising: obtaining, by a wearable device, image data from an optical device configured to scan a real-world environment; recognizing, based on the image data, an item that exists in the real-world environment; adding the item to an inventory of items associated with the real-world environment; accessing, by one or more processors, an item catalog to determine an estimated current value for the item; determining that the estimated current value is more than a threshold value; in response to determining that the estimated current value is more than the threshold value, displaying the estimated current value in association with the item on a display device of the wearable device; configuring a control that enables a user of the wearable device to list the item for sale in the item catalog; receiving user input that activates the control; in response to receiving the user input that activates the control: capturing a photo of the item; and causing a listing for the item to be submitted to the item catalog, the listing including the photo and contact information for the user of the wearable device.

[**0112**] Example Clause B, the method of Example Clause A, further comprising calculating the threshold value as a predetermined percentage of an average sales price of the item over a predefined period of time.

[**0113**] Example Clause C, the method of Example Clause B, wherein the predetermined percentage is defined by an electronic commerce system that maintains the item catalog.

[**0114**] Example Clause D, the method of Example Clause B, wherein the predetermined percentage is defined by the user of the wearable device.

[0115] Example Clause E, the method of Example Clause B, wherein the predetermined percentage is defined for a category of items to which the item belongs.

[0116] Example Clause F, the method of any one of Example Clauses A through E, wherein accessing the item catalog to determine the estimated current value is based on a determination that the item has not been used in a predefined period of time.

[0117] Example Clause G, the method of any one of Example Clauses A through E, wherein accessing the item catalog to determine the estimated current value is based on a determination that the item has been used a number of times in a predefined period of time, the number of times being less than a threshold number of times established for infrequent use.

[0118] Example Clause H, a device comprising: one or more processors; and a memory in communication with the one or more processors, the memory having computer-readable instructions stored thereupon which, when executed by the one or more processors, cause the one or more processors to: scan a real-world environment to obtain image data; recognize, based on the image data, an item that exists in the real-world environment; add the item to an inventory of items associated with the real-world environment; access an item catalog to determine an estimated current value for the item; determine that the estimated current value is more than a threshold value; and in response to determining that the estimated current value is more than the threshold value, display the estimated current value in association with the item on a display device.

[0119] Example Clause I, the device of Example Clause H, wherein the computer-readable instructions further cause the one or more processors to calculate the threshold value as a predetermined percentage of an average sales price of the item over a predefined period of time.

[0120] Example Clause J, the device of Example Clause I, wherein the predetermined percentage is defined by an electronic commerce system that maintains the item catalog.

[0121] Example Clause K, the device of Example Clause I, wherein the predetermined percentage is defined by the user of the wearable device.

[0122] Example Clause L, the device of Example Clause I, wherein the predetermined percentage is defined for a category of items to which the item belongs.

[0123] Example Clause M, the device of any one of Example Clauses H through L, wherein accessing the item catalog to determine the estimated current value is based on a determination that the item has not been used in a predefined period of time.

[0124] Example Clause N, the device of any one of Example Clauses H through M, wherein the threshold value is adjusted based on contextual data, the contextual data comprising one or more of a frequency of use of the item, a condition of the item, or a sales history for a user of the device.

[0125] Example Clause O, the device of Example Clause H, wherein the threshold value is defined by a user setting of the device.

[0126] Example Clause P, the device of any one of Example Clauses H through O, wherein the computer-readable instructions further cause the one or more processors to: configure a control that enables a user to list the item for sale in the item catalog; receive user input that activates the control; and in response to receiving the user input that

activates the control cause a listing for the item to be submitted to the item catalog, the listing including a portion of the image data that captures the item and contact information for the user.

[0127] Example Clause Q, a method comprising: recognizing, based on image data obtained by a wearable device, an item that exists in the real-world environment; adding the item to an inventory of items associated with the real-world environment; accessing, by one or more processors, information associated with an item catalog to determine that a number of sales of the item during a recent predefined period of time is greater than a threshold number of sales; based on the number of sales of the item during the recent predefined period of time being greater than the threshold number of sales, determining an estimated current value for the item; and displaying the estimated current value in association with the item on a display device of the wearable device.

[0128] Example Clause R, the method of Example Clause Q, wherein the threshold number of sales is established as a predetermined percentage of a number of sales of the item during a predefined period of time that precedes the recent predefined period of time.

[0129] Example Clause S, the method of Example Clause Q or Example Clause R, further comprising: receiving user input that instructs the wearable device to list the item for sale in the catalog of items; in response to receiving the user input: capturing a photo of the item; and causing a listing for the item to be submitted to the catalog of items, the listing including the photo and contact information for the user.

[0130] Example Clause T, the method of any one of Example Clause Q through S, further comprising receiving user input to enter an operation mode that enables the estimated current value to be displayed.

CONCLUSION

[0131] For ease of understanding, the processes discussed in this disclosure are delineated as separate operations represented as independent blocks. However, these separately delineated operations should not be construed as necessarily order dependent in their performance. The order in which the process is described is not intended to be construed as a limitation, and any number of the described process blocks may be combined in any order to implement the process or an alternate process. Moreover, it is also possible that one or more of the provided operations is modified or omitted.

[0132] Although the subject matter has been described in language specific to structural features and/or methodological acts, it is to be understood that the subject matter defined in the appended claims is not necessarily limited to the specific features or acts described above. Rather, the specific features and acts are disclosed as example forms of implementing the claims.

[0133] The terms “a,” “an,” “the” and similar referents used in the context of describing the invention (especially in the context of the following claims) are to be construed to cover both the singular and the plural unless otherwise indicated herein or clearly contradicted by context. The terms “based on,” “based upon,” and similar referents are to be construed as meaning “based at least in part” which includes being “based in part” and “based in whole” unless otherwise indicated or clearly contradicted by context.

[0134] It should be appreciated that any reference to “first,” “second,” etc. users or other elements within the

Summary and/or Detailed Description is not intended to and should not be construed to necessarily correspond to any reference of “first,” “second,” etc. elements of the claims. Rather, any use of “first” and “second” within the Summary and/or Detailed Description may be used to distinguish between two different instances of the same element (e.g., two different users, two different items, etc.).

[0135] Certain configurations are described herein, including the best mode known to the inventors for carrying out the invention. Of course, variations on these described configurations will become apparent to those of ordinary skill in the art upon reading the foregoing description. Skilled artisans will know how to employ such variations as appropriate, and the configurations disclosed herein may be practiced otherwise than specifically described. Accordingly, all modifications and equivalents of the subject matter recited in the claims appended hereto are included within the scope of this disclosure. Moreover, any combination of the above-described elements in all possible variations thereof is encompassed by the invention unless otherwise indicated herein or otherwise clearly contradicted by context.

What is claimed is:

1. A method comprising:
 - obtaining, by a wearable device, image data from an optical device configured to scan a real-world environment;
 - recognizing, based on the image data, an item that exists in the real-world environment;
 - adding the item to an inventory of items associated with the real-world environment;
 - accessing, by one or more processors, an item catalog to determine an estimated current value for the item;
 - determining that the estimated current value is more than a threshold value;
 - in response to determining that the estimated current value is more than the threshold value, displaying the estimated current value in association with the item on a display device of the wearable device;
 - configuring a control that enables a user of the wearable device to list the item for sale in the item catalog;
 - receiving user input that activates the control;
 - in response to receiving the user input that activates the control:
 - capturing a photo of the item; and
 - causing a listing for the item to be submitted to the item catalog, the listing including the photo and contact information for the user of the wearable device.
2. The method of claim 1, further comprising calculating the threshold value as a predetermined percentage of an average sales price of the item over a predefined period of time.
3. The method of claim 2, wherein the predetermined percentage is defined by an electronic commerce system that maintains the item catalog.
4. The method of claim 2, wherein the predetermined percentage is defined by the user of the wearable device.
5. The method of claim 2, wherein the predetermined percentage is defined for a category of items to which the item belongs.
6. The method of claim 1, wherein accessing the item catalog to determine the estimated current value is based on a determination that the item has not been used in a predefined period of time.

7. The method of claim 1, wherein accessing the item catalog to determine the estimated current value is based on a determination that the item has been used a number of times in a predefined period of time, the number of times being less than a threshold number of times established for infrequent use.

8. A device comprising:

- one or more processors; and
- a memory in communication with the one or more processors, the memory having computer-readable instructions stored thereupon which, when executed by the one or more processors, cause the one or more processors to:
 - scan a real-world environment to obtain image data;
 - recognize, based on the image data, an item that exists in the real-world environment;
 - add the item to an inventory of items associated with the real-world environment;
 - access an item catalog to determine an estimated current value for the item;
 - determine that the estimated current value is more than a threshold value; and
 - in response to determining that the estimated current value is more than the threshold value, display the estimated current value in association with the item on a display device.

9. The device of claim 8, wherein the computer-readable instructions further cause the one or more processors to calculate the threshold value as a predetermined percentage of an average sales price of the item over a predefined period of time.

10. The device of claim 9, wherein the predetermined percentage is defined by an electronic commerce system that maintains the item catalog.

11. The device of claim 9, wherein the predetermined percentage is defined by the user of the wearable device.

12. The device of claim 9, wherein the predetermined percentage is defined for a category of items to which the item belongs.

13. The device of claim 8, wherein accessing the item catalog to determine the estimated current value is based on a determination that the item has not been used in a predefined period of time.

14. The device of claim 8, wherein the threshold value is adjusted based on contextual data, the contextual data comprising one or more of a frequency of use of the item, a condition of the item, or a sales history for a user of the device.

15. The device of claim 8, wherein the threshold value is defined by a user setting of the device.

16. The device of claim 8, wherein the computer-readable instructions further cause the one or more processors to:

- configure a control that enables a user to list the item for sale in the item catalog;
- receive user input that activates the control; and
- in response to receiving the user input that activates the control cause a listing for the item to be submitted to the item catalog, the listing including a portion of the image data that captures the item and contact information for the user.

17. A method comprising:

- recognizing, based on image data obtained by a wearable device, an item that exists in the real-world environment;

adding the item to an inventory of items associated with the real-world environment;

accessing, by one or more processors, information associated with an item catalog to determine that a number of sales of the item during a recent predefined period of time is greater than a threshold number of sales;

based on the number of sales of the item during the recent predefined period of time being greater than the threshold number of sales, determining an estimated current value for the item; and

displaying the estimated current value in association with the item on a display device of the wearable device.

18. The method of claim **17**, wherein the threshold number of sales is established as a predetermined percentage of a number of sales of the item during a predefined period of time that precedes the recent predefined period of time.

19. The method of claim **17**, further comprising:

receiving user input that instructs the wearable device to list the item for sale in the catalog of items;

in response to receiving the user input:

capturing a photo of the item; and

causing a listing for the item to be submitted to the catalog of items, the listing including the photo and contact information for the user.

20. The method of claim **17**, further comprising receiving user input to enter an operation mode that enables the estimated current value to be displayed.

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