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Ryskamp et al.

(54) **USER INTERFACES FOR HEAD-MOUNTABLE DEVICES**

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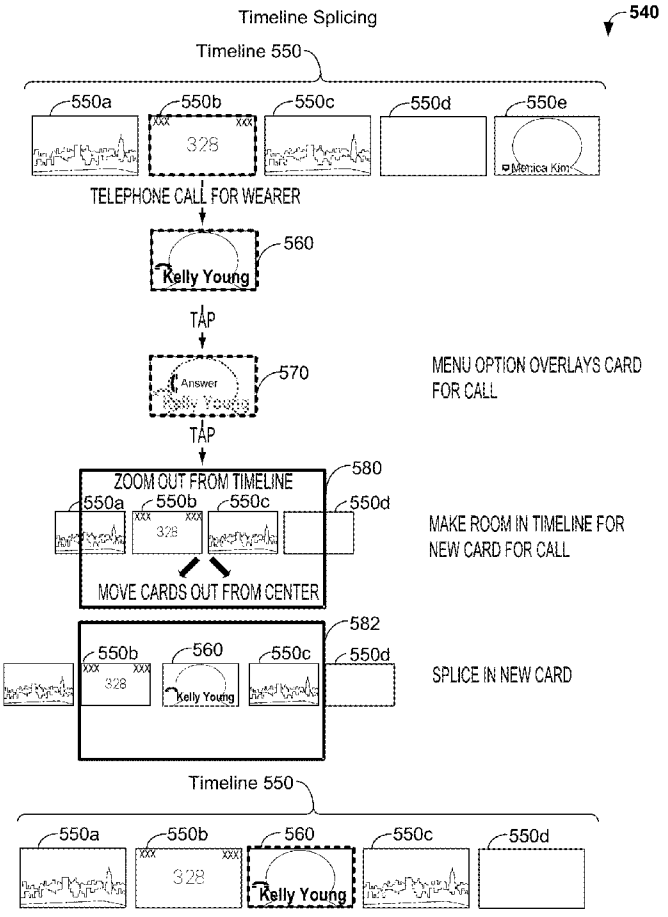
(52) **U.S. Cl.**
CPC *G06F 3/0482* (2013.01)
USPC **715/810**

(57) **ABSTRACT**

Methods, apparatus, and computer-readable media are described herein related to a user interface (UI) for a head-mountable device (HMD). A computing device, such as an HMD, can display at least a portion of a first linear arrangement of cards. The first linear arrangement can include an ordered plurality of cards that can include an actionable card and a bundle card that can correspond to a group of cards. A moveable selection region can be displayed. A given card can be selected by aligning the selection region with the given card. After selection of a bundle card, the computing device can display a second linear arrangement of cards that includes a portion of the corresponding group of cards. After selection of an actionable card, the computing device can display a third linear arrangement of cards that includes action card(s) selectable to perform action(s) based on the actionable card.



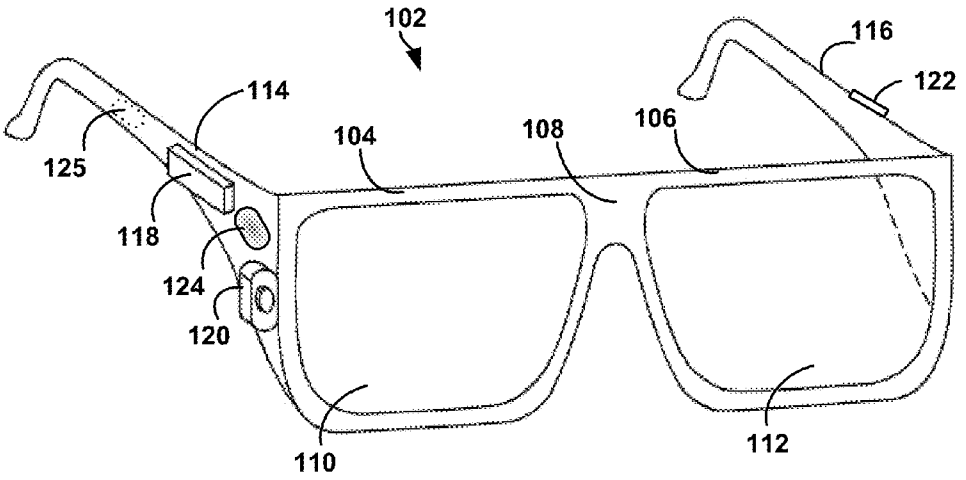

102
116
122
114
125
104
108
106
118
124
120
110
112

FIG. 1A

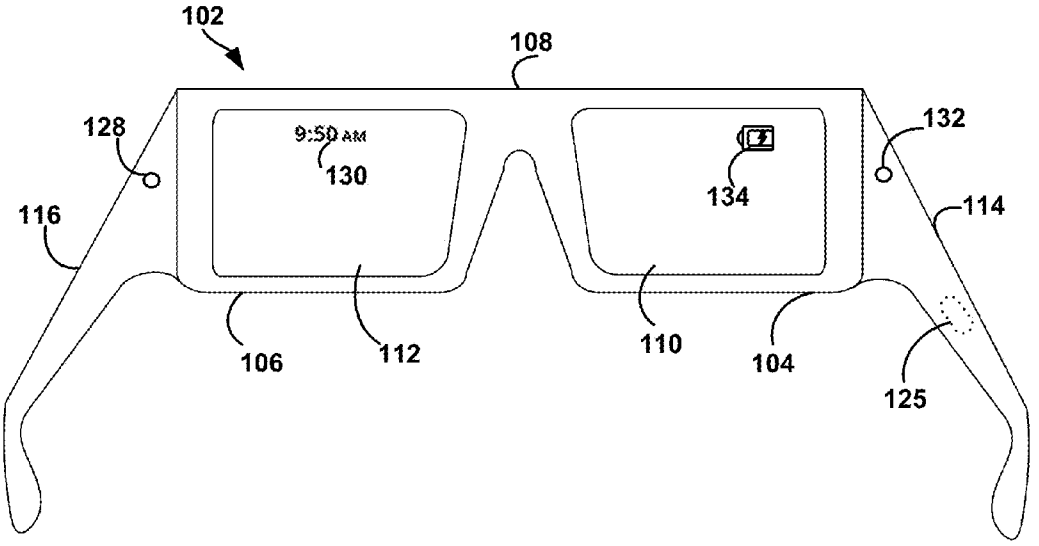

102
108
128
9:50 AM
130
132
134
116
114
106
112
110
104
125

FIG. 1B

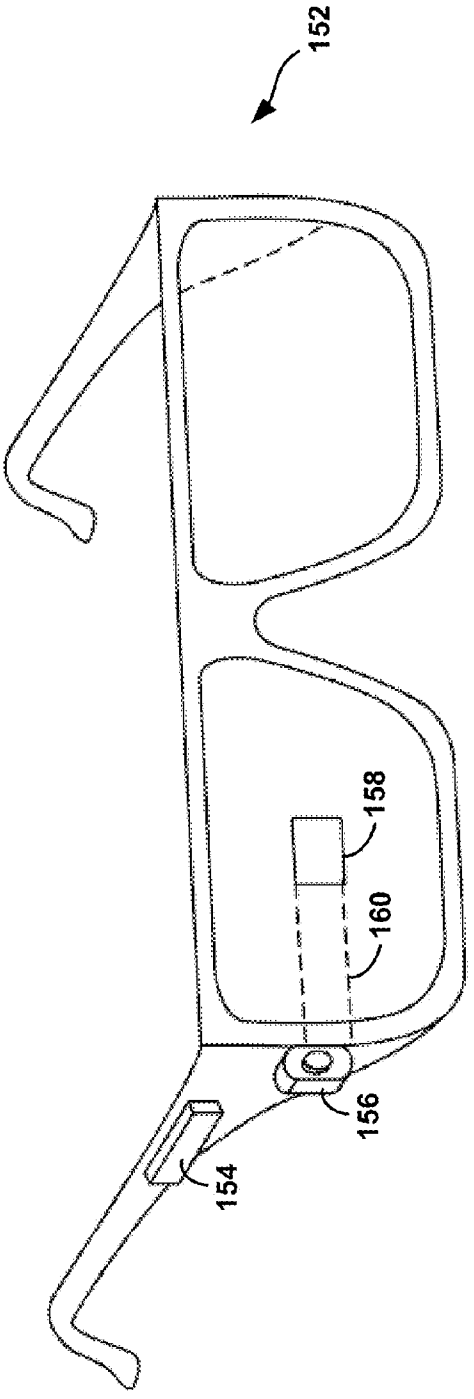


FIG. 1C

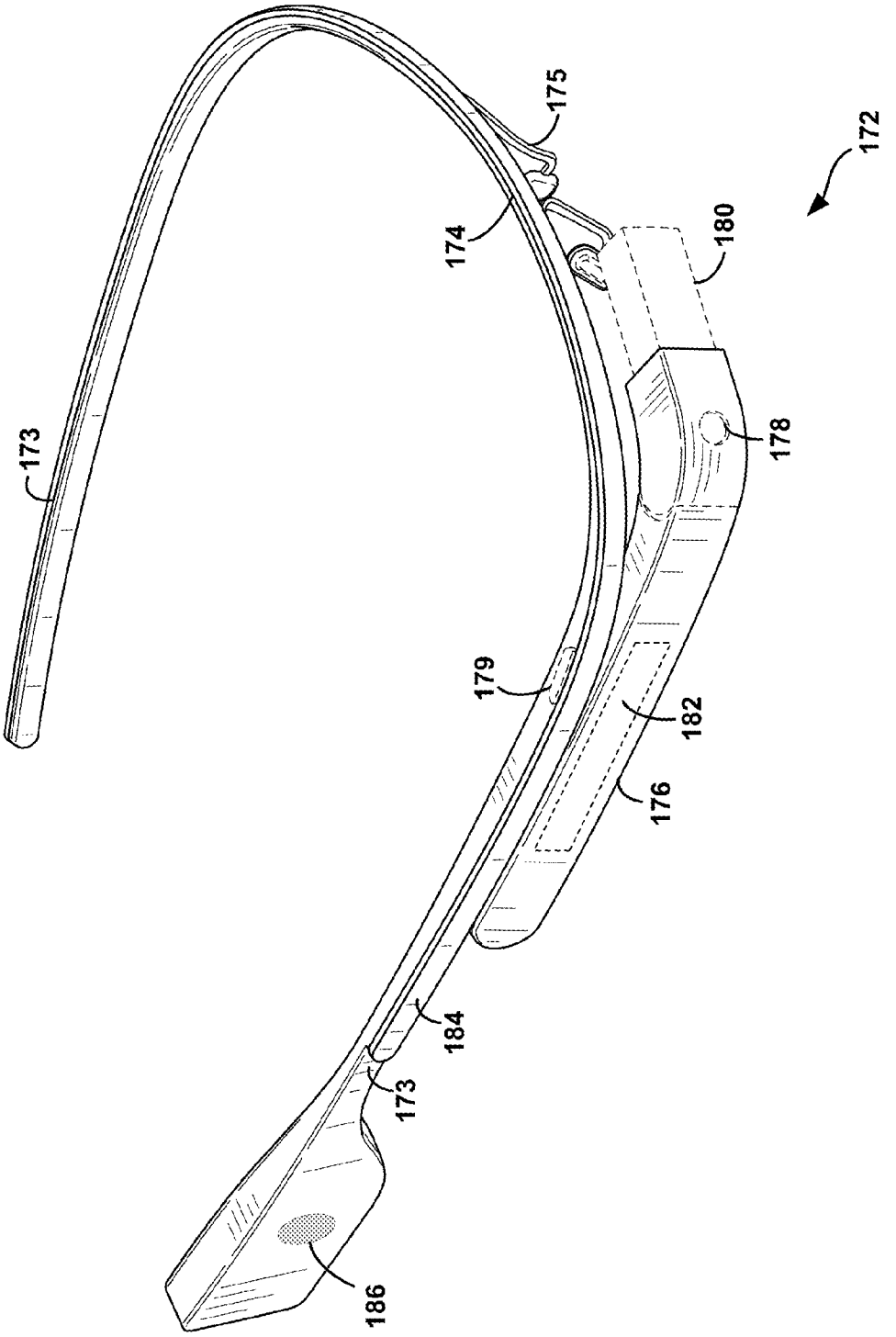


FIG. 1D

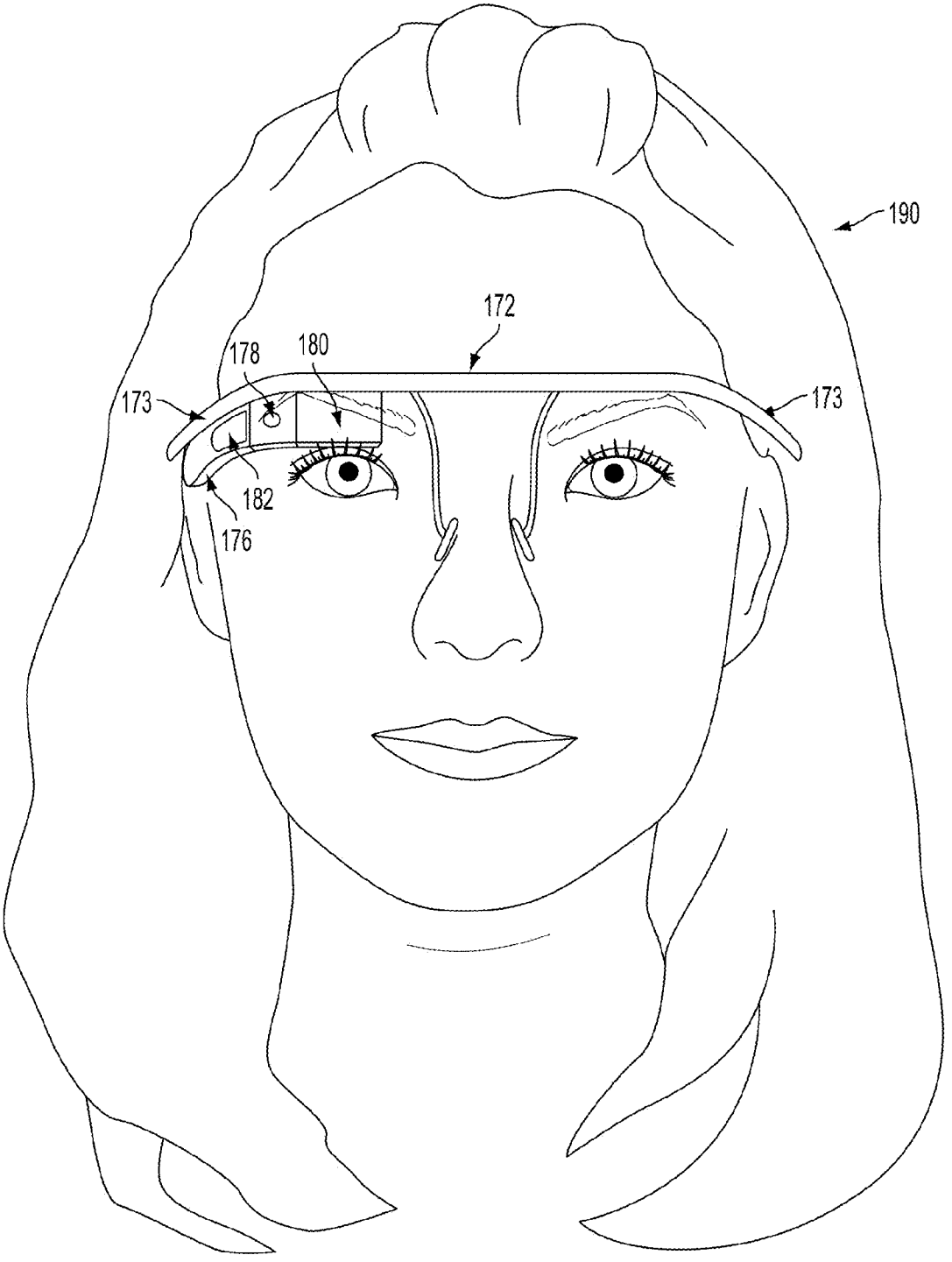


FIG. 1E

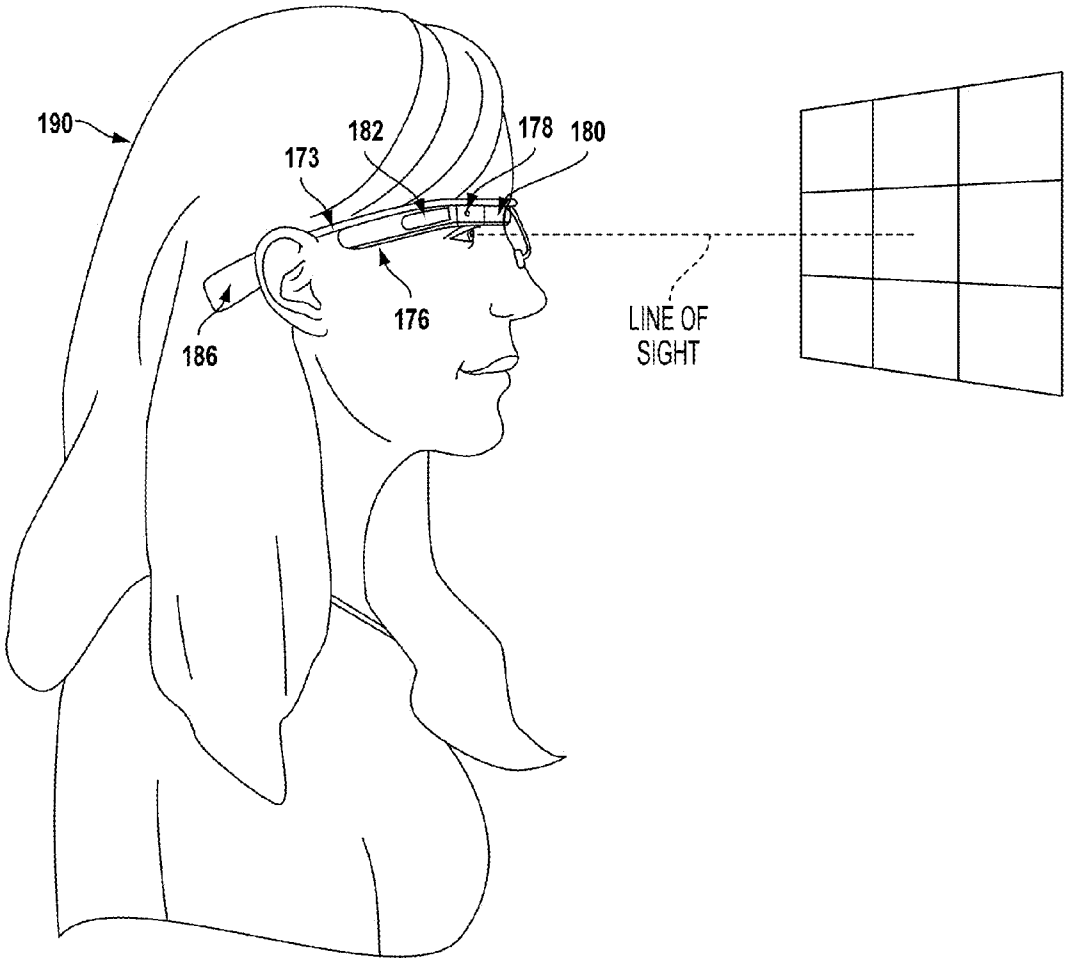


FIG. 1F

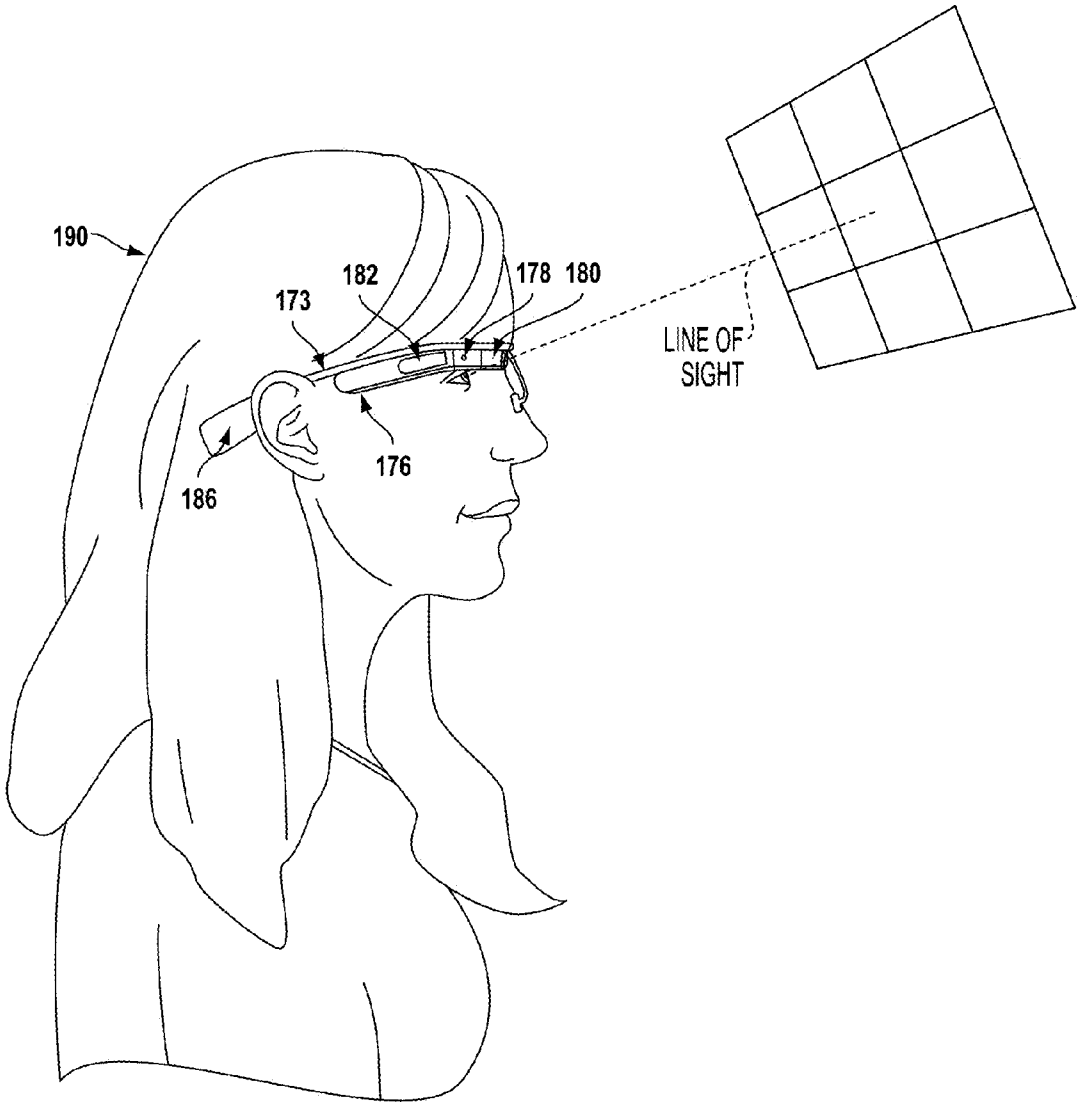


FIG. 1G

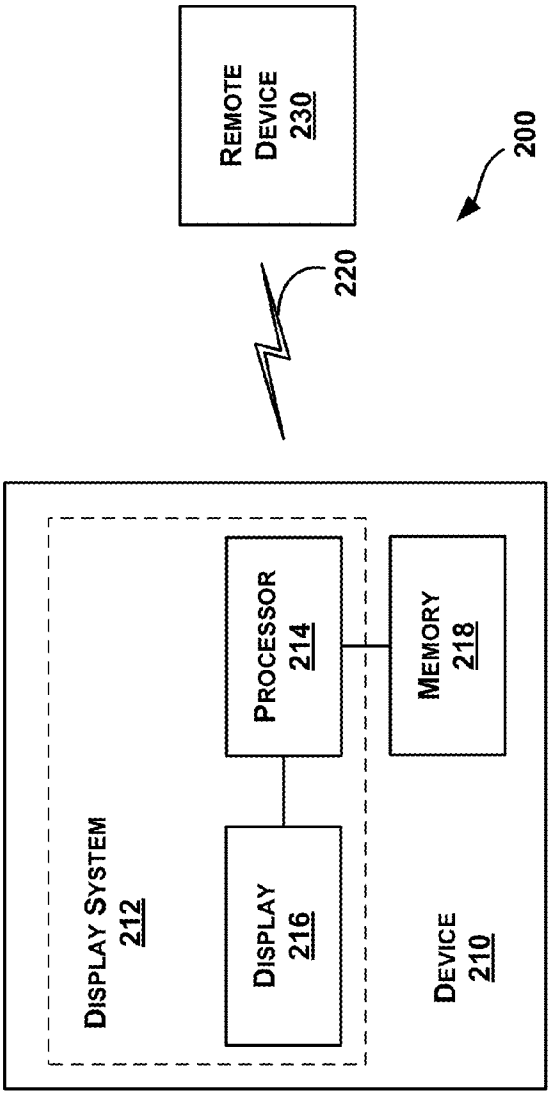

REMOTE DEVICE 230
200
220
DISPLAY SYSTEM 212
PROCESSOR 214
MEMORY 218
DISPLAY 216
DEVICE 210

FIG. 2A

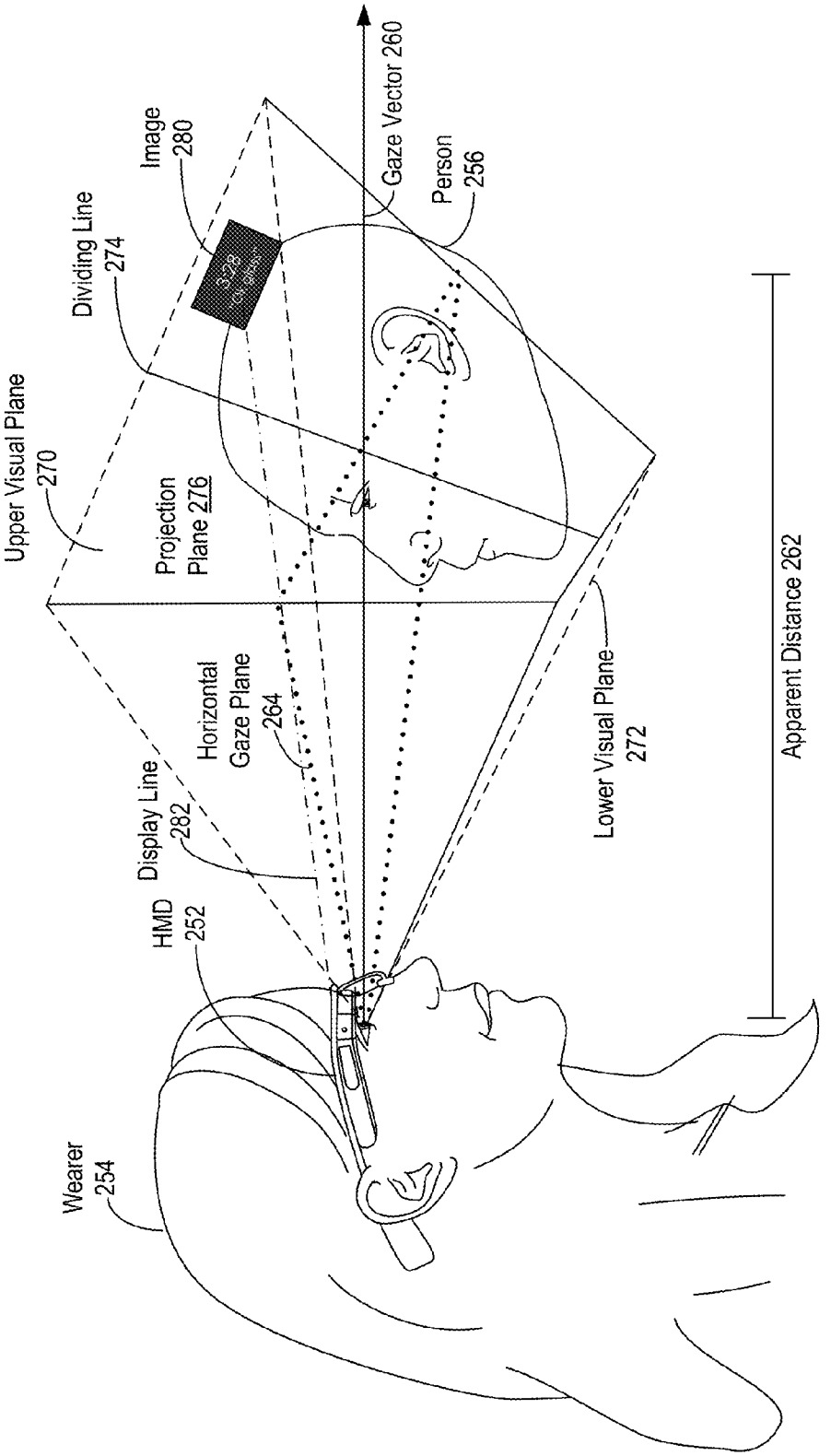

Gaze Vector 260
Person 256
Image 280
Dividing Line 274
Upper Visual Plane 270
Projection Plane 276
Horizontal Gaze Plane 264
Display Line 282
HMD 252
Wearer 254
Lower Visual Plane 272
Apparent Distance 262

FIG. 2B

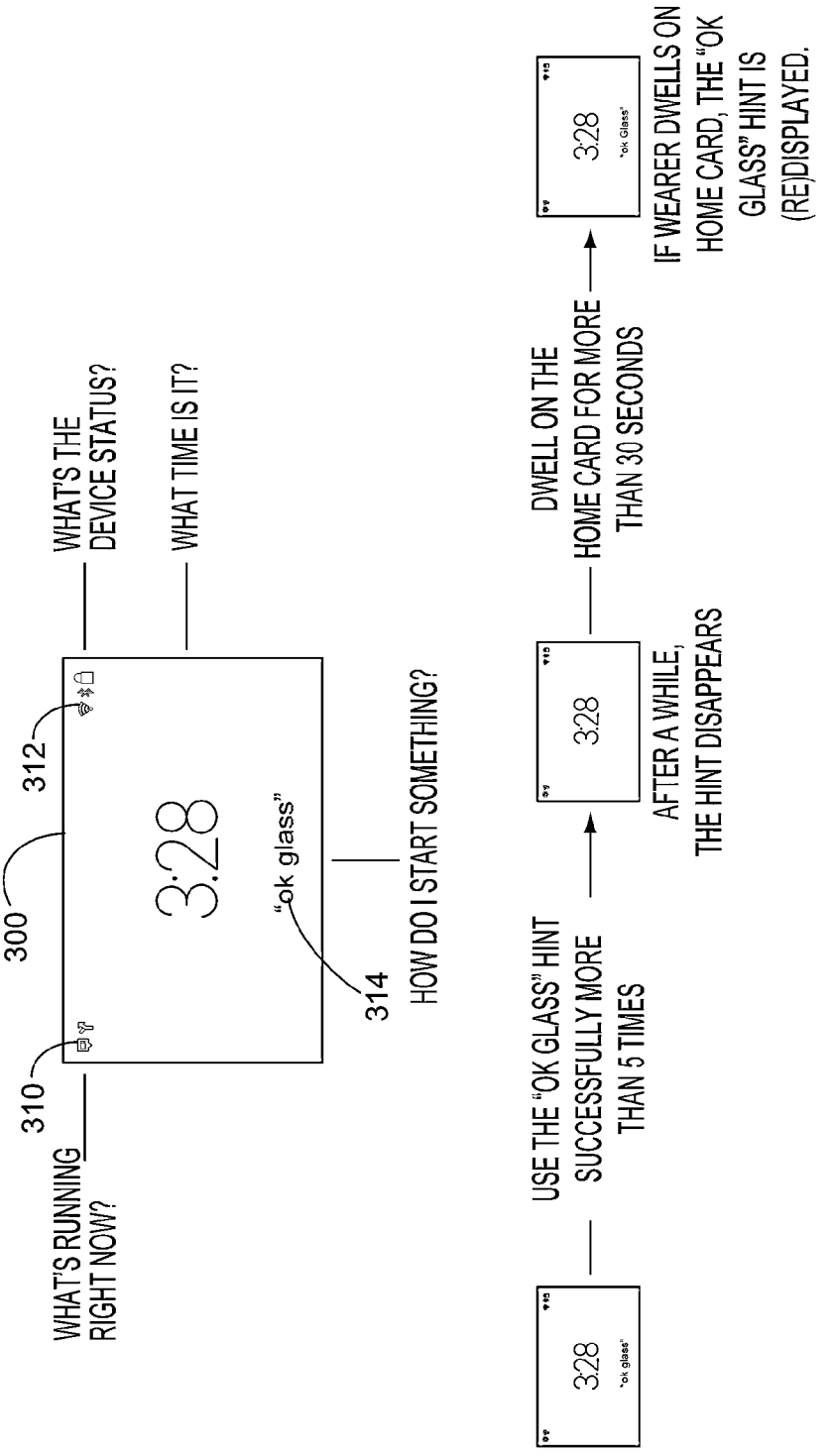

WHAT'S RUNNING RIGHT NOW?
310
300
312
WHAT'S THE DEVICE STATUS?
WHAT TIME IS IT?
3:28
"ok glass"
314
HOW DO I START SOMETHING?
3:28
"ok glass"
USE THE "OK GLASS" HINT SUCCESSFULLY MORE THAN 5 TIMES
3:28
AFTER A WHILE, THE HINT DISAPPEARS
DWELL ON THE HOME CARD FOR MORE THAN 30 SECONDS
3:28
"ok Glass"
IF WEARER DWELLS ON HOME CARD, THE "OK GLASS" HINT IS (RE)DISPLAYED.

FIG. 3

Multi-Tiered User Model 400

Basic

Tap	= Select
Swipe forward/away	= Choose next
Swipe backward/toward	= Choose previous
Swipe down	= Back/Home/Sleep
Voice	= Access voice menu
Camera button press	= Take a photo

Intermediate

Tap	= Select
Swipe forward/away	= Choose next
Swipe backward/toward	= Choose previous
Swipe down	= Back/Home/Sleep
Voice	= Access voice menu
Camera button press	= Take a photo
Camera button long press	= Capture menu
Two finger swipe forward/away	= Z-axis move away
Two finger swipe backward/toward	= Z-axis move toward
Two finger swipe down	= Sleep

Advanced

Tap	= Select
Swipe forward/away	= Choose next
Swipe backward/toward	= Choose previous
Swipe down	= Back/Home/Sleep
Voice	= Access to voice menu
Camera button press	= Take a photo
Camera button long press	= Capture menu
Two finger swipe forward/away	= Z-axis move away
Two finger swipe backward/toward	= Z-axis move toward
Two finger swipe down	= Sleep
Two finger press and hold	= The clutch
Nudge	= HMD wake / sleep

FIG. 4

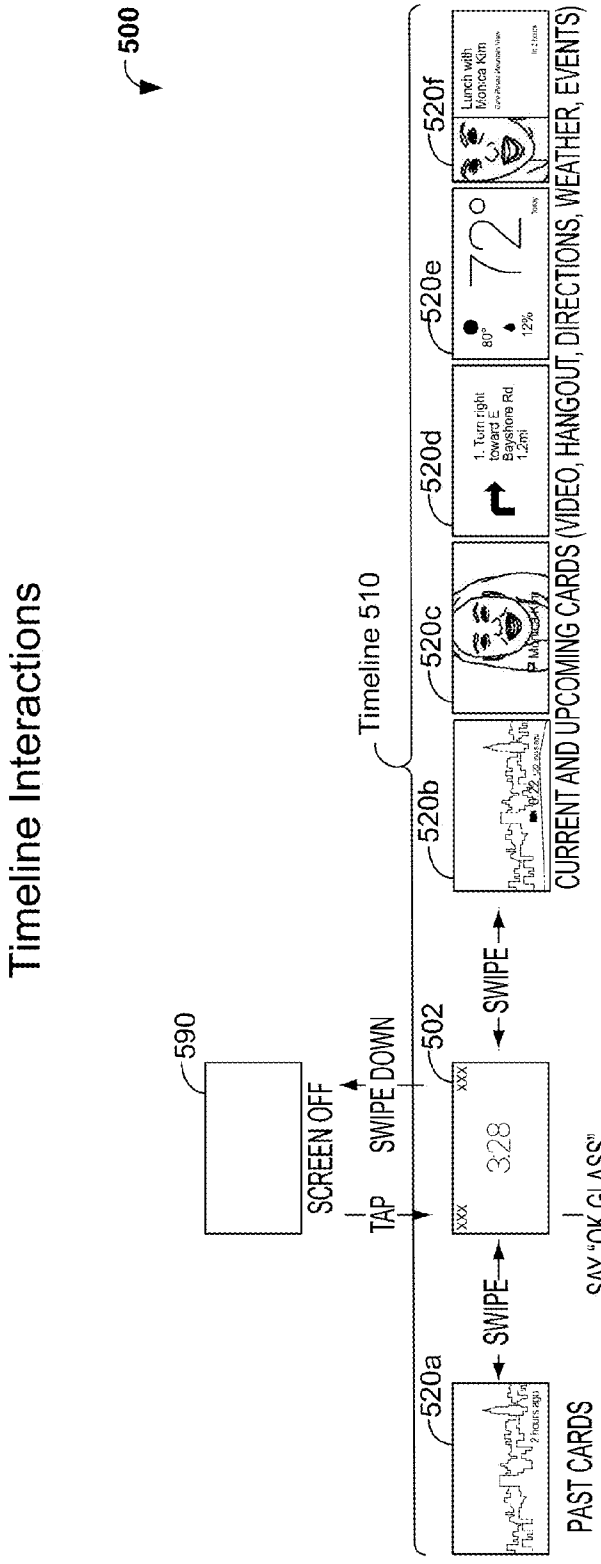

500
Timeline Interactions
Timeline 510
590
SCREEN OFF
TAP
SWIPE DOWN
502
328
SWIPE
SWIPE
520a
520b
520c
520d
520e
520f
CURRENT AND UPCOMING CARDS (VIDEO, HANGOUT, DIRECTIONS, WEATHER, EVENTS)
PAST CARDS (PHOTOS, EVENTS, ETC.)
SAY "OK GLASS"
530
ok glass. Google navigate to take a photo record a video send message to
SPEAK
SEE VOICE FLOW (FIG. 15)

FIG. 5A

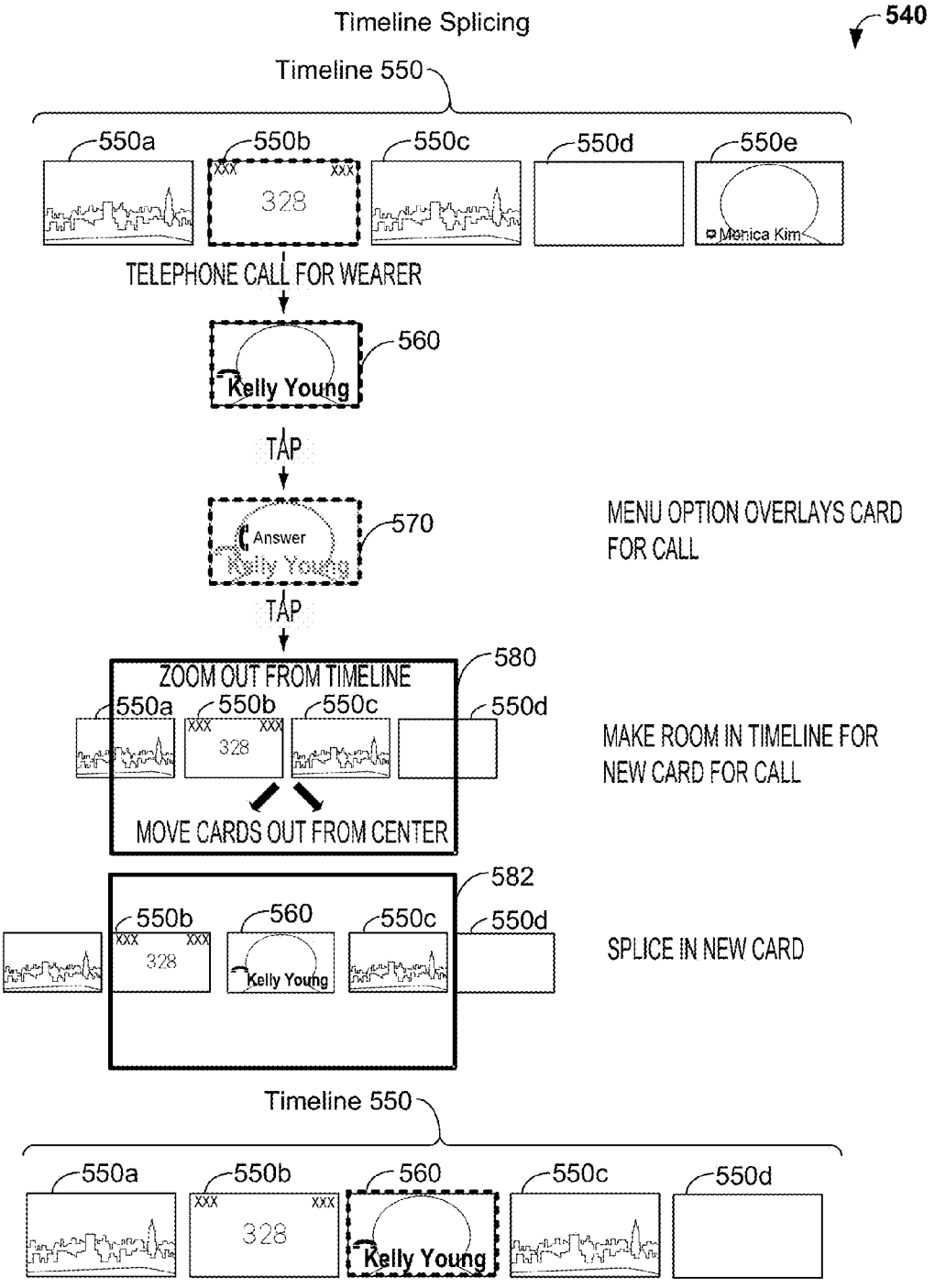

Timeline Splicing
540
Timeline 550
550a
550b
550c
550d
550e
328
Monica Kim
TELEPHONE CALL FOR WEARER
560
Kelly Young
TAP
570
Answer
Kelly Young
MENU OPTION OVERLAYS CARD FOR CALL
TAP
580
ZOOM OUT FROM TIMELINE
MAKE ROOM IN TIMELINE FOR NEW CARD FOR CALL
MOVE CARDS OUT FROM CENTER
582
SPLICE IN NEW CARD
Timeline 550

FIG. 5B

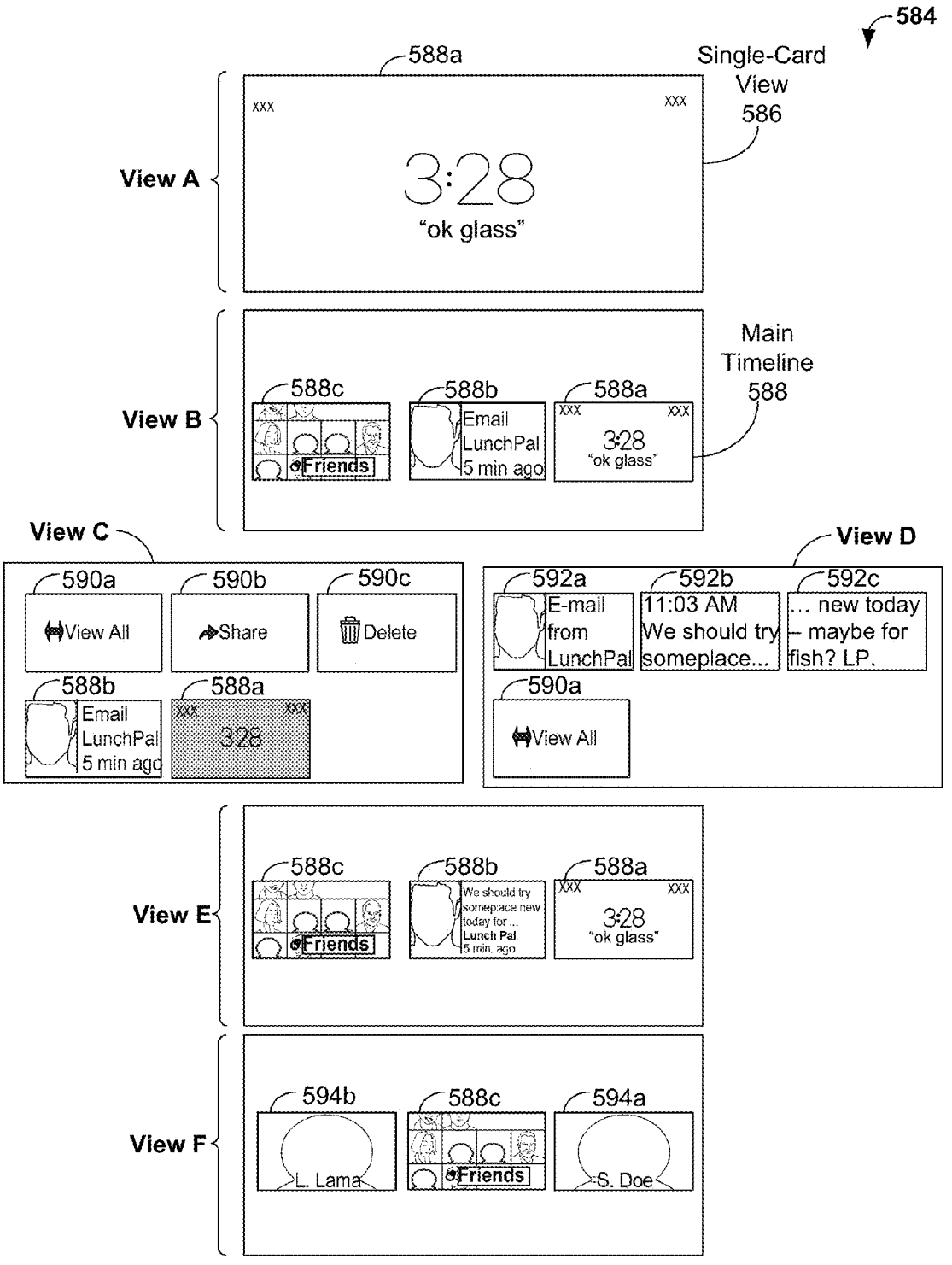

584
588a
Single-Card View 586
View A
XXX
XXX
3:28
"ok glass"
View B
Main Timeline 588
588c
588b
588a
Friends
Email LunchPal 5 min ago
XXX
XXX
3:28
"ok glass"
View C
View D
590a
590b
590c
View All
Share
Delete
588b
588a
Email LunchPal 5 min ago
328
592a
592b
592c
E-mail from LunchPal
11:03 AM We should try someplace...
... new today – maybe for fish? LP.
590a
View All
View E
588c
588b
588a
Friends
We should try someplace new today for ... Lunch Pal 5 min. ago
3:28
"ok glass"
View F
594b
588c
594a
L. Lama
Friends
S. Doe

FIG. 5C

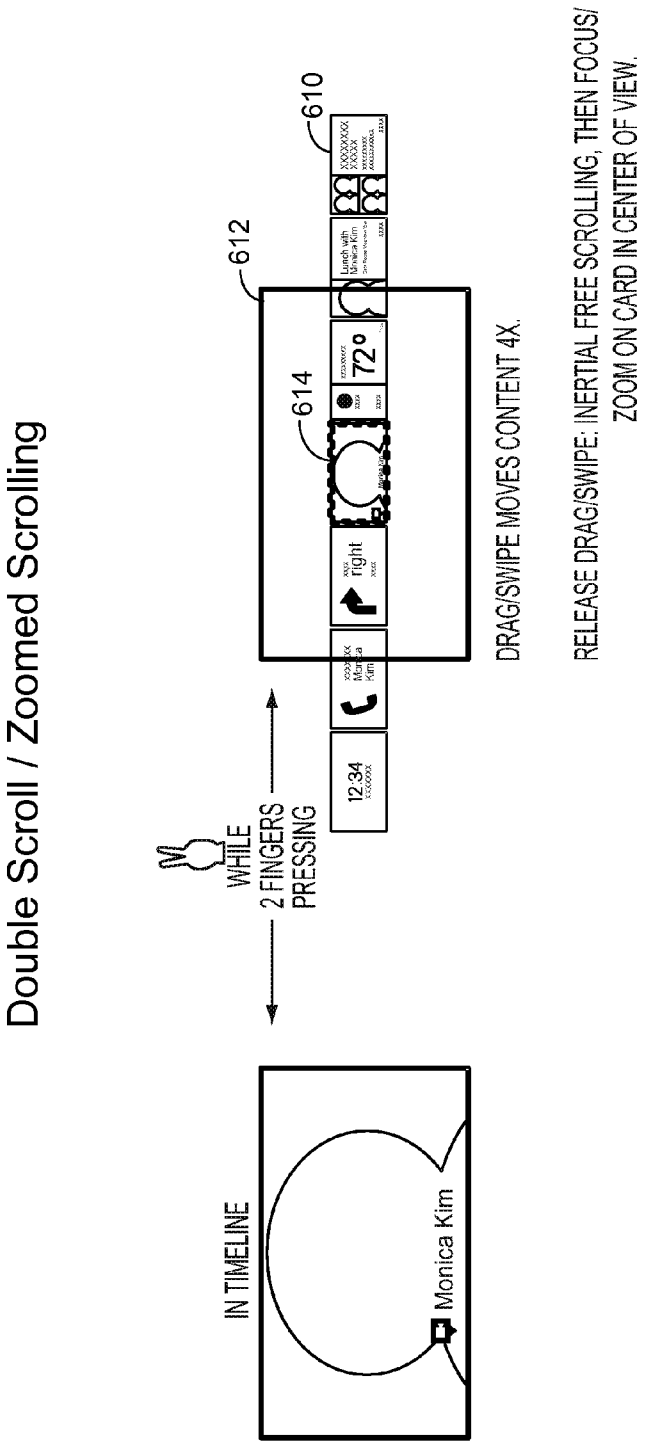

Double Scroll / Zoomed Scrolling
IN TIMELINE
Monica Kim
WHILE
2 FINGERS
PRESSING
612
610
614
72°
DRAG/SWIPE MOVES CONTENT 4X.
RELEASE DRAG/SWIPE: INERTIAL FREE SCROLLING, THEN FOCUS/
ZOOM ON CARD IN CENTER OF VIEW.

FIG. 6A

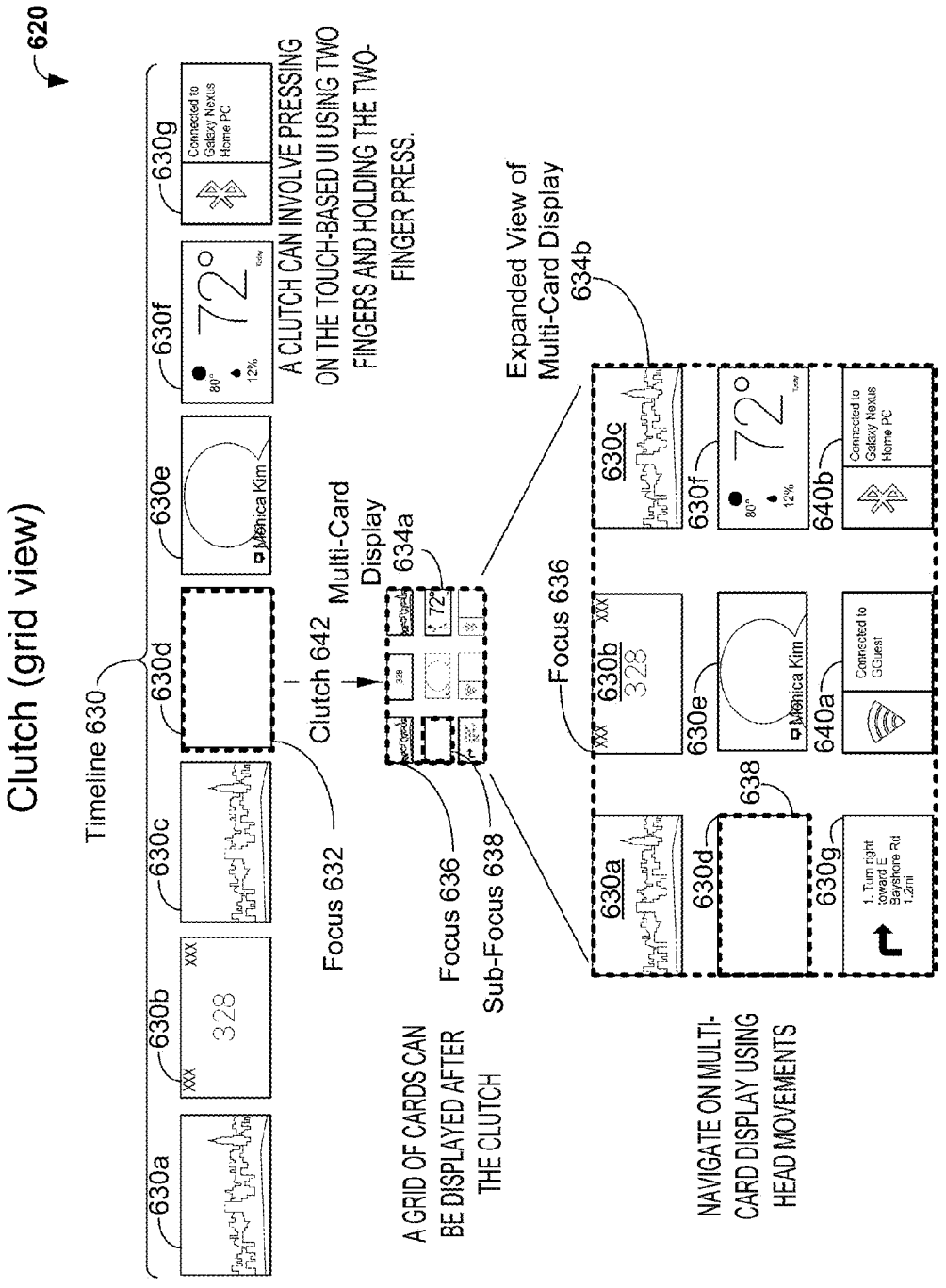

620
Clutch (grid view)
Timeline 630
630a
630b
630c
630d
630e
630f
630g
Focus 632
Clutch 642
Multi-Card Display 634a
A CLUTCH CAN INVOLVE PRESSING ON THE TOUCH-BASED UI USING TWO FINGERS AND HOLDING THE TWO-FINGER PRESS.
Expanded View of Multi-Card Display 634b
Focus 636
Sub-Focus 638
A GRID OF CARDS CAN BE DISPLAYED AFTER THE CLUTCH
NAVIGATE ON MULTI-CARD DISPLAY USING HEAD MOVEMENTS
638
640a
640b
Connected to Galaxy Nexus Home PC
Connected to GGuest
1. Turn right toward E Bayshore Rd 1.2mi
72°
328

FIG. 6B

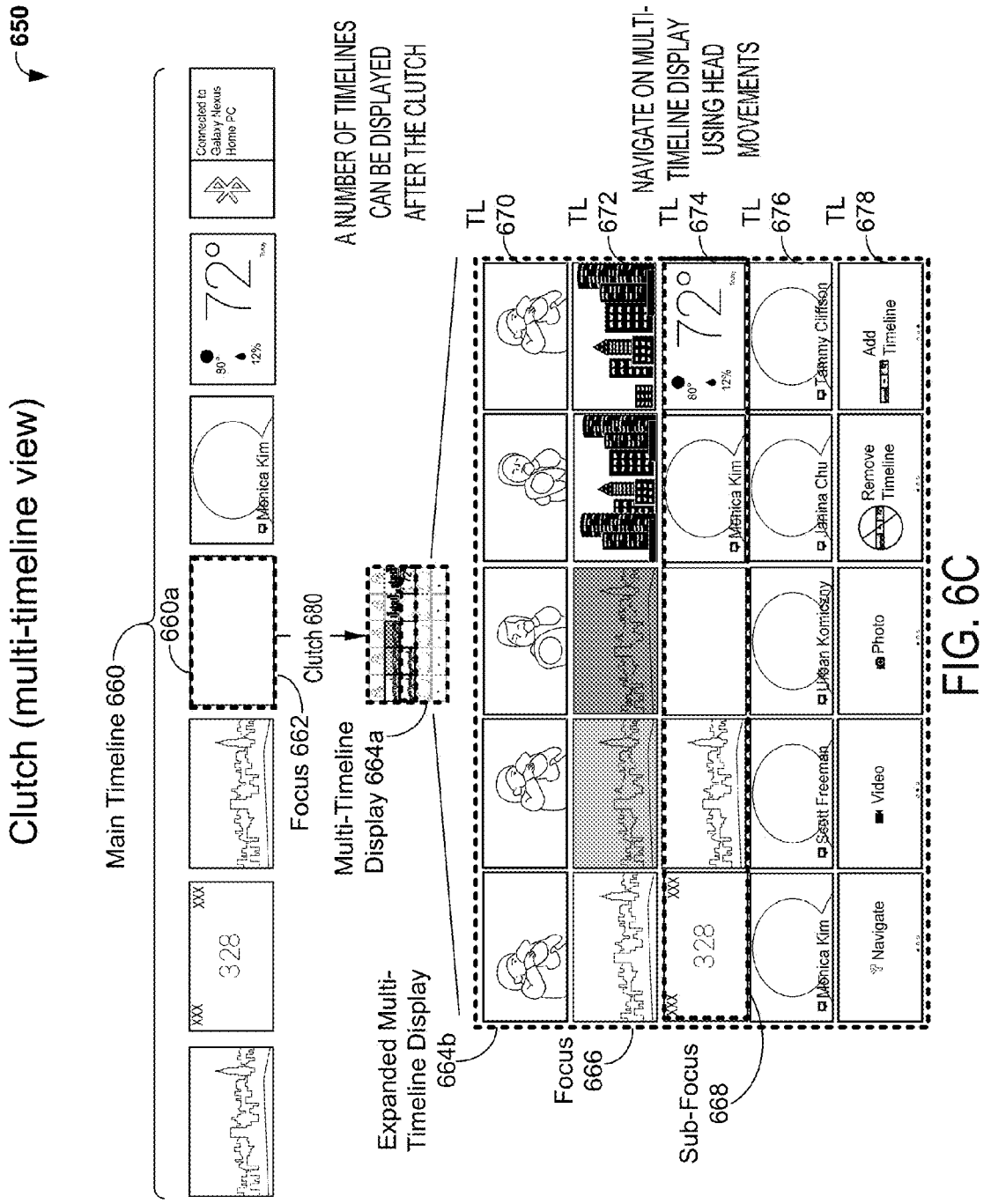

650
Clutch (multi-timeline view)
Main Timeline 660
660a
Focus 662
Clutch 680
Multi-Timeline Display 664a
Expanded Multi-Timeline Display 664b
A NUMBER OF TIMELINES CAN BE DISPLAYED AFTER THE CLUTCH
NAVIGATE ON MULTI-TIMELINE DISPLAY USING HEAD MOVEMENTS
TL 670
TL 672
TL 674
TL 676
TL 678
Focus 666
Sub-Focus 668
Connected to Galaxy Nexus Home PC
Monica Kim
Navigate
Scott Freeman
Video
Urban Komiotzy
Photo
Janina Chu
Remove Timeline
Tammy Cliffson
Add Timeline
328
72°

FIG. 6C

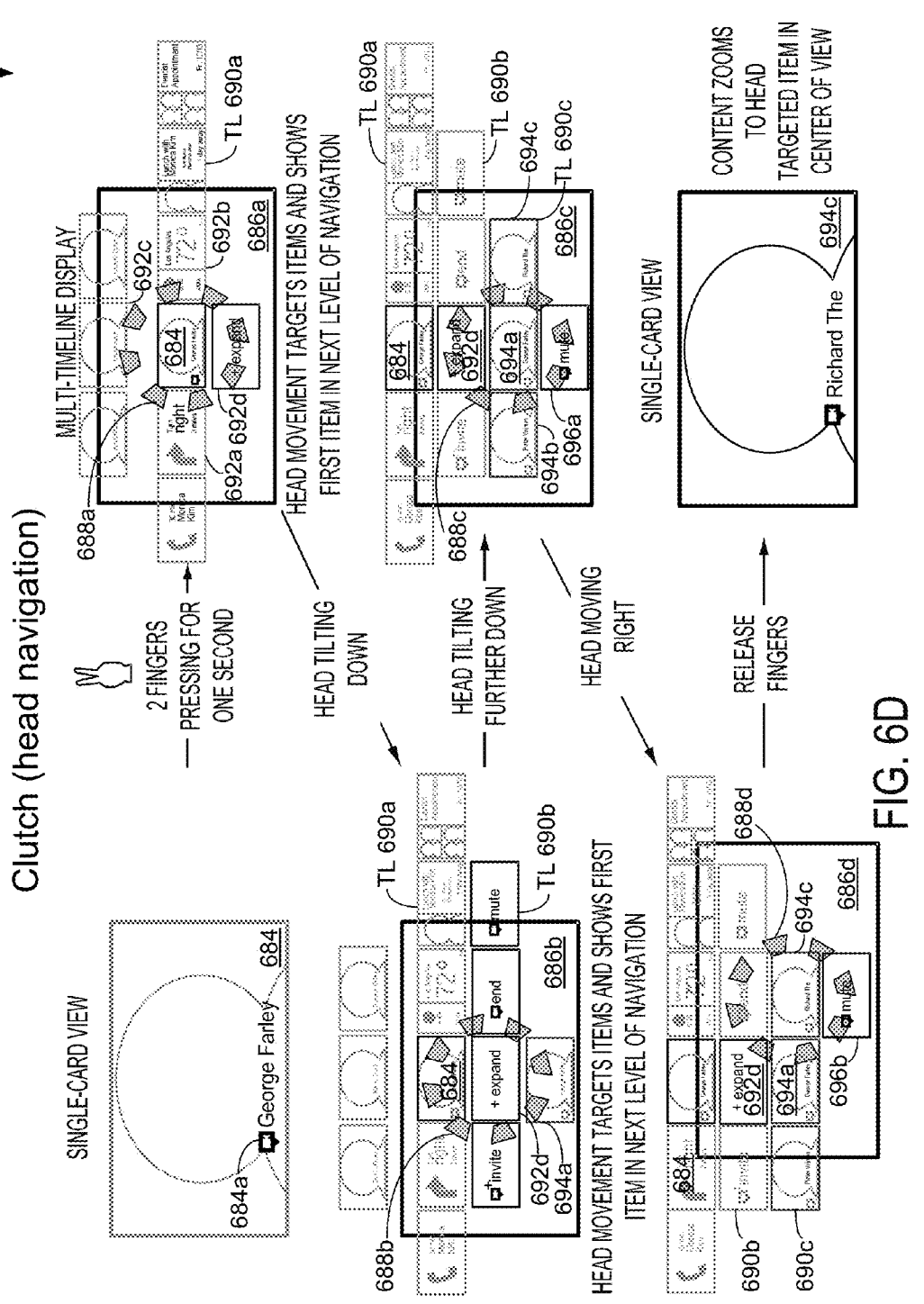

682
Clutch (head navigation)
SINGLE-CARD VIEW
George Farley
684
684a
2 FINGERS
PRESSING FOR
ONE SECOND
MULTI-TIMELINE DISPLAY
688a
692a
692d
692c
692b
686a
TL 690a
TL 690b
HEAD MOVEMENT TARGETS ITEMS AND SHOWS
FIRST ITEM IN NEXT LEVEL OF NAVIGATION
HEAD TILTING
DOWN
HEAD TILTING
FURTHER DOWN
HEAD MOVING
RIGHT
RELEASE
FINGERS
688b
688c
688d
694a
694b
694c
696a
696b
686b
686c
686d
690b
690c
SINGLE-CARD VIEW
CONTENT ZOOMS
TO HEAD
TARGETED ITEM IN
CENTER OF VIEW
Richard The

FIG. 6D

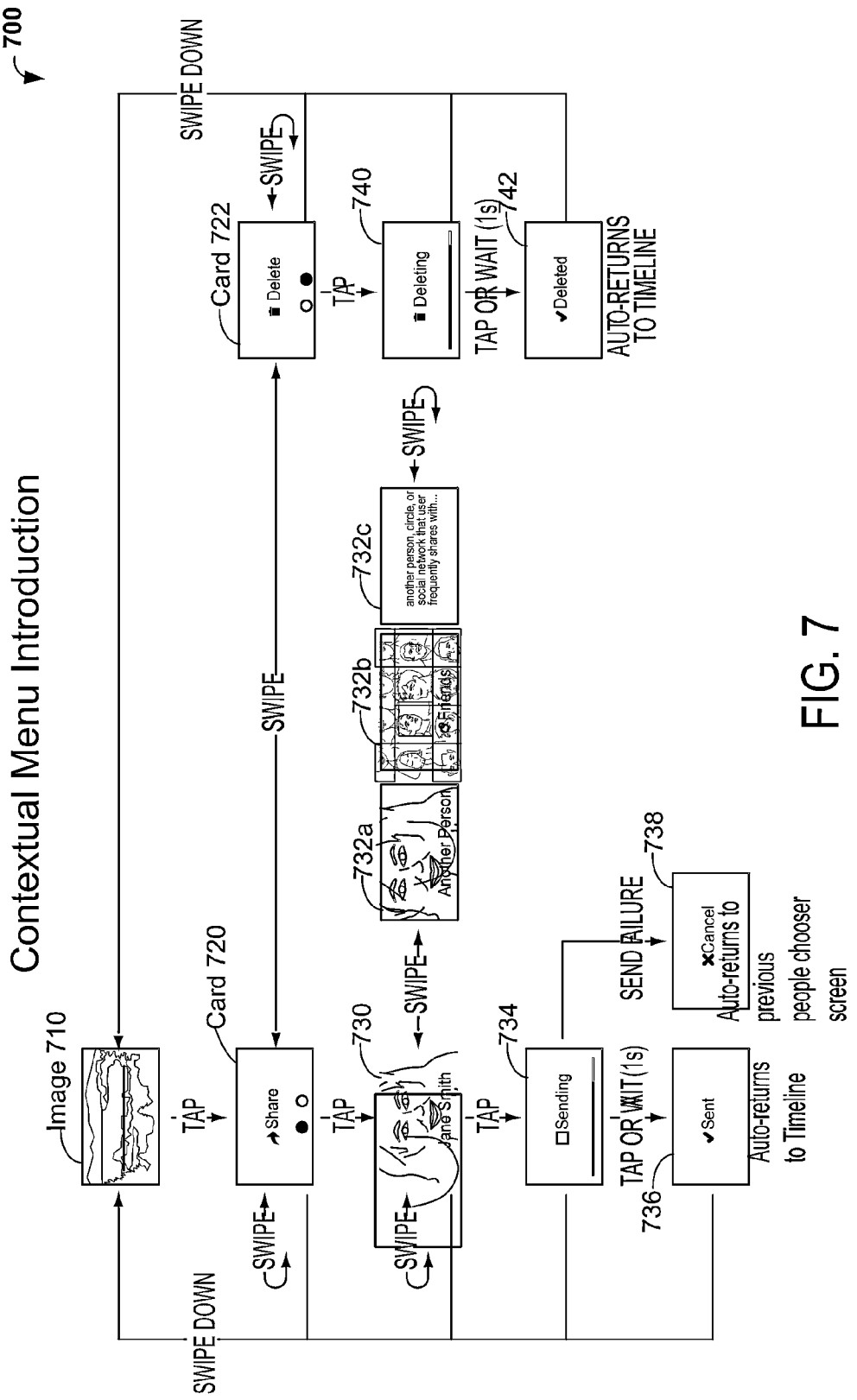

700
Contextual Menu Introduction
Image 710
TAP
Card 720
Share
SWIPE
SWIPE DOWN
730
Jane Smith
SWIPE
732a
Another Person
732b
732c
another person, circle, or social network that user frequently shares with...
SWIPE
SWIPE
SWIPE DOWN
Card 722
Delete
SWIPE
TAP
740
Deleting
TAP OR WAIT (1s)
742
Deleted
AUTO-RETURNS TO TIMELINE
TAP
734
Sending
SEND FAILURE
738
Cancel
Auto-returns to previous people chooser screen
TAP OR WAIT (1s)
736
Sent
Auto-returns to Timeline

FIG. 7

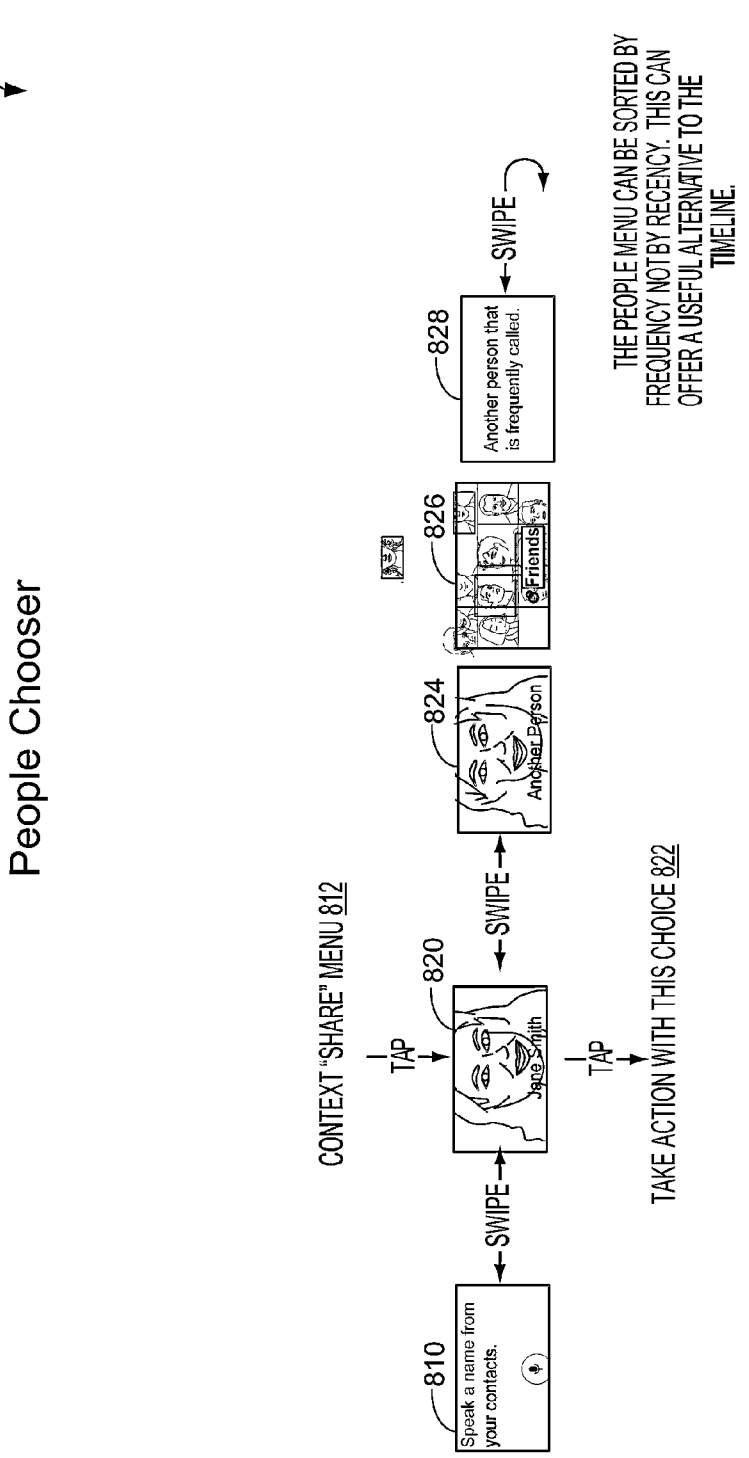

800
People Chooser
CONTEXT "SHARE" MENU 812
TAP
820
SWIPE
824
Another Person
826
Friends
828
Another person that is frequently called.
SWIPE
THE PEOPLE MENU CAN BE SORTED BY FREQUENCY NOT BY RECENCY. THIS CAN OFFER A USEFUL ALTERNATIVE TO THE TIMELINE.
SWIPE
810
Speak a name from your contacts.
TAP
TAKE ACTION WITH THIS CHOICE 822

FIG. 8

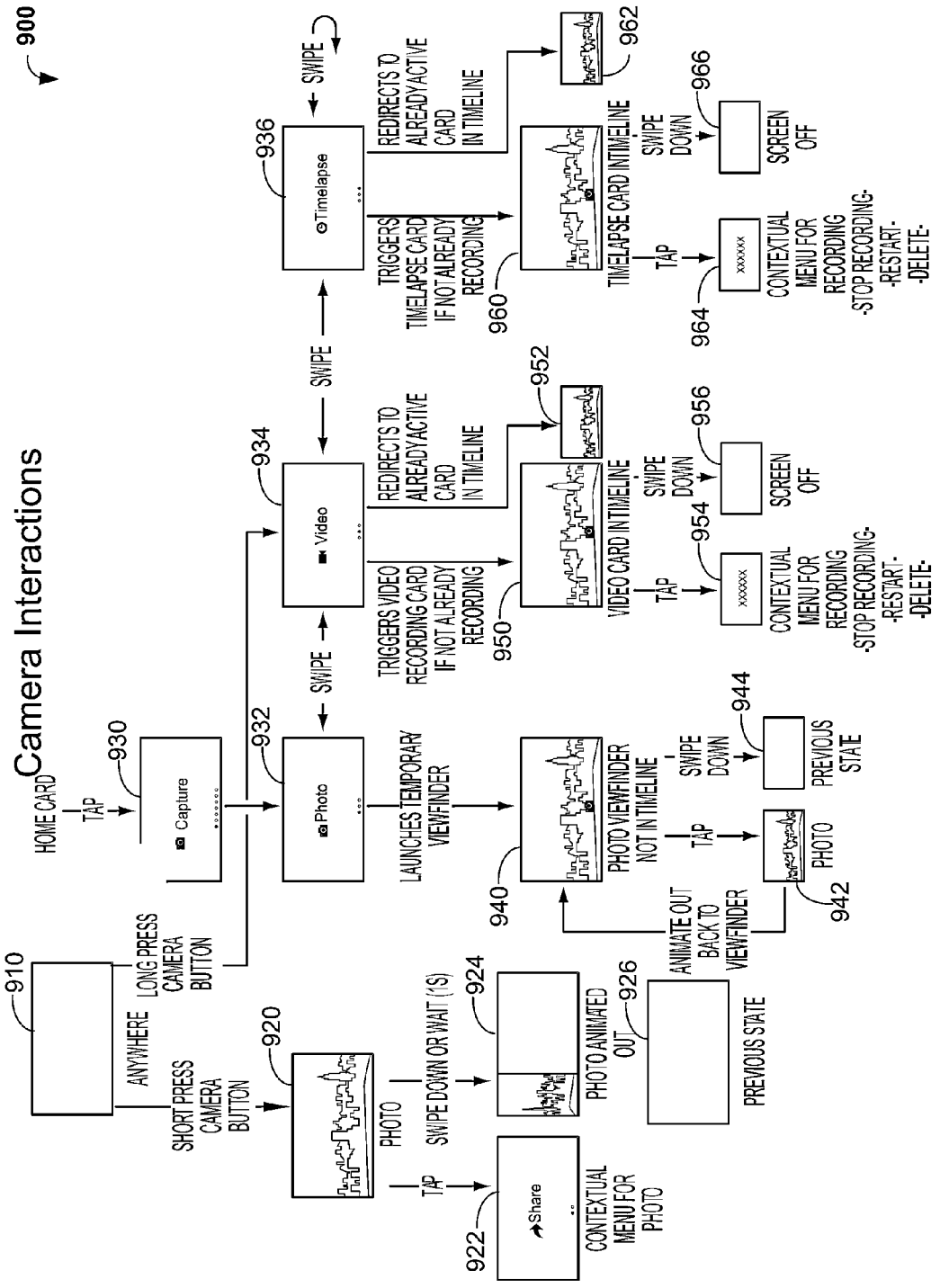

900
Camera Interactions
910
ANYWHERE
LONG PRESS CAMERA BUTTON
SHORT PRESS CAMERA BUTTON
HOME CARD
TAP
930
Capture
932
Photo
LAUNCHES TEMPORARY VIEWFINDER
SWIPE
934
Video
TRIGGERS VIDEO RECORDING CARD IF NOT ALREADY RECORDING
REDIRECTS TO ALREADY ACTIVE CARD IN TIMELINE
950
952
VIDEO CARD IN TIMELINE
TAP
954
SWIPE DOWN
956
SCREEN OFF
xxxxxx
CONTEXTUAL MENU FOR RECORDING
-STOP RECORDING-
-RESTART-
-DELETE-
SWIPE
936
Timelapse
TRIGGERS TIMELAPSE CARD IF NOT ALREADY RECORDING
REDIRECTS TO ALREADY ACTIVE CARD IN TIMELINE
960
962
TIMELAPSE CARD IN TIMELINE
TAP
964
SWIPE DOWN
966
SCREEN OFF
xxxxxx
CONTEXTUAL MENU FOR RECORDING
-STOP RECORDING-
-RESTART-
-DELETE-
920
PHOTO
TAP
SWIPE DOWN OR WAIT (1S)
924
PHOTO ANIMATED OUT
926
PREVIOUS STATE
922
Share
CONTEXTUAL MENU FOR PHOTO
940
PHOTO VIEWFINDER NOT IN TIMELINE
TAP
SWIPE DOWN
944
PREVIOUS STATE
ANIMATE OUT BACK TO VIEWFINDER
942
PHOTO

FIG. 9

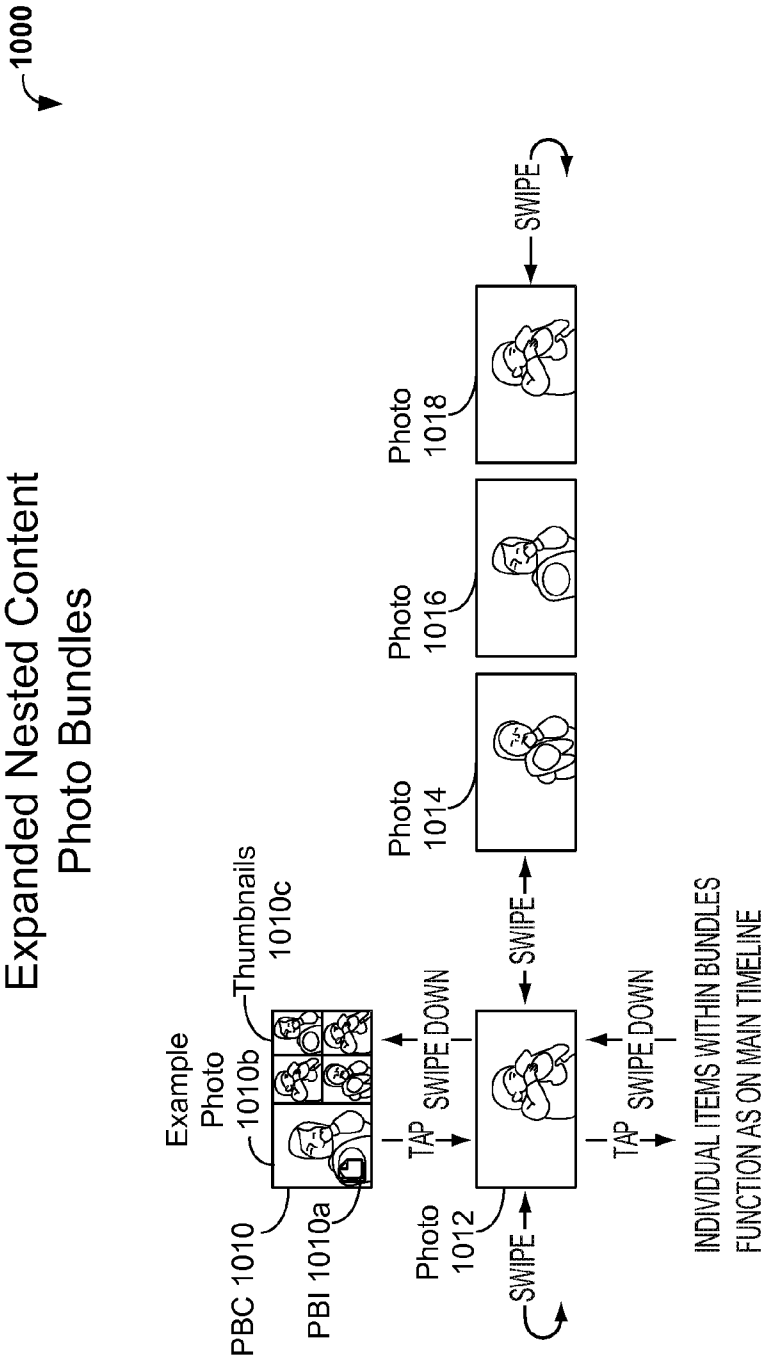

1000
Expanded Nested Content
Photo Bundles
Example
Photo
1010b
Thumbnails
1010c
PBC 1010
PBI 1010a
Photo
1012
TAP
SWIPE DOWN
SWIPE
Photo
1014
Photo
1016
Photo
1018
SWIPE
SWIPE
TAP
SWIPE DOWN
INDIVIDUAL ITEMS WITHIN BUNDLES
FUNCTION AS ON MAIN TIMELINE

FIG. 10A

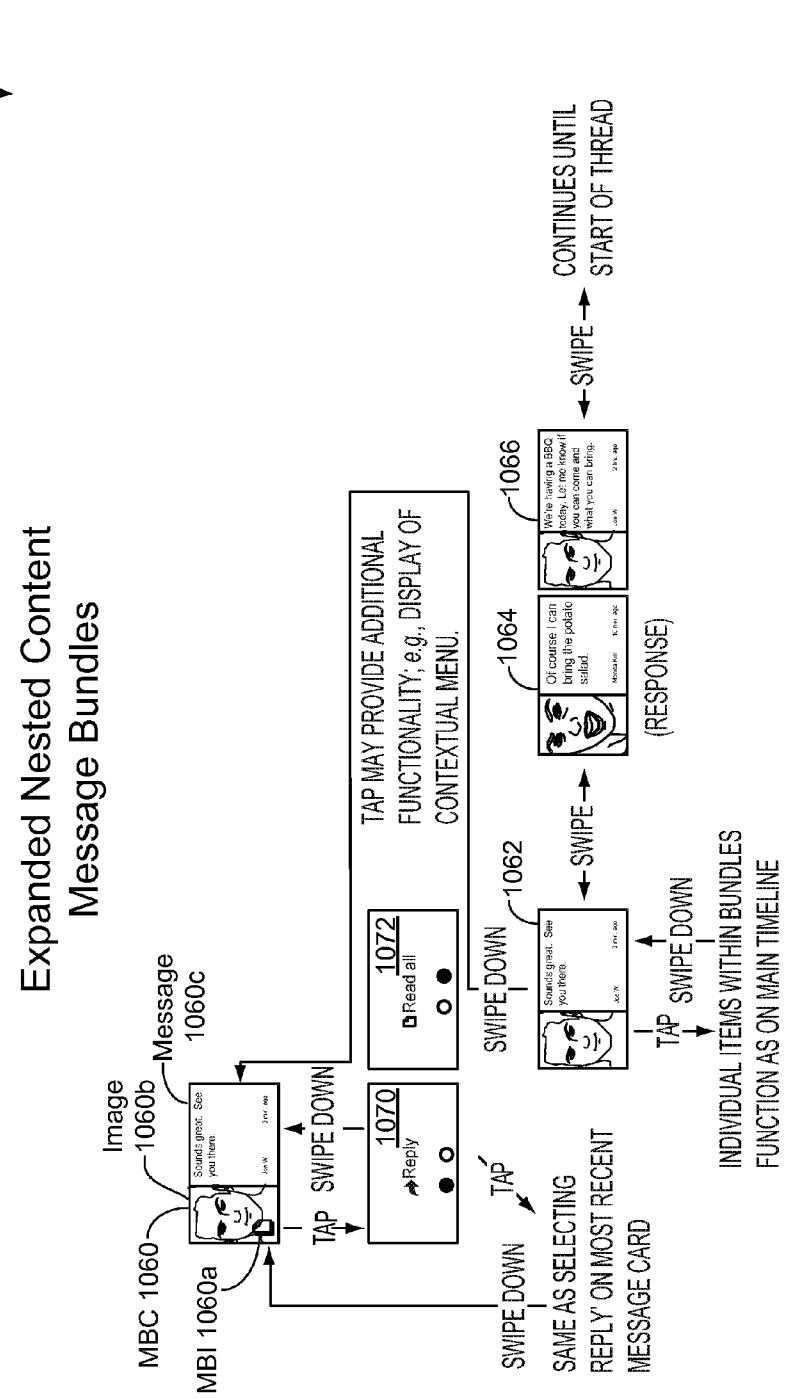

1050
Expanded Nested Content
Message Bundles
Image
1060b
Message
1060c
MBC 1060
MBI 1060a
Sounds great. See you there.
TAP
SWIPE DOWN
1070
Reply
1072
Read all
TAP MAY PROVIDE ADDITIONAL FUNCTIONALITY; e.g., DISPLAY OF CONTEXTUAL MENU.
SWIPE DOWN
1062
SWIPE
1064
Of course I can bring the potato salad.
1066
We're having a BBQ today. Let me know if you can come and what you can bring.
SWIPE
CONTINUES UNTIL START OF THREAD
(RESPONSE)
SWIPE DOWN
SAME AS SELECTING 'REPLY' ON MOST RECENT MESSAGE CARD
TAP
TAP
SWIPE DOWN
INDIVIDUAL ITEMS WITHIN BUNDLES FUNCTION AS ON MAIN TIMELINE

FIG. 10B

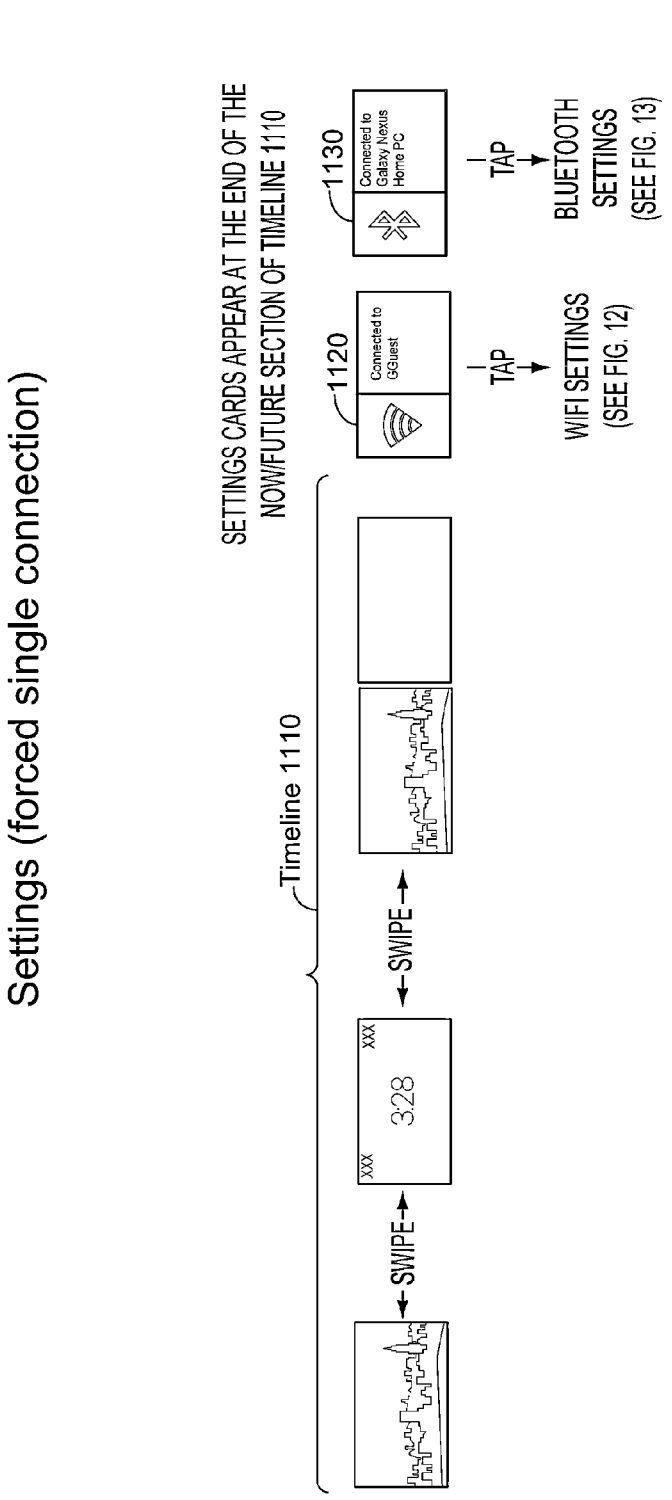

1100
Settings (forced single connection)
SETTINGS CARDS APPEAR AT THE END OF THE NOW/FUTURE SECTION OF TIMELINE 1110
Timeline 1110
SWIPE
SWIPE
XXX
XXX
3:28
1120
Connected to GGuest
1130
Connected to Galaxy Nexus Home PC
TAP
WIFI SETTINGS (SEE FIG. 12)
TAP
BLUETOOTH SETTINGS (SEE FIG. 13)

FIG. 11

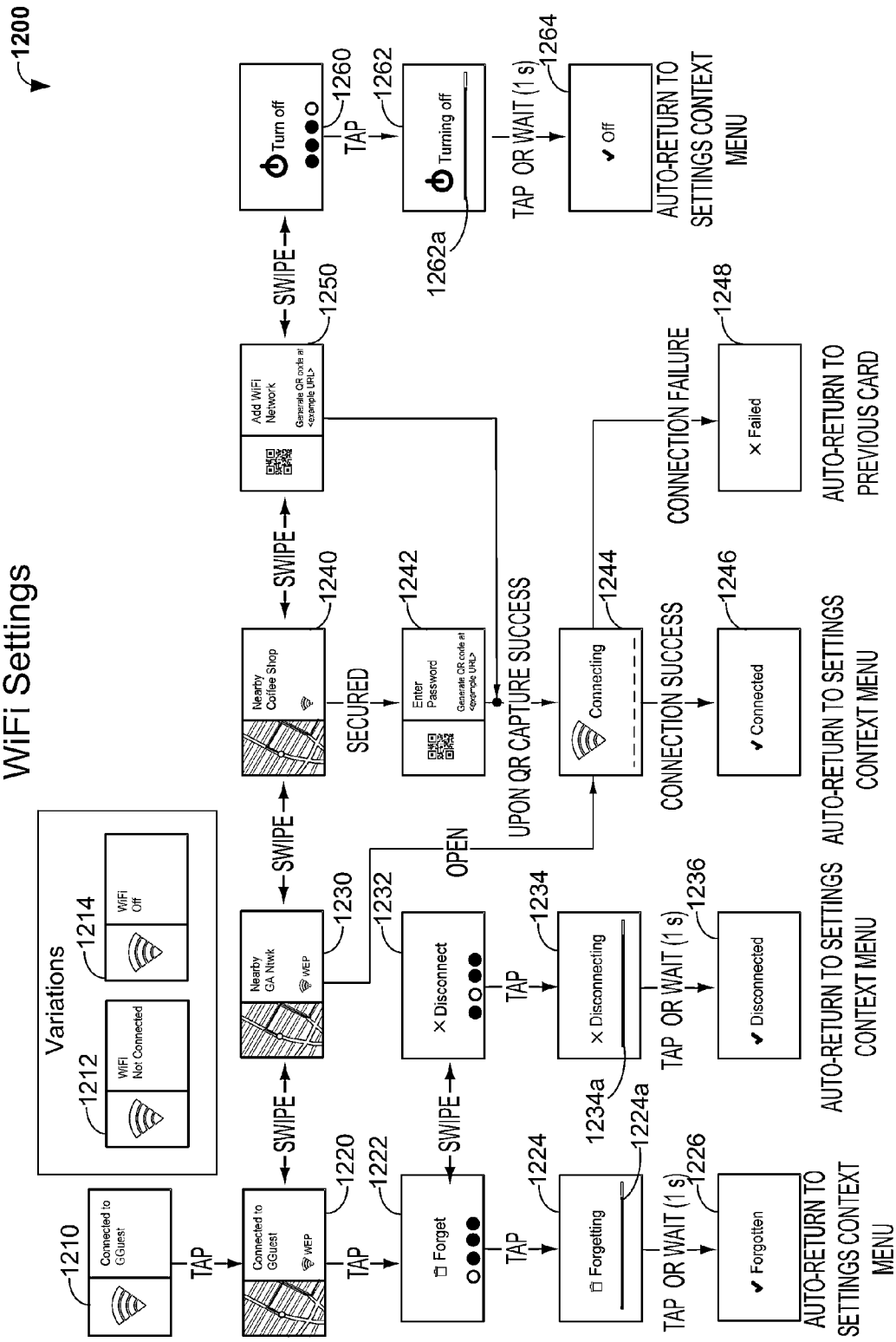

1200
WiFi Settings
Variations
1212
WiFi Not Connected
1214
WiFi Off
1210
Connected to GGuest
TAP
1220
Connected to GGuest
WEP
SWIPE
1230
Nearby GA Ntwk
WEP
SWIPE
1240
Nearby Coffee Shop
SECURED
1242
Enter Password
Generate QR code at <example URL>
SWIPE
1250
Add WiFi Network
Generate QR code at <example URL>
SWIPE
1260
Turn off
TAP
1262
Turning off
1262a
TAP OR WAIT (1 s)
1264
Off
AUTO-RETURN TO SETTINGS CONTEXT MENU
TAP
1222
Forget
SWIPE
1232
× Disconnect
OPEN
UPON QR CAPTURE SUCCESS
TAP
1234
× Disconnecting
1234a
TAP OR WAIT (1 s)
1236
Disconnected
AUTO-RETURN TO SETTINGS CONTEXT MENU
TAP
1224
Forgetting
1224a
TAP OR WAIT (1 s)
1226
Forgotten
AUTO-RETURN TO SETTINGS CONTEXT MENU
1244
Connecting
CONNECTION SUCCESS
1246
Connected
AUTO-RETURN TO SETTINGS CONTEXT MENU
CONNECTION FAILURE
1248
× Failed
AUTO-RETURN TO PREVIOUS CARD

FIG. 12

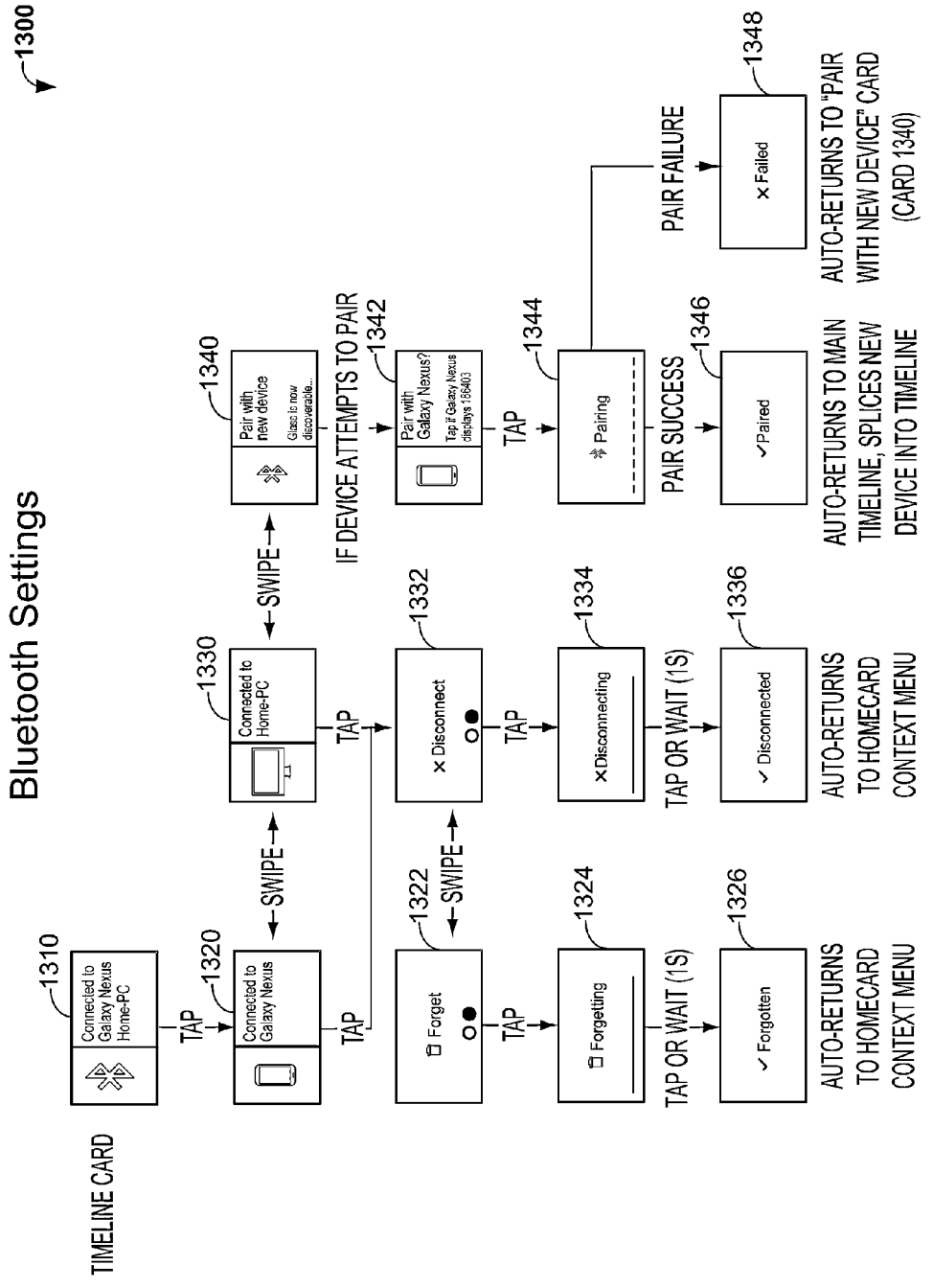

1300
Bluetooth Settings
TIMELINE CARD
1310
Connected to Galaxy Nexus Home-PC
TAP
1320
Connected to Galaxy Nexus
SWIPE
1330
Connected to Home-PC
SWIPE
1340
Pair with new device
Glass is now discoverable...
TAP
1322
Forget
SWIPE
1332
Disconnect
IF DEVICE ATTEMPTS TO PAIR
1342
Pair with Galaxy Nexus?
Tap if Galaxy Nexus displays 186403
TAP
1324
Forgetting
TAP
1334
Disconnecting
TAP
1344
Pairing
PAIR FAILURE
TAP OR WAIT (1S)
1326
Forgotten
TAP OR WAIT (1S)
1336
Disconnected
PAIR SUCCESS
1346
Paired
1348
Failed
AUTO-RETURNS TO HOMECARD CONTEXT MENU
AUTO-RETURNS TO HOMECARD CONTEXT MENU
AUTO-RETURNS TO MAIN TIMELINE, SPLICES NEW DEVICE INTO TIMELINE
AUTO-RETURNS TO "PAIR WITH NEW DEVICE" CARD (CARD 1340)

FIG. 13

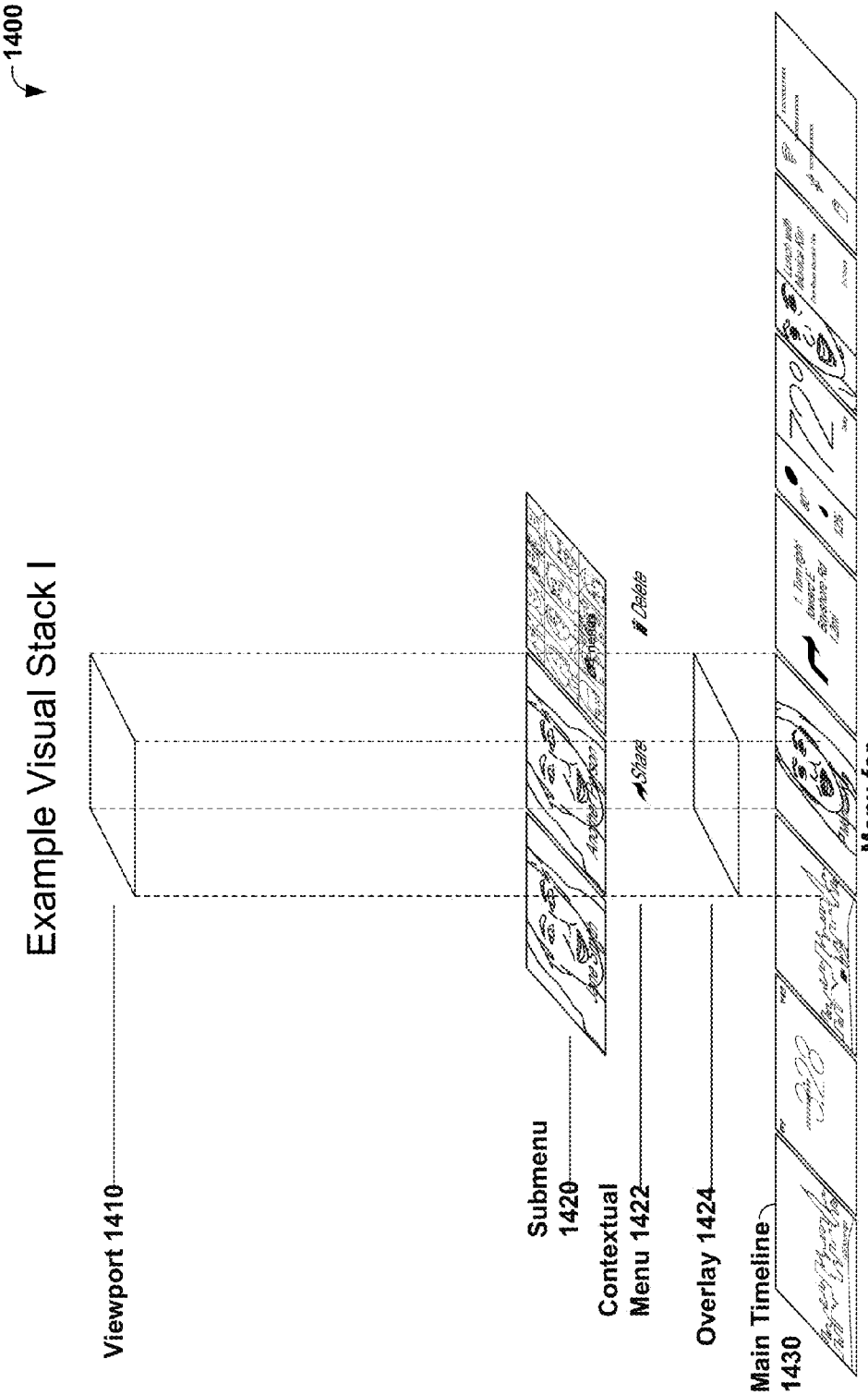

1400
Example Visual Stack I
Viewport 1410
Submenu 1420
Contextual Menu 1422
Overlay 1424
Main Timeline 1430
Share
Delete
Menu for Photo Bundle Card

FIG. 14A

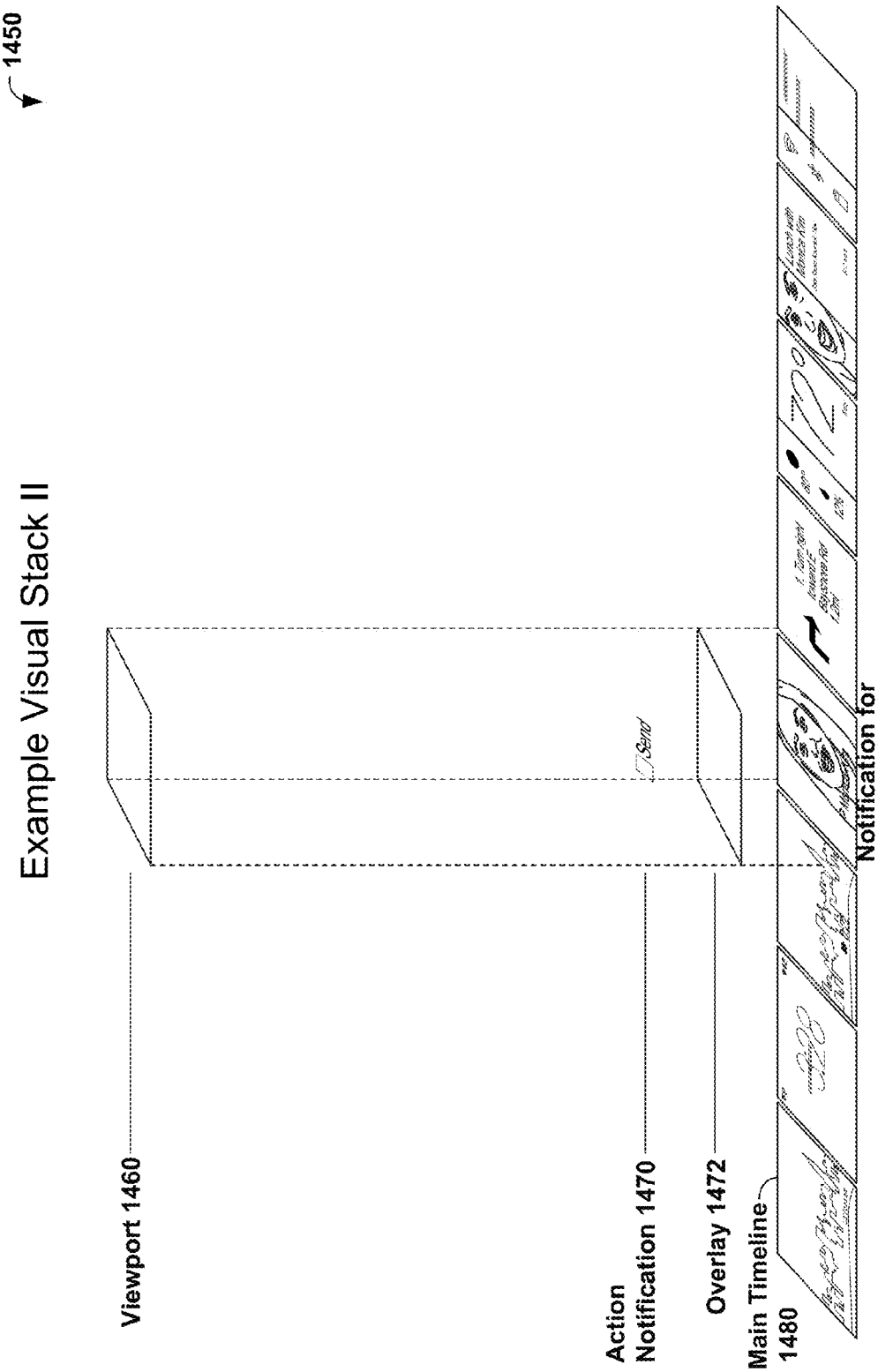

1450
Example Visual Stack II
Viewport 1460
Action Notification 1470
Overlay 1472
Main Timeline 1480
Notification for Photo Bundle Card

FIG. 14B

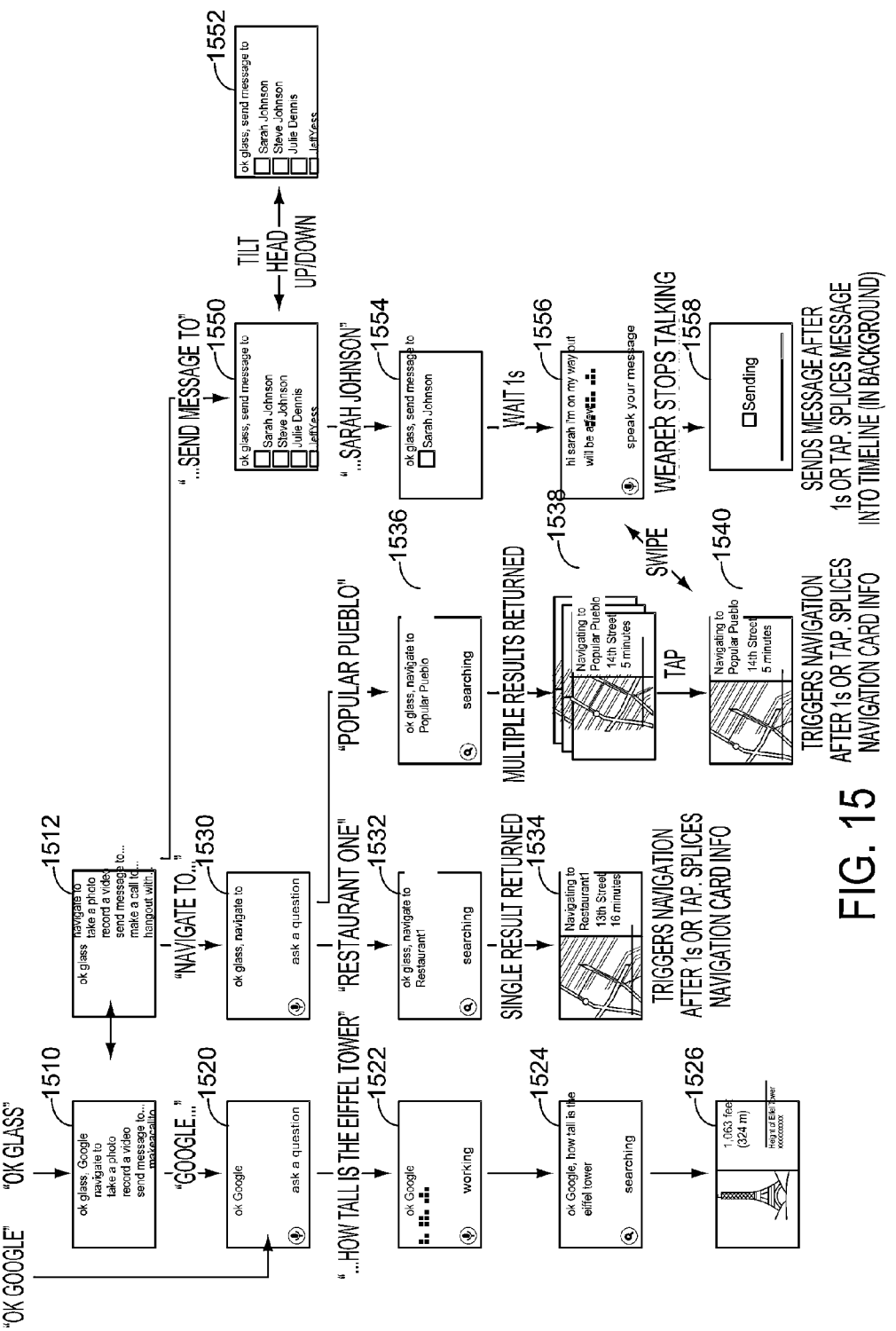

1500
Voice Interactions
"OK GOOGLE"
"OK GLASS"
1510
ok glass, Google navigate to take a photo record a video send message to... make a call to... hangout with...
1512
"GOOGLE..."
1520
ok Google
ask a question
"NAVIGATE TO..."
1530
ok glass, navigate to
ask a question
"...SEND MESSAGE TO"
1550
ok glass, send message to
Sarah Johnson
Steve Johnson
Julie Dennis
Jeff Voss
1552
TILT HEAD UP/DOWN
"...SARAH JOHNSON"
1554
ok glass, send message to
Sarah Johnson
WAIT 1s
1556
hi sarah i'm on my way but will be a
speak your message
WEARER STOPS TALKING
1558
Sending
SENDS MESSAGE AFTER 1s OR TAP. SPLICES MESSAGE INTO TIMELINE (IN BACKGROUND)
"...HOW TALL IS THE EIFFEL TOWER"
1522
ok Google
working
1524
ok Google, how tall is the eiffel tower
searching
1526
1,063 feet (324 m)
Height of Eiffel Tower: xxxxxxxx
"RESTAURANT ONE"
1532
ok glass, navigate to Restaurant1
searching
SINGLE RESULT RETURNED
1534
Navigating to Restaurant1 13th Street 16 minutes
TRIGGERS NAVIGATION AFTER 1s OR TAP. SPLICES NAVIGATION CARD INFO
"POPULAR PUEBLO"
1536
ok glass, navigate to Popular Pueblo
searching
MULTIPLE RESULTS RETURNED
1538
Navigating to Popular Pueblo 14th Street 5 minutes
TAP
SWIPE
1540
Navigating to Popular Pueblo 14th Street 5 minutes
TRIGGERS NAVIGATION AFTER 1s OR TAP. SPLICES NAVIGATION CARD INFO

FIG. 15

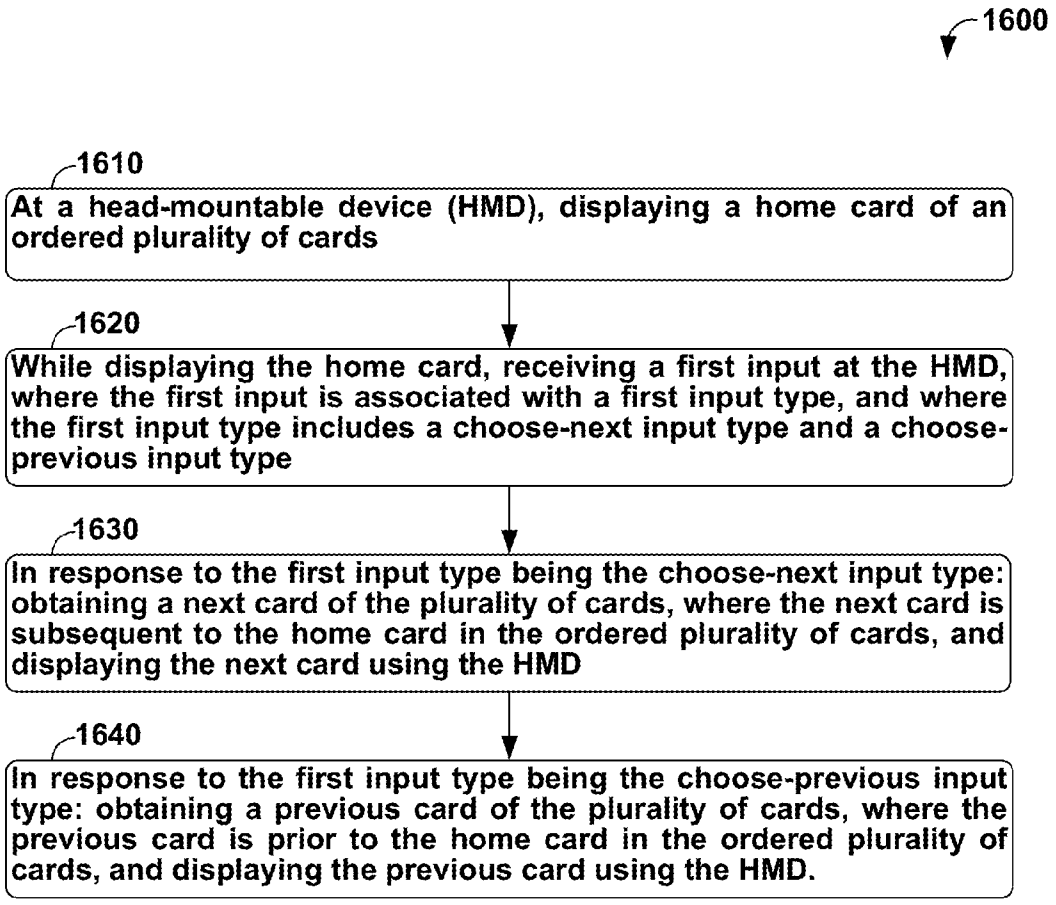

1600
1610
At a head-mountable device (HMD), displaying a home card of an ordered plurality of cards
1620
While displaying the home card, receiving a first input at the HMD, where the first input is associated with a first input type, and where the first input type includes a choose-next input type and a choose-previous input type
1630
In response to the first input type being the choose-next input type: obtaining a next card of the plurality of cards, where the next card is subsequent to the home card in the ordered plurality of cards, and displaying the next card using the HMD
1640
In response to the first input type being the choose-previous input type: obtaining a previous card of the plurality of cards, where the previous card is prior to the home card in the ordered plurality of cards, and displaying the previous card using the HMD.

FIG. 16A

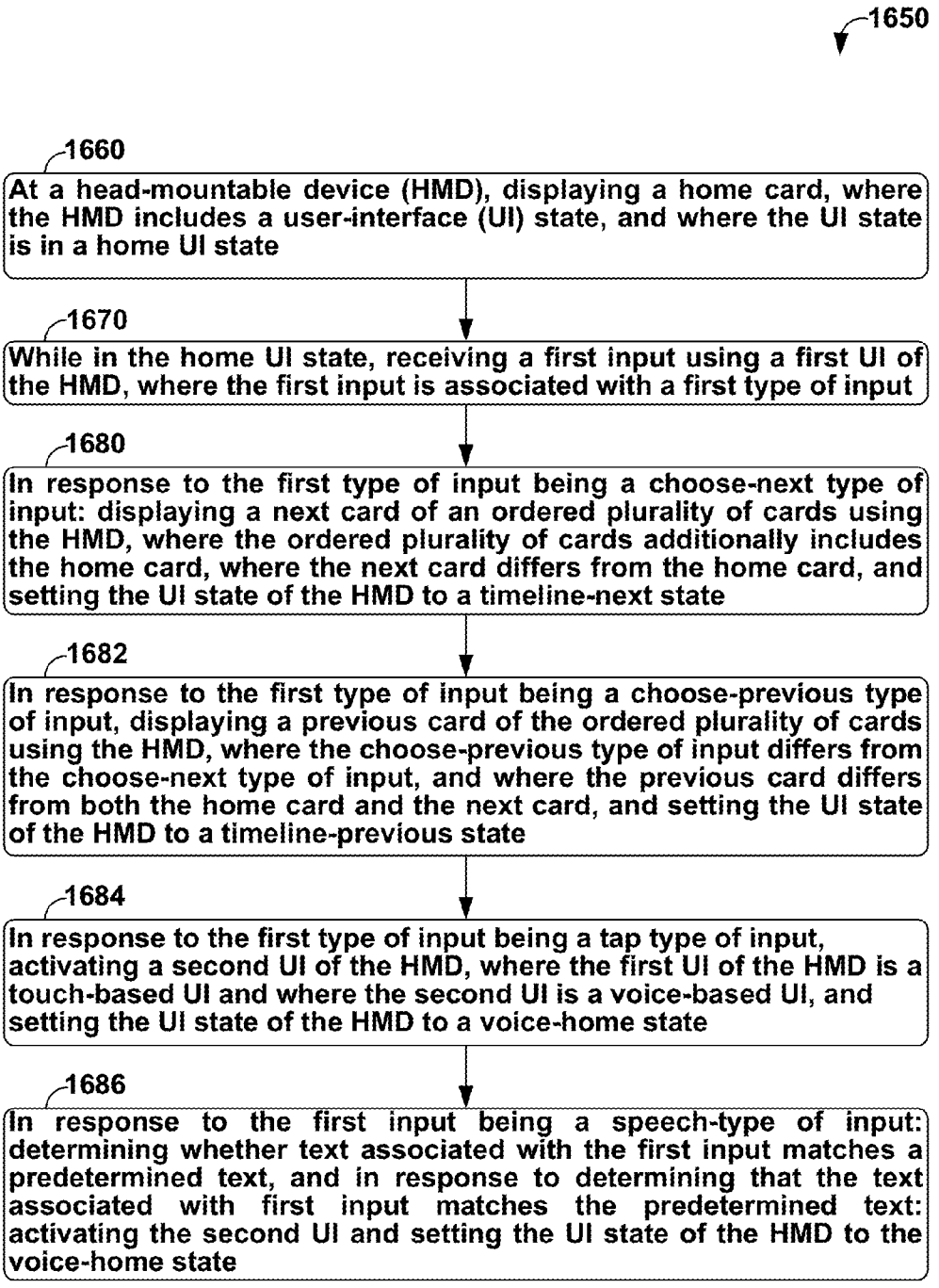

1650
1660
At a head-mountable device (HMD), displaying a home card, where the HMD includes a user-interface (UI) state, and where the UI state is in a home UI state
1670
While in the home UI state, receiving a first input using a first UI of the HMD, where the first input is associated with a first type of input
1680
In response to the first type of input being a choose-next type of input: displaying a next card of an ordered plurality of cards using the HMD, where the ordered plurality of cards additionally includes the home card, where the next card differs from the home card, and setting the UI state of the HMD to a timeline-next state
1682
In response to the first type of input being a choose-previous type of input, displaying a previous card of the ordered plurality of cards using the HMD, where the choose-previous type of input differs from the choose-next type of input, and where the previous card differs from both the home card and the next card, and setting the UI state of the HMD to a timeline-previous state
1684
In response to the first type of input being a tap type of input, activating a second UI of the HMD, where the first UI of the HMD is a touch-based UI and where the second UI is a voice-based UI, and setting the UI state of the HMD to a voice-home state
1686
In response to the first input being a speech-type of input: determining whether text associated with the first input matches a predetermined text, and in response to determining that the text associated with first input matches the predetermined text: activating the second UI and setting the UI state of the HMD to the voice-home state

FIG. 16B

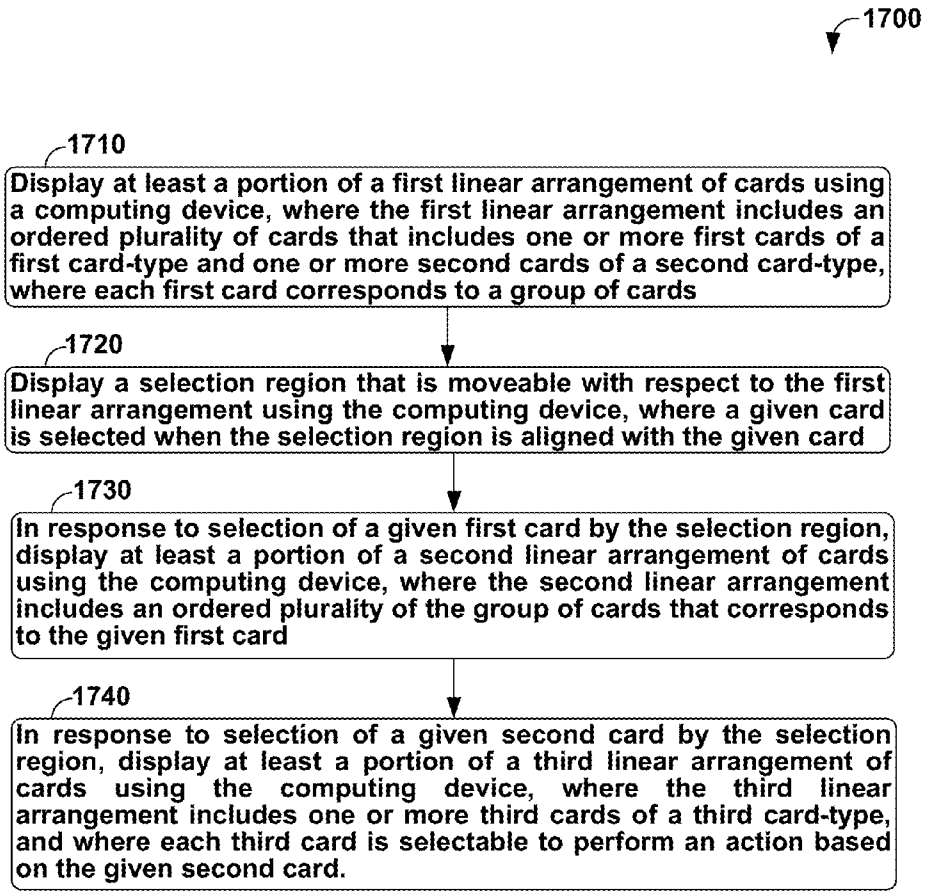

1700
1710
Display at least a portion of a first linear arrangement of cards using a computing device, where the first linear arrangement includes an ordered plurality of cards that includes one or more first cards of a first card-type and one or more second cards of a second card-type, where each first card corresponds to a group of cards
1720
Display a selection region that is moveable with respect to the first linear arrangement using the computing device, where a given card is selected when the selection region is aligned with the given card
1730
In response to selection of a given first card by the selection region, display at least a portion of a second linear arrangement of cards using the computing device, where the second linear arrangement includes an ordered plurality of the group of cards that corresponds to the given first card
1740
In response to selection of a given second card by the selection region, display at least a portion of a third linear arrangement of cards using the computing device, where the third linear arrangement includes one or more third cards of a third card-type, and where each third card is selectable to perform an action based on the given second card.

FIG. 17

USER INTERFACES FOR HEAD-MOUNTABLE DEVICES

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims priority to U.S. Patent App. No. 61/710,543, entitled "User Interfaces for Head-Mountable Devices", filed on Oct. 5, 2012, the contents of which are fully incorporated by referenced herein for all purposes.

BACKGROUND

[0002] Unless otherwise indicated herein, the materials 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.

[0003] Computing systems such as personal computers, laptop computers, tablet computers, cellular phones, and countless types of Internet-capable devices are prevalent in numerous aspects of modern life. Over time, the manner in which these devices are providing information to users is becoming more intelligent, more efficient, more intuitive, and/or less obtrusive.

[0004] The trend toward miniaturization of computing hardware, peripherals, as well as of sensors, detectors, and image and audio processors, among other technologies, has helped open up a field sometimes referred to as "wearable computing." In the area of image and visual processing and production, in particular, it has become possible to consider wearable displays that place a very small image display element close enough to a wearer's (or user's) eye(s) such that the displayed image fills or nearly fills the field of view, and appears as a normal sized image, such as might be displayed on a traditional image display device. The relevant technology can be referred to as "near-eye displays."

[0005] Near-eye displays are fundamental components of wearable displays, also sometimes called "head-mounted displays" (HMDs). A head-mounted display places a graphic display or displays close to one or both eyes of a wearer. To generate the images on a display, a computer processing system can be used. Such displays can occupy part or all of a wearer's field of view. Further, head-mounted displays can be as small as a pair of glasses or as large as a helmet.

SUMMARY

[0006] In one aspect, a method is provided. At a head-mountable device (HMD), displaying a home card of an ordered plurality of cards. While displaying the home card, receiving a first input at the HMD. The first input is associated with a first input type. The first input type includes a choose-next input type and a choose-previous input type. In response to the first input type being the choose-next input type: a next card of the ordered plurality of cards is obtained, the next card being subsequent to the home card in the ordered plurality of cards, and the HMD displays the next card. In response to the first input type being the choose-previous input type: a previous card of the ordered plurality of cards is obtained, where the previous card is prior to the home card in the ordered plurality of cards, and the HMD displays the previous card.

[0007] In another aspect, a method is provided. At an HMD, a home card is displayed. The HMD includes a user-interface (UI) state. The UI state is in a home UI state. While in the home UI state, a first UI of the HMD receives a first input. The first input is associated with a first type of input. In response to the first type of input being a choose-next type of input: the HMD displaying a next card of an ordered plurality of cards, where the ordered plurality of cards additionally includes the home card, where the next card differs from the home card, and setting the UI state of the HMD to a timeline-next state. In response to the first type of input being a choose-previous type of input, the HMD displaying a previous card of the ordered plurality of cards, where the choose-previous type of input differs from the choose-next type of input, and where the previous card differs from the both next card and the home card, and setting the UI state of the HMD to a timeline-previous state. In response to the first type of input being a tap type of input: activating a second UI of the HMD, where the first UI of the HMD is a touch-based UI and where the second UI is a voice-based UI, and setting the UI state of the HMD to a voice-home state. In response to the first type of input being a speech-type of input: determining whether text associated with the first input matches a predetermined text, and, in response to determining that the text associated with first input matches the predetermined text, activating the second UI and setting the UI state of the HMD to the voice-home state.

[0008] In another aspect, a computing device is provided. The computing device includes a processor and a non-transitory computer-readable medium that is configured to store program instructions that, when executed by the processor, cause the computing device to carry out functions. The functions include: displaying at least a portion of a first linear arrangement of cards, where the first linear arrangement includes an ordered plurality of cards that includes one or more first cards of a first card-type and one or more second cards of a second card-type, and where each first card corresponds to a group of cards; displaying a selection region that is moveable with respect to the first linear arrangement, where a given card is selected when the selection region is aligned with the given card; in response to selection of a given first card by the selection region, displaying at least a portion of a second linear arrangement of cards, where the second linear arrangement includes an ordered plurality of the group of cards that correspond to the given first card; and in response to selection of a given second card by the selection region, displaying at least a portion of a third linear arrangement of cards, where the third linear arrangement includes one or more third cards of a third card-type, where each third card is selectable to perform an action based on the given second card.

[0009] In another aspect, a non-transitory computer readable medium is provided. The non-transitory computer-readable medium is configured to store program instructions that, when executed by a processor of a computing device, cause the computing device to carry out functions. The functions include: displaying at least a portion of a first linear arrangement of cards, where the first linear arrangement includes an ordered plurality of cards that includes one or more first cards of a first card-type and one or more second cards of a second card-type, and where each first card corresponds to a group of cards; displaying a selection region that is moveable with respect to the first linear arrangement, where a given card is selected when the selection region is aligned with the given card; in response to selection of a given first card by the selection region, displaying at least a portion of a second linear arrangement of cards, where the second linear arrangement includes an ordered plurality of the group of cards that correspond to the given first card; and in response to selection

of a given second card by the selection region, displaying at least a portion of a third linear arrangement of cards, where the third linear arrangement includes one or more third cards of a third card-type, where each third card is selectable to perform an action based on the given second card.

[0010] In another aspect, a method is provided. A computing device displays at least a portion of a first linear arrangement of cards. The first linear arrangement includes an ordered plurality of cards. The ordered plurality of cards includes one or more first cards of a first card-type and one or more second cards of a second card-type. Each first card corresponds to a group of cards. The computing device displays a selection region that is moveable with respect to the first linear arrangement, where a given card is selected when the selection region is aligned with the given card. In response to selection of a given first card by the selection region, the computing device displays at least a portion of a second linear arrangement of cards, where the second linear arrangement includes an ordered plurality of the group of cards corresponding to the given first card. In response to selection of a given second card by the selection region, the computing device displays at least a portion of a third linear arrangement of cards, where the third linear arrangement includes one or more third cards of a third card-type, where each third card is selectable to perform an action based on the given second card.

[0011] In another aspect, a device is provided. The device includes: means for displaying at least a portion of a first linear arrangement of cards, where the first linear arrangement includes an ordered plurality of cards that includes one or more first cards of a first card-type and one or more second cards of a second card-type, and where each first card corresponds to a group of cards; means for displaying a selection region that is moveable with respect to the first linear arrangement, where a given card is selected when the selection region is aligned with the given card; means for, in response to selection of a given first card by the selection region, displaying at least a portion of a second linear arrangement of cards, where the second linear arrangement includes an ordered plurality of the group of cards that correspond to the given first card; and means for, in response to selection of a given second card by the selection region, displaying at least a portion of a third linear arrangement of cards, where the third linear arrangement includes one or more third cards of a third card-type, where each third card is selectable to perform an action based on the given second card.

[0012] These as well as other aspects, advantages, and alternatives will become apparent to those of ordinary skill in the art by reading the following detailed description, with reference where appropriate to the accompanying drawings. Further, it should be understood that this summary and other descriptions and figures provided herein are intended to illustrative embodiments by way of example only and, as such, that numerous variations are possible. For instance, structural elements and process steps can be rearranged, combined, distributed, eliminated, or otherwise changed, while remaining within the scope of the embodiments as claimed.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013] FIG. **1**A illustrates a wearable computing system according to an example embodiment.

[0014] FIG. **1**B illustrates an alternate view of the wearable computing device illustrated in FIG. **1**A.

[0015] FIG. **1**C illustrates another wearable computing system according to an example embodiment.

[0016] FIG. **1**D illustrates another wearable computing system according to an example embodiment.

[0017] FIGS. **1**E to **1**G are simplified illustrations of the wearable computing system shown in FIG. **1**D, being worn by a wearer.

[0018] FIG. **2**A illustrates a schematic drawing of a computing device according to an example embodiment.

[0019] FIG. **2**B shows an example projection of an image by an example head-mountable device (HMD), according to an example embodiment.

[0020] FIG. **3** shows an example home card of an example user interface for a HMD, according to an example embodiment.

[0021] FIG. **4** shows example operations of a multi-tiered user model for a user interface for a head-mountable device (HMD), according to an example embodiment.

[0022] FIG. **5**A shows a scenario of example timeline interactions, according to an example embodiment.

[0023] FIG. **5**B shows a scenario of example timeline interactions including splicing a new card into a timeline, according to an example embodiment.

[0024] FIG. **5**C shows a scenario for using a multi-timeline display, according to an example embodiment.

[0025] FIG. **6**A shows an example of using a two-fingered swipe on a touch-based UI of an HMD for zoomed scrolling, according to an example embodiment.

[0026] FIG. **6**B shows a scenario for using a clutch operation to generate a multi-card display, according to an example embodiment.

[0027] FIG. **6**C shows a scenario for using a clutch operation to generate a multi-timeline display, according to an example embodiment.

[0028] FIG. **6**D shows a scenario for using head movements to navigate a multi-timeline display, according to an example embodiment.

[0029] FIG. **7** shows a user-interface scenario including contextual menus, according to an example embodiment.

[0030] FIG. **8** shows a user-interface scenario including a people chooser, according to an example embodiment.

[0031] FIG. **9** shows a user-interface scenario with camera interactions, according to an example embodiment.

[0032] FIG. **10**A shows a user-interface scenario with photo bundles, according to an example embodiment.

[0033] FIG. **10**B shows a user-interface scenario with message bundles, according to an example embodiment.

[0034] FIG. **11** shows a user-interface scenario with a timeline having settings cards, according to an example embodiment.

[0035] FIG. **12** shows a user-interface scenario related to WiFi settings, according to an example embodiment.

[0036] FIG. **13** shows a user-interface scenario related to Bluetooth settings, according to an example embodiment.

[0037] FIG. **14**A shows an example visual stack, according to an example embodiment.

[0038] FIG. **14**B shows another example visual stack, according to an example embodiment.

[0039] FIG. **15** shows a user-interface scenario related to voice interactions, according to an example embodiment.

[0040] FIG. **16**A is a flow chart illustrating a method, according to an example embodiment.

[0041] FIG. **16**B is a flow chart illustrating another method, according to an example embodiment.

[0042] FIG. **17** is a flow chart illustrating another method, according to an example embodiment.

DETAILED DESCRIPTION

[0043] Example methods and systems are described herein. It should be understood that the words "example" and "exemplary" are used herein to mean "serving as an example, instance, or illustration." Any embodiment or feature described herein as being an "example" or "exemplary" is not necessarily to be construed as preferred or advantageous over other embodiments or features. In the following detailed description, reference is made to the accompanying figures, which form a part thereof. In the figures, similar symbols typically identify similar components, unless context dictates otherwise. Other embodiments can be utilized, and other changes can be made, without departing from the spirit or scope of the subject matter presented herein.

[0044] The example embodiments described herein are not meant to be limiting. It will be readily understood that the aspects of the present disclosure, as generally described herein, and illustrated in the figures, can be arranged, substituted, combined, separated, and designed in a wide variety of different configurations, all of which are explicitly contemplated herein.

A. OVERVIEW

[0045] In an example embodiment, a UI for a computing device can include a timeline feature that allows the wearer to navigate through a sequence of ordered screens. In the context of such a timeline feature, each screen can be referred to as a "card." Among the sequence of cards, one or more cards can be displayed, and of the displayed card(s), one card can be "focused on" for possible selection. For example, the timeline can be present one card for display at a time, and the card being displayed is also the card being focused on. In one embodiment, when a card is selected, the card can be displayed using a single-card view that occupies substantially all of the viewing area of the display. In some embodiments, the computing device utilizing the herein-disclosed UI can be configured as a HMD, wearable computer, tablet computer, laptop computer, desktop computer, mobile telephone, and/or other computing device. In particular embodiments, computing device **210** and/or remote device **230** discussed below in the context of FIG. **2**A can be configured to utilize the herein-disclosed UI.

[0046] Each card can be associated with a certain application, object, or operation. The cards can be ordered by a time associated with the card, application, object, or operation represented by the card. For example, if a card shows a photo captured by a wearer of the HMD at 2:57 PM, the time associated with the card is the time associated with the underlying photo object of 2:57 PM. As another example, a card representing a weather application can continuously update temperature, forecast, wind, and other weather-related information, and as such, the time associated with the weather application can be the current time. As an additional example, a card representing a calendar application can show a next appointment in 2 hours from now, and so the time associated with the card can be a time corresponding to the displayed next appointment, or 2 hours in the future.

[0047] The timeline feature can allow the wearer to navigate through the cards according to their associated times. For example, a wearer could move their head to the left to navigate to cards with times prior to a time associated with the focused-on card, and to the right to navigate to cards with times after the time associated with the focused-on card. As another example, the wearer can use a touch pad or similar device as part of a touch-based UI to make a swiping motion in one direction on the touch-based UI to navigate to cards with times prior to the time associated with the focused-on card, and make a swiping motion in another direction to navigate to cards with times after the time associated with the focused-on card.

[0048] Upon power up, the HMD can display a "home card", also referred to as a home screen. The home card can display a clock, and be associated with a time of "now" or a current time. In some cases, the home card can display a clock, to reinforce the association between the home card and now. Then, cards associated with times before now can be viewed in the timeline as prior to the home card, and cards associated with times equal to or after now can be viewed in the timeline subsequent to the home card.

[0049] After viewing cards on the timeline, the wearer can choose to interact with some cards. To select a card on the timeline for interaction, the wearer can tap on the touch-based UI, also referred to as performing a "tap operation", to select the focused-on card for interaction. In some cases, a "contextual menu" can be used to interact with the selected card. For example, if the selected focused-on card shows a photo or an image captured by the HMD, the contextual menu can provide one or more options or operations for interacting with the selected photo, such as sharing the image with one or more people, or deleting the photo.

[0050] Different contextual menus can be used for different objects. For example, a contextual object for a contact or representation of information about a person can have options or operations such as call the contact, send a message to the contact, delete the contact, or review/update contact details such as telephone numbers, e-mail addresses, display names, etc.

[0051] Lists of some objects can be arranged by a different order other than the time-based order used by the timeline. For example, a list of contacts can be arranged by frequency of contact; e.g., a contact for the person most-communicated-with using the HMD can be displayed first in a list of contacts, the second-most-communicated-with contact can be displayed second in the list, and so on. Other orderings are possible as well.

[0052] Groups of cards that represent share a relationship can be collected into a "bundle", or "stack" or "deck" of cards. The terms bundle of cards, stack of cards, and deck of cards are used interchangeably herein. A bundle of cards can include any cards that can be considered to be related for a certain purpose, related based on criteria and/or a related combination of criteria. For example, a collection of photos captured within a certain span of time can be represented as a photo bundle. As another example, a collection of messages (e.g. an instant messaging session, SMS/text-message exchange, or e-mail chain) can be represented as a message bundle. A bundle card can be constructed for display on the timeline that represents the bundle and, in some cases, summarizes the bundle; e.g., shows thumbnail photos of photos in a photo bundle. In some cases, data related to the card can be used to track relationship(s) used to create bundles, e.g., a location associated with a card, an indication that the card is a photo, message, or other kind of card, a name of an application that created the card, etc.

[0053] In some embodiments, cards can be classified according to activities taken upon selection. For example, upon selection of a bundle card, the bundle card can be replaced by one or more of the cards the bundle card represents. An "actionable" card can be a non-bundle card that the HMD can perform one or more actions related to the actionable card. In some example scenarios, a photo related to an actionable card can be shared, deleted, named, or stored by the HMD. In some other example scenarios, a message represented by an actionable card can be accepted, rejected, or transferred by the HMD. The user interface can generate and/or use "action" cards to represent actions that can be performed by the HMD related to the actionable card.

[0054] The HMD can also use a speech or voice-based UI that can include one or more microphones to capture audible input, such as speech from the wearer. The HMD can use speakers or a BCT to present audible output to the wearer. Upon receiving audible input, the HMD can attempt to recognize the input as a speech command and processing the command accordingly; for example, by converting the audible input to text and operating on the text. The speech input can represent commands to the HMD, such commands to search, navigate, take photos, record videos, send messages, make telephone calls, etc.

[0055] By organizing objects, applications, and operations into cards, the UI can provide a relatively simple interface to a large collection of possible data sources. Further, by enabling operation on a collection of cards arranged in a natural fashion—according to time in one example—the wearer can readily locate and then utilize cards stored by the HMD.

B. EXAMPLE WEARABLE COMPUTING DEVICES

[0056] Systems and devices in which example embodiments can be implemented will now be described in greater detail. In general, an example system can be implemented in or can take the form of a wearable computer (also referred to as a wearable computing device). In an example embodiment, a wearable computer takes the form of or includes a head-mountable device (HMD).

[0057] An example system can also be implemented in or take the form of other devices, such as a mobile phone, among other possibilities. Further, an example system can take the form of non-transitory computer readable medium, which has program instructions stored thereon that are executable by a processor to provide the functionality described herein. An example system can also take the form of a device such as a wearable computer or mobile phone, or a subsystem of such a device, which includes such a non-transitory computer readable medium having such program instructions stored thereon.

[0058] An HMD can generally be any display device that is capable of being worn on the head and places a display in front of one or both eyes of the wearer. An HMD can take various forms such as a helmet or eyeglasses. As such, references to "eyeglasses" or a "glasses-style" HMD should be understood to refer to an HMD that has a glasses-like frame so that it can be worn on the head. Further, example embodiments can be implemented by or in association with an HMD with a single display or with two displays, which can be referred to as a "monocular" HMD or a "binocular" HMD, respectively.

[0059] FIG. **1**A illustrates a wearable computing system according to an example embodiment. In FIG. **1**A, the wearable computing system takes the form of a head-mountable device (HMD) **102** (which can also be referred to as a head-mounted display). It should be understood, however, that example systems and devices can take the form of or be implemented within or in association with other types of devices, without departing from the scope of the invention. As illustrated in FIG. **1**A, the HMD **102** includes frame elements including lens-frames **104**, **106** and a center frame support **108**, lens elements **110**, **112**, and extending side-arms **114**, **116**. The center frame support **108** and the extending side-arms **114**, **116** are configured to secure the HMD **102** to a user's face via a user's nose and ears, respectively.

[0060] Each of the frame elements **104**, **106**, and **108** and the extending side-arms **114**, **116** can be formed of a solid structure of plastic and/or metal, or can be formed of a hollow structure of similar material so as to allow wiring and component interconnects to be internally routed through the HMD **102**. Other materials can be possible as well.

[0061] One or more of each of the lens elements **110**, **112** can be formed of any material that can suitably display a projected image or graphic. Each of the lens elements **110**, **112** can also be sufficiently transparent to allow a user to see through the lens element. Combining these two features of the lens elements can facilitate an augmented reality or heads-up display where the projected image or graphic is superimposed over a real-world view as perceived by the user through the lens elements.

[0062] The extending side-arms **114**, **116** can each be projections that extend away from the lens-frames **104**, **106**, respectively, and can be positioned behind a user's ears to secure the HMD **102** to the user. The extending side-arms **114**, **116** can further secure the HMD **102** to the user by extending around a rear portion of the user's head. Additionally or alternatively, for example, the HMD **102** can connect to or be affixed within a head-mounted helmet structure. Other configurations for an HMD are also possible.

[0063] The HMD **102** can also include an on-board computing system **118**, an image capture device **120**, a sensor **122**, and a finger-operable touch pad **124**. The on-board computing system **118** is shown to be positioned on the extending side-arm **114** of the HMD **102**; however, the on-board computing system **118** can be provided on other parts of the HMD **102** or can be remotely positioned from the HMD **102** (e.g., the on-board computing system **118** could be wire- or wirelessly-connected to the HMD **102**). The on-board computing system **118** can include a processor and memory, for example. The on-board computing system **118** can be configured to receive and analyze data from the image capture device **120** and the finger-operable touch pad **124** (and possibly from other sensory devices, user interfaces, or both) and generate images for output by the lens elements **110** and **112**.

[0064] The image capture device **120** can be, for example, a camera that is configured to capture still images and/or to capture video. In the illustrated configuration, image capture device **120** is positioned on the extending side-arm **114** of the HMD **102**; however, the image capture device **120** can be provided on other parts of the HMD **102**. The image capture device **120** can be configured to capture images at various resolutions or at different frame rates. Many image capture devices with a small form-factor, such as the cameras used in mobile phones or webcams, for example, can be incorporated into an example of the HMD **102**.

[0065] Further, although FIG. **1**A illustrates one image capture device **120**, more image capture devices can be used, and each can be configured to capture the same view, or to capture different views. For example, the image capture device **120** can be forward facing to capture at least a portion of the real-world view perceived by the user. This forward facing image captured by the image capture device **120** can then be used to generate an augmented reality where computer generated images appear to interact with or overlay the real-world view perceived by the user.

[0066] The sensor **122** is shown on the extending side-arm **116** of the HMD **102**; however, the sensor **122** can be positioned on other parts of the HMD **102**. For illustrative purposes, only one sensor **122** is shown. However, in an example embodiment, the HMD **102** can include multiple sensors. For example, an HMD **102** can include sensors **102** such as one or more gyroscopes, one or more accelerometers, one or more magnetometers, one or more light sensors, one or more infrared sensors, and/or one or more microphones. Other sensing devices can be included in addition or in the alternative to the sensors that are specifically identified herein.

[0067] The finger-operable touch pad **124** is shown on the extending side-arm **114** of the HMD **102**. However, the finger-operable touch pad **124** can be positioned on other parts of the HMD **102**. Also, more than one finger-operable touch pad can be present on the HMD **102**. The finger-operable touch pad **124** can be used by a user to input commands. The finger-operable touch pad **124** can sense at least one of a pressure, position and/or a movement of one or more fingers via capacitive sensing, resistance sensing, or a surface acoustic wave process, among other possibilities. The finger-operable touch pad **124** can be capable of sensing movement of one or more fingers simultaneously, in addition to sensing movement in a direction parallel or planar to the pad surface, in a direction normal to the pad surface, or both, and can also be capable of sensing a level of pressure applied to the touch pad surface. In some embodiments, the finger-operable touch pad **124** can be formed of one or more translucent or transparent insulating layers and one or more translucent or transparent conducting layers. Edges of the finger-operable touch pad **124** can be formed to have a raised, indented, or roughened surface, so as to provide tactile feedback to a user when the user's finger reaches the edge, or other area, of the finger-operable touch pad **124**. If more than one finger-operable touch pad is present, each finger-operable touch pad can be operated independently, and can provide a different function.

[0068] In a further aspect, HMD **102** can be configured to receive user input in various ways, in addition or in the alternative to user input received via finger-operable touch pad **124**. For example, on-board computing system **118** can implement a speech-to-text process and utilize a syntax that maps certain spoken commands to certain actions. In addition, HMD **102** can include one or more microphones via which a wearer's speech can be captured. Configured as such, HMD **102** can be operable to detect spoken commands and carry out various computing functions that correspond to the spoken commands.

[0069] As another example, HMD **102** can interpret certain head-movements as user input. For example, when HMD **102** is worn, HMD **102** can use one or more gyroscopes and/or one or more accelerometers to detect head movement. The HMD **102** can then interpret certain head-movements as being user input, such as nodding, or looking up, down, left, or right. An HMD **102** could also pan or scroll through graphics in a display according to movement. Other types of actions can also be mapped to head movement.

[0070] As yet another example, HMD **102** can interpret certain gestures (e.g., by a wearer's hand or hands) as user input. For example, HMD **102** can capture hand movements by analyzing image data from image capture device **120**, and initiate actions that are defined as corresponding to certain hand movements.

[0071] As a further example, HMD **102** can interpret eye movement as user input. In particular, HMD **102** can include one or more inward-facing image capture devices and/or one or more other inward-facing sensors (not shown) that can be used to track eye movements and/or determine the direction of a wearer's gaze. As such, certain eye movements can be mapped to certain actions. For example, certain actions can be defined as corresponding to movement of the eye in a certain direction, a blink, and/or a wink, among other possibilities.

[0072] HMD **102** also includes a speaker **125** for generating audio output. In one example, the speaker could be in the form of a bone conduction speaker, also referred to as a bone conduction transducer (BCT). Speaker **125** can be, for example, a vibration transducer or an electroacoustic transducer that produces sound in response to an electrical audio signal input. The frame of HMD **102** can be designed such that when a user wears HMD **102**, the speaker **125** contacts the wearer. Alternatively, speaker **125** can be embedded within the frame of HMD **102** and positioned such that, when the HMD **102** is worn, speaker **125** vibrates a portion of the frame that contacts the wearer. In either case, HMD **102** can be configured to send an audio signal to speaker **125**, so that vibration of the speaker can be directly or indirectly transferred to the bone structure of the wearer. When the vibrations travel through the bone structure to the bones in the middle ear of the wearer, the wearer can interpret the vibrations provided by BCT **125** as sounds.

[0073] Various types of bone-conduction transducers (BCTs) can be implemented, depending upon the particular implementation. Generally, any component that is arranged to vibrate the HMD **102** can be incorporated as a vibration transducer. Yet further it should be understood that an HMD **102** can include a single speaker **125** or multiple speakers. In addition, the location(s) of speaker(s) on the HMD can vary, depending upon the implementation. For example, a speaker can be located proximate to a wearer's temple (as shown), behind the wearer's ear, proximate to the wearer's nose, and/or at any other location where the speaker **125** can vibrate the wearer's bone structure.

[0074] FIG. **1**B illustrates an alternate view of the wearable computing device illustrated in FIG. **1**A. As shown in FIG. **1**B, the lens elements **110**, **112** can act as display elements. The HMD **102** can include a first projector **128** coupled to an inside surface of the extending side-arm **116** and configured to project a display **130** onto an inside surface of the lens element **112**. Additionally or alternatively, a second projector **132** can be coupled to an inside surface of the extending side-arm **114** and configured to project a display **134** onto an inside surface of the lens element **110**.

[0075] The lens elements **110**, **112** can act as a combiner in a light projection system and can include a coating that reflects the light projected onto them from the projectors **128**, **132**. In some embodiments, a reflective coating may not be used (e.g., when the projectors **128**, **132** are scanning laser devices).

[0076] In alternative embodiments, other types of display elements can also be used. For example, the lens elements **110**, **112** themselves can include: a transparent or semi-transparent matrix display, such as an electroluminescent display or a liquid crystal display, one or more waveguides for delivering an image to the user's eyes, or other optical elements capable of delivering an in focus near-to-eye image to the user. A corresponding display driver can be disposed within the frame elements **104**, **106** for driving such a matrix display. Alternatively or additionally, a laser or LED source and scanning system could be used to draw a raster display directly onto the retina of one or more of the user's eyes. Other possibilities exist as well.

[0077] FIG. **1**C illustrates another wearable computing system according to an example embodiment, which takes the form of an HMD **152**. The HMD **152** can include frame elements and side-arms such as those described with respect to FIGS. **1**A and **1**B. The HMD **152** can additionally include an on-board computing system **154** and an image capture device **156**, such as those described with respect to FIGS. **1**A and **1**B. The image capture device **156** is shown mounted on a frame of the HMD **152**. However, the image capture device **156** can be mounted at other positions as well.

[0078] As shown in FIG. **1**C, the HMD **152** can include a single display **158** which can be coupled to the device. The display **158** can be formed on one of the lens elements of the HMD **152**, such as a lens element described with respect to FIGS. **1**A and **1**B, and can be configured to overlay computer-generated graphics in the user's view of the physical world. The display **158** is shown to be provided in a center of a lens of the HMD **152**, however, the display **158** can be provided in other positions, such as for example towards either the upper or lower portions of the wearer's field of view. The display **158** is controllable via the computing system **154** that is coupled to the display **158** via an optical waveguide **160**.

[0079] FIG. **1**D illustrates another wearable computing system according to an example embodiment, which takes the form of a monocular HMD **172**. The HMD **172** can include side-arms **173**, a center frame support **174**, and a bridge portion with nosepiece **175**. In the example shown in FIG. **1**D, the center frame support **174** connects the side-arms **173**. The HMD **172** does not include lens-frames containing lens elements. The HMD **172** can additionally include a component housing **176**, which can include an on-board computing system (not shown), an image capture device **178**, and a button **179** for operating the image capture device **178** (and/or usable for other purposes). Component housing **176** can also include other electrical components and/or can be electrically connected to electrical components at other locations within or on the HMD. HMD **172** also includes a BCT **186**.

[0080] The HMD **172** can include a single display **180**, which can be coupled to one of the side-arms **173** via the component housing **176**. In an example embodiment, the display **180** can be a see-through display, which is made of glass and/or another transparent or translucent material, such that the wearer can see their environment through the display **180**. Further, the component housing **176** can include the light sources (not shown) for the display **180** and/or optical elements (not shown) to direct light from the light sources to the display **180**. As such, display **180** can include optical features that direct light that is generated by such light sources towards the wearer's eye, when HMD **172** is being worn.

[0081] In a further aspect, HMD **172** can include a sliding feature **184**, which can be used to adjust the length of the side-arms **173**. Thus, sliding feature **184** can be used to adjust the fit of HMD **172**. Further, an HMD can include other features that allow a wearer to adjust the fit of the HMD, without departing from the scope of the invention.

[0082] FIGS. **1**E to **1**G are simplified illustrations of the HMD **172** shown in FIG. **1**D, being worn by a wearer **190**. As shown in FIG. **1**F, when HMD **172** is worn, BCT **186** is arranged such that when HMD **172** is worn, BCT **186** is located behind the wearer's ear. As such, BCT **186** is not visible from the perspective shown in FIG. **1**E.

[0083] In the illustrated example, the display **180** can be arranged such that when HMD **172** is worn, display **180** is positioned in front of or proximate to a user's eye when the HMD **172** is worn by a user. For example, display **180** can be positioned below the center frame support and above the center of the wearer's eye, as shown in FIG. **1**E. Further, in the illustrated configuration, display **180** can be offset from the center of the wearer's eye (e.g., so that the center of display **180** is positioned to the right and above of the center of the wearer's eye, from the wearer's perspective).

[0084] Configured as shown in FIGS. **1**E to **1**G, display **180** can be located in the periphery of the field of view of the wearer **190**, when HMD **172** is worn. Thus, as shown by FIG. **1**F, when the wearer **190** looks forward, the wearer **190** can see the display **180** with their peripheral vision. As a result, display **180** can be outside the central portion of the wearer's field of view when their eye is facing forward, as it commonly is for many day-to-day activities. Such positioning can facilitate unobstructed eye-to-eye conversations with others, as well as generally providing unobstructed viewing and perception of the world within the central portion of the wearer's field of view. Further, when the display **180** is located as shown, the wearer **190** can view the display **180** by, e.g., looking up with their eyes only (possibly without moving their head). This is illustrated as shown in FIG. **1**G, where the wearer has moved their eyes to look up and align their line of sight with display **180**. A wearer might also use the display by tilting their head down and aligning their eye with the display **180**.

[0085] FIG. **2**A illustrates a schematic drawing of a computing device **210** according to an example embodiment. In an example embodiment, device **210** communicates using a communication link **220** (e.g., a wired or wireless connection) to a remote device **230**. The device **210** can be any type of device that can receive data and display information corresponding to or associated with the data. For example, the device **210** can be a heads-up display system, such as the head-mounted devices **102**, **152**, or **172** described with reference to FIGS. **1**A to **1**G.

[0086] Thus, the device **210** can include a display system **212** comprising a processor **214** and a display **216**. The display **210** can be, for example, an optical see-through display, an optical see-around display, or a video see-through display. The processor **214** can receive data from the remote device **230**, and configure the data for display on the display **216**. The processor **214** can be any type of processor, such as a microprocessor or a digital signal processor, for example.

[0087] The device **210** can further include on-board data storage, such as memory **218** coupled to the processor **214**. The memory **218** can store software that can be accessed and executed by the processor **214**, for example.

[0088] The remote device **230** can be any type of computing device or transmitter including a laptop computer, a mobile telephone, or tablet computing device, etc., that is

configured to transmit data to the device **210**. The remote device **230** and the device **210** can contain hardware to enable the communication link **220**, such as processors, transmitters, receivers, antennas, etc.

[0089] Further, remote device **230** can take the form of or be implemented in a computing system that is in communication with and configured to perform functions on behalf of client device, such as computing device **210**. Such a remote device **230** can receive data from another computing device **210** (e.g., an HMD **102**, **152**, or **172** or a mobile phone), perform certain processing functions on behalf of the device **210**, and then send the resulting data back to device **210**. This functionality can be referred to as "cloud" computing.

[0090] In FIG. **2**A, the communication link **220** is illustrated as a wireless connection; however, wired connections can also be used. For example, the communication link **220** can be a wired serial bus such as a universal serial bus or a parallel bus. A wired connection can be a proprietary connection as well. The communication link **220** can also be a wireless connection using, e.g., Bluetooth® radio technology, communication protocols described in IEEE 802.11 (including any IEEE 802.11 revisions), Cellular technology (such as GSM, CDMA, UMTS, EV-DO, WiMAX, or LTE), or Zigbee® technology, among other possibilities. The remote device **230** can be accessible via the Internet and can include a computing cluster associated with a particular web service (e.g., social-networking, photo sharing, address book, etc.).

C. EXAMPLE IMAGE PROJECTION

[0091] FIG. **2**B shows an example projection of UI elements described herein via an image **280** by an example head-mountable device (HMD) **252**, according to an example embodiment. Other configurations of an HMD can also be used to present the UI described herein via image **280**. FIG. **2**B shows wearer **254** of HMD **252** looking at an eye of person **256**. As such, wearer **254**'s gaze, or direction of viewing, is along gaze vector **260**. A horizontal plane, such as horizontal gaze plane **264** can then be used to divide space into three portions: space above horizontal gaze plane **264**, space in horizontal gaze plane **264**, and space below horizontal gaze plane **264**. In the context of projection plane **276**, horizontal gaze plane **260** appears as a line that divides projection plane into a subplane above the line of horizontal gaze plane **260**, a subplane below the line of horizontal gaze plane **260**, and the line where horizontal gaze plane **260** intersects projection plane **276**. In FIG. **2**B, horizontal gaze plane **264** is shown using dotted lines.

[0092] Additionally, a dividing plane, indicated using dividing line **274** can be drawn to separate space into three other portions: space to the left of the dividing plane, space on the dividing plane, and space to right of the dividing plane. In the context of projection plane **276**, the dividing plane intersects projection plane **276** at dividing line **274**. Thus, the dividing plane divides projection plane into: a subplane to the left of dividing line **274**, a subplane to the right of dividing line **274**, and dividing line **274**. In FIG. **2**B, dividing line **274** is shown as a solid line.

[0093] Humans, such wearer **254**, when gazing in a gaze direction, can have limits on what objects can be seen above and below the gaze direction. FIG. **2**B shows the upper visual plane **270** as the uppermost plane that wearer **254** can see while gazing along gaze vector **260**, and shows lower visual plane **272** as the lowermost plane that wearer **254** can see while gazing along gaze vector **260**. In FIG. **2**B, upper visual plane **270** and lower visual plane **272** are shown using dashed lines.

[0094] The HMD can project an image for view by wearer **254** at some apparent distance **262** along display line **282**, which is shown as a dotted and dashed line in FIG. **2**B. For example, apparent distance **262** can be 1 meter, four feet, infinity, or some other distance. That is, HMD **252** can generate a display, such as image **280**, which appears to be at the apparent distance **262** from the eye of wearer **254** and in projection plane **276**. In this example, image **280** is shown between horizontal gaze plane **264** and upper visual plane **270**; that is image **280** is projected above gaze vector **260**. In this example, image **280** is also projected to the right of dividing line **274**. As image **280** is projected above and to the right of gaze vector **260**, wearer **254** can look at person **256** without image **280** obscuring their general view. In one example, the display element of the HMD **252** is translucent when not active (i.e. when image **280** is not being displayed), and so the wearer **254** can perceive objects in the real world along the vector of display line **282**.

[0095] Other example locations for displaying image **280** can be used to permit wearer **254** to look along gaze vector **260** without obscuring the view of objects along the gaze vector. For example, in some embodiments, image **280** can be projected above horizontal gaze plane **264** near and/or just above upper visual plane **270** to keep image **280** from obscuring most of wearer **254**'s view. Then, when wearer **254** wants to view image **280**, wearer **254** can move their eyes such that their gaze is directly toward image **280**.

D. AN EXAMPLE USER INTERFACE FOR AN HMD

[0096] FIGS. **3** through **15** collectively describe aspects of an example user interface for an HMD such as discussed above at least in the context of FIGS. **1**A through **2**. The HMD can be configured with a user interface (UI) controller receiving inputs from at least two user interfaces: a touch-based UI and a voice-based UI. The touch-based UI can include a touch pad and a button, configured to receive various touches, such as one-finger swipes in various directions, two-finger or multi-finger swipes in various directions, taps, button presses of various durations, and button releases.

[0097] Once a touch is received, the touch-based UI can report the touch; e.g., a "swipe forward" or "tap" to the HMD, or in some cases, to a component of the HMD such as a UI controller. In other embodiments, the HMD can act as the UI controller. As described herein, the HMD includes any necessary components, such as but not limited to one or more UI controllers, which are configured to perform and control the UI operations described herein.

[0098] The voice-based UI can include a microphone configured to receive various words, including commands, and to report the received words; e.g., "Call Mom", to the HMD. In some embodiments, the HMD can include a gaze-based UI that is configured to detect duration and/or direction of one or more gazes of a wearer of the HMD. For example, the gaze-based UI can be configured to detect "dwell time" or how long the wearer gazes in a fixed direction, the direction of the gaze, a rate of change of the gaze, and additional information related to wearer gazes. In some cases, the HMD can generate audible outputs; e.g., tones, words, songs, etc., that can be heard by the wearer via headphones, speakers, or bone conduction devices of the HMD.

[0099] The HMD can generate "cards", also referred to as screens or images, which are capable of occupying the full display of the HMD when selected. One card is a home card that is the first card displayed when UI is activated, for example shortly after HMD powers up or when the HMD wakes from a sleep or power-saving mode. FIG. **3** shows an example home card **300** of an example user interface, according to an example embodiment. Home card **300** includes application status indicators **310**, device status indicators **312**, hint **316** and a clock shown in large numerals indicating the current time in the center of home card **300**. Application status indicators **310** can indicate which application(s) are operating on the HMD. As shown in FIG. **3**, application status indicators **310** include camera and Y-shaped road icons to respectively indicate operation of a camera application and a navigation application. Such indicators can remind the wearer what applications or processes are presently running and/or consuming power and/or processor resources of the HMD.

[0100] Device status indicators **312** can indicate which device(s) are operating on the HMD and HMD status. As shown in FIG. **3**, device status indicators **312** include icons for a wireless network and a Bluetooth network, respectively, that indicate the HMD is presently configured for communication via a wireless network and/or a Bluetooth network. In one embodiment, the HMD may not present device status indicators **312** on home card **300**.

[0101] Hint **314** is shown in FIG. **3** as "ok glass". Hint **314** is shown in quotes to indicate that the hint is related to the voice-based UI of the HMD. In some embodiments, hint **314** can be related to the touch-based UI of the HMD. The words in hint **314** illustrated as "ok glass" indicate that a wearer should say the words "ok glass" to activate the voice-based UI of the HMD. In other words, "ok glass" in this instance is a word (that can also be referred to as "a hotword") that triggers activation of a voice-based UI. Other hotwords can also be used.

[0102] As also indicated in the lower portion of FIG. **3**, if hint **314** is used successfully a number, e.g., 5, of times, the HMD can remove hint **314** from being displayed on home card **110**. However, if the HMD has a gaze-based UI and detects that a dwell time of the wearer on the home card exceeds a threshold, such as a 30-second threshold, the HMD can add hint **314** back to home card **110** to remind the wearer about specific words, e.g., ok glass, used to activate the voice-based UI. In one embodiment, the hotword presented as hint **314** on home card **300** can be updated to make the user aware of other functionality of the HMD, or to suggest queries or actions based on the HMD's current geographic location or situational context.

[0103] The UI can accept as inputs certain operations performed using the touch-based UI. The UI can receive these operations and responsively perform actions to enable the wearer to interact with the HMD. These operations can be organized into tiers. FIG. **4** lists example operations of a multi-tiered user model **400** for a user interface for a head-mountable device (HMD), according to an example embodiment.

[0104] As shown in FIG. **4**, multi-tiered user model **400** has three tiers: basic, intermediate, and advanced. The basic tier provides the smallest number of operations of any tier of multi-tiered user model **400**. The intermediate tier includes all operations provided by the basic tier, along with additional operations not provided by the basic tier. Similarly, the advanced tier includes all operations provided by the basic and intermediate tiers, along with additional operations not provided by either the basic tier or intermediate tier.

[0105] FIG. **4** shows that the basic tier of multi-tiered user model **400** provides tap, swipe forward, swipe backward, voice, and camera button press operations. A tap operation can involve a single physical tap—that is, one quick, slight strike with one or more fingers on the touch pad of the touch-based UI. A swipe forward operation, sometimes termed a swipe right, can involve a movement forward by one or more fingers touching the touch pad, where forward is the general direction from the wearer's ear toward the wearer's eye when the wearer has the HMD on. A swipe backward operation, sometimes termed a "swipe left", can involve a movement backward by one or more fingers touching the touch pad, where backward is the general direction from the wearer's eye toward the wearer's ear when the wearer has the HMD on. A "swipe down" operation can involve a downward movement by one or more fingers touching the touch pad, where downward is the general direction from the top of the wearer's head toward the wearer's neck when the wearer has the HMD on.

[0106] While example embodiments in this description make reference to particular directions of touchpad input such as up, down, left, right, it should be understood that these are exemplary and that embodiments where certain operations can be triggered via different input directions are contemplated.

[0107] In one embodiment, the physical actions used by the wearer to perform some or all of the herein-described operations can be customized; e.g., by the wearer and/or other entity associated with the HMD. For example, suppose the wearer prefers to perform a physical action of a "double-tap"—that is, one physical tap quickly followed by a second physical tap—rather than the above-mentioned single physical tap, to perform a tap operation. In this embodiment, the wearer and/or other entity could configure the HMD to recognize a double-tap as a tap operation, such as by training or setting the HMD to associate the double-tap with the tap operation. As another example, suppose that the wearer would like to interchange the physical operations to perform swipe forward and backward operations; e.g., the swipe forward operation would be performed using a physical action described above as a swipe left and the swipe backward operation would be performed using a physical action described above as a swipe right. In this embodiment, the wearer could configure the HMD to recognize a physical swipe left as a swipe forward operation and physical swipe right as a swipe backward operation. Other customizations are possible as well; e.g., using a sequence of swipes to carry out the tap operation.

[0108] The tap operation can select a currently visible card. The swipe forward operation can remove the currently visible card from display and select a next card for display. The swipe backward operation can remove the currently visible card from display and select a previous card for display.

[0109] The swipe down operation can, depending on context, act to go back, go home, or sleep. Going back can remove the currently visible card from display and display a previously-visible card for display. For example, the previously-visible card can be the card that most recently viewed; e.g. if card A is currently visible and card B is previously-viewed card, then the swipe down operation can remove card A from visibility and display card B. Going home can replace the

currently visible card from display and display the home card. Sleeping can cause part of the HMD, e.g., the display, or all of the HMD to be deactivated.

[0110] A voice operation can provide access to a voice menu of operations. Voice interactions with the UI are discussed below in more detail in the context of FIG. **15**. A camera button press can instruct the HMD to take a photo using a camera associated with and/or part of the HMD.

[0111] FIG. **4** shows that the intermediate tier of multi-tiered user model **400** provides tap, swipe forward, swipe backward, voice, and camera button press operations as described above in the context of the basic tier. Also, the intermediate tier provides camera button long press, two finger swipe forward, two finger swipe backward, and two finger swipe down operations.

[0112] The camera button long press operation can instruct the HMD to provide a capture menu for display and use. The capture menu can provide one or more operations for using the camera associated with HMD. The capture menu is discussed below in more detail in the context of FIG. **7**.

[0113] The two finger swipe forward operation removes the currently visible card from display and selects a next card for display using a "zoomed scroll". The two finger swipe forward operation removes the currently visible card from display and selects the next card for display using a zoomed scroll. Zoomed scrolls are discussed in more detail in the context of at least FIG. **6**A. The two finger swipe down causes the HMD to sleep at this position in a timeline.

[0114] FIG. **4** shows that the advanced tier of multi-tiered user model **400** provides tap, swipe forward, swipe backward, voice, and camera button press operations as described above in the context of the basic tier, as well as camera button long press, two finger swipe forward, two finger swipe backward, and two finger swipe down operations described above in the context of the intermediate tier. The advanced tier also provides one-finger press-and-hold, two-finger press-and-hold, and nudge operations.

[0115] The one-finger press-and-hold operation zooms, or expands, the display of the current card, or content related to the current card, starting when the wearer presses on the touch-based UI and continues to zoom as long as the wearer "holds" or keeps pressing on the touch-based UI.

[0116] The two-finger press-and-hold can provide a "clutch" operation, which can be performed by pressing on the touch-based UI in two separate spots using two fingers and holding the fingers in their respective positions on the touch-based UI. After the fingers are held in position on the touch-based UI, the clutch operation is engaged. In some embodiments, the HMD recognizes the clutch operation only after the fingers are held for at least a threshold period of time; e.g., one second. The clutch operation will stay engaged as long as the two fingers remain on the touch based UI. Clutch operations are discussed in more detail below in the context of at least FIGS. **6**B and **6**C.

[0117] The nudge operation can be performed using a short, slight nod of the wearer's head. For example, the HMD can be configured with accelerometers or other motion detectors that can detect the nudge and provide an indication of the nudge to the HMD. Upon receiving indication of a nudge, the HMD can toggle an activation state of the HMD. That is, if the HMD is active (e.g., displaying a card on the activated display) before the nudge, the HMD can deactivate itself (e.g., turn off the display) in response. Alternatively, if the HMD is inactive before the nudge but is active enough to detect nudges; e.g., within two or a few seconds of notification of message arrival, the HMD can activate itself in response.

[0118] By way of further example, in one scenario, the HMD is powered on with the display inactive. In response to the HMD receiving a new text message, an audible chime can be emitted by the HMD. Then, if the wearer nudges within a few seconds of the chime, the HMD can activate and present a card with the content of the text message. If, from the activated state, the user nudges again, the display will deactivate. Thus, in this example, the user can interact with the device in a completely hands-free manner.

[0119] As mentioned above, the UI maintains a timeline or ordered sequence of cards that can be operated on using the operations described in FIG. **4** immediately above. FIG. **5**A shows a scenario **500** of example timeline interactions, according to an example embodiment.

[0120] Scenario **500** begins with home card **502** being displayed by an HMD worn by a wearer. Home card **502** and cards **520***a*-**520***c* can be arranged as a "timeline" or ordered sequence of cards. In the example shown in FIG. **5**A, each card in timeline **510** has a specific time associated with the card. The timeline can be ordered based on the specific time associated with each card. In some cases, the specific time can be "now" or the current time. For example, home card **502** can be associated with the specific time of now. In other cases, the time can be a time associated with an event leading to the card. For example, FIG. **5**A shows that card **520***a* represents a photo taken at a time 2 hours ago. Then, card **520***a* can be associated with the specific time of 1:28, which is 2 hours before the current time of 3:28 shown on home card **500**.

[0121] Cards **520***b*-**520***f* represent current cards, or cards associated with the specific time of now, or upcoming cards, or cards associated with a future time. For example, card **520***b* is a current card that includes an image currently generated by a camera associated with the HMD, card **520***c* is a current card that includes an image of a "hangout" or video conference call currently in-progress generated by an application of the HMD, card **520***d* is a current card that includes an image and text currently generated by a navigation application/process presently running on the HMD, card **520***e* is a current card that includes images and text currently generated by a weather application of the HMD, and **520***f* is an upcoming card that includes images and text generated by a calendar application of the HMD indicating an appointment for "Lunch with Monica Kim" in "2 hours".

[0122] In scenario **500**, the HMD can enable navigation of the time line using swipe operations. For example, starting at home card **502**, a swipe backward operation can cause the HMD to select and display a previous card, such as card **520***a*, and a swipe forward operation can cause the HMD to select and display a next card, such as card **520***b*. Upon displaying card **520***b*, the swipe forward operation can cause the HMD to select and display the previous card, which is home card **502**, and the swipe backward operation can cause the HMD to select and display the next card, which is card **520***c*.

[0123] In scenario **500**, there are no cards in timeline **510** that are previous to card **520***a*. In one embodiment, the timeline is represented as a circular timeline. For example, in response to a swipe backward operation on card **520***a* requesting a previous card for display, the HMD can select **520***f* for (re)display, as there are no cards in timeline **510** that are after card **520***f* during scenario **500**. Similarly, in response to a swipe forward operation on card **520***f* requesting a next card

for display, the HMD can select **520***a* for (re)display, as there are no cards in timeline **510** that are after card **520***f* during scenario **500**.

[0124] In another embodiment, instead of a circular representation of the timeline, when the user navigates to the end of the timeline, a notification is generated to indicate to the user that there are no additional cards to navigate to in the instructed direction. Examples of such notifications could include any of or a combination of the following: a visual effect, an audible effect, a glowing effect on the edge of the card, a three dimensional animation twisting the edge of the card, a sound (e.g. a click), a textual or audible message indicating that the end of the timeline has been reached (e.g. "there are no cards older than this"). Alternatively, in one embodiment, an attempt by the user to navigate past a card in a direction where there are no additional cards could result in no effect, i.e. swiping right on card **520***a* results in no perceptible change to the display or card **520***a*.

[0125] While displaying home card **502**, a wearer of the HMD can recite or utter a hotword, for example the words "ok glass" to activate the voice-based interface of the HMD. In response, the HMD can display card **530** that lists some of the commands that can be uttered by the wearer to interact with the voice-based interface. FIG. **5**A shows example commands as "Google" to perform a search query, "navigate to" to find directions to a location, "take a photo" to capture an image using a camera associated with the HMD, "record a video" to capture a sequence of images and/or associated sounds, using a camera and/or a microphone associated with the HMD, and "send a message" to generate and send an e-mail, SMS message, instant message, or some other type of message.

[0126] While displaying card **530**, the wearer can utter something in response, which can lead to voice interactions with the UI, such as those discussed below with respect to FIG. **15**. The commands capable of triggering voice interactions are not necessarily limited to those presented on card **530** at the time the utterance is received. For example, as the user dwells on card **530**, additional commands can be presented for other features. Further, such commands presented on card **530** can change over time through further use of the HMD, or can be remotely updated to surface additional features or content of the HMD. Still further, similar to the frequent contact aspects described herein, commands for frequently used functions of the HMD can be presented on card **530**. As such, these commands can change over time based on use of the HMD by the wearer.

[0127] In some examples, timelines can become lengthy. The UI provides operations for speedy use of the UI, such as two-fingered swipes and clutches, although other gestures to invoke such navigation operations are possible. FIG. **6**A shows an example of using a two-fingered swipe on a touch-based UI of an HMD for zoomed scrolling, according to an example embodiment.

[0128] FIG. **5**B shows scenario **540** of example timeline interactions including splicing a new card into timeline **550**, according to an example embodiment. Scenario **540** begins with a wearer of an HMD using the HMD to observe timeline **550**, focusing in on card **550***b*, which is the home card for timeline **550**. FIG. **5**B shows the focused-on card, card **550***b*, of timeline **550** using a dotted-line border. At this point of scenario **540**, card **550***b* is displayed by the HMD using a single-card view.

[0129] Scenario **540** continues by the HMD receiving an incoming telephone call from a contact, Kelly Young. For example, the HMD can be configured with one or more transceivers configured to establish, maintain, and tear down communication links, such as communication link **220** discussed above in the context of FIG. **2**A, that utilize one of a number of cellular and/or other technologies to originate and terminate wireless telephone calls.

[0130] Upon receiving the phone call, the HMD can generate, retrieve, and/or determine card **560** representing the calling party, Kelly Young, of the telephone call. Once available, the HMD can display card **560** using a single-card view.

[0131] In scenario **540**, the wearer of the HMD would like to answer the call from Kelly Young. To accomplish this, the wearer can perform a tap operation to bring up a contextual menu suitable for the context of a telephone call. This contextual menu can have options such as, but not limited to, answering the telephone call, routing/forwarding the telephone call to another number (e.g., another phone, voice mail), ignoring/rejecting the telephone call, putting the calling party on hold, bridging the calling party into a three-way or multi-way call, bridging the calling party into a video conference call, such as a hangout, and saving contact information related to the telephone call.

[0132] In scenario **540**, the first option of the contextual menu for the telephone call is an answer option. The options of the contextual menu can be displayed as an overlay on top of card **560** representing the telephone call. In some embodiments, such as shown in FIG. **5**B, card **570** can be generated by (a) displaying text and/or graphics related to the contextual menu item overlaying (b) a dimmed version of card **560**. Card **570** can then be focused on and displayed using a single-card view.

[0133] The wearer can answer the call by performing a tap operation while the answer option is active; e.g., while card **570** is focused on. In response, the HMD can generate display **580** by determining where in the timeline a new card representing the telephone call would be displayed. As the telephone call is a current and most recent event for the HMD, a card representing the telephone call; e.g. card **560**, would be adjacent to and on the future/now side of a timeline. That is, for timeline **550** shown at the top of FIG. **5**B, card **560** would be "spliced into", or inserted or placed into the middle of, timeline **550** between home card **550***b* and card **550***c*.

[0134] The HMD can be configured to animate this splicing operation by showing room being made for the to-be-spliced-in card in the timeline and then showing the to-be-spliced-in card placed into the timeline. Once spliced in, the HMD can show the spliced card in single-card view as the focused-on card. For example, in response to the tap operation performed while card **570** is displayed, the HMD can switch to a zoomed-out, or multi-card, display of the timeline as shown in display **580** showing part or all of cards **550***a*-**550***d* of timeline **550**. Then, the HMD can show the cards on each side of the to-be-spliced-in card; e.g., cards **550***b* and **550***c*, moving away from the center of the zoomed-out display as indicated in display **580**.

[0135] Then, once cards on each side of the to-be-spliced-in card have each moved far enough away from the center of the display to permit insertion of a new card, the to-be-spliced-in card can be shown in the display between the cards on each side. Display **582** shows a stage of this insertion animation after cards **550***b* and **550***c* have moved far enough apart to permit splicing in card **560**—the to-be-spliced-in card.

[0136] Timeline **550** at the bottom of FIG. **5**B shows the result of the splicing operation. Card **560** (the formed to-be-spliced-in card) in shown between cards **550***b* and **550***c* in timeline **550**, and is indicated as being focused on by the HMD. As card **560** is focused in by the HMD, card **560** can be shown in single-card mode.

[0137] Scenario **540** can conclude with the HMD answering the telephone call before, during, or after the animation of the splicing operation, and the telephone call between Kelly Young and the wearer entering the talking state.

[0138] The splicing operation can be performed in reverse when a card is to be removed from a timeline; that is, a "reverse splice" can be performed. For example, after the call with Kelly Young is completed, card **560** could be removed from the timeline **500**. In an embodiment, an animation that is substantially in the reverse of the splicing process described above is used in conjunction with removing card **560** from the timeline **550**.

[0139] FIG. **5**C shows scenario **584** using a multi-timeline display, according to an example embodiment. Scenario **584** begins with a wearer of an HMD using View A, shown at the top of FIG. **5**C, that can be generated by the HMD to observe home card **588***a* displayed in single-card view **586**. In scenario **584**, a wearer of an HMD can switch from single-card view **586** into a multi-timeline view using a clutch operation, as discussed in detail below in the context of FIG. **6**D. In other scenarios, a different operation or operations than a clutch can be performed to switch into the multi-timeline view.

[0140] In scenario **584**, multiple cards of main timeline **588** can be displayed simultaneously upon entering the multi-timeline view. View B of FIG. **5**C, shown just below View A, illustrates a multi-timeline view and shows three cards **588***a*, **588***b*, and **588***c* of main timeline **588** in a linear arrangement. Card **588***a* is a home card for main timeline **588**, card **588***b* is a card representing an "Email" from "LunchPal" that arrived "5 min ago", and card **588***c* is a bundle card that shows a number of thumbnail images related to a bundle of contacts called "Friends".

[0141] In scenario **584**, card **588***a* was shown in while in single-user view **586** and in an initial multi-timeline view. In some scenarios, the initial multi-timeline view can be centered on the card shown in a previous single-card view; e.g., home card **588***a*. In other scenarios, multiple timelines can be displayed as part of the initial multi-timeline view; for example, main timeline **588** can be accompanied by a one or more timelines showing card representing one or more contacts, photos, previous events, future events, and/or other cards.

[0142] In scenario **584**, the wearer of the HMD can select a card for use by controlling a selection region; e.g., focus **688***a* shown in FIG. **6**D. A given card, such as card **588***b*, can be selected when the selection region is aligned with the given card. In this context, the selection region can be aligned with a given card in a display when the selection region is placed over the given card in the display, the selection region substantially overlaps the given card in the display, and/or a UI action (e.g., a tap of a touchpad, a click of a mouse, a key press) is performed when the selection region overlaps the given card in the display. Other techniques for aligning a selection region and a given card are possible as well. In some embodiments, the selection region substantially overlaps the given card when at least 50% of the selection region overlaps the given card in the display. In some embodiments, the HMD can be configured to detect head movements and the selection region can be moved using the head movements.

[0143] In scenario **584**, the wearer of the HMD selects card **588***b* and, after the selection of card **588***b*, View C can be generated, which is shown below and to the left of View B in FIG. **5**C. View C shows card **588***b* of main timeline **588** and a linear arrangement of three action cards **590***a*, **590***b*, and **590***c* shown above card **588***b*; that is, View C shows multiple linear arrangements simultaneously. As shown in View C, the linear arrangement of action cards starts with card **590***a* that is directly above selected card **588***b*, and the linear arrangement of action cards is adjacent to, above, and parallel to main timeline **588**. Card **588***a* is shown in View C as greyed out to indicate that card **588***a* is not selected.

[0144] Upon selection of action card **590***a* to "View All", the wearer can view the e-mail represented by card **588***b*. Selection of action card **590***b* to "Share" can enable the wearer to share; e.g., reply to, forward, post to a website, etc., the e-mail represented by card **588***b*. Selection of action card **590***c* to "Delete" can permit the wearer to delete the e-mail represented by card **588***b*.

[0145] In scenario **584**, the wearer selects card **590***a* to view all of the e-mail represented by card **588***b*. After selection of card **590***a*, the content of the e-mail is shown using three content cards **592***a*, **592***b*, and **592***c* shown in View D as adjacent to and above selected card **590***a*. View D is shown directly to the right of View C in FIG. **5**C.

[0146] View D also shows that the linear arrangement of contact cards begins with card **592***a*, which is shown directly above selected card **592***a*. View D does not show unselected action cards **590***b* and **590***c*; in some embodiments, unselected cards can be displayed. In particular scenarios, unselected but displayed card can be displayed in a visually distinct manner to indicate non-selection; e.g., shown with a grey background as for card **588***a* in View C.

[0147] Scenario **584** continues with the wearer of the HMD manipulating the selection region to return to the main timeline **588** and select card **588***c* as shown in View E. FIG. **5**C shows View E below and to the left of View D. As mentioned above, card **588***c* is a bundle card representing a group of related cards; in this example, a group of contact cards. Each contact card can have an indication that the card is a contact card. In some embodiments, card represented by bundle card **588***c* can have an indication that the card is in the "Friends" bundle of cards/contacts. As such, the HMD can determine cards in the "Friends" bundle by searching for each card having an indication that the card is in the "Friends" group of cards.

[0148] Upon selection of card **588***c*, the HMD can generate View F, which shows contact cards **594***a* and **594***b* of the "Friends" bundle displayed the linear arrangement with main timeline **588**. View F is shown in FIG. **5**C directly below View E. Bundle card **588***b* is shown by View F as remaining in the linear arrangement with main timeline **588**. In some scenarios, contact cards **594***a* and **594***b*, as well as additional cards in the "Friends" bundle can be shown in a linear arrangement adjacent to the linear arrangement showing a selected bundle card; e.g., card **588***c*. In other scenarios, upon selection of bundle card **588***c*, bundle card **588***c* is no longer displayed; rather, the bundle card can be considered to be replaced by the content of the bundle.

[0149] Also, the splicing operation can utilize card generated by other applications. For example, suppose a card representing a navigation application/process is displayed on a

timeline, and the wearer uses a tap operation to activate the navigation application/process to provide directions to a destination. To show the directions to the destination, the navigation application/process can generate a results card that includes one or more directions. When first generated, the results card can be spliced into the timeline, using the splicing operation described immediately above. When the wearer arrives at the destination, the results card can be removed using the reverse splice operation described above. In some scenarios, multiple cards can be spliced in and/or reverse spliced out of a timeline simultaneously or substantially as so, such as when being added to or leaving a multi-party hangout, telephone call, or other communication.

[0150] To speed movement in selecting next card(s) in the timeline, a wearer can swipe forward with two fingers, as shown in FIG. **6**A, to perform a zoomed scroll to a next card. Similarly, to speed movement in selecting previous card(s) in the timeline, a wearer can swipe backward with two fingers, as also shown in FIG. **6**, to perform a zoomed scroll to a previous card.

[0151] Upon receiving a UI operation for a zoomed scroll, for example, a two-fingered swipe forward, a reduced-size view of cards can be displayed in the resulting timeline **610**. That is, as shown in FIG. **6**A, multiple cards can be shown in example display **612** generated by the HMD. A swipe or drag operation associated with the zoomed scroll can move content faster, e.g., 4 times faster, than when performing a regular swipe or drag operation. Inertial free scrolling can be performed as part of zoomed scrolling. After the zoomed scroll completes, the focus for the UI is on card **614** of timeline **610**. FIG. **6**A shows card **614** outlined using a thick dashed line in the center of display **612**.

[0152] A timeline that has been released after the zoomed scroll can stay zoomed out, or can continue with reduced image views, until a minimum velocity threshold for the timeline is reached. After the minimum velocity threshold is reached, display **612** can be instructed to zoom to the card that is closest to the center of display **612**; e.g., display **612** can zoom to card **614**. That is, the HMD can show card **614** as large as possible within display **612**.

[0153] Additional techniques for rapid movement within a timeline and between timelines can be provided by the UI. For example, a clutch operation can lead to generation and display of a multi-card display, such as shown in FIG. **6**B, or a multi-timeline display, such as shown in FIG. **6**C. Navigation within the multi-card display and/or multi-timeline display can, in some embodiments, be performed using head movements. In other embodiments, the multi-card display or multi-timeline display in toto can be focused on, or displayed by the HMD. Thus, to aid navigation, a sub-focus can be implemented to highlight a card or a timeline within a multi-card or multi-timeline display.

[0154] FIG. **6**B shows a scenario **620** for using clutch operation **642** to generate a multi-card display **634***a*, according to an example embodiment. Scenario **620** begins with an HMD having timeline **630** with cards **630***a* through **630***g*, and with a focus on card **630***d*. During scenario **620**, prior to clutch **642**, the HMD displays cards in the timeline using a single-card view, while solely displaying a focused-upon card. As the focus is on card **630***d*, which FIG. **6** shows as a photo of a woman's face, the HMD displays a single-card view of card **630***d*.

[0155] Scenario **620** continues with a wearer of the HMD performing clutch operation **642** using the touch-based UI of the HMD. A clutch operation can involve pressing on the touch-based UI of the HMD using two fingers and holding the two-finger press until the HMD recognizes the clutch operation **642** has been performed. Other gestures, techniques, inputs or time thresholds can be used to trigger the clutch operation. For example, in certain embodiments, a three-finger gesture or a voice-action could be used to engage and/or disengage the clutch operation.

[0156] Upon recognition of clutch operation **642**, in scenario **620**, the HMD can generate and display multi-card display **634***a*, which is shown in an expanded view as multi-card display **634***b*. In some embodiments, the HMD can focus on the entire multi-card display **634***a* using focus **636**. In other embodiments, the HMD can focus a subset of cards, such as but not limited to, a single card, a row of cards, a column of cards, a block of cards, or some other selection of cards, within multi-card display **634***a* using sub-focus **638**. For example, in scenario **620**, the HMD is configured to display sub-focus **638** on a single card. In some embodiments, the sub-focus can remain on one or more cards at or near the center of the display.

[0157] As shown in FIG. **6**B using expanded multi-card display **634***b*, the multi-card display shows nine cards: cards **630***a* through **630***g* of timeline **630** and two other cards **640***a* and **640***b* not shown as part of timeline **630**. The wearer of the HMD can navigate around multi-card display **634***a*, **634***b* using head movements, such as moving the wearer's head up, down, left, and/or right. In some embodiments, gaze tracking can be used in place of or in addition to head movements for navigating around multi-card display **634***a*, **634***b* and/or multi-timeline display **664***a*, **664***b*.

[0158] In scenario **620**, "wrap-around" movements, or moving off the end of a row or column to the respective other end of the row or column, are enabled. Then, in response to respective movements upward, downward, leftward, or rightward by the head of the wearer, the sub-focus **638** can move from card **630***d*, as shown in FIG. **6**B, to respective cards **630***a*, **630***g*, **630***f*, or **630***g*. In particular embodiments, wrap-around can be inhibited, so moving the wearer's head leftward will not move sub-focus **638** from card **630***d* to card **630***f*, but rather sub-focus **638** will stay at the left-end of the middle row on card **630***d*.

[0159] In some embodiments, in response to respective movements diagonally up-and-left, up-and-right, down-and-left, and down-and-right by the head of the wearer, the sub-focus **638** can move from card **630***d*, as shown in FIG. **6**B, to respective cards **630***c*, **630***b*, **640***b*, or **640***c*. Other types of head movements and/or UI operations can be used as well or instead with multi-card display **634***a*, **634***b*, including but not limited to head movements and/or UI operations that move the focus faster than and/or slower than one card at a time, zooming in and out, reshaping sub-focus **638**, selecting card(s), and deselecting card(s).

[0160] In some embodiments, sub-focus **638** may not be used. For example, in these embodiments, a leftward head movement can move each of cards **630***b*, **630***c*, **630***e*, **630***f*, **640***a*, and **640***b* to the left by one card and bring in new cards to the "right" of these cards (new cards not shown in FIG. **6**B) on to multi-card displays **634***a* and **634***b*. The new cards can be displayed in the respective positions of card **630***c*, **630***f*, and **640***b*, and remove cards **630***a*, **630***d*, and **630***g* from multi-card display **634***a* and **634***b*. Also, a rightward head movement can move each of cards **630***a*, **630***b*, **630***d*, **630***e*, **630***g*, **640***a* to the right by one card, bring in new cards to the

"right" of these cards (not shown in FIG. **4**) on to multi-card displays **634***a* and **634***b*. The new cards can be displayed in the respective positions of card **630***a*, **630***d*, and **640***g*, and remove cards **630***c*, **630***f*, and **640***b* multi-card displays **634***a* and **634***b*.

[0161] In these embodiments, an upward head movement can: (1) bring a new row of cards considered to be "above" the top row of cards; e.g., cards in the positions of cards **630***a*, **630***b*, **630***c* of multi-card displays **634***a* and **634***b*, (2) display the new row of cards on the top row of multi-card displays **634***a* and **634***b*, (3) move the top row of cards down to be displayed as the middle row of cards; e.g. display cards **630***a*, **630***b*, and **630***c* in the positions of cards **630***d*, **630***e*, and **630***f* of multi-card displays **634***a* and **634***b*, (4) move the middle row of cards down to the bottom row of cards e.g. display cards **630***d*, **630***e*, and **630***f* in the positions of cards **630***g*, **640***a*, and **640***b* of multi-card displays **634***a* and **634***b*, thus removing the bottom row of cards; e.g., cards **630***g*, **640***a*, and **640***b*, from view on multi-card displays **634***a* and **634***b*.

[0162] In these embodiments, a downward head movement can: (1) bring a new row of cards considered to be "below" the bottom row of cards of multi-card displays **634***a* and **634***b*, (2) display the new row of cards on the bottom row of multi-card displays **634***a* and **634***b*, (3) move the bottom row of cards up to be displayed as the middle row of cards; e.g. display cards **630***g*, **640***a*, and **640***b* in the positions of cards **630***d*, **630***e*, and **630***f* of multi-card displays **634***a* and **634***b*, (4) move the middle row of cards up to the top row of cards e.g. display cards **630***d*, **630***e*, and **630***f* in the positions of cards **630***a*, **630***b*, and **630***c* of multi-card displays **634***a* and **634***b*, thus removing the top row of cards; e.g., cards **630***a*, **630***b*, and **630***c*, from view on multi-card displays **634***a* and **634***b*.

[0163] Scenario **620** continues with clutch **642** being released while sub-focus **638** is on card **630***g*. Clutch **642** can be released by the wearer removing one or both of their fingers from the touch-based UI of the HMD. After clutch **642** is released, the HMD can use a single-user view to display either (a) card **630***c*, as the card being focused on before clutch operation **642** began, or (b) card **630***g*, as the card focused on using sub-focus **638** just prior to release of clutch **642**. In response to clutch **642** being released for HMD embodiments not using sub-focus **638**, the HMD can use a single-user view to display card **630***c*.

[0164] FIG. **6**C shows a scenario **650** for using clutch operation **680** to generate a multi-timeline display **664***a*, according to an example embodiment. Scenario **650** begins with an HMD displaying main timeline **660** with a focus on card **660***a*. During scenario **650** prior to clutch **680**, the HMD displays cards in main timeline **660** using a single-card view, displaying a focused-upon card. As the focus is on card **660***a*, the HMD displays a single-card view of card **660***a*.

[0165] Scenario **650** continues with a wearer of the HMD performing clutch operation **680**. Upon recognition of clutch operation **680**, in scenario **650**, the HMD can generate and display multi-timeline display **664***a*, which is shown in an expanded view as multi-timeline display **664***b*. In some embodiments, the HMD can focus on the entire multi-timeline display **664***a* using focus **666**. In other embodiments, the HMD can focus a subset of cards and/or timelines, such as, but not limited to, a single card, one, some, or all cards on a timeline, a column of cards across one or more timelines, a block of cards across multiple timelines, a single timeline, a group of timelines, or some other selection of cards and/or timelines, within multi-card display **664***a* using sub-focus **668**.

[0166] As shown in FIG. **6**C using expanded multi-timeline display **664***b*, the multi-timeline displays five timelines (TLs): timelines **670**, **672**, **674**, **676**, and **678**. The multi-timeline display displays five cards for each of displayed timelines **670**, **672**, **674**, **676**, and **678**. The timelines can be selected for display based on a type of object displayed in a card; e.g., a timeline having only photos, only photo bundles, only messages, only message bundles, only cards representing active applications. Additional criteria can be used to further select items for a timeline; e.g., for photo objects, some criteria can be: only photos taken before (or after) a predetermined date, within a date range, at a location, as part of a photo bundle, photos that were shared, photos that were shared and with one or more messages received in response, etc. Other criteria for photo objects and/or other types of objects are possible as well for selection in a timeline. For example, in scenario **650**, all of the cards in timeline **670** represent photos in a photo bundle, all of the cards in timeline **672** represent photos taken in a given city location, and all of the cards in timeline **678** represent contacts that do not have associated photos/images.

[0167] The additional timelines presented can represent different user accounts associated with the HMD, for example, a first timeline could be cards generated by a user's work account, e.g. photos, events, contacts, email, messages, sent to or received by his/her work account, e.g. user@google.com. In this example, the HMD could be configured to allow access to multiple user accounts, such as the user's personal account, e.g. user@gmail.com; such that a second timeline accessible from the grid view could be cards generated by the user's personal account, e.g. photos, events, contacts, email, messages, sent to or received by his/her personal account. This way, the user can easily interact with the HMD via different profiles or personas, such as work or personal.

[0168] The timelines can be selected to be part or all of the main timeline; for example, FIG. **6**C shows that timeline **674** includes five cards selected from main timeline **660**. Cards can be selected from main timeline **660** randomly, based on focus **662**, based on a type of object represented on the main timeline; e.g., select only cards representing active applications visible from the main timeline, and/or based on other criteria. For example, in scenario **650**, timeline **674** includes card **660***a*, which was the focused-on card prior to clutch **680**, and the two cards on each side of card **660***a* in main timeline **660**. Other criteria for selecting cards from a main timeline are possible as well.

[0169] One or more timelines can act as contextual menu(s) for multi-timeline display **664***a*, including possible operations that can be performed from multi-timeline display **664***a*, operations on multi-timeline display **664***a*, and/or other operations. For example, timeline **678** includes a menu of operations including navigate, take a video, take a photo, remove a timeline option, and add a timeline. Other operations are possible as well. For example, if clutch is engaged from card **660***a* in main timeline **660**, the multi-timeline display **664***a* could present a contextual menu of operations that could be executed based off of the presently selected card **660***a*, e.g. share this card, delete the card, remove from timeline, add to bundle, etc.

[0170] In one embodiment, the wearer of the HMD can navigate around multi-timeline display **664***a*, **664***b* using head movements. For example, in scenario **650**, the HMD is configured to display sub-focus **668**, shown as a dotted line on both multi-timeline displays **664***a* and **664***b*, shown focusing on a single timeline; e.g., timeline **668**.

[0171] In one example of scenario **650**, "wrap-around" movements, or moving off the end of a row or column to the respective other end of the row or column, are enabled. Then, in response to respective movements upward, downward, leftward, or rightward by the head of the wearer, the sub-focus **668** can move from timeline **674**, as shown in FIG. **6**C, to respective timelines **672**, **676**, **672**, or **676**. In particular embodiments, wrap-around can be inhibited, so moving the head of the wearer leftward will not move sub-focus **668** from timeline **674** to timeline **672** and moving the head of the wearer rightward will not move sub-focus **668** from timeline **674** to timeline **676** but rather sub-focus **638** will stay on timeline **674** in response to either the leftward or the rightward movement.

[0172] In some embodiments, in response to respective movements diagonally up-and-left, up-and-right, down-and-left, and down-and-right by the head of the wearer with wrap-around enabled, the sub-focus **638** can move from timeline **674**, as shown in FIG. **6**C, to respective cards **672**, **672**, **676**, and **676**. In particular embodiments, wrap-around can be inhibited, but as each of the diagonal movements has an up or down components, movement to a respective timeline will succeed when sub-focus **668** is on timeline **674**.

[0173] In some embodiments, sub-focus **668** may not be used. For example, in these embodiments, a leftward head movement can move each of timelines **670**, **672**, **674**, **676**, **678** to the left on multi-timeline display **664***a*,**664***b* by one or more cards and a rightward head movement can move each of timelines **670**, **672**, **674**, **676**, **678** to the right on multi-timeline display **664***a*,**664***b* by one or more cards. Also in these embodiments, an upward head movement can bring a time "above" timeline **670** (not shown in FIG. **6**C) into view as a top-most timeline on multi-timeline displays **664***a* and **664***b*, move down each of timelines **670**, **672**, **674**, **676** by one time line on multi-timeline displays **664***a* and **664***b*, and remove timeline **678** from view. Further, an upward head movement can bring a time "below" timeline **678** (not shown in FIG. **6**C) into view as a bottom-most timeline on multi-timeline displays **664***a* and **664***b*, move up each of timelines **672**, **674**, **676**, **678** by one timeline on multi-timeline displays **664***a* and **664***b*, and remove timeline **670** from view.

[0174] Other types of head movements and/or UI operations can be used as well or instead with multi-timeline display **664***a*, **664***b*, including but not limited to head movements and/or UI operations that move the focus faster than and/or slower than one timeline at a time, enable navigation of cards within a timeline, which can include some or all of the navigation techniques discussed above regarding multi-card displays **634***a* and **634***b*, zooming in and out, reshaping sub-focus **668**, selecting card(s)/timeline(s), and deselecting card (s)/timeline(s).

[0175] Scenario **650** continues with clutch **680** being released while sub-focus **688** is on timeline **670**. After clutch **680** is released, the HMD can use a single-card view to display a card on selected timeline **670**.

[0176] FIG. **6**D shows scenario **682** for using head movements to navigate a multi-timeline display, according to an example embodiment. Scenario **682** begins with the HMD displaying a single-card view **684** of a contact named "George Farley" participating in a hangout, as shown at the upper-left hand corner of FIG. **6**D. A hangout can be indicated by the HMD using icon **684***a* of a camera inside of a speech balloon. Scenario **682** continues with the wearer of the HMD performing a clutch operation, or pressing two fingers on the touch-based UI of the HMD for at least one second.

[0177] After determining a clutch operation was performed, the HMD can generate multi-timeline display **686***a*, shown in the upper-right-hand corner of FIG. **6**D as a rectangle with thick lines. Multi-timeline display **686***a* is shown displaying a focus **688***a* and parts of three timelines, including timeline (TL) **690***a*. In scenario **682**, focus **688***a*, shown in FIG. **6**D as a circular arrangement of gray trapezoids, rests or focuses on card **684**. Focus **688***a* rests on card **684**, as card **684** which was the card previously being displayed in a single-card view. In one embodiment, focus **688***a* element may not be presented.

[0178] During scenario **682**, head movements can be used target items and move between levels of navigation. Each level of navigation can be represented in a multi-timeline display as one or more cards on a timeline. For example, multi-timeline display **686***a* shows that if the wearer made a leftward head movement, card **692***a* on timeline **690***a*, representing a navigation application/process would be centered on by focus **688***a*. Multi-timeline display **686***a* also shows that if the wearer made a rightward head movement, card **692***b* on timeline **690***a* representing a weather application would be centered on by focus **688***a*. Similarly, multi-timeline display **686***a* shows that if the wearer made respective upward or downward head movements, respective cards **692***c* or **692***d* would be centered on by focus **688***a*.

[0179] Scenario **682** continues with the wearer making a downward head tilt. After determining a downward head movement was performed, the HMD can move focus **688***a* downward onto card **692***d* with text of "expand". The HMD can generate multi-timeline display **686***b* with focus **688***b* on card **692***d*, as shown in the center-left portion of FIG. **6**D. Multi-timeline display **686***b* shows that card **692***d* is part of timeline **690***b*.

[0180] Timeline **690***b* represents a contextual menu for the hangout, which includes card **692***d* to expand, or show other members in the hangout, invite to request other people join the hangout, end the hangout, and mute sound from one or more persons at the hangout. Below timeline **690***b*, a card **694***a* representing an attendee of the hangout is shown, in part to represent the next level of navigation if the wearer were to decide to make another downward head motion.

[0181] Scenario **682** continues with the wearer of the HMD making another downward head motion. After determining a downward head movement was performed, the HMD can move focus **688***b* downward onto card **694***a*, which represents George Farley as a hangout attendee.

[0182] The HMD can generate multi-timeline display **686***c* with focus **688***c* on card **694***a*, as shown in the center-right portion of FIG. **6**D. Multi-timeline display **686***c* shows that card **694***a* is part of timeline **690***c*, which represents attendees of the hangout. FIG. **6**D shows that there are three other attendees at the hangout beyond the wearer: Pieter Vrijman represented by card **694***b*, George Farley represented by card **694***a*, and Richard The, who is represented by card **694***c*. Below card **694***a* is card **696***a* with text of "mute", representing a contextual menu of operations regarding attendees of

hangouts. Card **696***a* also represents the next level of navigation if the wearer were to decide to make another downward head motion.

[0183] Scenario **682** continues with the wearer of the HMD making a rightward head motion. After determining a rightward head movement was performed, the HMD can move focus **688***c* rightward onto card **694***c*, which represents Richard The. The HMD can generate multi-timeline display **686***d* with focus **688***d* on card **694***c*, as shown in the lower-left corner of FIG. **6**D. Below card **694***c* is card **696***b* with text of "mute", representing a contextual menu of operations regarding attendees of hangouts and the next level of navigation corresponding to downward head movements.

[0184] Scenario **682** continues with the wearer releasing his/her fingers from the touch-based UI of the HMD, thereby ending the clutch operation. After determining the clutch operation has completed, the HMD can revert to a single-card view as shown at the lower right hand corner of FIG. **6**D. In some embodiments, the single-card view can view the last-focused card during multi-timeline display. For example, the last focus; e.g., focus **688***d*, during multi-timeline display was on card **694***c* representing Richard The. Then, the single-card view can display last-focused card **696***c* in a single card view to end scenario **682**.

[0185] The user interface can use contextual menus to designate operations for specific objects, applications, and/or cards. FIG. **7** shows user-interface scenario **700** including contextual menus, according to an example embodiment. A contextual menu is a menu of operations or other possible selections that are based on a card. For example, if the card is a card representing a video, a contextual menu can include operations such as sharing the video, editing the video, watching the video, deleting the video, adding the video to a "video bundle" or collection of videos, annotating the video, adding, deleting and/or editing sound associated with the video, and/or other operations related to the video, including but not limited more or fewer options.

[0186] Scenario **700** begins with the HMD receiving a tap while displaying image **710**. In some embodiments, image **710** is part of a timeline. In response to the tap, the HMD can select operations for a contextual menu, such as sharing and deleting the photo, based on the displayed card; e.g., image **710**. To display the contextual menu, the HMD can then display card **720** to indicate that a share operation can be performed on image **710**. Card **720** also shows two dots to indicate that the current contextual menu has two options, with the leftmost dot being black and the rightmost dot being white to indicate that the current Share option is the first option of the two options.

[0187] To select the other option in the contextual menu, a wearer can perform a swipe operation while card **720** is displayed. In response to the swipe operation, card **722** can be displayed, where card **722** is associated with a delete operation for image. As with card **720**, card **722** shows two dots to indicate that the current contextual menu has two options, with the leftmost dot being white and the rightmost dot being black to indicate that the current Delete option is the second option of the two options. A swipe operation while displaying card **722** causes (re)display of card **720**.

[0188] If a tap operation is received while displaying card **720**, the HMD can interpret the tap operation as selection of the Share option of the contextual menu. In response, a "people chooser" can be used to select a first person for sharing.

[0189] The people chooser can display card **730**, which includes an image and a name of a first contact. FIG. **7** shows that card **730** indicates the first person as "Jane Smith". In response to viewing card **730**, the wearer can instruct the people chooser to show other possible recipients of photo **710** via swiping through a list of contacts. In scenario **700**, the list of contacts can be represented by cards that include: card **732***a* showing "Another Person", card **732***b* showing "Friends", and card **732***c* indicating other person(s), circle(s), and/or social network(s) for sharing photos. People choosers are also discussed in more detail at least in the context of FIG. **8**.

[0190] FIG. **7** shows that swiping left while card **732***c* is displayed to request a next possible recipient can lead to re-displaying card **730** associated with Jane Smith. Similarly, FIG. **7** shows that swiping right while card **730** is displayed to request a previous possible recipient can lead to card **732***c*.

[0191] In scenario **700**, the wearer taps on the touch-based UI while card **730** is displayed, indicating that the wearer wishes to share image **710** with Jane Smith. In response to this tap, card **734** is displayed, which includes the word "Sending" and a progress bar. In scenario **700**, the HMD is configured to wait for a "grace period", such as one or a few second(s), before carrying sending or deleting images, to give the wearer a brief interval to cancel sending or deleting the image.

[0192] The progress bar on card **734** can show the passing of the time of the grace period for sending image **710**. Once the grace period expires or a tap is received, the HMD can send image **710**, e.g., via e-mail or multi-media message, to Jane Smith. If image **710** is sent successfully, the HMD can display card **736** with text of "Sent" to indicate that image **710** was indeed successfully sent to Jane Smith. After displaying card **736**, the HMD can return to a timeline display, such as discussed above in the context of at least FIG. **5**A.

[0193] If image **710** is not sent successfully or was cancelled, such as by the wearer performing a swipe down operation during the grace period, the HMD can display card **738** to indicate to the wearer that the HMD was unsuccessful in sending image **710** sent to Jane Smith. After displaying card **738**, the HMD can return to a timeline display, such as discussed above in the context of at least FIG. **5**A.

[0194] If a tap operation is received while displaying card **722**, which FIG. **7** shows is the "Delete" card, the HMD can interpret the tap operation as selection of the Delete option of the contextual menu. In response to this tap, the HMD can display card **740** with text of "Deleting" and a progress bar for a grace period that has to expire before the HMD will delete image **710**. Once the grace period expires or a tap is received, the HMD can delete image **710**. Once image **710** is deleted, the HMD can display card **742** to indicate to the wearer that image **710** was indeed deleted. After displaying card **742**, the HMD can return to a timeline display, such as discussed above in the context of at least FIG. **5**A.

[0195] FIG. **7** also shows that at any time while displaying cards **720**, **722**, **730**, **732***a*-**732***c*, **734**, **736**, **740**, and **742**, a swipe down operation can be performed. In response, the HMD can stop the current operation; e.g., send or delete, and return to displaying image **710**.

[0196] The UI can utilize "people choosers" or software configured to help a wearer find a person from among the wearer's contacts, such as when the wearer wants to contact that the person. FIG. **8** shows a user-interface scenario **800** including a people chooser, according to an example embodiment. In scenario **800**, two techniques are shown for invoking

the people chooser. While card **810** is displayed, a wearer of an HMD can use a voice interface that requests that the wearer "Speak a name from your contacts." Also or instead, at **812**, the HMD can be in a contextual menu with a "Share" option that is selected.

[0197] After either card **810** or **812** is displayed, the people chooser is invoked to permit selection of a person or "contact" as a destination for sharing, being called, looked up in a contact directory, or some other activity. The people chooser sorts contacts by frequency of use, rather than by time of use; e.g., recency, to be a useful alternative to the timeline.

[0198] FIG. **8** shows that card **820** is selected for display by the people chooser. Card **820** represents "Jane Smith". In scenario **800**, Jane Smith is the most frequently used contact. Card **820** includes the contact's name, Jane Smith, and an image related to the contact, e.g., a picture of Jane Smith. After reviewing the card shown at **820**, the wearer of the HMD can either tap or swipe the touch-based UI to select "Jane Smith" as the person selected for the activity; e.g., sharing, calling, etc., that can lead to invocation of the people chooser.

[0199] If a tap is received while card **820** is shown, the HMD can then take action **822** with the choice. If a swipe is received while card **820** is displayed, then another card can be displayed for a next-most recent contact; e.g., card **824** for "Another Person". To select "Another Person" for the action while card **824** is displayed, a wearer can either tap the HMD using the touch-based UI or say the person's name, e.g., "Another Person", using the voice-based interface. If "Another Person" is selected, the HMD can carry out the action with "Another Person".

[0200] Otherwise, "Another Person" is not selected. Then, the wearer can swipe again, and another card can be displayed for a group of contacts, such as card **826** for "Friends". To select a "Friend" for the action while card **826** is displayed, a wearer can either tap the HMD using the touch-based UI or say the person's name, e.g., "Friend", using the voice-based interface. If the "Friends" group is selected, the HMD can provide cards in the "Friends" group in response to swipe actions until either a contact in the "Friends" group is selected or the "Friends" group is exhausted without the wearer making a selection. Each item in the "Friends" group, or friend, can be a contact or other representation of a person, organization, group, family, etc. that the wearer has designated as a friend. In one embodiment, the "Friends" group can be a bundle or folder that enables access to the items or friends within the bundle or folder. In one embodiment, the "Friends" group can be a group of friends ordered based on time of friend designation, most recent access, or by some other criteria.

[0201] Otherwise, "Friends" are not selected. Then, the wearer can swipe while card **826** is displayed to bring up card **828**, representing another contact frequently called by the wearer. Scenario **800** can continue with swipes that show contacts until either a contact is selected or until all contacts have been displayed. If all contacts have been displayed, after displaying the last selected contact, the HMD can "wrap-around" or return to the first selected card; e.g., card **820** representing "Jane Smith".

[0202] As mentioned above, the HMD can be configured with a camera, and the UI can aid wearer interaction with the camera. FIG. **9** shows a user-interface scenario **900** with camera interactions, according to an example embodiment. Scenario **900** can begin by displaying card **910** or card **930** for an HMD configured with one or more cameras that can perform at least the activities described herein.

[0203] While displaying card **910**, at any point while utilizing the UI of the HMD, the camera button; e.g., button **179** of HMD **172** shown in FIG. **1**D, can be pressed for either a short time; e.g., less than one second, or a long time; e.g., longer than the short time. If the camera button is pressed for the short time, also referred to as a "short press" of the camera button, scenario **900** continues by displaying card **920**. Otherwise, if the camera button is pressed for the long time, also referred to as a "long press" of the camera button, scenario **900** continues by displaying card **934**.

[0204] In response to the short press of the camera button, a photo or still image is captured using the camera—an example image capture is shown as card **920**. If, after capturing the photo, a tap is received, scenario **900** continues by displaying card **922**; otherwise, if either a swipe down is received or no interaction with the touch-based UI is recorded during a wait interval; e.g., one second, scenario **900** continues by displaying card **924**.

[0205] Card **922** is part of a contextual menu with options for operating on the captured photo. The contextual menu can include options such as a share option for the captured photo; e.g., as indicated by the "Share" card shown at **922**, a delete option for the captured photo, and other options for the captured photo (e.g., editing the photo).

[0206] Card **924** shows the captured photo as "animated out"; that is, the image of the captured photo is replaced with a blank card shown as card **926** via an animated transition. After displaying card **926**, the HMD can return to a previous state; e.g., a position in the timeline being displayed at **910** before receiving the short press of the camera button.

[0207] After displaying a home card, such as card **300** shown in FIG. **3**, a tap can be received via the touch-based UI. In response to the tap, the HMD can display a "Capture" card, such as card **930**. After displaying card **930**, scenario **900** can continue with a display of card **932**.

[0208] Card **932** is shown in FIG. **9** as a "Photo" card, indicating that to the wearer that a photo or still image can be captured using the camera. If a swipe is received while displaying card **932**, scenario **900** can continue by displaying card **934**; otherwise, scenario **900** can continue at **950**.

[0209] Card **934** is shown in FIG. **9** as a "Video" card to indicate to the wearer that a video can be captured using the camera. If a swipe is received while displaying card **934**, scenario **900** can continue by displaying card **936**. In one embodiment, multiple camera operations can occur simultaneously; e.g., the HMD can perform some or all of recording video, capturing still images, capturing timelapse images, and conducting video conferencing at the same time. In more particular embodiments, the HMD can perform the multiple camera operations and/or multiple telephone operations simultaneously; e.g., the HMD can, while perform multiple camera operations, conduct one or more two-party or multi-party voice calls, dial one or more parties, have one or more voice calls on hold, forward one or more voice call, and other telephone operations.

[0210] Otherwise, the HMD can determine whether a new video session is to be started to capture the requested video or if a pending video session is to be rejoined. If the new video session is to be started, the HMD can trigger the camera to start recording images (if not already recording) and scenario **900** can continue by displaying card **950**. If the pending video session is to be rejoined, the HMD can redirect to, or request

display of, an already-existing card for the pending video session and scenario **900** can continue by displaying a card for the pending video session, shown in FIG. **9** as card **952**.

[0211] Card **936** is shown in FIG. **9** as a "Timelapse" card to indicate to the wearer that a timelapse image can be captured using the camera. If, a swipe is received while displaying card **936**, scenario **900** can continue by displaying card **932**.

[0212] Otherwise, the HMD can determine whether a new timelapse session is to be started to capture the requested timelapse image or if a pending timelapse session is to be rejoined. If the new timelapse session is to be started, the HMD can trigger a timelapse card to start displaying a timelapse image being captured by the camera (if not already recording) and scenario **900** can continue by displaying card **960**. If the pending timelapse session is to be rejoined, the HMD can redirect to an already-existing card for the pending timelapse session and scenario **900** can continue by displaying a card for the pending timelapse session, shown in FIG. **9** as card **962**.

[0213] Upon displaying card **940**, the HMD can launch a temporary view finder and instruct the camera to begin capturing images. Upon capturing each image, the HMD can display the image. While displaying the image, the wearer can either (a) provide a tap to the HMD and scenario **900** can continue by displaying card **942** or (b) provide a swipe down using the HMD and scenario **900** can continue by displaying card **944**.

[0214] Upon displaying card **942**, the HMD can capture an image using the camera. Once captured, the HMD can display the captured image for a short period of time; e.g., one or a few seconds. After displaying the captured image for the short period, scenario **900** can proceed to display card **940**.

[0215] Upon displaying card **944**, which is a blank card, any image for possible capture, e.g., card **940**, animates out. In some embodiments, the camera can be deactivated after animating out the image, if no other application; e.g., video, is using the camera. After displaying card **944**, the HMD can return to a previous state; e.g., a position in the timeline being displayed at **910** before reaching **944**.

[0216] Card **950** can be a card representing the new video session. While the video session is active, the HMD can capture images and, in some embodiments, sound, and store the captured video. Upon capturing each image for the video session, the HMD can display the captured image using card **950**, which represents the new video session. While displaying the images for the video session using card **950**, the wearer can either (a) provide a tap to the HMD and scenario **900** can continue by displaying card **954** or (b) provide a swipe down using the HMD and scenario **900** can continue by displaying card **956**.

[0217] Card **952** can be a card representing the pending video session. While the video session is active, the HMD can capture images, and in some embodiments, sound, and store the captured video. Upon capturing each image for the video session, the HMD can display the captured image using the card **952**, which represents the pending video session. While displaying the images for the video session using card **952**, the wearer can either (a) provide a tap to the HMD and scenario **900** can continue by displaying card **954** or (b) provide a swipe down using the HMD and scenario **900** can continue by displaying card **956**.

[0218] Card **954** can represent a contextual menu with options for the captured video. The contextual menu can include options for the captured video, such as a stop recording option, restart recording option, delete video option, and other options.

[0219] Card **956** can be a blank card indicating to the wearer that the video session has terminated. In some embodiments, the captured video can be deleted after the video session is stopped, while in other embodiments, the captured video or audio video can remain in storage after the video session is stopped. In some embodiments, the camera can be deactivated if no other application; e.g., a timelapse photo capture, is using the camera. In other embodiments, after displaying the blank card, the HMD can return to a previous state; e.g., a position in the timeline being displayed using card **910** before card **956** was ever displayed.

[0220] Card **960** can represent the new timelapse session. While the new timelapse session is active, the HMD can capture images for addition to the timelapse image. Upon capturing each image for the timelapse session, the HMD can display image(s) related to the new timelapse session using card **960**. While displaying card **960**, the wearer can either (a) provide a tap to the HMD and scenario **900** can continue by displaying card **964** or (b) provide a swipe down using the HMD and scenario **900** can continue by displaying card **966**.

[0221] Card **962** can represent the pending timelapse session. While the pending timelapse session is active, the HMD can capture images for addition to the timelapse image. Upon capturing each image for the timelapse session, the HMD can display image(s) related to the pending timelapse session using card **962**. While displaying card **962**, the wearer can either (a) provide a tap to the HMD and scenario **900** can continue by displaying card **964** or (b) provide a swipe down using the HMD and scenario **900** can continue by displaying card **966**.

[0222] Card **964** can represent a contextual menu with options for the captured timelapse image. The contextual menu can include options for the captured timelapse image, such as a stop timelapse option, a timelapse frequency option, a restart timelapse option, and other options.

[0223] Card **966** can be a blank card that indicates to the wearer that the timelapse session has terminated. In some embodiments, the captured timelapse image can be deleted after the timelapse session is stopped, while in other embodiments, the captured timelapse image can remain in storage after the timelapse session is stopped. In some embodiments, the camera can be deactivated if no other application; e.g., video is using the camera. In other embodiments, after displaying the blank card, the HMD can return to a previous state; e.g., a position in the timeline being displayed using card **910** before card **966** was ever displayed.

[0224] Objects, such as photos and messages, can be grouped or "bundled" by the UI to simplify interactions with these bundles. FIG. **10**A shows user-interface scenario **1000** with photo bundles, according to an example embodiment. Scenario **1000** begins with an HMD displaying photo bundle card (PBC) **1010** in a timeline. Photo bundle card **1010** includes photo bundle indicator (PBI) **1010***a*, example photo **1010***b*, and thumbnails **1010***c*. Photo bundle indicator **1010***a*, shown in FIG. **10**A as a page with a turned-down corner, indicates that a "photo bundle" or collection of photos is associated with photo bundle card **1010**. Example photo **1010***b*, shown in FIG. **10**A as occupying roughly one-half of photo bundle card **1010**, provides a relatively large image of an example photo in the photo bundle. Thumbnails **1010***c*, shown in FIG. **10**A as collectively occupying roughly one-

half of photo bundle card **1010**, provides four relatively small images of four example photos in the photo bundle.

[0225] While displaying photo bundle card **1010**, the wearer of the HMD can tap on a touch-based UI to instruct the HMD to display the photos in the photo bundle. During scenario **1000**, while displaying photo bundle card **1010**, the HMD can receive a tap and subsequently display a card with photo **1012**.

[0226] Each individual item within a bundle, e.g., a photo within a photo bundle, functions the same with respect to the user interface as it would if the item were displayed on the timeline. For example, in the case of a photo, such as photo **1012**, tapping on the touch-based UI would enter a contextual menu for the photo, and swiping down while in the contextual menu would return to photo **1012**.

[0227] While displaying photo **1012**, the HMD can receive a swipe forward to display the next photo in the bundle or a swipe backward to display the previous photo in the bundle. In scenario **1000** as shown in FIG. **10**A, the next photo can be photo **1014**. As photo **1012** is the first photo in the bundle, the previous photo is the last photo in the bundle, or photo **1018**.

[0228] During scenario **1000**, the HMD receives a swipe backward while displaying photo **1012**. In response to the swipe backward, the HMD can display photo **1018** as discussed above. Scenario **1000** continues with the HMD receiving two more swipes backwards. In response, the HMD can first display photo **1016** which is the previous photo to photo **1018**, and, after receiving the second swipe backward, display photo **1014** which is the previous photo to photo **1016** as shown in FIG. **10**A.

[0229] While displaying photo **1014**, the HMD can receive a tap. In response to the tap, the HMD can display photo bundle card **1010** and scenario **1000** can end.

[0230] FIG. **10**B shows user-interface scenario **1050** with message bundles, according to an example embodiment. Scenario **1050** begins with an HMD displaying message bundle card (MBC) **1060** in a timeline. Message bundle card **1060** includes message bundle indicator (MBI) **1060***a* and a most-recent message in the message bundle, which includes image **1060***b* and message **1060***c*. Photo bundle indicator **1060***a*, shown in FIG. **10**B as a page with a turned-down corner, indicates that a "message bundle" or collection of messages is associated with message bundle card **1060**. Image **1060***b* can be an image associated with the sender of the most-recent message in the message bundle. Message **1060***c* can include text, and in some embodiments, other type(s) of data, that is sent with the most-recent message in the message bundle. As shown in FIG. **10**B, image **1060***b* occupies roughly one-third of message bundle card **1060**, is an image of "Joe W." who sent message **1060***c*, which occupies roughly two-thirds of message bundle card **1060**. Message **1060***c* includes text that says "Sounds great. See you there," and was sent three minutes ago.

[0231] In scenario **1060**, while displaying message bundle card **1060**, the wearer of the HMD can tap on a touch-based UI. Some bundles have additional functionality, specific to the bundle, associated with a tap. In the example of the message bundle, a contextual menu can be displayed in response to the tap. FIG. **10**B shows two options in the contextual menu: a reply option associated with card **1070** and a read-all option associated with card **1072**.

[0232] While card **1070** associated with the reply option is displayed, the HMD can receive a tap. In response, the HMD can interpret the tap as a selection to reply to the most recently displayed message card. While card **1072** associated with the read all option is displayed, the HMD can receive a tap, which can be interpreted to read the messages in the message bundle, starting with the most recent. In one embodiment, the HMD can start with the first message in the message bundle rather than the most recent. In response to receiving a swipe down while in the contextual menu for message bundles, the HMD can select message bundle card **1060** for display.

[0233] Each individual item within a bundle, e.g., a message within a message bundle, functions the same with respect to the user interface as it would if the item were displayed on the timeline. For example, in the case of a message, such as message **1062**, tapping on the touch-based UI would enter a contextual menu for the message, and swiping down while in the contextual menu for the message would return to message **1062**.

[0234] While displaying message **1062**, the HMD can receive a swipe forward to display the next message in the bundle or a swipe backward to display the previous message in the bundle. In scenario **1050** as shown in FIG. **10**B, the previous message can be message **1064**. As message **1062** is the first message in the bundle, there is no "next" message, so the last message in the bundle, or message **1066**, can be displayed instead.

[0235] During scenario **1050**, the HMD receives a swipe forward while displaying message **1062**. In response to the swipe forward, the HMD can display message **1066** as discussed above. Scenario **1050** continues with the HMD receiving two more swipe forwards. In response, the HMD can first display message **1064** which is the next message to message **1066**, and, after receiving the second swipe forward, display message **1062**, which is the next message to message **1064** as shown in FIG. **10**B.

[0236] While displaying message **1062**, the HMD can receive a tap. In response to the tap, the HMD can enter a contextual menu for message **1062** and scenario **1050** can end.

[0237] The HMD has various settings, including settings for networks such as WiFi and Bluetooth networks. FIG. **11** shows user-interface scenario **1100** with timeline **1110** including settings cards **1120**, **1130**, according to an example embodiment. As shown in FIG. **11**, timeline **1110** has two settings cards **1120** and **1130** at the now/future end of the timeline. As shown in FIG. **11**, both cards **1120** and **1130** permit interaction with various "settings", e.g., controls, preferences, data, and/or other information, in response to a tap input of the touch-based user interface.

[0238] Card **1120** is related to wireless network ("WiFi") settings, which can be settings related to wireless networks operating using one or more protocols, such as IEEE 802.11 protocols, which are discussed in more detail below in the context of FIG. **12**. Card **1130** is related to Bluetooth settings, which can be settings related to short range wireless networks operating using one or more Bluetooth protocols, which are discussed in more detail below in the context of FIG. **13**.

[0239] FIG. **12** shows user-interface scenario **1200** related to WiFi settings, according to an example embodiment. Scenario **1200** begins with an HMD displaying card **1210**. Card **1210** indicates that the HMD is connected via WiFi to a network of computers called "GGuest."

[0240] During scenario **1200**, in response to viewing card **1210**, a wearer of the HMD taps the touch-based UI of the HMD. In response, the HMD displays card **1220**, indicating

both that the HMD is connected to GGuest and a map of the general area around the HMD.

[0241] After viewing card **1220**, the wearer can swipe next through cards **1230** and **1240** that indicate available networks for accessible connections, card **1250** to begin the process to add another WiFi network, and card **1260** to turn off the WiFi functionality of the HMD. In some embodiments, swiping next after displaying card **1260** leads to display of card **1220**. In other embodiments, swiping previous after displaying card **1220** leads to display of card **1260**.

[0242] In response to tapping while displaying card **1220**, the HMD displays card **1222** with text of "Forget". After viewing card **1222** during scenario **1200**, wearer can use the touch-based UI of the HMD to either (a) tap to instruct the HMD to begin a process of forgetting, e.g., deleting stored information, about the currently connected WiFi network, or (b) swipe to bring up card **1232** with text of "Disconnect" to begin a process of disconnecting from the currently connected WiFi network. In scenario **1200**, the currently connected WiFi network would be GGuest, as card **1220** was reached after tapping card **1210**, and card **1210** is associated with the GGuest WiFi network.

[0243] During one aspect of scenario **1200**, the wearer taps on the touch-based HMD while card **1222** is displayed to instruct the HMD to forget about the GGuest network. The process of forgetting about a WiFi network is associated with a grace period to permit the wearer to reconsider. In response to the tap operation, the HMD can display card **1224** with text of "Forgetting" and progress bar **1224***a*. Progress bar **1224***a* can take a length of time, such as equal to or greater than the grace period, to complete display. After progress bar **1224***a* is completely displayed, the grace period is deemed to have expired.

[0244] Once the grace period expires or a tap is received during display of card **1224**, the HMD can delete stored information about the currently connected WiFi network and display card **1226** indicating the currently connected WiFi network is now forgotten. After displaying card **1226**, the HMD can return to the settings context menu.

[0245] During another aspect of scenario **1200**, the wearer taps on the touch-based HMD while card **1232** is displayed to instruct the HMD to disconnect from the GGuest network. The process of disconnecting from a WiFi network is associated with a grace period to permit the wearer to reconsider. In response to the tap operation, the HMD can display card **1234** with text of "Disconnecting" and progress bar **1234***a*. Progress bar **1234***a* can take a length of time, such as equal to or greater than the grace period, to complete display. After progress bar **1234***a* is completely displayed, the grace period is deemed to have expired.

[0246] Once the grace period expires or a tap is received during display of card **1234**, the HMD can disconnect from the currently connected WiFi network and display card **1236** indicating that the HMD is now disconnected from the previously-connected WiFi network. After displaying card **1236**, the HMD can return to the settings context menu.

[0247] Card **1230** displays information about a nearby WiFi network named "GA Ntwk" including the network's use of Wired Equivalent Privacy or "WEP", and a map with location information about "GA Ntwk." In response to tapping while displaying card **1230**, the HMD attempts to connect the "GA Ntwk" network and displays card **1244** with text of "Connecting"

[0248] After displaying card **1244**, if the HMD is able to successfully connect to the WiFi network, the HMD will display card **1246** with text of "Connected" and return to the setting context menu. If the HMD is unable to successfully connect to the WiFi network; e.g., the network is not open access and requires authentication for access, the HMD will display card **1248** with text of "Failed" and return to the previous card; e.g., card **1230** to request additional input related to the "GA Ntwk." In some embodiments, the HMD can automatically attempt WiFi reconnection upon (initial) failure. In particular embodiments, the HMD will automatically attempt WiFi reconnection for a fixed number of attempts before indicating failure. If the HMD automatically reattempts WiFi connection upon failure, the HMD can display card **1244** as the "previous" card.

[0249] Card **1240** displays information about a nearby WiFi network named "Coffee Shop" including a map with location information about "Coffee Shop". In response to tapping while displaying card **1240**, the HMD can determine that the "Coffee Shop" network is secured and display card **1242**. Card **1242** displays an icon of a Quick Response (QR) code, text to "Enter Password", and a hint of "Generate QR code at <Example URL>."

[0250] In scenario **1200**, the QR code is provided to the HMD. For example, the QR code can be on a sticker, poster, paper, or otherwise displayed at the wearer's location; e.g., the "Coffee Shop" location. As another example, the QR code can be generated via a website in which the user entered the credentials for access to the network. Once a suitable QR code is located, the wearer can capture the QR code by pointing the HMD's camera at it. In other embodiments, other techniques besides a QR code can be used to enter network credentials, such as the wearer speaking the password for access to a network.

[0251] In response to the HMD successfully capturing the QR code or otherwise obtaining the password for the "Coffee Shop" network, the HMD can display card **1244**. After displaying card **1244**, if the HMD is able to successfully connect to the WiFi network, the HMD will display card **1246** with text of "Connected" and return to the setting context menu. If the HMD is unable to successfully connect to the WiFi network, the HMD will display card **1248** with text of "Connected" and return to the previous card; e.g., card **1230** to request additional input related to the "Coffee Shop" network.

[0252] In some embodiments, the HMD can automatically reattempt WiFi connection upon (initial) failure. In particular embodiments, the HMD will automatically attempt WiFi reconnection for a fixed number of attempts before indicating failure. If the HMD automatically reattempts WiFi connection upon failure, the HMD can display card **1244** as the "previous" card.

[0253] Card **1250** displays a QR code encoding information about a WiFi network. In response to tapping while displaying card **1250**, the wearer can obtain a QR code and the HMD's camera can be utilized to capture the QR code as discussed above. In other embodiments, other techniques besides a QR code can be used to enter network credentials, such as the wearer speaking the password for access to a network. In response to the HMD obtaining the QR code or otherwise obtaining the password for the WiFi network to be added, the HMD can display card **1244**.

[0254] After displaying card **1244**, if the HMD is able to successfully connect to the WiFi network, the HMD will

display card **1246** with text of "Connected" and return to the setting context menu. If the HMD is unable to successfully connect to the WiFi network, the HMD will display card **1248** with text of "Failed" and return to the previous card; e.g., card **1230** to request additional input related to the WiFi network to be added indicated using card **1250**. In some embodiments, the HMD can automatically reattempt WiFi connection upon (initial) failure. In particular embodiments, the HMD will automatically attempt WiFi reconnection for a fixed number of attempts before indicating failure. If the HMD automatically reattempts WiFi connection upon failure, the HMD can display card **1244** as the "previous" card.

[0255] In response to tapping card **1260**, the HMD begins a process of "turning off" or deactivating WiFi functionality for the HMD. In scenario **1200**, the process of deactivating WiFi functionality is associated with a grace period to permit the wearer to cancel or abort the WiFi deactivation. In response to the tap operation, the HMD can display card **1262** with text of "Turning off" and progress bar **1262***a*. Progress bar **1262***a* can take a length of time, such as equal to or greater than the grace period, to complete display. After progress bar **1262***a* is completely displayed, the grace period is deemed to have expired.

[0256] Once the grace period expires or a tap is received during display of card **1262**, the HMD can deactivate WiFi functionality for the HMD, and display card **1264** indicating the WiFi functionality for the HMD is off. After displaying card **1264**, the HMD can return to the settings context menu.

[0257] In other example scenarios, card **1210** could indicate, as shown using card **1212** of FIG. **12**, that the HMD is not connected to a WiFi network or, as shown using card **1214** of FIG. **12**, that WiFi functionality of the HMD is turned off. In those examples, card **1220** is not used, and tapping either card **1212** or **1214** leads to display of card **1230**.

[0258] If the WiFi functionality is off; e.g., card **1214** is displayed, card **1260** displays a "Turn On" or similar text, and tapping card **1260** while the WiFi functionality is initially off, lead to activation of the HMD's WiFi functionality.

[0259] FIG. **13** shows user-interface scenario **1300** related to Bluetooth settings, according to an example embodiment. Scenario **1300** begins with the HMD displaying card **1310** in a timeline. As shown in FIG. **13**, card **1310** includes a Bluetooth logo and text indicating the HMD is "Connected to Galaxy Nexus [and] Home-PC." During scenario **1300**, in response to viewing card **1310**, the wearer performs a tap operation using the touch-based UI of the HMD.

[0260] In response to the tap operation, the HMD can display card **1320**. Card **1320** shows an image of a mobile device and text of "Connected to Galaxy Nexus." After viewing card **1320**, the wearer can swipe next through card **1330** that indicate connection to a Home-PC and card **1340** to begin the process to "pair with" or connect to another device using Bluetooth. In some embodiments, swiping next after displaying card **1340** leads to display of card **1320**. In other embodiments, swiping previous after displaying card **1320** leads to display of card **1340**.

[0261] After viewing card **1320**, the wearer can perform a tap operation using the touch-based UI of the HMD. In response to this tap operation, card **1332** is displayed with text of "Disconnect" to indicate a disconnect operation to be performed on the current Bluetooth connection. After viewing card **1332**, the wearer can use the touch-based UI to perform a swipe operation. In response to the swipe, the HMD can display card **1322** with text of "Forget" to indicate a forget operation for the current Bluetooth connection.

[0262] After viewing card **1322** during scenario **1300**, the wearer can use the touch-based UI of the HMD to either (a) tap to instruct the HMD to begin a process of forgetting about the current Bluetooth connection, or (b) swipe to re-view card **1332**. In scenario **1300**, the Bluetooth connection would be a connection between the HMD and "Galaxy Nexus", as card **1322** was reached after tapping card **1320**, and card **1320** is associated with the HMD/Galaxy Nexus Bluetooth connection.

[0263] During one aspect of scenario **1300**, the wearer taps on the touch-based HMD while card **1322** is displayed to instruct the HMD to forget about the HMD/Galaxy Nexus Bluetooth connection. The process of forgetting about a Bluetooth connection is associated with a grace period to permit the wearer to reconsider. In response to the tap operation, the HMD can display card **1324** with text of "Forgetting" and a progress bar. The progress bar can take a length of time, such as equal to or greater than the grace period, to complete display. After the progress bar is completely displayed, the grace period is deemed to have expired.

[0264] Once the grace period expires or a tap is received during display of card **1324**, the HMD can delete stored information about the current Bluetooth connection and display card **1326** indicating the current Bluetooth connection is now forgotten. After displaying card **1326**, the HMD can return to the home card context menu.

[0265] In another aspect of scenario **1300**, the wearer taps on the touch-based HMD while card **1332** is displayed to instruct the HMD to disconnect from the Galaxy Nexus. The process of disconnecting a Bluetooth connection is associated with a grace period to permit the wearer to reconsider. In response to the tap operation, the HMD can display card **1334** with text of "Disconnecting" and a progress bar that can take a length of time, such as equal to or greater than the grace period, to complete display. After the progress bar is completely displayed, the grace period is deemed to have expired.

[0266] Once the grace period expires or a tap is received during display of card **1334**, the HMD can disconnect from the current Bluetooth connection and display card **1336** indicating that the HMD is now disconnected from the previously-connected Bluetooth connection. After displaying card **1336**, the HMD can return to the home card context menu.

[0267] In another example of scenario **1300**, the wearer can use the touch-based UI of the HMD to perform a tap operation while card **1330** is displayed. Card **1330** shows an image of a computer display and has text of "Connected to Home-PC" to indicate a Bluetooth connection between the HMD and a device named "Home-PC". In response to this tap operation, the HMD can display card **1332** for disconnecting the HMD/Home-PC connection, or after receiving a swipe operation, the HMD can display card **1322** for disconnecting the HMD/Home-PC connection. After either card **1322** or **1332** is displayed, the wearer can use the touch-based UI to perform a tap operation. In response to the tap, the HMD can respectively perform the forgetting (after card **1322** display) or disconnecting operations (after card **1322** display) for Bluetooth connections, using the HMD/Home-PC connection as the current Bluetooth connection, as the tap for card **1322**/**1332** was received after most recently displaying card **1330** representing the HMD/Home-PC connection.

[0268] After displaying card **1340**, the HMD can be brought into, or already be in, proximity of some other device

configured to pair with the HMD. In scenario **1300**, the other device is a mobile phone identified, e.g., as "Galaxy Nexus." In other scenarios, the HMD can attempt to pair with a device other than the Galaxy Nexus. If the other device attempts to pair with the HMD (or vice versa), card **1342** can be displayed in response. As shown in FIG. **13**, card **1342** includes an image of a mobile device and text of "Pair with Galaxy Nexus? Tap if Galaxy Nexus displays 186403."

[0269] In response to the display of card **1342**, the wearer can use the touch-based UI to perform a tap operation, and so instruct the HMD to pair with the other device; e.g., the Galaxy Nexus. After receiving the tap, the HMD can display card **1344** with text of "Pairing" to indicate that the HMD is attempting to pair with the Galaxy Nexus.

[0270] If the pairing operation between the HMD and the Galaxy Nexus is successful, the HMD can display card **1344** with text of "Paired" and can return to the main timeline after "splicing" or adding a card for the new device to the timeline. On the other hand, if the pairing operation between the HMD and the Galaxy Nexus is unsuccessful, the HMD can display card **1348** with text of "Failed" and can return to card **1340** ("Pair with new device") to possibly reattempt pairing with the Galaxy Nexus and/or pair with a different device.

[0271] The HMD can arrange portions of a card in a "visual stack" in order to generate the visual rendering of the card. FIG. **14**A shows example visual stack **1400**, according to an example embodiment. Visual stack **1400** is used to generate or render a card from a set of overlaid images.

[0272] From the wearer's perspective, visual stack **1400** is the collection of images viewed looking down viewport **1410** via a "rectangular tube", shown with dashed lines in FIG. **14**A, to main timeline **1430**. The collection of images can be part of timelines, menus, etc., each of which can be considered to run independently at different levels perpendicular to the rectangular tube. The wearer can then perceive content on the display of the HMD through the viewport **1410** to see the portions of the timelines, menus, etc. that are within the rectangular tube.

[0273] FIG. **14**A shows that three items are in visual stack **1400** between viewport **1410** and main timeline **1430**: submenu **1420**, contextual menu **1422**, and overlay **1424**. Submenu **1420** includes three images: an image of "Jane Smith", an image of "Another Person", and an image associated with "Friends", with the image of "Another Person" inside the rectangular tube. Contextual menu **1422** includes two options: a "Share" option and a "Delete" option, with the "Share" inside the rectangular tube. Thus, visual stack **1400** shows contextual menu **1422** for a photo bundle card shown on main timeline **1430** with a "Share" option selected from the contextual menu **1422**, and a sharing destination of "Another Person" selected from submenu **1420**.

[0274] FIG. **14**B shows example visual stack **1450**, according to an example embodiment. From the wearer's perspective, visual stack **1450** is the collection of images viewed looking down viewport **1460** via a rectangular tube shown with dashed lines in FIG. **14**A, to main timeline **1480**. FIG. **14**B shows two items are in visual stack **1450** between viewport **1460** and main timeline **1480**: action notification **1470** and overlay **1472**. Action notification **1470** shows a "Send" notification. Thus, visual stack **1400** shows a "Send" notification for a photo bundle card shown on main timeline **1480**.

[0275] In some embodiments, overlay **1472** is completely opaque with respect to main timeline **1480**. In these embodiments, the wearer viewing visual stack **1450** sees action notification **1470** and overlay **1472**. In other embodiments, overlay **1472** is partially or completely transparent or translucent with respect to main timeline **1480**. In these embodiments, the wearer viewing visual stack **1450** sees action notification **1470** and overlay **1472** with some portion(s) of the photo bundle card shown on main timeline **1480** visible, depending on the visibility of an image on main timeline **1480** through overlay **1472**.

[0276] Along with the touch-based UI detailed above, the HMD can utilize a voice-based interface. FIG. **15** shows a user-interface scenario **1500** related to voice interactions, according to an example embodiment. Scenario **1500** begins with a wearer of the HMD reciting and/or uttering the phrase "ok glass", which can be prompted by a hint provided on a home card such as discussed above in the context of FIG. **3**.

[0277] In response to the HMD recognizing "ok glass", the HMD can receive the utterance "ok glass" via the voice-based interface and display card **1510**. Card **1510** shows the input command "ok glass" to confirm the input received at the voice-based UI of the HMD and a list of available voice commands including "Google", "navigate to", "take a photo", "record a video", "send a message to", and "make a call to."

[0278] The wearer of the HMD can tilt his/her head up or down to respectively scroll up or down through lists, such as the list of available voice commands. For example, card **1512** shows the result of scrolling down the list of possible voice commands shown in card **1510**, indicating the removal of the previously-visible available voice command "Google" and the addition of the available voice command "hangout with." The HMD can use tilt sensors, accelerometers, motion detectors, and/or other devices/sensors to determine if the wearer tilted their head and/or whether the wearer tilted their head up or down.

[0279] While display of card **1510**, the wearer utters the word "Google", which causes card **1520** to be displayed. Card **1520** can also be displayed in response to the wearer uttering "OK Google" and the voice-based HMD recognizing the "OK Google" phrase. Card **1520**, as shown in FIG. **15**, includes a hint of "ask a question" along with an icon of a microphone that can act as a reminder to the wearer that they are using the voice-based interface.

[0280] In response to the display of card **1520**, the wearer can utter "How tall is the Eiffel Tower?" The HMD can then display card **1522** showing that the HMD is processing the input utterance, and once processed, display card **1524**. Card **1524** "echo-prints" or repeats the input utterance of "How tall is the Eiffel Tower?" and also prints an indicator of "searching" to inform the wearer that a search is ongoing based on their input. After the search is complete, the HMD can display card **1526**, which includes an image of the Eiffel Tower and an answer of "1,063 feet (324 m)" to the question asked by the wearer.

[0281] In another aspect of scenario **1500**, in response to card **1512**, the viewer can utter "Navigate to". In response, the voice-based UI of the HMD can capture the utterance, determine that the utterance is "Navigate to" and display card **1530** showing an echo-print of the "Navigate to" utterance.

[0282] Scenario **1500** includes two examples of a destination of the "Navigate to" command. In one example, the wearer utters "Restaurant 1" as the destination, indicated via card **1532**. Card **1532** includes an echo-print of the "ok glass, navigate to Restaurant 1" command and an indication that the HMD is searching for a location of Restaurant 1. In this

example, a single location result is returned for "Restaurant 1". Card **1534** includes a map to the single location that occupies about one-third of the card. The remainder of card **1534** shows that the HMD is "navigating to Restaurant 1" which is on "13th Street" and will take "16 minutes" to get to the restaurant.

[0283] In another navigation example, the wearer utters "Popular Pueblo" as the destination, as indicated via card **1536**. Card **1536** includes an echo-print of the "ok glass, navigate to Popular Pueblo" command and an indication that the HMD is searching for a location of Popular Pueblo. In this example, a search for a location of "Popular Pueblo" returned multiple locations, as indicated by location cards **1538**. The wearer can use the touch-based UI to swipe through the multiple location cards **1538** to view each location cards individually, and to perform a tap operation to select a particular Popular Pueblo location while the desired Popular Pueblo location card is displayed. After the desired Popular Pueblo location card is displayed and the tap operation is completed, the desired location result is shown in card **1540** of FIG. **15**. Card **1540** includes a map to the desired location that occupies about one-third of the card. The remainder of card **1540** shows that the HMD is "navigating to Popular Pueblo" which is on "14th Street" and will take "5 minutes" to get to the desired Popular Pueblo.

[0284] In another aspect of scenario **1500**, in response to card **1512**, the viewer can utter "Send message to". In response, the voice-based UI of the HMD can capture the utterance, determine that the utterance is "Send message to" and display card **1550** showing an echo-print of the "Navigate to" utterance, along with a list of potential recipients of the message. FIG. **15** shows that the list of potential recipients includes "Sarah Johnson", "Steve Johnson", and "Julie Dennis".

[0285] To navigate through the list of potential recipients, the wearer can tilt their head up or down to respectively scroll up or down through the list as indicated by cards **1550** and **1552**. Scenario **1500** continues with the wearer uttering "Sarah Johnson" to the HMD. The voice-based UI of the HMD can capture the utterance, determine that the utterance is "Sarah Johnson" and display card **1554** showing an echo-print of the "send message to" utterance, along with "Sarah Johnson" as a recipient of the message.

[0286] The HMD can wait for a period of time, e.g., one second, for the wearer to provide additional recipients. If the wearer does not provide additional recipients in that period of time, the HMD can display a card, such as card **1556**, for composing and echo-printing a message. Card **1556** shows echo-printed utterances including "hi sarah I'm on my way out will be a few" and blocks. The blocks indicate that the HMD is in the process of recognizing the utterances provided by the wearer and translating those utterances into text. In some embodiments, speech can be translated to text using one or more automatic speech recognition (ASR) techniques.

[0287] After some time, the wearer stops uttering content for the message. In scenario **1500**, after uttering the content of the message, the wearer decides to send the message to the recipient, Sarah Johnson. To send the message, the user can either perform a tap operation using the touch-based UI, or stop uttering for a period of time; e.g., one second. In response, the HMD can display a card such as card **1558** indicating that the message is in the process of being sent. After the message is sent, the sent message is spliced into the timeline.

E. EXAMPLE METHODS OF OPERATION

[0288] FIG. **16**A is a flow chart illustrating a method **1600**, according to an example embodiment. In FIG. **16**A, method **1600** is described by way of example as being carried out by a computing device, such as a wearable computer, and possibly a wearable computer that includes a head-mounted display (HMD). However, it should be understood that example methods, such as method **1600**, can be carried out by a wearable computer without wearing the computer. For example, such methods can be carried out by simply holding the wearable computer using the wearer's hands. Other possibilities can also exist.

[0289] Further, example methods, such as method **1600**, can be carried out by devices other than a wearable computer, and/or can be carried out by sub-systems in a wearable computer or in other devices. For example, an example method can alternatively be carried out by a device such as a mobile phone, which is programmed to simultaneously display a graphic object in a graphic display and also provide a point-of-view video feed in a physical-world window. Other examples are also possible.

[0290] As shown in FIG. **16**A, method **1600** begins at block **1610**, where an HMD can display a home card of an ordered plurality of cards. In some embodiments, the ordered plurality of cards can be ordered based on time. Each card in the ordered plurality of cards is associated with a specific time. In particular of these embodiments, the choose-next input type can be associated with going forward in time. A specific time can be associated with the next card that is equal to or later than a specific time associated with the home card. The choose-previous input type can be associated with going backward in time. A specific time can be associated with the previous card that is equal to or earlier than the specific time associated with the home card.

[0291] At block **1620**, while displaying the home card, the HMD can receive a first input. The first input can be associated with a first input type. The first input type can include a choose-next input type and a choose-previous input type. In some embodiments, the HMD can include a touch-based UI, such as a touch pad, via which the first input can be received. The user-input can be received via other user-interfaces as well.

[0292] At block **1630**, if the first input is of the choose-next input type, the HMD can: (a) obtain a next card of the ordered plurality of cards, where the next card is subsequent to the home card in the ordered plurality of cards, and (b) display the next card using the HMD.

[0293] At block **1640**, in response to the first input type being the choose-previous input type, the HMD can: (a) obtain a previous card of the ordered plurality of cards, where the previous card is prior to the home card in the ordered plurality of cards, and (b) display the previous card using the HMD.

[0294] In some embodiments, method **1600** can further involve the HMD receiving a next input while displaying the next card. The next input can be associated with a next input type. The next input type can include the choose-next input type and the choose-previous input type. In response to the next input type being the choose-next input type, the HMD can obtain a second-next card of the plurality of cards, where the second-next card is subsequent to the next card in the ordered plurality of card. The HMD can display the second-

next card. In response to the next input type being the choose-previous input type, the HMD can obtain the home card and display the home card.

[0295] In other embodiments, method **1600** can additionally include that the HMD can, while displaying the previous card, receive a previous input. The previous input can be associated with a previous input type. The previous input type can include the choose-next input type and the choose-previous input type. In response to the previous input type being the choose-next input type, the HMD can obtain the home card and display the home card. In response to the previous input type being the choose-previous input type, the HMD can obtain a second-previous card of the plurality of cards, where the second-previous card is prior to the previous card in the ordered plurality of cards. The HMD can display the second-previous card.

[0296] In particular of the other embodiments, the second-previous card can include a bundle card. The bundle card can represent a collection of cards and can include a bundle card indicator. Then, method **1600** can further include receiving a bundle-card input of a bundle-card type at the HMD, while displaying the bundle card. A first card of the collection of cards can be displayed in response to the bundle-card type of input being a tap. While displaying the first card of the collection of cards, the HMD can receive a first-card input associated with a first-card type. In response to the first-card input being the choose-next type of input, the HMD can select a second card in the collection of cards, where the second card is subsequent to the first card and display the second card. In response to the first-card input being the choose-previous type of input, the HMD can select a third card in the collection of cards, where the third card is prior to the first card; and display the third card.

[0297] In still other embodiments, the first input type can additionally include a fast-choose-next input type and a fast-choose-previous input type. Each of the choose-next input type and the choose-previous input type can be associated with a first card rate, and each of the fast-choose-next input type and the fast-choose-previous input type can be associated with a second card rate. The second card rate can exceed the first card rate.

[0298] In these embodiments, method **1600** can additionally include: in response to the first input type being the choose-next input type: (i) simulating movement at the first card rate through of the ordered plurality of cards subsequent to the home card, and (ii) obtaining the next card based on the simulated movement subsequent to the home card at the first card rate. In response to the first input type being the choose-previous input type, method **1600** can include: (iii) simulating movement at the first card rate through of the ordered plurality of cards prior to the home card, and (iv) obtaining the previous card based on the simulated movement prior to the home card at the first card rate. In response to the first input type being the fast-choose-next input type, method **1600** can include: (v) simulating movement at the second card rate through of the ordered plurality of cards subsequent to the home card, and (vi) obtaining a fast-next card based on the simulated movement subsequent to the home card at the second card rate. In response to the first input type being the fast-choose-previous input type, method **1600** can additionally include: (vii) simulating movement at the second card rate through of the ordered plurality of cards prior to the home card, and (viii) obtaining a fast-previous card based on the simulated movement prior to the home card at the second card rate.

[0299] In particular of these embodiments, each of the choose-next input type and the choose-previous input type can be associated with a swipe made using a first number of fingers and each of the fast-choose-next input type and the fast-choose-previous input type can be associated with a swipe made using a second number of fingers. Then, the first number of fingers can differ from the second number of fingers.

[0300] FIG. **16**B is a flow chart illustrating a method **1650**, according to an example embodiment. In FIG. **16**B, method **1650** is described by way of example as being carried out by a computing device, such as a wearable computer, and possibly a wearable computer that includes an HMD, but other techniques and/or device can be used to carry out method **1650**, such as discussed above in the context of method **1600**.

[0301] As shown in FIG. **16**B, method **1650** begins at block **1660**, where a home card can be displayed by a head-mountable device (HMD). The HMD can include a user-interface (UI) state, where the UI state is in a home UI state.

[0302] In some embodiments, displaying the home card can include displaying a hint for using a UI of the HMD on the home card. In particular embodiments, the hint can include a hint for the voice-based UI. In other particular embodiments, the hint can include a hint for the touch-based UI. In still other particular embodiments, displaying the hint can include determining whether a number of times the hint is used successfully meets or exceeds a threshold number of times. In response to the number of times the hint is used successfully does not meet or exceed the threshold number of times, the hint can be displayed on the home card. In response to the number of times the hint is used successfully does meet or exceed the threshold number of times, the hint can be inhibited from display on the home card.

[0303] At block **1670**, while in the home UI state, a first UI of the HMD can receive a first input. The first input can be associated with a first type of input.

[0304] At block **1680**, in response to the first type of input being a choose-next type of input, the HMD can: display a next card of an ordered plurality of cards, where the ordered plurality of cards also includes the home card, and where the next card can differ from the home card, and set the UI state to a timeline-next state.

[0305] At block **1682**, the HMD can, in response to the first type of input being a choose-previous type of input: display a previous card of the ordered plurality of cards, where the choose-previous type of input differs from the choose-next type of input, and where the previous card differs from the both next card and the home card, and set the UI state to a timeline-previous state.

[0306] At block **1684**, the HMD can, in response to the first type of input being a tap type of input: activate a second UI of the HMD, where the first UI of the HMD is a touch-based UI and where the second UI is a voice-based UI, and set the UI state of the HMD to a voice-home state.

[0307] At block **1686**, the HMD can, in response to the first type of input being a speech-type of input, determine whether text associated with the first input matches a predetermined text. In response to determining that the text associated with first input matches the predetermined text, the HMD can activate the second UI and set the UI state to the voice-home state.

[0308] In some embodiments, method **1650** can additionally include: in response to the first input being a sleep-type of input, deactivating at least a portion of the HMD and setting the UI state of the HMD to a deactivated state.

[0309] In other embodiments, method **1650** can additionally include: receiving a second input using the first UI while in the timeline-previous state. The second input can be associated with a second type of input. In response to the second type of input being the tap type of input: (i) one or more operations can be selected based on the previous card, (ii) a menu of operation cards can be generated based on the selected one or more operations, where each operation card in the menu of operation cards can correspond to an operation of the one or more operations, and (ii) at least one operation card of the menu of operation cards can be displayed.

[0310] In particular of the other embodiments, displaying the at least one operation card of the menu of operation cards can include displaying text associated with the operation that overlays the display of the previous card.

[0311] In other particular of the other embodiments, the one or more operations can include an operation associated with a grace period of time. Then, method **1650** can additionally include: while displaying at least one operation card of the menu of operation cards, receiving an operation input using the first UI where the operation input has an operation type. In response to the operation type of input being the tap type of input, an operation associated with the displayed at least one operation card can be determined. A determination can be made whether a grace period of time is associated with the associated operation. If the grace period of time is associated with the associated operation, a card can be displayed that is configured to graphically indicate the grace period of time, where the displaying takes at least the grace period of time. After displaying the card configured to graphically indicate the grace period of time, the HMD can perform the associated operation.

[0312] In still other embodiments, method **1650** can additionally include: while in the timeline-next state, receiving a second input using the first UI. The second input can be associated with a second type of input. In response to the second type of input being the tap type of input: (a) one or more operations can be selected based on the next card, (b) a menu of operations can be generated based on the selected one or more operations, and (c) at least one menu operation of the menu of operations can be displayed. In particular of the still other embodiments, displaying the at least one menu operation of the menu of operations can include displaying text associated with the at least one menu operation that overlays the display of the next card.

[0313] In even other embodiments, method **1650** can additionally include: in response to the UI state of the HMD being in the voice-home state, generating a menu card to display a menu of operations for using the voice-based UI. The HMD can display the menu card. After displaying the menu card, a head-related input related to a head movement associated with the HMD can be received. The menu card can be modified based on the head-related input. The modified menu card can be displayed using the HMD.

[0314] FIG. **17** is a flow chart illustrating a method **1700**, according to an example embodiment. In FIG. **17**, method **1700** is described by way of example as being carried out by a computing device, such as a wearable computer and possibly a wearable computer that includes an HMD, but other techniques and/or devices can be used to carry out method **1700**, such as discussed above in the context of method **1600**.

[0315] Method **1700** can begin at block **1710**. At block **1710**, a computing device can display at least a portion of a first linear arrangement of cards. The first linear arrangement can include an ordered plurality of cards that includes one or more first cards of a first card-type and one or more second cards of a second card-type. Each first card corresponds to a group of cards. Aspects of the first linear arrangement are discussed above at least in the context of at least FIGS. **5**C, **6**D, **7**, **8**, **10**A, **10**B, **14**A, and **14**B.

[0316] In some embodiments, the first linear arrangement can include a timeline and each card of the first linear arrangement can be associated with a specific time, such as discussed above at least in the context of at least FIGS. **5**A-**15**.

[0317] In other embodiments, each card of the ordered plurality of cards can include a relationship-related parameter, such as a type as discussed above at least in the context of at least FIGS. **5**C, **6**C, **6**D, **10**A, and **10**B, or other kind(s) of relationship-related parameter(s). In particular embodiments, each card in the group of cards can be related to a same relationship-related parameter, such as discussed above in the context of at least FIGS. **5**C, **6**C, **6**D, **10**A, and **10**B.

[0318] At block **1720**, the computing device can display a selection region that is moveable with respect to the first linear arrangement, where a given card is selected when the selection region is aligned with the given card. Alignment of the selection region and the given card is discussed above in more detail in the context of FIG. **5**C. Additional aspects of the selection region are discussed above at least in the context of FIGS. **5**C and **6**A-**6**D.

[0319] In some embodiments, the HMD can be configured to detect head movements. In these embodiments, displaying the selection region that is moveable with respect to the first linear arrangement can include moving the selection region with respect to the first linear arrangement based on the head movements, such as discussed above at least in the context of FIGS. **5**C and **6**D.

[0320] At block **1730**, in response to selection of a given first card by the selection region, the computing device can display at least a portion of a second linear arrangement of cards, where the second linear arrangement can include an ordered plurality of the group of cards that corresponds to the given first card. Aspects of the given first card are discussed above at least in the context of FIGS. **5**C, **6**D, **7**, **8**, **10**A, **10**B, **14**A, and **14**B. In some embodiments, the second linear arrangement can also include the given first card.

[0321] At block **1740**, in response to selection of a given second card by the selection region, the computing device can display at least a portion of a third linear arrangement of cards, where the third linear arrangement includes one or more third cards of a third card-type, where each third card is selectable to perform an action based on the given second card. Aspects of actionable cards are discussed above at least in the context of FIGS. **5**A-**15**.

[0322] In some embodiments, the selected second card can be related to a first relationship-related parameter, and displaying at least the portion of the third linear arrangement can include determining the one or more third cards based on the first relationship-related parameter, such as discussed above in the context of at least FIGS. **5**C and **6**D. In other embodiments, the second linear arrangement can include the bundle card.

[0323] In even other embodiments, the HMD can be configured with a touchpad. In these embodiments, such as discussed above in the context of at least FIGS. **5**C and **6**A-**6**D, method **1700** can further include: initially displaying a single card of from the first linear arrangement using a single-card view; while displaying the single card, receiving a first input via the touchpad; in response to the first input: switching to a multi-timeline view and displaying, in the multi-timeline view, the at least a portion of the first linear arrangement of cards, wherein the at least the portion of the first linear arrangement of cards comprises the single card.

[0324] In still other embodiments, method **1700** can further include: after displaying the second linear arrangement of cards, selecting a card other than the selected first card; and ceasing display of the second linear arrangement.

F. CONCLUSION

[0325] The present disclosure is not to be limited in terms of the particular embodiments described in this application, which are intended as illustrations of various aspects. Many modifications and variations can be made without departing from its spirit and scope, as will be apparent to those skilled in the art. Functionally equivalent methods and apparatuses within the scope of the disclosure, in addition to those enumerated herein, will be apparent to those skilled in the art from the foregoing descriptions. Such modifications and variations are intended to fall within the scope of the appended claims.

[0326] The above detailed description describes various features and functions of the disclosed systems, devices, and methods with reference to the accompanying figures. In the figures, similar symbols typically identify similar components, unless context dictates otherwise. The example embodiments described herein and in the figures are not meant to be limiting. Other embodiments can be utilized, and other changes can be made, without departing from the spirit or scope of the subject matter presented herein. It will be readily understood that the aspects of the present disclosure, as generally described herein, and illustrated in the figures, can be arranged, substituted, combined, separated, and designed in a wide variety of different configurations, all of which are explicitly contemplated herein.

[0327] With respect to any or all of the ladder diagrams, scenarios, and flow charts in the figures and as discussed herein, each block and/or communication can represent a processing of information and/or a transmission of information in accordance with example embodiments. Alternative embodiments are included within the scope of these example embodiments. In these alternative embodiments, for example, functions described as blocks, transmissions, communications, requests, responses, and/or messages can be executed out of order from that shown or discussed, including substantially concurrent or in reverse order, depending on the functionality involved. Further, more or fewer blocks and/or functions can be used with any of the ladder diagrams, scenarios, and flow charts discussed herein, and these ladder diagrams, scenarios, and flow charts can be combined with one another, in part or in whole.

[0328] A block that represents a processing of information can correspond to circuitry that can be configured to perform the specific logical functions of a herein-described method or technique. Alternatively or additionally, a block that represents a processing of information can correspond to a module, a segment, or a portion of program code (including related data). The program code can include one or more instructions executable by a processor for implementing specific logical functions or actions in the method or technique. The program code and/or related data can be stored on any type of computer readable medium such as a storage device including a disk or hard drive or other storage medium.

[0329] The computer readable medium can also include non-transitory computer readable media such as computer-readable media that stores data for short periods of time like register memory, processor cache, and random access memory (RAM). The computer readable media can also include non-transitory computer readable media that stores program code and/or data for longer periods of time, such as secondary or persistent long term storage, like read only memory (ROM), optical or magnetic disks, compact-disc read only memory (CD-ROM), for example. The computer readable media can also be any other volatile or non-volatile storage systems. A computer readable medium can be considered a computer readable storage medium, for example, or a tangible storage device.

[0330] Moreover, a block that represents one or more information transmissions can correspond to information transmissions between software and/or hardware modules in the same physical device. However, other information transmissions can be between software modules and/or hardware modules in different physical devices.

[0331] The particular arrangements shown in the figures should not be viewed as limiting. It should be understood that other embodiments can include more or less of each element shown in a given figure. Further, some of the illustrated elements can be combined or omitted. Yet further, an example embodiment can include elements that are not illustrated in the figures.

[0332] While various aspects and embodiments have been disclosed herein, other aspects and embodiments will be apparent to those skilled in the art. The various aspects and embodiments disclosed herein are for purposes of illustration and are not intended to be limiting, with the true scope and spirit being indicated by the following claims.

We claim:

1. A computing device, comprising:

a processor; and

a non-transitory computer-readable medium configured to store program instructions that, when executed by the processor, cause the computing device to carry out functions comprising:

displaying at least a portion of a first linear arrangement of cards, wherein the first linear arrangement comprises an ordered plurality of cards that includes one or more first cards of a first card-type and one or more second cards of a second card-type, and wherein each first card corresponds to a group of cards;

displaying a selection region that is moveable with respect to the first linear arrangement, wherein a given card is selected when the selection region is aligned with the given card;

in response to selection of a given first card by the selection region, displaying at least a portion of a second linear arrangement of cards, wherein the second linear arrangement comprises an ordered plurality of the group of cards that corresponds to the given first card; and

in response to selection of a given second card by the selection region, displaying at least a portion of a third

linear arrangement of cards, wherein the third linear arrangement comprises one or more third cards of a third type, wherein each third card is selectable to perform an action based on the given second card.

2. The computing device of claim **1**, wherein each first card is a bundle card, wherein each second card is an actionable card, and wherein each third card is an action card.

3. The computing device of claim **1**, wherein the first linear arrangement comprises a timeline, and wherein each card of the first linear arrangement is associated with a specific time.

4. The computing device of claim **1**, wherein each card of the first linear arrangement comprises a relationship-related parameter.

5. The computing device of claim **4**, wherein each card in the group of cards comprises a same relationship-related parameter.

6. The computing device of claim **4**, wherein the selected second card is related to a first relationship-related parameter, and wherein displaying at least the portion of the third linear arrangement comprises determining the one or more third cards based on the first relationship-related parameter.

7. The computing device of claim **1**, wherein the computing device is further configured with a touchpad, and wherein the functions further comprise:

initially displaying a single card from the first linear arrangement using a single-card view;

while displaying the single card, receiving a first input via the touchpad; and

in response to the first input:

switching to a multi-timeline view; and

displaying, in the multi-timeline view, the at least a portion of the first linear arrangement of cards, wherein the at least the portion of the first linear arrangement of cards comprises the single card.

8. The computing device of claim **1**, wherein the computing device is configured to detect head movements, and wherein displaying the selection region that is moveable with respect to the first linear arrangement comprises moving the selection region with respect to the first linear arrangement based on the head movements.

9. The computing device of claim **1**, wherein displaying the at least a portion of the third linear arrangement of cards comprises displaying the third linear arrangement adjacent to and parallel to the first linear arrangement, and wherein the third linear arrangement begins with a third card aligned with and adjacent to the selected second card.

10. The computing device of claim **1**, wherein the functions further comprise:

after displaying the second linear arrangement of cards, selecting a card other than the selected first card; and

ceasing display of the second linear arrangement.

11. The computing device of claim **1**, wherein the second linear arrangement further comprises the bundle card.

12. The computing device of claim **1**, wherein the computing device is configured as a head-mountable device.

13. A non-transitory computer-readable medium configured to program instructions that, when executed by a processor of a computing device, cause the computing device to carry out functions comprising:

displaying at least a portion of a first linear arrangement of cards, wherein the first linear arrangement comprises an ordered plurality of cards that includes one or more first cards of a first card-type and one or more second cards of a second card-type, and wherein each first card corresponds to a group of cards;

displaying a selection region that is moveable with respect to the first linear arrangement, wherein a given card is selected when the selection region is aligned with the given card;

in response to selection of a given first card by the selection region, displaying at least a portion of a second linear arrangement of cards, wherein the second linear arrangement comprises an ordered plurality of the group of cards that corresponds to the given first card; and

in response to selection of a given second card by the selection region, displaying at least a portion of a third linear arrangement of cards, wherein the third linear arrangement comprises one or more third cards of a third type, and wherein each third card is selectable to perform an action based on the given second card.

14. The non-transitory computer-readable medium of claim **13**, wherein each first card is a bundle card, wherein each second card is an actionable card, and wherein each third card is an action card.

15. The non-transitory computer-readable medium of claim **13**, wherein the first linear arrangement comprises a timeline, and wherein each card of the first linear arrangement is associated with a specific time.

16. The non-transitory computer-readable medium of claim **13**, wherein each card of the first linear arrangement comprises a relationship-related parameter.

17. The non-transitory computer-readable medium of claim **16**, wherein each card in the bundle of cards comprises a same relationship-related parameter.

18. The non-transitory computer-readable medium of claim **16**, wherein the selected second card is related to a first relationship-related parameter, and wherein displaying at least the portion of the third linear arrangement comprises determining the one or more third cards based on the first relationship-related parameter.

19. The non-transitory computer-readable medium of claim **13**, wherein the computing device is associated with a touchpad, and wherein the functions further comprise:

initially displaying a single card of the plurality of cards using a single-card view;

while displaying the single card, receiving a first input via the touchpad;

in response to the first input:

switching to a multi-timeline view; and

displaying, in the multi-timeline view, the at least a portion of the first linear arrangement of cards, wherein the at least the portion of the first linear arrangement of cards comprises the single card.

20. The non-transitory computer-readable medium of claim **13**, wherein displaying the at least a portion of the third linear arrangement of cards comprises displaying the third linear arrangement adjacent to and parallel to the first linear arrangement, and wherein the third linear arrangement begins with an action card aligned with and adjacent to the selected actionable card

21. The non-transitory computer-readable medium of claim **13**, wherein the computing device is configured as a head-mountable device.

22. A method, comprising:

displaying at least a portion of a first linear arrangement of cards using a computing device, wherein the first linear

arrangement comprises an ordered plurality of cards that includes one or more first cards of a first card-type and one or more second cards of a second card-type, and wherein each first card corresponds to a group of cards;

displaying a selection region that is moveable with respect to the first linear arrangement using the computing device, wherein a given card is selected when the selection region is aligned with the given card;

in response to selection of a given first card by the selection region, displaying at least a portion of a second linear arrangement of cards using the computing device, wherein the second linear arrangement comprises an ordered plurality of the group of cards that corresponds to the given first card; and

in response to selection of a given second card by the selection region, displaying at least a portion of a third linear arrangement of cards using the computing device, wherein the third linear arrangement comprises one or more third cards of a third type, and wherein each third card is selectable to perform an action based on the given second card.

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