US012032973B1

(12) **United States Patent**
Mars et al.

(10) **Patent No.: US 12,032,973 B1**
(45) **Date of Patent: Jul. 9, 2024**

(54) **METHODS AND APPARATUS FOR CONFIGURING WEARABLE DEVICES**

(71) Applicant: **OURARING INC.**, San Francisco, CA (US)

(72) Inventors: **Denis Mars**, San Francisco, CA (US); **Simon Ratner**, San Francisco, CA (US)

(73) Assignee: **Ouraring, Inc.**, San Francisco, CA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 217 days.

(21) Appl. No.: **17/547,174**

(22) Filed: **Dec. 9, 2021**

Related U.S. Application Data

(60) Provisional application No. 63/123,252, filed on Dec. 9, 2020.

(51) **Int. Cl.**
G06F 9/445 (2018.01)
H04L 9/40 (2022.01)

(52) **U.S. Cl.**
CPC ***G06F 9/4451*** (2013.01); ***H04L 63/0884*** (2013.01)

(58) **Field of Classification Search**
CPC G06F 9/44505; G06F 9/4451; G06F 9/44563; G06F 9/44584
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

9,858,799	B1 *	1/2018	DeLuca	A61B 5/681
2016/0249174	A1 *	8/2016	Patel	A61B 5/01
2016/0287165	A1 *	10/2016	Abreu	A61B 5/441
2017/0206559	A1 *	7/2017	Bakshi	H04W 4/021
2021/0045169	A1 *	2/2021	Pupakdee	H04L 63/0869
2023/0062700	A1 *	3/2023	Decrop	G06F 3/0486

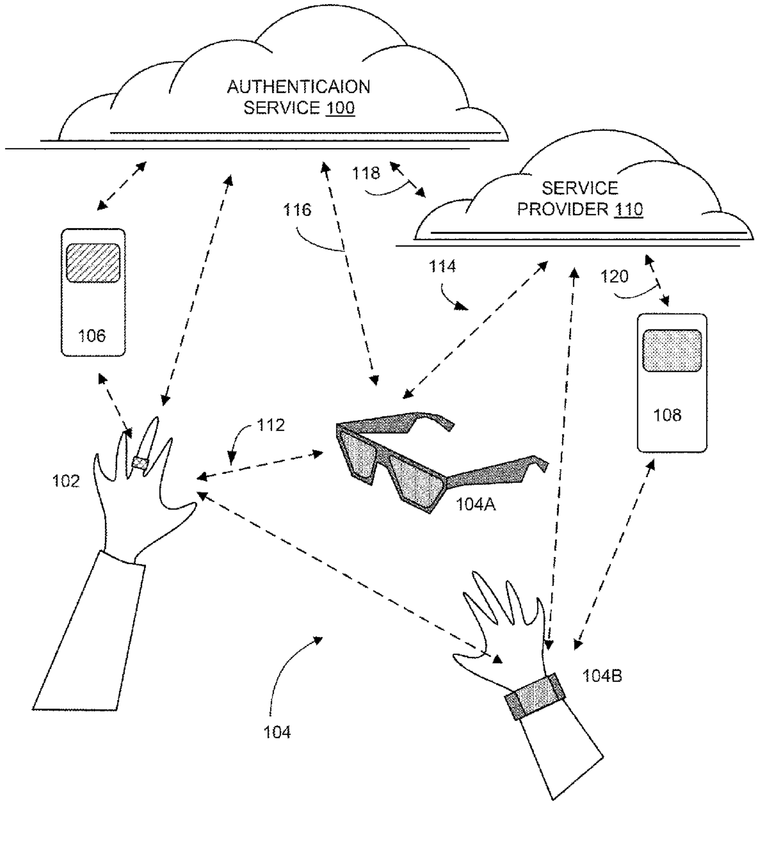
* cited by examiner

Primary Examiner — Raymond N Phan
(74) *Attorney, Agent, or Firm* — Holland & Hart LLP

(57) **ABSTRACT**

A method includes providing with a first wearable smart device, a plurality of identification signals associated with a first user, receiving with a second wearable smart device, the plurality of identification signals, determining with a processor of the second wearable smart device, configuration data for the second wearable smart device in response to the plurality of identification signals, configuring with the processor, the second wearable smart device in response to the configuration data, receiving with an input portion of the second wearable smart device a user input, and directing with the processor, performance of a tangible action in response to the configuration data and to the user input.

20 Claims, 8 Drawing Sheets



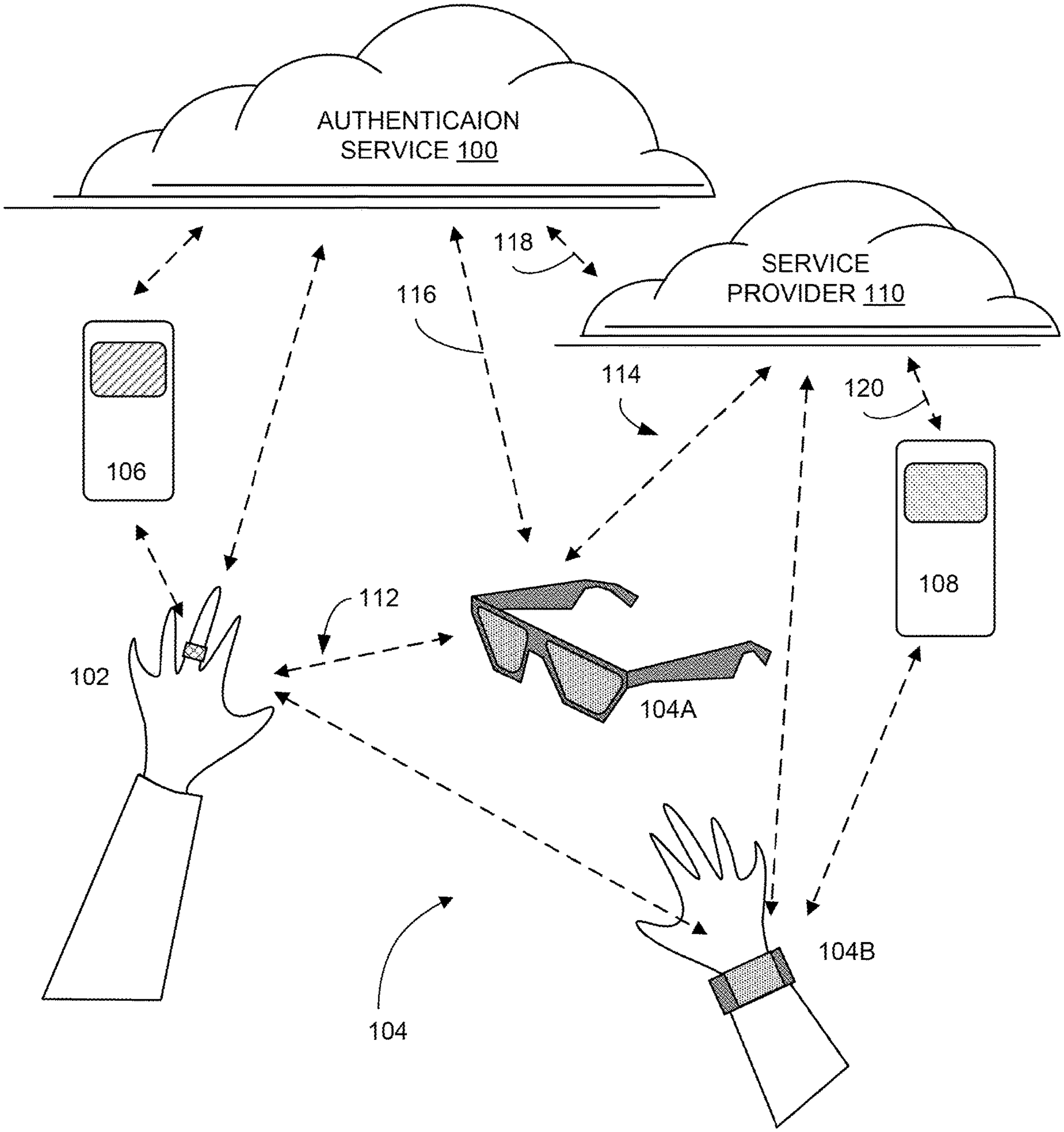

AUTHENTICAION
SERVICE 100
SERVICE
PROVIDER 110
118
116
114
120
106
108
112
102
104A
104B
104

FIG. 1

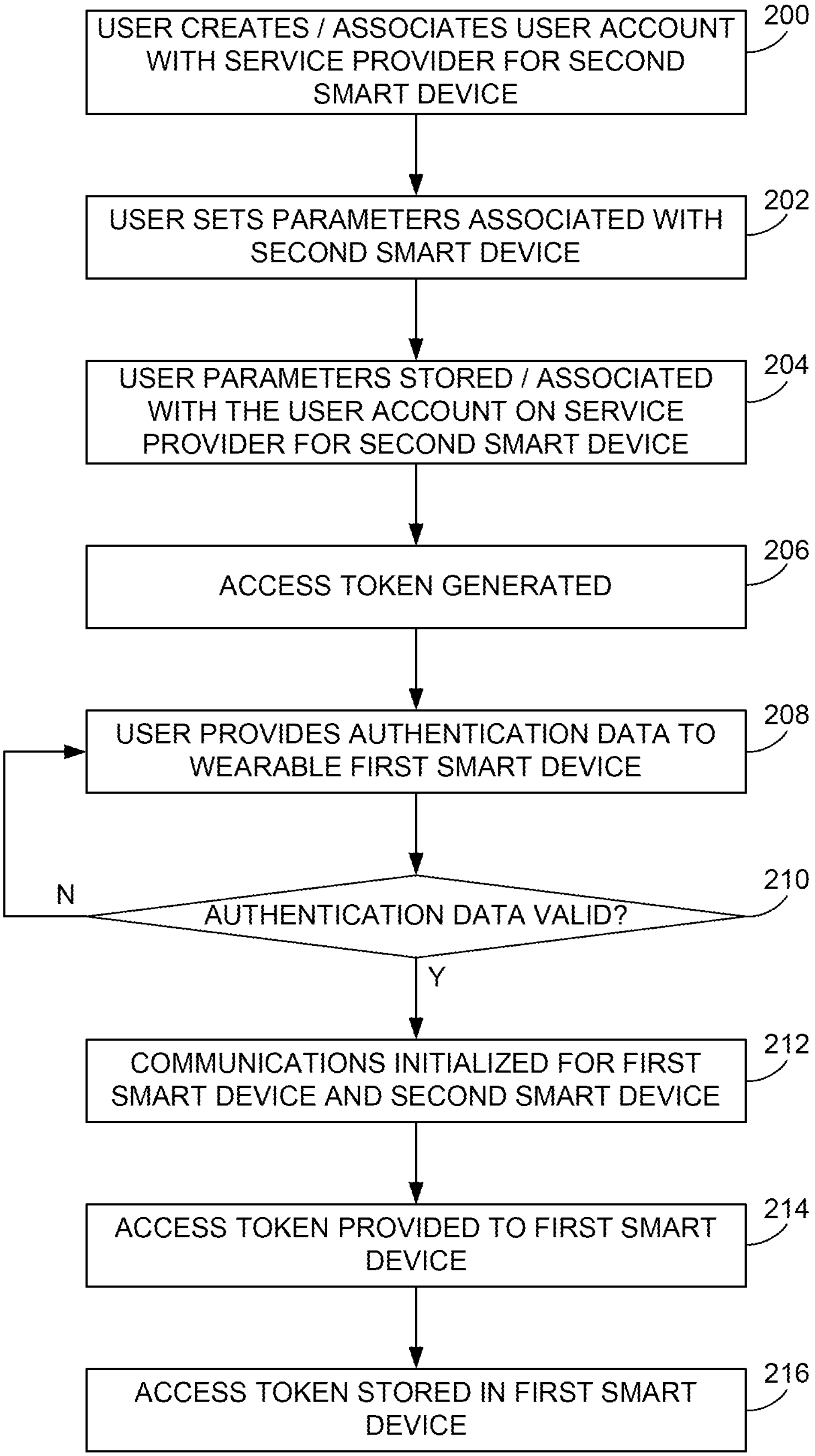

USER CREATES / ASSOCIATES USER ACCOUNT WITH SERVICE PROVIDER FOR SECOND SMART DEVICE
200
USER SETS PARAMETERS ASSOCIATED WITH SECOND SMART DEVICE
202
USER PARAMETERS STORED / ASSOCIATED WITH THE USER ACCOUNT ON SERVICE PROVIDER FOR SECOND SMART DEVICE
204
ACCESS TOKEN GENERATED
206
USER PROVIDES AUTHENTICATION DATA TO WEARABLE FIRST SMART DEVICE
208
AUTHENTICATION DATA VALID?
210
N
Y
COMMUNICATIONS INITIALIZED FOR FIRST SMART DEVICE AND SECOND SMART DEVICE
212
ACCESS TOKEN PROVIDED TO FIRST SMART DEVICE
214
ACCESS TOKEN STORED IN FIRST SMART DEVICE
216

FIG. 2

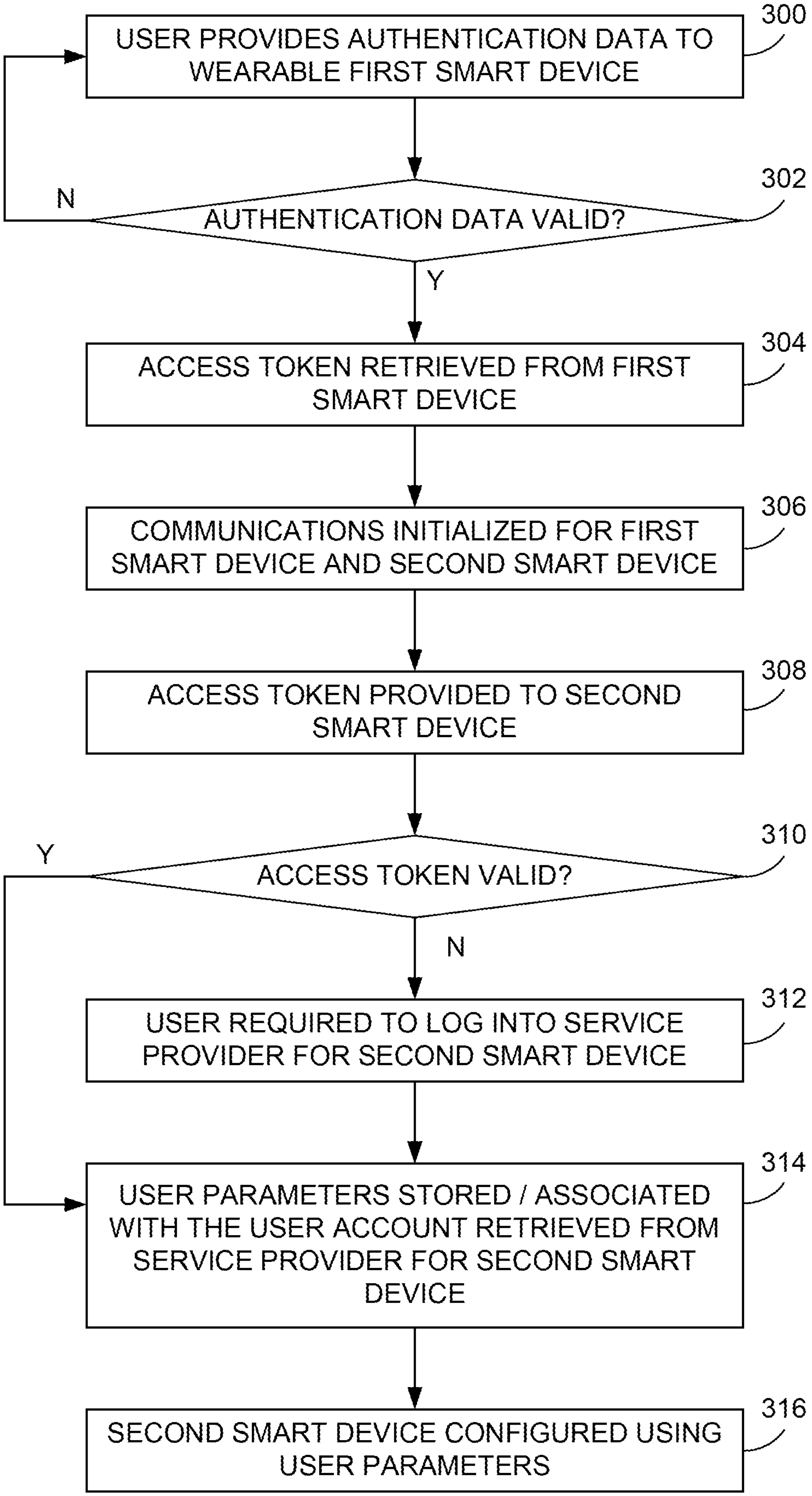

300
USER PROVIDES AUTHENTICATION DATA TO WEARABLE FIRST SMART DEVICE
302
AUTHENTICATION DATA VALID?
N
Y
304
ACCESS TOKEN RETRIEVED FROM FIRST SMART DEVICE
306
COMMUNICATIONS INITIALIZED FOR FIRST SMART DEVICE AND SECOND SMART DEVICE
308
ACCESS TOKEN PROVIDED TO SECOND SMART DEVICE
310
ACCESS TOKEN VALID?
Y
N
312
USER REQUIRED TO LOG INTO SERVICE PROVIDER FOR SECOND SMART DEVICE
314
USER PARAMETERS STORED / ASSOCIATED WITH THE USER ACCOUNT RETRIEVED FROM SERVICE PROVIDER FOR SECOND SMART DEVICE
316
SECOND SMART DEVICE CONFIGURED USING USER PARAMETERS

FIG. 3

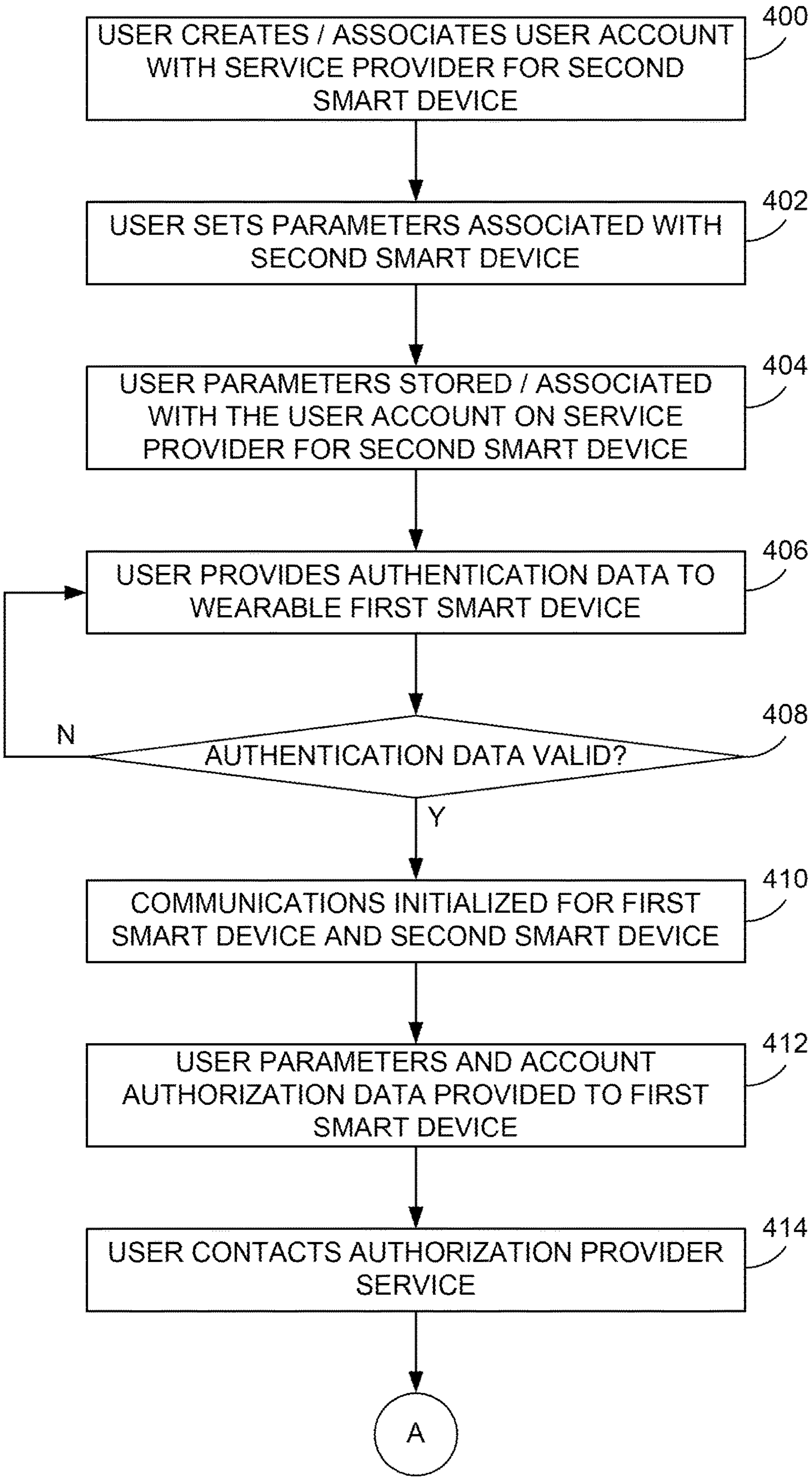

USER CREATES / ASSOCIATES USER ACCOUNT WITH SERVICE PROVIDER FOR SECOND SMART DEVICE
400
USER SETS PARAMETERS ASSOCIATED WITH SECOND SMART DEVICE
402
USER PARAMETERS STORED / ASSOCIATED WITH THE USER ACCOUNT ON SERVICE PROVIDER FOR SECOND SMART DEVICE
404
USER PROVIDES AUTHENTICATION DATA TO WEARABLE FIRST SMART DEVICE
406
AUTHENTICATION DATA VALID?
408
N
Y
COMMUNICATIONS INITIALIZED FOR FIRST SMART DEVICE AND SECOND SMART DEVICE
410
USER PARAMETERS AND ACCOUNT AUTHORIZATION DATA PROVIDED TO FIRST SMART DEVICE
412
USER CONTACTS AUTHORIZATION PROVIDER SERVICE
414
A

FIG. 4A

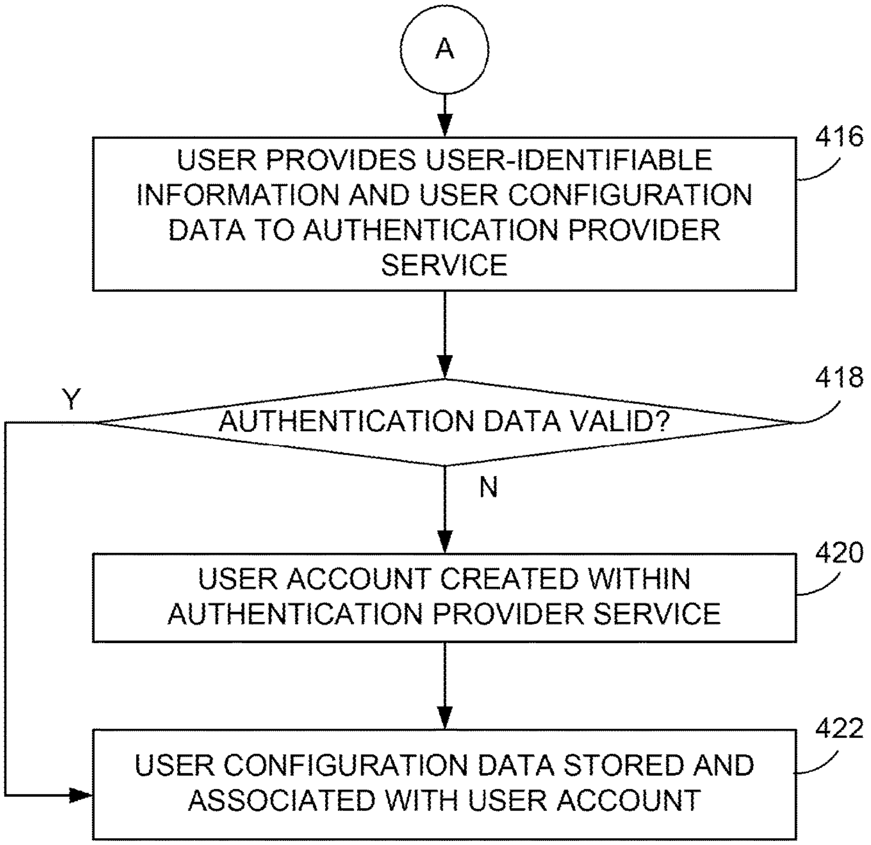

A
USER PROVIDES USER-IDENTIFIABLE INFORMATION AND USER CONFIGURATION DATA TO AUTHENTICATION PROVIDER SERVICE
416
AUTHENTICATION DATA VALID?
418
Y
N
USER ACCOUNT CREATED WITHIN AUTHENTICATION PROVIDER SERVICE
420
USER CONFIGURATION DATA STORED AND ASSOCIATED WITH USER ACCOUNT
422

FIG. 4B

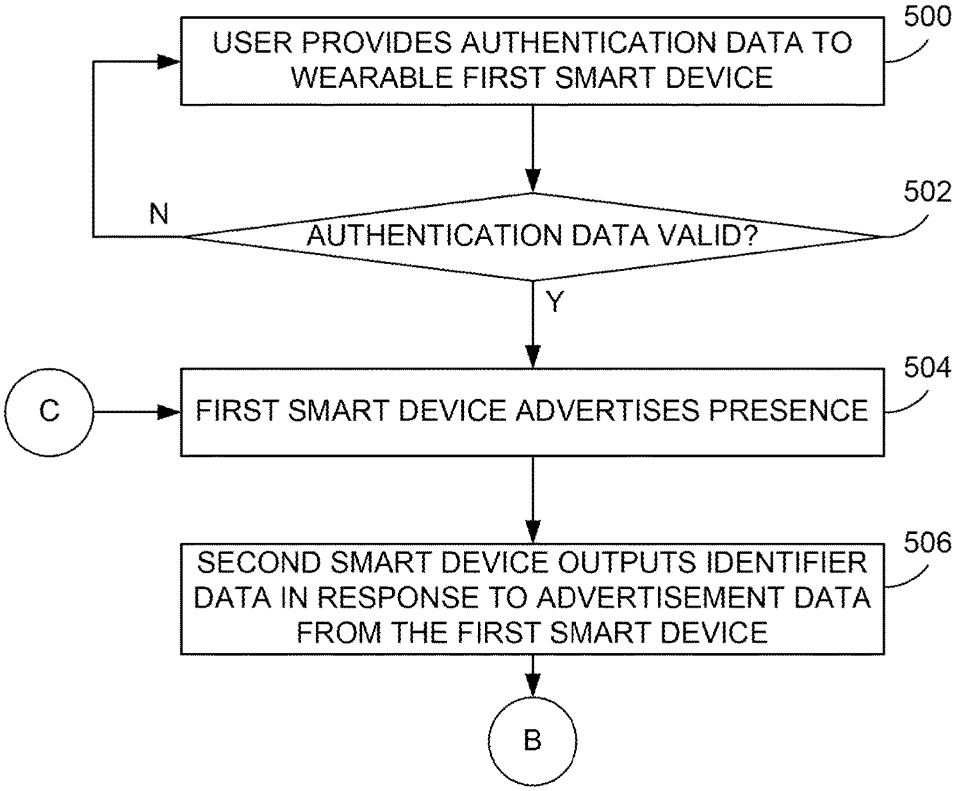

USER PROVIDES AUTHENTICATION DATA TO WEARABLE FIRST SMART DEVICE
500
AUTHENTICATION DATA VALID?
502
N
Y
C
FIRST SMART DEVICE ADVERTISES PRESENCE
504
SECOND SMART DEVICE OUTPUTS IDENTIFIER DATA IN RESPONSE TO ADVERTISEMENT DATA FROM THE FIRST SMART DEVICE
506
B

FIG. 5A

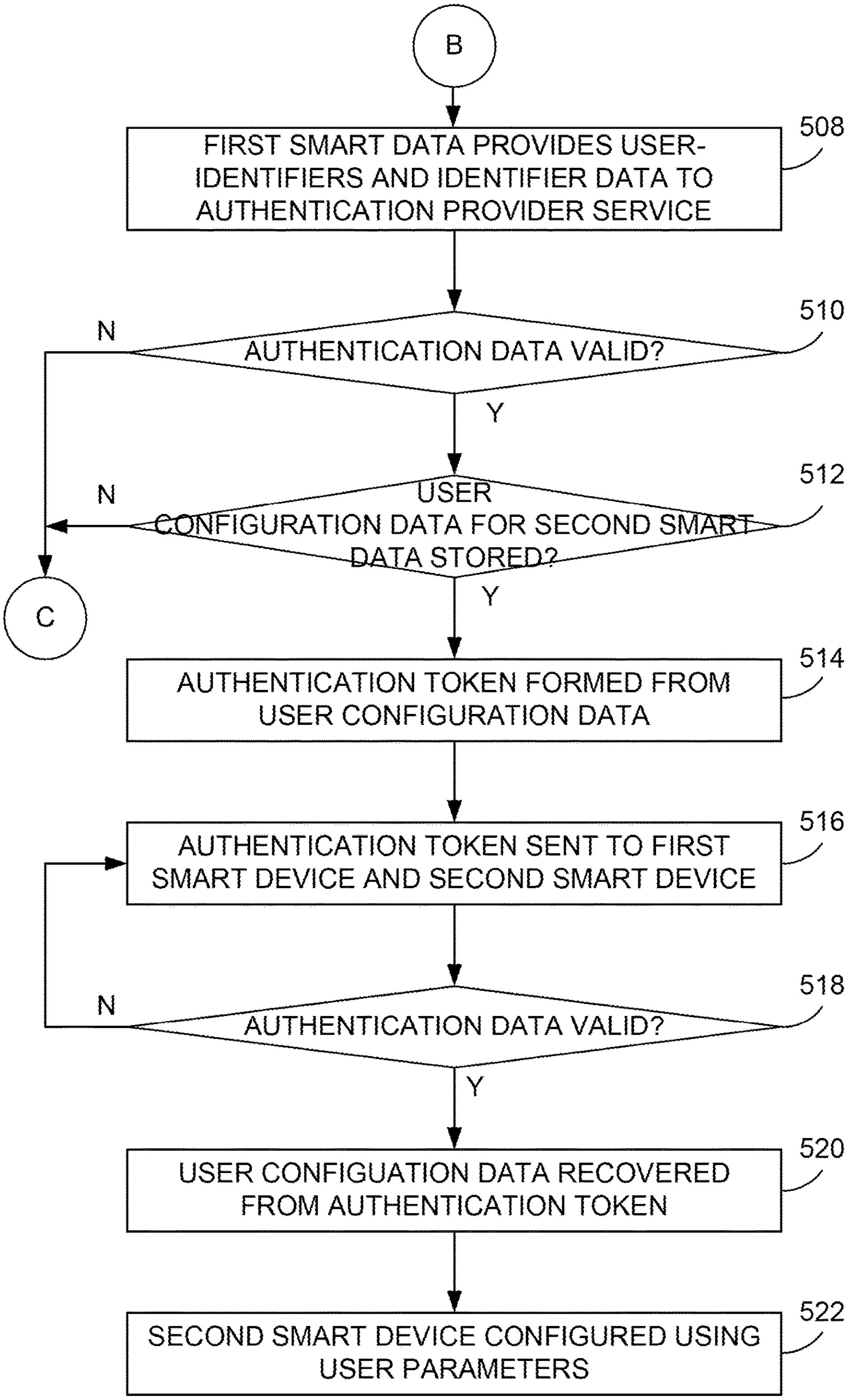

B
FIRST SMART DATA PROVIDES USER-IDENTIFIERS AND IDENTIFIER DATA TO AUTHENTICATION PROVIDER SERVICE
508
AUTHENTICATION DATA VALID?
510
N
Y
USER CONFIGURATION DATA FOR SECOND SMART DATA STORED?
512
N
Y
C
AUTHENTICATION TOKEN FORMED FROM USER CONFIGURATION DATA
514
AUTHENTICATION TOKEN SENT TO FIRST SMART DEVICE AND SECOND SMART DEVICE
516
AUTHENTICATION DATA VALID?
518
N
Y
USER CONFIGUATION DATA RECOVERED FROM AUTHENTICATION TOKEN
520
SECOND SMART DEVICE CONFIGURED USING USER PARAMETERS
522

FIG. 5B

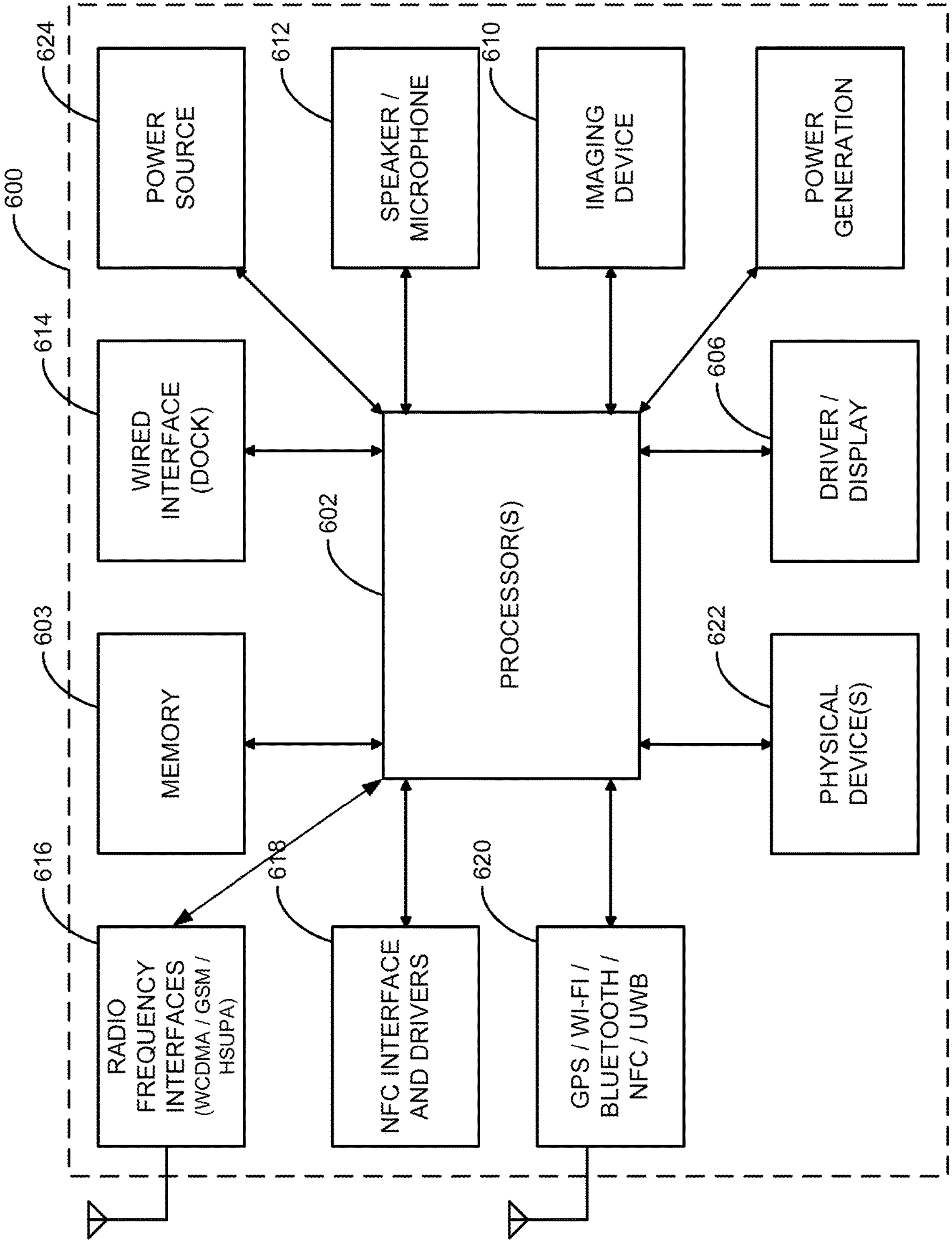

600
624
POWER SOURCE
612
SPEAKER / MICROPHONE
610
IMAGING DEVICE
POWER GENERATION
614
WIRED INTERFACE (DOCK)
606
DRIVER / DISPLAY
602
PROCESSOR(S)
603
MEMORY
622
PHYSICAL DEVICE(S)
616
RADIO FREQUENCY INTERFACES (WCDMA / GSM / HSUPA)
618
NFC INTERFACE AND DRIVERS
620
GPS / WI-FI / BLUETOOTH / NFC / UWB

FIG. 6

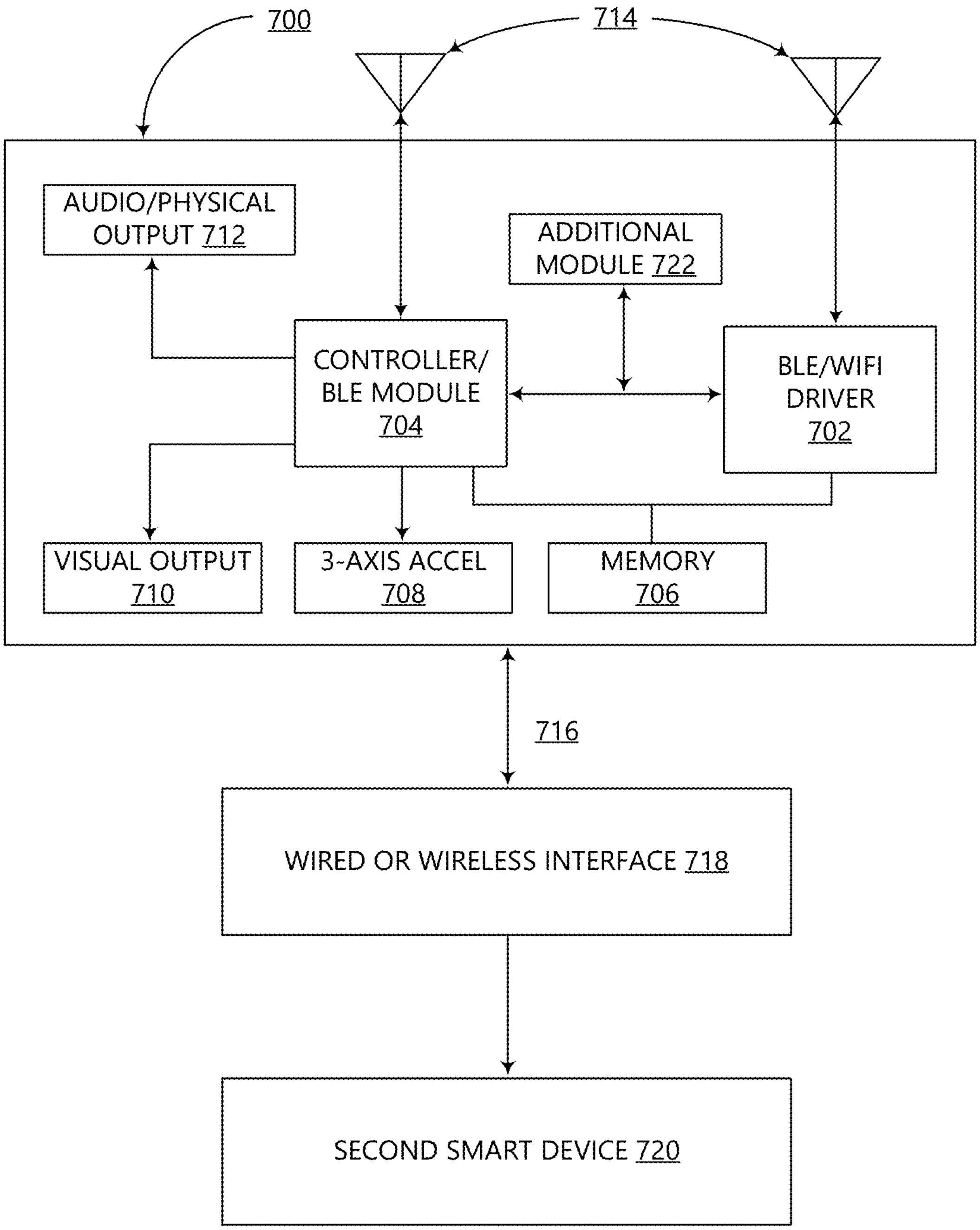

700
714
AUDIO/PHYSICAL OUTPUT 712
ADDITIONAL MODULE 722
CONTROLLER/ BLE MODULE 704
BLE/WIFI DRIVER 702
VISUAL OUTPUT 710
3-AXIS ACCEL 708
MEMORY 706
716
WIRED OR WIRELESS INTERFACE 718
SECOND SMART DEVICE 720

FIG. 7

METHODS AND APPARATUS FOR CONFIGURING WEARABLE DEVICES

CROSS-REFERENCE TO RELATED APPLICATIONS

The present invention is a non-provisional of U.S. App. No. 63/123,252 filed Dec. 9, 2020, and incorporates it by reference, for all purposes.

BACKGROUND

The present invention relates to augmented or mixed reality systems. More specifically, the present invention relates to methods and apparatus for facilitating configuration of augmented or mixed reality systems, such as smart glasses, smart earbuds, or other devices.

Currently, augmented reality devices and systems are considered novelty devices to the general public. Although some systems are being used for manufacturing, medical and military applications, the high costs of such systems has contributed to the relative low adoption rate by the general public. Even with the lower costs of consumer-grade augmented reality devices, often one device may be shared among a family, a work group, or the like.

A challenge with sharing augmented reality devices is that they often need to be manually adjusted for each user to account for differences in facial geometry, hearing capability, visual preferences, and the like. Some differences between users may be easily adjusted via a physical dial (e.g. adjusting for head circumference, wheel for volume, etc.). However a problem is that many of these differences require electronic adjustment or recalibration between users, that are often tiresome for the user to perform each and every time they use the devices. Because of these difficulties, it makes it less likely that users will actually use such devices.

Additionally, another challenge is that separate users of an augmented reality devices typically have separate user accounts associated therewith. As an example, a first user may have a Steam account with three programs, whereas a second user may have a Steam account with ten programs, and the like. When the different users attempt to use the augmented reality device, they will often have to logout of a previous user's account and to log into their user account, before they put on the device. The inventors of the present invention also consider these pairing functions cumbersome and also make it less likely that users will actually use such augmented reality devices.

In light of the above, what is desired are improved methods for facilitating configuration of smart devices such as augmented reality devices without the drawbacks discussed above.

SUMMARY

The present invention relates to augmented or mixed reality systems. More specifically, the present invention relates to methods and apparatus for facilitating configuration of augmented or mixed reality systems, such as smart glasses, smart earbuds, or other devices.

Some embodiments disclose methods and systems for facilitating configuration of augmented reality (AR) devices via the use of an additional user smart device (e.g. a smart ring, a smart watch, a smart fitness band, a smart phone, or the like) and a storage account or data associated with the user. In some operations, as a user specifies configuration data for the AR device, the user configuration data may be stored in a user account, typically associated with the AR device. A token associated with the user account is then generated and provided for storage in the additional user smart device. At a later time, typically when the user authenticates themselves to the additional user smart device, that additional user smart device may output the token to the AR device. The AR device then uses the token to access the user account and to provision the AR device to the user's preferences. The user may then use the AR device without having to perform significant manual configuration.

Additional embodiments disclose methods and systems for facilitating configuration of augmented reality (AR) devices via the use of an additional user smart device (e.g. a smart ring, a smart watch, a smart fitness band, a smart phone, or the like) and an authentication provider service. In operation, as a user specifies configuration data for the AR device, the user configuration data may be transmitted to the authentication provider service and associated with a user account. At a later time, typically when the user authenticates themselves to the additional user smart device, that device may enter an advertisement mode. When the AR device receives the advertisement, it sends AR identifying information to the additional smart device. In response, the additional smart device sends user-identifying information and the AR identifying information to the authentication provider service. The service determines the user account from the user-identifying information and determines user configuration data for the AR device. The authentication service provider creates a token including the user configuration data in a token payload, and provides the token to the AR system. If the AR system authenticates the token, the AR system uses the token payload to configure the AR system for the user.

Some benefits to the herein disclosed embodiments are that AR systems will be easier for users to configure and use. Accordingly, it is expected that the use and adoption of AR systems will increase leading to more development and sales of more advanced AR systems in the future. Additional benefits are believed to include a more secure and authorized access to user configuration data for AR and other smart devices.

According to an aspect, a method is disclosed. A technique may include providing with a first wearable smart device, a plurality of identification signals associated with a first user, receiving with a second wearable smart device, the plurality of identification signals, and determining with a processor of the second wearable smart device, configuration data for the second wearable smart device in response to the plurality of identification signals. A process may include configuring with the processor, the second wearable smart device in response to the configuration data, receiving with an input portion of the second wearable smart device a user input, and performing with the processor, a tangible action in response to the configuration data and to the user input.

According to another aspect, a system is disclosed. A device may include a first wearable smart device comprising a first device configured to provide a plurality of identification signals associated with a first user. An apparatus may include a second wearable smart device including a receiver configured to receive the plurality of identification signals from the first wearable smart device, a processor configured to determine configuration data for the second wearable smart device in response to the plurality of identification signals, and wherein the processor is configured to configure the second wearable smart device in response to the configuration data, and a user input portion configured to receive a user input, wherein the processor is configured to perform a tangible action for the user in response to the configuration data and to the user input.

BRIEF DESCRIPTION OF THE DRAWINGS

In order to more fully understand the present invention, reference is made to the accompanying drawings. Understanding that these drawings are not to be considered limitations in the scope of the invention, the presently described embodiments and the presently understood best mode of the invention are described with additional detail through use of the accompanying drawings in which:

FIG. **1** illustrates a system diagram according to various embodiments;

FIG. **2** illustrates a flow diagram according to various embodiments of the present invention;

FIG. **3** illustrates a flow diagram according to various embodiments of the present invention;

FIGS. **4**A-B illustrate a flow diagram according to various embodiments of the present invention;

FIGS. **5**A-B illustrate a flow diagram according to various embodiments of the present invention;

FIG. **6** is a block diagram illustrating an example of a system capable of implementing various processes in some embodiments; and

FIG. **7** is another block diagram of a portion of a reader interface according to various embodiments of the present invention.

DETAILED DESCRIPTION

FIG. **1** illustrates a block diagram according to some embodiments of the present invention. More specifically, FIG. **1** illustrates an authentication provider service **100**, e.g. cloud-based authentication provider service; a wearable first smart device **102**, e.g. a smart ring, a smart headphone, smart glasses, a smart watch, a smart tracker, an implanted smart device, and the like; and a second smart device **104**, e.g. a smart phone, a virtual reality system, an augmented or mixed reality system **104**A, a PC, a smart watch **104**B, and the like. Also illustrated in FIG. **1** are some embodiments that may include a third smart device **106** (e.g. a smart phone, PC, tablet or the like) and a fourth smart device **108** (e.g. a smart phone, PC, or the like).

In various embodiments, wearable smart device **102** may directly interact with authentication provider service **100** or indirectly, where third smart device **106** facilitates the interaction, or the like. In some embodiments, first smart device **102** may interact with authentication provider service **100** via a combination of Bluetooth, Wi-Fi, Cellular data, and the like. In various embodiments, second smart device **104** may interact directly with a smart device provider service **110** and authentication provider service **100**. For example, second smart device **104** may use a wide area network, e.g. Wi-Fi, cellular data (e.g. 4G, 5G), mesh network, wired network or the like to communicate with services **100** and **110**. In some embodiments, fourth smart device **108** may facilitate such interactions. For example, second smart device **104** may use Bluetooth, ZigBee, UWB, or the like to communicate with fourth smart device **108**. In turn, fourth smart device **108** communicates with services **100** and **110** via a wide area network, as discussed above.

In various embodiments, wearable first smart device **102** may interact with second smart device **104** in a number of wired (e.g. USB) or wireless ways, such as via optical barcode, light patterns, NFC, Bluetooth, ZigBee, Wi-Fi, UWB or the like.

FIG. **2** illustrates a flow diagram of processes according to various embodiments of the present invention. Referring to the elements in FIG. **1**, in FIG. **2**, a user initially registers themselves using a second smart device **104** or other hardware device similar to second smart device **104**, step **200**. Such embodiments may include the user creating an account with service provider **110** (e.g. Viveport, Quest Store, Steam) with second smart device **104** or linking **118** to an account with an authentication provider service **100** such as an existing account (e.g. operating system account, Windows, MacOS, etc.), an email account (Gmail, Yahoo! mail, etc.), a social media account (e.g. Facebook, Meta, Twitter, Instagram, etc.), a cloud storage account (e.g. Dropbox, Box, etc.), a device account (e.g. iTunes, Google, etc.) or the like.

Next, after the user creates an account, the user may define one or more configurations or parameters for second smart device **104**, and the like, step **202**. Examples of configurations may include, for smart listening devices (e.g. earbuds): an equalization profile, hearing parameters, volume, audio guidance parameters (e.g. specified sounds associated with specified directions, language), left/right balance, downloaded audio, and the like; for augmented/mixed reality/smart glasses: brightness and display parameters, color space and gamut, display icons, refresh rate, resolution, maps, documents, interpupillary distance (IPD), and the like; for a smart watch/fitness tracker: display parameters, device display images or wallpapers, haptic feedback, applications available, email accounts, text messages, contact lists, audio playlists, documents and other user-specified data; and the like. Generally for typical devices additional data may also include data such as: manufacturer names or identifiers, model names or identifiers, serial numbers, software version numbers, and the like. It should be understood that the types of data described above are not limited to the devices listed, for example, sounds may also be specified for smart watches, volume parameters may be specified for smart glasses, playlists may be specified for smart listening devices, and the like. The user data associated with second smart device **104** need not be static, and it is contemplated that as the user uses second smart device **104**, additional data will be included as user data for second smart device **104**.

In various embodiments, the user parameters are associated with the user account and are stored, sometimes in service provider **102**, step **204**. In one example, the user parameters may be stored in one or more data files, and the one or more data files are associated with the user account, the user parameters may be stored in a database, or the like.

In some embodiments, an access token associated with second smart device **104** may be generated, step **206**. In various examples, the authorization token may be provided directly by a service provider associated with second smart device **104** (e.g. Vive, Bose, Apple, etc.), may be an OAuth, OAuth2 token or the like, may be provided by a third-party provider (e.g. Google, Facebook, Twitter, or the like as discussed above). In some embodiments, the token may be non-expiring, and in other embodiments, the access tokens may be short-lived and have an expiration time.

In some embodiments, security of the user parameters may not be as important, so a token may be non-expiring. In such embodiments, the user parameters may include, brightness levels, IPD, volume levels, interface language, keyboard layout, localization data, and the like. In these examples, it is not typically critical if the access token is stolen or transmission of the access token may be intercepted, because important user data (e.g. email address, user names, etc.) are not associated with the access token. In some other embodiments, the access token may include a uniform resource locator (URL), a network address, or the like which may be accessed by second smart device **104** to retrieve the user preference data stored therein, a cloud storage location which may be accessed by second smart device **104** to retrieve the user configuration data stored therein, and the like. In some embodiments, these tokens may be encrypted using a private key associated with service provider **102** and encrypted using a public key associated with a user of second smart device **104**.

Subsequently, in various embodiments, the user may initialize wearable first smart device **102** or reauthorize their access to wearable first smart device **102**. This process may include a user providing biometric data to first smart device **102** and having first smart device **102** record the user biometric data as authorized biometric data in first smart device **102**. In some cases, this process may include a user providing user biometric data to first smart device **102**, step **208** and having first smart device **102** compare the user biometric data to authorized biometric data already stored in first smart device **102**, step **210**. In various examples, the biometric data may include fingerprint data, capillary image data, voice data, movement data (e.g. gesture or behavioral data), iris image data, and the like. Other types of data may include movement of first smart device **102**, e.g. two turns of a ring clockwise, three turns counter-clockwise, and one turn clockwise; pointing to the north, then south, then north, then east, then north; tapping a rhythm pattern or other pattern, e.g. "SOS" or other password in Morse code; and the like. Other types of physical manipulation are contemplated in additional embodiments.

In some embodiments, after user access to first smart device **102** is authorized, first smart device **102** and second smart device **104** may initiate communication with each other, step **212**. In some cases, the communication may be made wirelessly, e.g. Bluetooth, ZigBee, Wi-Fi, or the like. In other cases, the communication may be made via a wired connection, e.g. USB, Thunderbolt, or the like. In still other cases, the communication may be facilitated by a cloud-service, e.g. authentication provider service **100**, service provider **110**, or the like. In various embodiments, after communication is established, second smart device **104** may provide the access token to first smart device **102**, step **214**, which then stores the access token, step **216**. It is contemplated that the access token is stored in a secure location within first smart device **102**, such that the authentication token cannot be retrieved, unless the user is authenticated by first smart device **102**.

In some embodiments, as discussed above the user preference data may include non-important user data (e.g. non user-identifiable data) such as general configuration data, (e.g. inter pupillary distance (IPD), brightness preferences, etc. In such cases, the access token may directly encode or represent such user preference data. Further, this access token may be reduced to a tangible form, such as an optical barcode, QR code, or the like that can be easily output or displayed by first smart device **102**. In some examples, the optical barcode may be displayed on a display of wearable first smart device **102**, the optical barcode may be printed on to a sticker, or the like and affixed to first smart device **102**, or the like. Additionally, in some embodiments described below, the token may be reduced to a pattern of light signals output by wearable first smart device **102** and observable to other smart devices (e.g. **104**A). Alternatively, the token data may be stored in first smart device **102** and can be output via NFC communication signals in response to NFC query signals from second smart device **104**.

FIG. **3** illustrates a flow diagram according to various embodiments of the present invention. The steps describe below may occur after the process illustrated in FIG. **2**, for example, one hour later, one day later, or the like. As discussed above, an access token associated with the user and second smart device **104** is stored in first smart device **102** in step **214**, and may be valid for a limited period of time.

In various embodiments, the user enters authorization data/biometric data to first smart device **102**, step **300**. As discussed above, this data may include a combination of one or more of: fingerprints, gesture data, motion data, tapping patterns, or the like. In some cases, the process in FIG. **3** continues if first smart device **102** determines that the authorization data is valid. step **302**.

In various embodiments, the access token previously provided by second smart device may be retrieved form a secure memory portion of first smart device **102**, step **304**. As discussed above, in some embodiments, the access token provides access to user-identifiable data, in some embodiments, the access token may store user preference data that does not contain user-identifiable data (e.g. user names, email address, etc.), in some embodiments, combinations of the above embodiments may be used, and the like.

Next, in various embodiments, first smart device **102** and second smart device **104** (e.g. **104**A, **104**B, etc.) may initiate communication **112** with each other, step **306**. As disclosed above, in some cases, the communication may be made wirelessly, e.g. Bluetooth, ZigBee, Wi-Fi, NFC or the like; in other cases, the communication may be made via a wired connection, e.g. USB. Thunderbolt, or the like; and in still other cases, the communication may be facilitated by a cloud-service, e.g. authentication provider service **100**, service provider **110**, or the like. In various embodiments, after communication is established, first smart device **102** provides the access token to second smart device **102**, step **308**.

As examples of the transfer process, first smart device **102** may initiate contact with second smart device **104** via BLE and after appropriate handshaking, first smart device **102** may transfer the access token data to second smart device **104**. In another example, second smart device **104** may output NFC signals (e.g. electromagnetic signals) to first smart device **102**, and in response (after any appropriate security handshaking) first smart device **102** may output the access token via NFC signals to second smart device **104**. In another example, the token data may be visible on the surface of first smart device **102** in the form of an optical barcode (via a sticker, a display, or the like), and second smart device **104** may capture the optical barcode via a camera, or the like. In yet another example, first smart device **102** may have one or more LED lights that output visible (or IR) light signals, and second smart device **104** may use a camera to capture the light signals. As an example, the LED lights may be used to output a string of light pulses (formatted in an agreed format) that are captured by a camera or optical sensor of second smart device **104**. In some embodiments, these string of light pulses may encode the access token data discussed herein.

In some embodiments, the token may be decrypted to recover a payload. As examples, the token may be decrypted using a public key of service provider, a public key associated with a user of first smart device **102**, a private key associated with second smart device **104**, a combination of the above, and the like.

In some embodiments, second smart device **104** also determines whether the access token is valid, step **310**. In some cases the access token may have been valid, but now has expired; in some cases the access token is not recognized (i.e. the user of first smart device **102** has not registered an account with second smart device **104**); and the like. In some cases where the access token is invalid, the user may be asked to manually log into second smart device **104**, to create an account, or the like, step **312**. In cases where the access token is considered valid, the access token may be used to authorize second smart device **104** to retrieve user preference data, and the like, **114**, step **314**. As mentioned above, in some cases the token may, in part or in whole, directly represent the user preference data (i.e. parameters associated with the user), or the like

In some embodiments, the token may include a location or a pointer to where the user preference data may be retrieved, or the like. As an example of this embodiment, second smart device **104** may request and receive the encrypted data **116**, associated with the user from service provider **100**. That encrypted data may then be decrypted within second smart device **104** using a public key of service provider **100**, a private key of smart device **104**, and the like. In one embodiment, encrypted data that is provided, **112**, by device **102** to **112** may include a key associated with the user, a user account identifier (associated with service **100** or **110**), and the like. In some embodiments, the encrypted data may also include a file location, the service provider, or the like within service provider **100** or **110**. In some embodiments, using the user account identifier, the specified file location, or the like, service provider **100** or **110** may provide one or more additional encrypted data files associated with the user. Next, using one or more keys discussed above (e.g. key associated with the user, etc.) the additional encrypted data files may be decrypted and the user preferences, accounts, etc. associated with second smart device **104** may be recovered.

In various embodiments, the user preference data may be used to configure or provision second smart device **104**, step **316**. For example, the user preference data may include logging into a user account to determine which software is licensed for the user to use; to setup physical parameters of second smart device **104** (e.g. volume, images, etc.); to log into email, messaging, social media accounts, or the like. In some embodiments, the user may have to enter/reenter a password, passcode, PIN, or the like in second smart device **104** before the user may use second smart device **104**. In various embodiments, second smart device **104** is then configured appropriately for use by the user. The user may then use the second smart device **104**. For example, the user may request video or audio data to be played, the user may run one or more programs, and the like.

FIGS. **4**A-B illustrate another flow diagram according to some embodiments of the present invention. Referring to the elements in FIG. **1**, in FIGS. **4**A-B, a user initially registers with second smart device **104** or other hardware device similar to second smart device **104** (e.g. **108**), step **400**. Such embodiments may include the user creating an account with service provider **110** for second smart device **104**, or linking **118** to an account with an authentication provider service **100** such as described above, or an authentication provider service provided by the assignee of the present patent application.

Next, after the user creates an account, the user may define one or more configurations or parameters for second smart device **104**, and the like, step **402**. As discussed above, the user configuration data may include: an equalization profile, hearing parameters, volume, audio guidance parameters, left/right balance, downloaded audio, brightness and display parameters, display icons, specified visual guidance directions, maps, documents, interpupillary distance (IPD), display parameters, device display images or wallpapers, applications available, email accounts, text messages, contact lists, audio playlists, documents and other user-specified data, device hardware and software identifiers, and the like. In some examples, the configuration data may also include: manufacturer names or identifiers, model names or identifiers, serial numbers, software version numbers, and the like.

These user parameters may be uploaded (e.g. **120**) and associated with the user account and may be stored in service provider **110**, step **404**. In one example, the user parameters may be stored in one or more data files associated with the user account.

Next, in various embodiments, the user may initialize wearable first smart device **102** or reauthorize their access to wearable first smart device **102**. This process may include a user providing biometric data to first smart device **102** and having first smart device **102** record the user biometric data as authorized biometric data in first smart device **102**. In some cases, this process may include a user providing user biometric data to first smart device **102**, step **406** and having first smart device **102** compare the user biometric data to authorized biometric data already stored in first smart device **102**, step **408**. As mentioned above, the biometric data may include fingerprint data, capillary image data, voice data, movement data (e.g. gesture or behavioral data), iris image data, and the like. Other types of data may include movement of first smart device **102**, e.g. two turns of a ring clockwise, three turns counter-clockwise, and one turn clockwise; pointing to the north, then south, then north, then east, then north; tapping a rhythm or the like.

In some embodiments, after user access to first smart device **102** is authorized, first smart device **102** and second smart device **104** may initiate communication with each other, **112**, step **410**. In some cases, the communication may be made wirelessly, e.g. Bluetooth, ZigBee, Wi-Fi, or the like. In other cases, the communication may be made via a wired connection, e.g. USB, Thunderbolt, or the like. In some embodiments, after communication is established, second smart device **104** may provide the captured user configuration or preference data, which may also include an access token or authorization data associated with service provider **110**, to first smart device **102**, step **412**.

In various embodiments, first smart device **102** then contacts authentication provider service **100**, step **414**, and provides user-identifiable data, step **416**. In some cases, first smart device **102** may communicate directly with authentication provider service **100**, via wide area network (e.g. Wi-Fi, Ethernet, etc.). In other cases, first smart device **102** communicates the user configuration data (possibly including user account login token), and the like to third smart device **106** via short-range communications (e.g. Bluetooth, UWB, NFC, wired interface), or the like, and third smart device **106** communicates with authentication provider service **100** via wide area network. In some embodiments where third smart device **106** facilitates the communication, an executable application under development by the current assignee of the present application may run upon third smart device **106**. The application directs the processor of the third smart device to provide user data including user-identifiable information, e.g. the user's email address, telephone number, a user name, or the like, and the user configuration data that was received in step **412**, above. In other examples, the authentication provider service first authenticates the user, via user-identifiable information, before the user configuration data is provided.

In some embodiments, the user-identifiable information is compared to accounts stored within authentication provider service **100**, step **418**. If no associated user account is found, an account within authentication provider service **100** may be created, step **420**. If a user account is found, the user configuration data provided in step **416** is stored in an account associated with the user-identifiable information, step **422**.

FIGS. **5**A-B illustrates a flow diagram according to various embodiments of the present invention. The steps describe below may happen after the process illustrated in FIGS. **4**A-B, for example, one hour later, one day later, or the like.

In various embodiments, the user enters authorization data/biometric data to first smart device **102**, step **500**. As discussed above, this data may include a combination of one or more of: fingerprints, gesture data, motion data, tapping patterns, or the like. In some cases, the process in FIGS. **5**A-B continue if first smart device **102** determines that the authorization data is valid. step **502**.

Next, first smart device **102** may then begin providing advertisement signals, step **504**. In various examples, the advertisement signals may be provided on via a short-range transceiver, e.g. Bluetooth, UWB, ZigBee, NFC or the like. In some cases, the advertisement signals may not be permanently associated with first smart device. In other words, the advertisement signals are ephemeral identifiers. Next, second smart device **104** receives the advertisement signals, and outputs identifier data, step **506**. In some examples, the identifier data may identify the type of device (e.g. AR goggles, smart glasses), the manufacturer of the device (e.g. Oculus, Bose, etc.), a model of the device (e.g. iPhone 12 mini), a serial number or other identifier, a time stamp, a nonce, and the like. This communication may use the same short-range communication means discussed above, or the like.

In various embodiments, first smart device **110** may provide the identifier data along with user-identifiable information (such as previously provided in step **416**, for example) to authentication provider service, step **508**. As discussed above, in some embodiments, first smart device **102** may communicate directly with authentication provider service **100**, and in other embodiments, first smart device **102** may use the application running upon third smart device **104** to facilitate communication with authentication provider service **100**. Any combination of short-range (e.g. BLE, UWB, NFC) or wide area (e.g. Wi-Fi, cellular data) communications channels may be used for these data transfers.

In some embodiments, authentication provider service **100** determines if the user-identifier is authorized to access a user account within authentication provider service **100**, step **510**. This process may include two determinations: if the user-identifier is associated with a user account in authentication provider service **100**, and if the user is authorized to access the user account. The later determination may be used in cases where user access to authentication provider service **100** is provided by subscription service (e.g. software as a service), by corporate or individual policies, or the like.

In various embodiments, if access to the user account is provided, authentication provider service may determine whether any user configuration data associated with second smart device **104** is stored therein, step **512**. In some embodiments, this determination may use some of the identifier data of second smart device **104** received by first smart device **102** in step **506**, above. For example, authentication provider service **100** may use the model identifier/product identifier, e.g. Bose/Audio Sunglasses, Apple/iPhone 12 pro, Google/Glass, or the like, to determine whether the user has any associated user configuration data stored for a specific device within authentication provider service **100**.

As illustrated in FIG. **5**B, if the user configuration data exists, authentication provider service **100** forms an authentication token including the user configuration data within a payload section of the token, step **514**. In some examples, the payload section may be encrypted with a private key of authentication provider service **100**, a public or private key associated with the user, or the like. The authentication token may then be returned to first smart device **102**, possibly facilitated by third smart device **108**, using the same communications channels discussed above, and in turn, first smart device **102** may communicate the authentication token to second smart device **104**, step **516**. In various embodiments, this communication may be via methods described above, including Bluetooth, UWB, ZigBee, a wired connection, NFC, barcode, light pattern, or the like, discussed above.

In various embodiments, second smart device may determine whether the authentication token is authentic, step **518**. In some examples, second smart device may use a public key associated with authentication provider service, or other key, to decrypt the authentication token to recover a time stamp, a nonce, and other payload data. The time stamp and the nonce may be used by second smart device to ensure the token has not expired, has not already been used, and the like. In various embodiments, the payload data may include the user configuration or preference data for second smart device, step **520**.

In various embodiments, the user preference data may then be used to configure or provision second smart device **104**, step **522**. For example, the user preference data may include logging into a user account to determine which software is licensed for the user to use; to setup physical parameters of second smart device **104** (e.g. volume, images, etc.); to log into email, messaging, social media accounts, or the like. In some embodiments, the user may have to enter/reenter a password, passcode, PIN, or the like in second smart device **104** before the user may use second smart device **104**. In various embodiments, the user then may use the appropriately configured second smart device **104**. For example, the user may wear smart earbuds (second smart device **104**) to playback text from the user's documents, e-mail, purchased audio books, and the like; the user may have augmented reality glasses (second smart device **104**) run applications that the user has previously purchased, display heads-up diagrams of devices they are servicing, and the like; the user may have their smart phone provisioned with applications licensed by a company the user works for, with the user's personal audio playlists, with the user identifying information, and the like.

FIG. **6** illustrates a functional block diagram of various embodiments of the present invention. More specifically, it is contemplated that wearable devices, smart devices, PCs and cloud-based servers may be implemented with a subset or superset of the components illustrated in FIG. **6**.

In FIG. **6**, a computing device **600** may include some, but not necessarily all of the following components: an applications processor **602**, memory **604**, a display **606**, an image acquisition device **610**, audio input/output devices **612**, and the like. Additional communications from and to computing device **600** can be provided by via a wired interface **614** (e.g. dock, plug, controller interface to peripheral devices); a GPS/Wi-Fi Bluetooth interface/UWB **616**; an NFC interface (e.g. antenna or coil) and driver **618**; RF interfaces and drivers **620**, and the like. Also included in some embodiments are physical sensors **622** (e.g. (MEMS-based) accelerometers, gyros, magnetometers, pressure sensors, temperature sensors, bioimaging sensors etc.).

In various embodiments, computing device **600** may be a computing device (e.g. Apple iPad, Microsoft Surface, Samsung Galaxy Note, an Android Tablet); a smart phone (e.g. Apple iPhone, Google Pixel, Samsung Galaxy **5**); a portable computer (e.g. netbook, laptop, convertible), a media player (e.g. Apple iPod); a reading device (e.g. Amazon Kindle); a smart fitness tracker (e.g. Fitbit, Apple Watch, Garmin or the like); a smart headset or AR glasses (e.g. Oculus Rift, HTC Vive, Sony PlaystationVR, Magic Leap, Microsoft HoloLens); a smart wearable device (e.g. Motiv smart ring, smart headphones); an implanted device (e.g. smart device medical), an POS device, a server or the like. Typically, computing device **600** may include one or more processors **602**. Such processors **602** may also be termed application processors, and may include a processor core, a video/graphics core, and other cores. Processors **602** may include processor from Apple (A13, A14), NVidia (Tegra), Intel (Core), Qualcomm (Snapdragon), Samsung (Exynos), ARM (Cortex), MIPS technology, a microcontroller, and the like. In some embodiments, processing accelerators may also be included, e.g. an AI accelerator, Google (Tensor processing unit), a GPU, or the like. It is contemplated that other existing and/or later-developed processors/microcontrollers may be used in various embodiments of the present invention.

In various embodiments, memory **604** may include different types of memory (including memory controllers), such as flash memory (e.g. NOR, NAND), SRAM, DDR SDRAM, or the like. Memory **604** may be fixed within computing device **600** and may include removable (e.g. SD, SDHC, MMC, MINI SD, MICRO SD, CF, SIM). The above are examples of computer readable tangible media that may be used to store embodiments of the present invention, such as computer-executable software code (e.g. firmware or application programs that are executable upon processor **602**), security applications, application data, operating system data, databases or the like. Additionally, in some embodiments, a secure device including secure memory and/or a secure processor are provided to store data described above. It is contemplated that other existing and/or later-developed memory and memory technology may be used in various embodiments of the present invention.

In various embodiments, display **606** may be based upon a variety of later-developed or current display technology, including LED or OLED status lights; touch screen technology (e.g. resistive displays, capacitive displays, optical sensor displays, electromagnetic resonance, or the like); and the like. Additionally, display **606** may include single touch or multiple-touch sensing capability. Any later-developed or conventional output display technology may be used for embodiments of the output display, such as LED IPS, OLED, Plasma, electronic ink (e.g. electrophoretic, electrowetting, interferometric modulating), or the like. In various embodiments, the resolution of such displays and the resolution of such touch sensors may be set based upon engineering or non-engineering factors (e.g. sales, marketing, physical space). In some embodiments, display **606** may integrated into computing device **600** or may be separate.

In some embodiments of the present invention, acquisition device **610** may include one or more sensors, drivers, lenses and the like. The sensors may be visible light, infrared, and/or UV sensitive sensors that are based upon any later-developed or convention sensor technology, such as CMOS, CCD, or the like. In some embodiments of the present invention, image recognition algorithms, image processing algorithms or other software programs for operation upon processor **602**, to process the image data. For example, such software may pair with enabled hardware to provide functionality such as: facial recognition (e.g. Face ID, head tracking, camera parameter control, or the like); fingerprint capture/analysis; blood vessel capture/analysis; iris scanning capture/analysis; otoacoustic emission (OAE) profiling and matching; and the like. In various embodiments of the present invention, imaging device **610** may provide user input data in the form of a selfie, biometric data, or the like.

In various embodiments, audio input/output **612** may include conventional microphone(s)/speakers. In various embodiments, voice processing and/or recognition software may be provided to applications processor **602** to enable the user to operate computing device **600** by stating voice commands. In various embodiments of the present invention, audio input **612** may provide user input data in the form of a spoken word or phrase, or the like, as described above. In some embodiments, audio input/output **612** may be integrated into computing device **600** or may be separate.

In various embodiments, wired interface **614** may be used to provide data or instruction transfers between computing device **600** and an external source, such as a computer, a remote server, a POS server, a local security server, a storage network, another computing device **600**, a client device, a peripheral device to control, or the like. Embodiments may include any later-developed or conventional physical interface/protocol, such as: USB, micro USB, mini USB, USB-C, Firewire, Apple Lightning connector, Ethernet, POTS, custom dock, or the like. In some embodiments, wired interface **614** may also provide electrical power, or the like to power source **624**, or the like. In other embodiments interface **614** may utilize close physical contact of device **600** to a dock for transfer of data, magnetic power, heat energy, light energy, laser energy or the like. Additionally, software that enables communications over such networks is typically provided.

In various embodiments, a wireless interface **616** may also be provided to provide wireless data transfers between computing device **600** and external sources, such as computers, storage networks, headphones, microphones, cameras, or the like. As illustrated in FIG. **6**, wireless protocols may include Wi-Fi (e.g. IEEE 802.11 a/b/g/n, WiMAX), Bluetooth, Bluetooth Low Energy (BLE) IR, near field communication (NFC), ZigBee, Ultra-Wide Band (UWB), Wi-Fi-6, mesh communications, NFC and the like.

GPS receiving capability may also be included in various embodiments of the present invention. As illustrated in FIG. **6**, GPS functionality is included as part of wireless interface **616** merely for sake of convenience, although in implementation, such functionality may be performed by circuitry that is distinct from the Wi-Fi circuitry, the Bluetooth circuitry, and the like. In various embodiments of the present invention, GPS receiving hardware may provide user input data in the form of current GPS coordinates, or the like, as described above.

Additional wireless communications may be provided via RF interfaces in various embodiments. In various embodiments. RF interfaces **618** may support any future-developed or conventional radio frequency communications protocol, such as CDMA-based protocols (e.g. WCDMA), GSM-based protocols, HSUPA-based protocols, G4, G5, or the like. In some embodiments, various functionality is provided upon a single IC package, for example the Marvel PXA330 processor, and the like. As described above, data transmissions between a smart device and the services may occur via Wi-Fi, a mesh network, 4G, 5G, or the like.

In various embodiments, any number of future developed, current operating systems, or custom operating systems may be supported, such as iPhone OS (e.g. iOS), Google Android, Linux, Windows, MacOS, or the like. In various embodiments of the present invention, the operating system may be a multi-threaded multi-tasking operating system, e.g. RingOS, currently under development by the current assignee of the present application. Accordingly, inputs and/or outputs from and to display **606** and inputs/or outputs to physical sensors **622** may be processed in parallel processing threads. In other embodiments, such events or outputs may be processed serially, or the like. Inputs and outputs from other functional blocks may also be processed in parallel or serially, in other embodiments of the present invention, such as acquisition device **610** and physical sensors **622**.

In some embodiments of the present invention, physical sensors **622** (e.g. MEMS-based) accelerometers, gyros, magnetometers, pressure sensors, temperature sensors, imaging sensors (e.g. blood oxygen, heartbeat, blood vessel, iris data, etc.), thermometer, otoacoustic emission (OAE) testing hardware, and the like may be provided. The data from such sensors may be used to capture data associated with device **600**, and a user of device **600**. Such data may include physical motion data, pressure data, orientation data, or the like. Data captured by sensors **622** may be processed by software running upon processor **602** to determine characteristics of the user, e.g. gait, gesture performance data, or the like and used for user authentication purposes. In some embodiments, sensors **622** may also include physical output data, e.g. vibrations, pressures, and the like.

In some embodiments, a power supply **624** may be implemented with a battery (e.g. LiPo), ultracapacitor, or the like, that provides operating electrical power to device **600**. In various embodiments, any number of power generation techniques may be utilized to supplement or even replace power supply **624**, such as solar power, liquid metal power generation, thermoelectric engines, rf harvesting (e.g. NFC) or the like.

FIG. **6** is representative of components possible for a smart reader, a smart device, an authentication server, a wearable smart device (e.g. a smart ring, an AR system) and the like for embodying the present invention. It will be readily apparent to one of ordinary skill in the art that many other hardware and software configurations are suitable for use with the present invention. Embodiments of the present invention may include at least some but need not include all of the functional blocks illustrated in FIG. **6**. For example, a smart phone (e.g. access control device) configured to perform may of the functions described above includes most if not all of the illustrated functionality. As another example, a wearable device, e.g. a smart ring (electronic devices enclosed in a ring-shaped shell, enclosure, or form factor), may include some of the functional blocks in FIG. **6**, but it need not include a high-resolution display **630** or a touch screen, a speaker/microphone **660**, or the like. In still other examples, a cloud-based server or a virtual machine (VM) may not include image acquisition device **612**, MEMs devices **622**, GPS capability **616**, and the like. Further components described above may be distributed among multiple computers, virtual machines, or the like.

FIG. **7** illustrates a block diagram according to some embodiments of the present invention. More specifically, FIG. **7** illustrates a block diagram of a short-range reader device **700** that may be included within second smart device **104**, describe above. Alternatively, reader device **700** may be coupled to an existing second smart device **104** to provide the short-range transmissions discussed herein and illustrated in FIG. **1**A. In still other embodiments, some, but not necessarily all of the blocks illustrated in FIG. **7** may be implemented by existing hardware within second smart device **104**. In operation, reader device **700** may perform the short-range communications between smart device **102** and smart device **104** as illustrated in FIG. **1**. (e.g. BLE, UWB, NFC etc.).

In some embodiments, device **700** includes an rf control module **702**, a controller **704**, memory **706**, an accelerometer **708**, visual/haptic output **710**, audio output **712**, antennas **714**, interface bus **716**, and an interface module **718**. In some embodiments, controller **704** may be embodied as a Nordic nRF52832 system on a chip, suitable for controlling Bluetooth low energy (BLE) communications and UWB communications, and for performing various functionalities described herein. Controller **704** may include a processor, such as a 62-bit ARM® Cortex®-M4F CPU and include 712 kB to 74 kB RAM. In various embodiments, other types of SoC controllers may also be used, such as Blue Gecko from Silicon Labs, CC2508 from TI, or the like. Controller **702** may be embodied as a muRata 1LD Wi-Fi/BLE module, suitable for controlling Bluetooth low energy (BLE), Wi-Fi communications. Controller **702** may include a processor, such as a 62-bit ARM® Cortex®-M4. In various embodiments, other types of controllers may also be used, such as CYW43012 from Cypress, or the like. In some embodiments, modules **702** and **704** enable communication via short range communications protocols, such as BLE, ZigBee, UWB, NFC, Wi-Fi or the like. Modules **702** and **704** may also support mesh networking via BLE, Wi-Fi 7, or the like. In some embodiments, module **702** also supports Wi-Fi communications to communicate over a wide-area network (e.g. Internet).

In various embodiments, memory **706** may include non-volatile memory storing embodiments of the executable software code described herein. In some embodiments, the memory may be SRAM, Flash memory, the public key of authentication provider service, or the like. In FIG. **7**, audio/haptic output **712** is provided to give a user with audio feedback or haptic feedback and visual output **710** is provided to give a user visual feedback in response to the user approaching reader device **700**. In some embodiments, visual output **710** may be one or more LED lights having different colored outputs, may be a status display panel. The feedback may be provided to the user based upon an application running upon the smart device and interacting with reader device **700**.

Accelerometer **728** is provided in some embodiments to determine whether reader device **700** is tampered with. For example, after installed and operable on a mounting location (e.g. on a wall), accelerometer **728** monitors the orientation of accelerometer **728** with respect to gravity. If a party attempts to remove reader device **700** from a mounting surface, accelerometer **708** will be able to sense the change in orientation. Based upon the change in orientation exceeding a threshold, a number of actions may be taken by reader device **700**. One action may be to cease operation of reader device **700**, another action may be to alert a remote server of the tampering, and the like. In other embodiments, other physical sensors, e.g. pressure sensors, light sensors, gyroscopes, and the like may be used. Such embodiments may also provide tamper detection indication.

In FIG. **7**, interface **716** is used to couple reader device **700** to interface module **718**. In various embodiments, interface module **718** interfaces with any number of external functional modules, e.g. NFC reader device, or the like. In one configuration, an external functional module **720** may be second smart device **104**, or the like. In some embodiments, interface **716** may provide power to reader module **700**, interface **716** may transmit data from reader device **700** to interface module **718** (e.g. credentials), provide power or the like.

In one configuration, rf control module **702** is not used, and only one antenna **714** is provided, or vice versa; in another configuration, modules **702** and **704** are both used, and two antennas **714** are used (one specifically for scanning for ephemeral IDs within a geographic region and one specifically for handling communications with a smart device). Such embodiments are particularly useful in high volume situations wherein one antenna may receive ephemeral IDs from many different smart devices (e.g. five users walking down a hall near a security door or vending machine), whereas the other antenna will provide the credentials and receive tokens from the specific users' smart devices who want to interact with the reader (e.g. to enter the security door, to receive a good, to access a computer, receive power or the like). In other embodiments, other channels may be used to provide the above communications, such as short-range Wi-Fi, Zigbee, NFC, ANT, UWB or the like.

Further embodiments can be envisioned to one of ordinary skill in the art after reading this disclosure. For example, the first smart device may be a smart ring and the second smart device may be a game console. When the user wears and authenticates themselves to a smart ring and turns on or approaches a gaming console, the techniques described above may be used to facilitate the gaming console may automatically logging into the user's account and opening specific programs. As another example, the first smart device may be a smart watch and the second smart device may be a corporate-issue laptop computer. When the user wears and authenticates themselves to a smart watch and turns on or approaches the computer, the techniques described above may be used to facilitate the laptop automatically logging into the user's account, that has specific programs provisioned, and logging into the user's e-mail or Slack account. As still another example, the first smart device may be a smart phone and the second smart device may be a hotel television. When the user authenticates themselves to the smart phone and approaches the television, the techniques described above may be used to facilitate the television automatically logging into a user's Netflix account, or the like. In light of the present patent disclosure, it is believed that one of ordinary skill in the art will contemplate additional applications that are within the scope of embodiments of the present invention.

In other embodiments, combinations or sub-combinations of the above disclosed invention can be advantageously made. The block diagrams of the architecture and flow charts are grouped for ease of understanding. However, it should be understood that combinations of blocks, additions of new blocks, re-arrangement of blocks, and the like are contemplated in alternative embodiments of the present invention.

The specification and drawings are, accordingly, to be regarded in an illustrative rather than a restrictive sense. It will, however, be evident that various modifications and changes may be made thereunto without departing from the broader spirit and scope of the invention as set forth in the claims.

We claim:

1. A method comprising:

providing, with a first wearable smart device, a plurality of identification signals associated with a first user;

receiving, with a second wearable smart device, the plurality of identification signals;

determining, with a processor of the second wearable smart device, configuration data for the second wearable smart device in response to the plurality of identification signals, the configuration data comprising one or more user preferences associated with the first user;

configuring, with the processor, the second wearable smart device in response to the configuration data and in accordance with the one or more user preferences;

receiving, with an input portion of the second wearable smart device, a user input; and

directing, with the processor of the second wearable smart device, a tangible action to be performed in response to the configuration data and to the user input.

2. The method of claim **1**, wherein providing the plurality of identification signals comprises:

outputting, with a first transmitter of the first wearable smart device, the plurality of identification signals, wherein the first transmitter is selected from a group consisting of: an NFC tag, a Bluetooth transmitter, a Bluetooth Low Energy (BLE) transmitter, a radio frequency (RF) transmitter, a plurality of LED lights, and an optical bar code.

3. The method of claim **1**, wherein the first wearable smart device is selected from a group consisting of: a smart ring, a smart watch, and a smart fitness tracker.

4. The method of claim **1**, wherein the plurality of identification signals are selected from a group consisting of: encoded configuration data, a uniform resource locator (URL), a network address, and a storage identifier.

5. The method of claim **1**, wherein the configuration data further comprises an account associated with the first user for the first wearable smart device or the second wearable smart device, setup data associated with the first user for the second wearable smart device, or both.

6. The method of claim **1**, further comprising:

receiving, via a transceiver of the second wearable smart device, remote data associated with the first user in response to the plurality of identification signals, wherein the configuration data for the second wearable smart device is determined in response to the remote data associated with the first user.

7. The method of claim **1**, wherein providing the plurality of identification signals associated with the first user comprises:

outputting, with one or more LEDs of the first wearable smart device, a plurality of light signals, wherein the plurality of light signals are received by the second wearable smart device via an optical sensor of the second wearable smart device.

8. The method of claim **1**, wherein providing the plurality of identification signals associated with the first user comprises:

providing, with the first wearable smart device, a token associated with the first user and signed by an authentication provider service; and wherein determining the configuration data for second wearable smart device comprises:

authenticating the token with the processor of the second wearable smart device, wherein the configuration data for the second wearable smart device is determined in response to the token and to the token being authenticated.

9. The method of claim **3**, wherein the second wearable smart device is selected from a group consisting of: a mixed-reality system, an augmented-reality system, a virtual-reality system, smart glasses, and smart earbuds.

10. The method of claim **8**, further comprising:

receiving, via the processor of the second wearable smart device, user configuration data from the authentication provider service, wherein the configuration data for the second wearable smart device is determined in response to the user configuration data, the token, and to the token being authenticated.

11. A system, comprising:

a first wearable smart device comprising a first device configured to provide a plurality of identification signals associated with a first user; and

a second wearable smart device comprising:

a receiver configured to receive the plurality of identification signals from the first wearable smart device;

a processor configured to determine configuration data for the second wearable smart device in response to the plurality of identification signals, wherein the configuration data comprises one or more user preferences associated with the first user, and wherein the processor is configured to configure the second wearable smart device in response to the configuration data and in accordance with the one or more user preferences; and

a user input portion configured to receive a user input, wherein the processor is configured to direct output of a tangible action for the user in response to the configuration data and to the user input.

12. The system of claim **11**, wherein the first device comprises a first transmitter selected from a group consisting of: an NFC tag, a Bluetooth transmitter, a Bluetooth Low Energy (BLE) transmitter, an rf transmitter, a plurality of LED lights, and an optical bar code.

13. The system of claim **11**, wherein the first wearable smart device is selected from a group consisting of: a smart ring, a smart watch, and a smart fitness tracker.

14. The system of claim **11**, wherein the plurality of identification signals are selected from a group consisting of: encoded configuration data, a uniform resource locator (URL), a network address, a storage identifier, and an account identifier associated with the first user.

15. The system of claim **11**, wherein the configuration data further comprises an account identifier associated with the first user for the first wearable smart device or the second smart device, setup data associated with the first user for the second wearable smart device, or both.

16. The system of claim **11**, wherein the second wearable smart device further comprises:

a transceiver configured to receive remote data associated with the first user from a remote source in response to at least a first portion of the plurality of identification signals, wherein the processor is configured to determine the configuration in response to the remote data and at least a second portion of the plurality of identification signals.

17. The system of claim **11**, wherein the first device comprises one or more LEDs configured to provide a plurality of light signals associated with the first user, wherein the second wearable smart device further comprises an optical sensor configured to receive the plurality of light signals.

18. The system of claim **11**,

wherein the first wearable smart device comprises a first transceiver configured to provide a token associated with the first user and encrypted with a first key associated with an authentication provider service; and

wherein the second wearable smart device comprises a second transceiver configured to receive the token from the first transceiver, wherein the processor is configured to authenticate the token using a second key associated with the authentication provider service, wherein the processor is configured to determine the configuration data for the second wearable smart device in response to the token and to the token being authenticated.

19. The system of claim **13**, wherein the second wearable smart device is selected from a group consisting of: a mixed-reality system, an augmented-reality system, a virtual-reality system, smart glasses, and smart earbuds.

20. The system of claim **18**, wherein the processor is configured to:

receive user configuration data from the authentication provider service; and

determine a decryption key in response to the token and the token being authenticated, the configuration data for the second wearable smart device is determined in response to the decryption key and the user configuration data.

* * * * *