A DATA COMMUNICATION METHOD

TECHNICAL FIELD

This invention relates generally to a data communication method.

Background

Data acquisition user devices are usually dependent on other devices, for example a communication device like a smart phone, to establish a data communication pathway with a server system for sending acquired data thereto. These communication devices need to be installed with a specific application that needs to be launched before any form of data transmission therethrough can happen. Further, the communication device and the user device need to be tediously paired at both ends so that data can be transmitted from the user device to or through the communication device. In many instances, there could be multiple communication devices available for selection and although the pairing between the user device and the communication device may have occur beforehand, there is still a need to physically and actively determine availability and ability of each of the communication device at the point of data transmission which makes the entire data communication process inefficacious. The need to understand the steps required and potential missteps that may occur during establishment of the communication link or pathway and the need to ensure proper launching and activation of specific applications on the communication device to be utilized is just too unfriendly for the non-tech saavy. In instances where the user device is to be used by the elderly or te disabled for medical data capture, the deemed simple steps of activating the application on the communication device, establishing communication link or pairing prior to use of the medical device will render user device useless in the timely updating of acquired data to a server for, for example, monitoring purposes. Therefore, there exists a need for a method for addressing the foregoing problems.

Summary

In accordance with a first aspect of the invention, there is disclosed a data communication method comprising capturing user data by a user device, the user device having device data being descriptive of at least one of device type of the user device and data format of the user data, sending the device data to a communication device for determining readiness of the communication device to receive the user data in response to the user data being captured, sending an identifier to the communication device to determine pre-registration of the identifier therewith, determining presence of a data communication pathway between the communication device and a server over a network, and transmitting the user data from the user device to the server via the communication device in response to the data communication pathway being present and the pre-registration of the identifier being determined.

In accordance with a second aspect of the invention, there is disclosed a machine-readable medium having stored therein a plurality of programming instructions, which when executed, the instructions cause the machine to capture user data by a user device, the user device having device data being descriptive of at least one of device type of the user device and data format of the user data, send the device data to a communication device for determining readiness of the communication device to receive the user data in response to the user data being captured, send an identifier to the communication device to determine pre-registration of the identifier therewith, determine presence of a data communication pathway between the communication device and a server over a network, and transmit the user data from the user device to the server via the communication device in response to the data communication pathway being present and the pre-registration of the identifier being determined.

Brief Description of the Drawings

FIG. 1 shows a process flow diagram of a data communication method according to an aspect of the invention;

FIG. 2 shows a system diagram of a data communication system for implementing the data broadcast method of FIG. 1 according to an aspect of the invention; and

FIG. 3 shows a data flow diagram between a user device, a communication device and a server system of the data communication system of FIG. 2 utilising the data communication method of FIG. 1.

Detailed Description

An exemplary embodiment of the present invention, a data communication method 100, preferably implemented using a data communication system 20, is described hereinafter with reference to FIG. 1 to FIG. 3. The data communication system 20 comprises a user device 22, a communication device 24, a server system 26 or a plurality of inter-networked server systems residing on a cloud platform. Communication between the communication device 24 and the server system 26 can occur through wired or wireless means. The communication device 24 are preferably also in signal and data communication with the server system 26 over a network.

In an implementation of the data communication system 20, the data communication method 100 initiates with capturing user data 30 by the user device 22 in a step 102. It is preferred that the user device 22 has device data 32 being descriptive of at least one of device type of the user device 22 and data format of the user data 32. Next, the device data 32 is sent to a communication device 24 in a step 104 for determining readiness of the communication device 24 to receive the user data 30 in response to the user data 30 being captured. Further, an identifier 34 is sent to the communication device 24 in a step 106 to determine pre-registration of the identifier 34 therewith. Presence of a data communication pathway between the communication device 24 and the server system 26 over the network can then be determined in a step 108. The user data 30 from the user device 22 is then transmitted to the server system 26 via the communication device 24 in a step 110 in response to the data communication pathway being present and the pre-registration of the identifier 34 being determined.

In the step 104, sending of the device data 32 to the communication device 24 for determining readiness of the communication device 24 to receive the user data 30 comprises sending the device data 32 to the communication device 24 for verifying compliance of the device data 32 with the communication device 24 or requirements set out for the communication device 24. Compliance of the device data 32 is verified by matching the device data 32 against at least one of a list of approved device types and a list of approved

data format. In addition or alternatively, determining compliance of the device data 32 will also comprise ensuring compatability with an application operating on the communication device 24, determining presence of an application, for example presence of a background service or presence of a background service 38 in tandem with presence and activation of a UI service on the communication device 24, and determining the correct version of a particular application operating on the communication device 24.

Preferably, determining of compliance of the device data 32 involves at least verifying that a particular background service 38 is operating on the communication device 24 to ensure readiness for processing and/or handling of the user data 30 by communication device 24 in addition to matching the device data 32 against at least one of a list of approved device types and a list of approved data format by the communication device 24. This will enable a response signal to be received from the communication device 24 by the user device 22 indicating compliance of the device data 32 with the communication device 24.

Preferably, the user device 22 is one of a medical device, a sports tracker, an activity tracker and wearable technology device with the user data 30 being captured by the user device 22 being data relating to at least one of heart rate, body weight, blood pressure, saturation, medical adherence, blood coagulation, glucose, temperature, activity level, electro-cardiogram levels and corresponding date and time of data capture. Further preferably, the communication device 24 is one of a computing device, a mobile computing device, a mobile communication device and a wireless router, mobile phone, smart device, smart phone, wearable communication device, wearable sensors and the like devices with mobile data or mobile data and voice connectivity, for example over a 3G, 4G or an LTE network.

Preferably, the user data 30 comprises the identifier 34 which is uniquely indicative of identity of a user 40 wherefrom the user data 30 is captured. To obtain the identifier 34 to be associated with the user data 30, at least one of biometric data, machine readable code and voice signature is capturable from the user and processed by at least one of the user device and the communication device to obtain the associated identifier 34 from a database

or look-up table. This is ideal in implementations where more than one user 40 is expected for each of the user device 22. Alternatively, a device code stored on and uniquely identifying the user device 22 may be obtained from the user device 40 wherefrom the identifier 34 may be obtained to consequently identify the user 40.

Once the user data 30 from the user device 22 is transmitted to the server system 26 via the communication device 24 in the step 110, it is preferred the user data 30 be transmitted for storage in one of a plurality of data accounts 42 associated with the identifier 34 in a step 120. The plurality of data accounts 42 resides on the server system 26. Preferably, the user device 22 comprises a user interface (UI) for providing at least one of a visual alert and an audible alert therefrom at least one of prior to and during transmitting the user data 30 from the user device 22 to the server system 26.

Prior to sending the device data 32 to the communication device 24 in the step 104 for determining readiness of the communication device 24 to receive the user data 30, an indication of availability is received from a plurality of candidate devices 46 in a step 130. Next, compliance of the plurality of candidate devices 46 with predefined criteria is determined in a step 132. Finally, one of the plurality of candidate devices 46 as the communication device 24 based on nearest compliance with the predefined criteria in a step 134 before the device data 32 is eventually sent to the one of the plurality of candidate devices 46 being selected as the communication device.

The plurality of candidate devices 46 are assessed for nearest compliance to predefined criteria based on at least one of preference level of each of the plurality of candidate devices 46, level of recent physical movement of the each of the plurality of candidate devices 46, proximity of each of the plurality of candidate devices 46 to the user device 22, signal strength of each of the plurality of candidate devices 46, operating status of each of the plurality of candidate devices 46 and at least one of pose and position of each of the plurality of candidate devices 46.

Preferably, the communication device 24 is pre-registered in the step 106 either subsequent to being the selected one of the plurality of candidate devices 46 or prior to being selected or selection of one of the plurality of candidate devices 46 as the communication device 24. During pre-registration, a registration request is sent to the communication device 24, or at least one of the plurality of candidate devices 46, in a step 140. An acknowledgement of the registration request is received via a predefined application operating on the communication device 24, for example the background service 38, to thereby pre-register the communication device 24 with the user device 22.

The data communication method 100 utilising the data communication system 20 has various implements and applications. In an exemplary application of the data communication method 100 and the data communication system 20, the user 40 of the user device 20, a medical device for measuring blood pressure of the user 40 as the user data 30, may wish to register the user device 22 in conjunction with one, or more, of available devices with data communication link with the server system 26. To enable a device to be registrable and hence be taken as the one of the plurality of candidate devices 46 or the communication device 24, an application has to be downloaded onto the device from the server system 26 or an alternate site hosting the application. It is submitted that the application is to enable performance of at least a portion of the data communication method 100. Once the application has been downloaded and installed onto the device, the user device 22 is activated either by repowering up the user device 22, operating the user device 22 which has gone into a sleep mode, operating an activate button or function on the user device 22 or activating the device via voice command.

Once the user device 22 has been activated, a registration request is sent to the device whereto the application has been downloaded and installed, now the communication device 24. The application operating on the communication device 24 will prompt for acknowledgement, from the user 40 or whoever is operating the communication device 24, of the registration request. It is preferred that the application operates as the background

service 38 for performing the corresponding portion of the data communication method 100 and as a UI service only for reconfiguration and setting changes purposes. Once the registration request has been acknowledged on the communication device 24, an acknowledgement of the registration request is sent from the communication device 24 to the user device 22 to conclude and indicate pre-registration of the communication device 24 with the user device 22. Through the UI service, the communication device is able to de-register the user device 22. Likewise, the user device 22 may be operated to register the communication device 24 or any of the plurality of candidate devices 46 registered with the user device 22.

When the user device 22 is in use as the medical device by the user 40, the blood pressure of the user is measured by the user device 22 for generating the blood pressure readings as the user data 30. Next, the device data 32 is sent to the communication device 24 for determining readiness of the communication device 24 to receive the user data 30 in response to the user data 30 being captured from the user 40. The device data 32 sent will enable verification that the particular background service 38 associated with the data communication method 100 is operating on the communication device 24 to ensure readiness for processing and/or handling of the user data 30 by communication device 24 and for the background service 38 to match the device data 32, corresponding to the user device 22, against at least one of a list of approved device types and a list of approved data format by the communication device 24. This will enable a response signal to be received from the communication device 24 by the user device 22 indicating compliance of the device data 32 with the communication device 24.

In the event that there is more than one potential communication device 24 existing as the plurality of candidate devices an indication of availability is received from one or more of the plurality of candidate devices 46 before the available one or more of the plurality of candidate devices 46 is verified for compliance of the plurality of candidate devices 46 with predefined criteria. The predefined criteria seek to reject candidate devices 46 that have

been inactive for a pre-determined duration and to pick the remaining candidate devices the one with the strongest signal strength as the communication device 24.

Next, the identifier 34 is sent to the communication device 24 to determine pre-registration of the identifier 34 therewith. Typically, it is assumed that the user device 22 only has a single user and hence, the device code, for example the device/product serial number of the user device 22, is taken to be associated with and indicative of the identifier 34. In situations where the user device 22 enables multiple uses to be identified, the UI of the user device may enable capture of, for example biometric fingerprint or voice data to obtain the associated identifier 34 from a database or look-up table. Obtaining of the associated identifier 34 in a multiple user scenario may be performed by the user device 22, by the communication device 24 or by the server system 26.

Presence of the data communication pathway between the communication device 24 and the server system 26 over the network is then determined before the user data 30 is transmitted from the user device 22 to the server system 26. As above presented, the data communication method 200 in conjunction with the data communication system 20 enables the user device 22 to be seamlessly used with the communication device 24 without need for configuration during use. For example, frequent use of the user device 22, for example a blood glucose monitor, does not require configuration during use. Blood glucose level is determined from a blood sample provided by the user 40 as the user data 30 which is then automatically transmitted to the server system 26 upon capture of the user data 30 without further intervention by the user 40. However, a visual and/or audible alert may still be provided by one of or both of the user device 22 and the communication device 24 prior to the user data 30 being transmitted to the server system 26. The communication device 24 may be further configured to prompt for approval from the user 40 before the user data 30 received from the user device 22 is transmitted to the server system 26. Approval from the user 40 may be effected by movement or shaking of the communication device 26 or by voice response or command from the user 40.

It is preferred that data communication, including any form of "pairing" between the user device 22 and the communication device 24 be terminated subsequent to the user data 30 being sent from the user device 22 to the server system 26 via the communication device 24. Data communication will be re-established again for subsequent transmission of the user data 30 to the server system 26, preferably based on a suitable communication device 24 selected from the plurality of candidate devices 46 against the predefined criteria.

The data communication method 100 may be implemented through use of a machine-readable medium having stored therein a plurality of programming instructions, which when executed, the instructions cause the machine to capture user data by a user device, the user device having device data being descriptive of at least one of device type of the user device and data format of the user data, send the device data to a communication device for determining readiness of the communication device to receive the user data in response to the user data being captured, send an identifier to the communication device to determine pre-registration of the identifier therewith, determine presence of a data communication pathway between the communication device and a server over a network, and transmit the user data from the user device to the server via the communication device in response to the data communication pathway being present and the pre-registration of the identifier being determined.

Aspects of particular embodiments of the present disclosure address at least one aspect, problem, limitation, and/or disadvantage associated with existing data communication methods and systems. While features, aspects, and/or advantages associated with certain embodiments have been described in the disclosure, other embodiments may also exhibit such features, aspects, and/or advantages, and not all embodiments need necessarily exhibit such features, aspects, and/or advantages to fall within the scope of the disclosure. It will be appreciated by a person of ordinary skill in the art that several of the above-disclosed structures, components, or alternatives thereof, can be desirably combined into alternative structures, components, and/or applications. In addition, various modifications, alterations,

and/or improvements may be made to various embodiments that are disclosed by a person of ordinary skill in the art within the scope of the present disclosure, which is limited only by the following claims.

Claims

1. A data communication method comprising:

capturing user data by a user device, the user device having device data being descriptive of at least one of device type of the user device and data format of the user data;

sending the device data to a communication device for determining readiness of the communication device to receive the user data in response to the user data being captured;

sending an identifier to the communication device to determine pre-registration of the identifier therewith;

determining presence of a data communication pathway between the communication device and a server over a network; and

transmitting the user data from the user device to the server via the communication device in response to the data communication pathway being present and the pre-registration of the identifier being determined.

2. The data communication method as in claim 1, sending the device data to a communication device for determining readiness of the communication device to receive the user data comprising:

sending the device data to the communication device for verifying compliance of the device data.

3. The data communication method as in claim 2, compliance of the device data being verified by matching the device data against at least one of a list of approved device types and a list of approved data format.

4. The data communication method as in claim 1, sending the device data to a communication device for determining readiness of the communication device to receive the user data comprising:

receiving a response signal from a background service operating on the communication device.

5. The data communication method as in claim 1, the user device being one of a medical device, a sports tracker, an activity tracker and wearable technology device.

6. The data communication method as in claim 1, the user data captured by the user device comprising data relating to at least one of heart rate, body weight, blood pressure, saturation, medical adherence, blood coagulation, glucose, temperature, activity level, electro-cardiogram levels and corresponding date and time of data capture.

7. The data communication method as in claim 1, the communication device being one of a computing device, a mobile computing device, a mobile communication device and a wireless router, mobile phone, smart device, smart phone, wearable communication device, wearable sensors.

8. The data communication method as in claim 1, the user data comprising the identifier being uniquely indicative of identity of a user wherefrom the user data is captured.

9. The data communication method as in claim 8, further comprising;

capturing at least one of biometric data, machine readable code and voice signature from the user; and

processing the at least one of biometric data, machine readable code and voice signature by at least one of the user device and the communication device to obtain the identifier.

10. The data communication method as in claim 8, further comprising:

retrieving device code stored on and uniquely identifying the user device; and

obtaining the identifier corresponding with the device code.

11. The data broadcast method as in claim 1, further comprising:

providing at least one of a visual alert and an audible alert from a user interface (UI) of the user device at least one of prior to and during transmitting the user data from the user device to the server.

12. The data communication method as in claim 1, the user data being transmitted for storage in one of a plurality of data accounts associated with the identifier, the plurality of data accounts residing on the server.

13. The data broadcast method as in claim 1, further comprising:

receiving an indication of availability from a plurality of candidate devices;

determining compliance of the plurality of candidate devices with predefined criteria; and

selecting one of the plurality of candidate devices as the communication device based on nearest compliance with the predefined criteria prior to sending the device data to the one of the plurality of candidate devices being selected as the communication device.

14. The data broadcast method as in claim 13, the plurality of candidate devices are compared for nearest compliance to predefined criteria based on at least one of preference level of each of the plurality of candidate devices, level of recent physical movement of the each of the plurality of candidate devices, proximity of each of the plurality of candidate devices to the user device, signal strength of each of the plurality of candidate devices, operating status of each of the plurality of candidate devices and at least one of pose and position of each of the plurality of candidate devices

15. The data broadcast method as in claim 1, further comprising:

sending a registration request to the communication device; and

receiving acknowledgement of the registration request via a predefined application operating on the communication device to thereby pre-register the communication device with the user device.

16. A machine-readable medium having stored therein a plurality of programming instructions, which when executed, the instructions cause the machine to:

capture user data by a user device, the user device having device data being descriptive of at least one of device type of the user device and data format of the user data;

send the device data to a communication device for determining readiness of the communication device to receive the user data in response to the user data being captured;

send an identifier to the communication device to determine pre-registration of the identifier therewith;

determine presence of a data communication pathway between the communication device and a server over a network; and

transmit the user data from the user device to the server via the communication device in response to the data communication pathway being present and the pre-registration of the identifier being determined.