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(54) **DATA TRANSMISSION METHOD AND MOBILE DEVICE ADAPTED THERETO**

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H04M 1/725 (2006.01)

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CPC ***H04M 1/7253*** (2013.01); *H04M 2250/12* (2013.01); *H04M 2250/64* (2013.01)

(58) **Field of Classification Search**
CPC H04M 1/7253; H04M 2250/12; H04M 2250/02; H04M 2250/04; H04M 2207/18; H04W 4/02; H04W 4/008; H04W 4/18; H04W 8/005; H04W 4/023; H04W 4/026; H04B 5/00
USPC 455/456.1, 456.2, 456.3, 457, 421, 418, 455/550.1
See application file for complete search history.

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Primary Examiner — Suhail Khan

(57) **ABSTRACT**

A method and a mobile device are adapted to transmit data through short-range communication based on movement of the mobile device. External mobile devices near the mobile device are searched. Location information for each external mobile device found near the mobile device is acquired. Data to be transmitted is set. The movement of the mobile device is recognized. At least one target mobile device is set to receive data, based on the movement of the mobile device and the acquired location information of the found external mobile devices. And the data is transmitted to the at least one target mobile device.

21 Claims, 10 Drawing Sheets

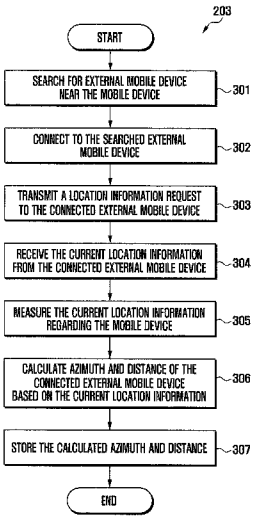


FIG. 1

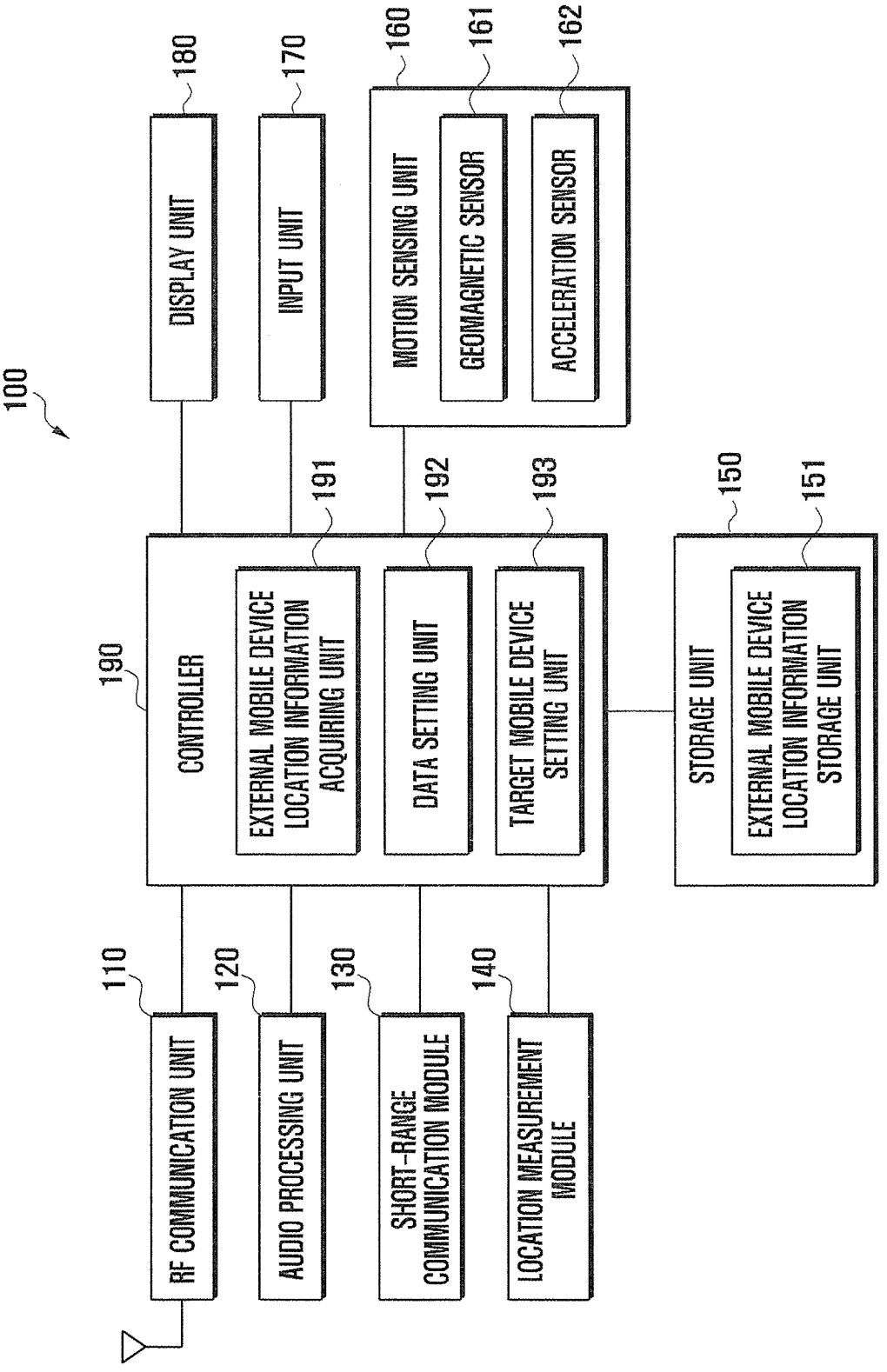

100
180
DISPLAY UNIT
170
INPUT UNIT
160
MOTION SENSING UNIT
161
GEOMAGNETIC SENSOR
162
ACCELERATION SENSOR
190
CONTROLLER
191
EXTERNAL MOBILE DEVICE LOCATION INFORMATION ACQUIRING UNIT
192
DATA SETTING UNIT
193
TARGET MOBILE DEVICE SETTING UNIT
150
STORAGE UNIT
151
EXTERNAL MOBILE DEVICE LOCATION INFORMATION STORAGE UNIT
110
RF COMMUNICATION UNIT
120
AUDIO PROCESSING UNIT
130
SHORT-RANGE COMMUNICATION MODULE
140
LOCATION MEASUREMENT MODULE

FIG. 2

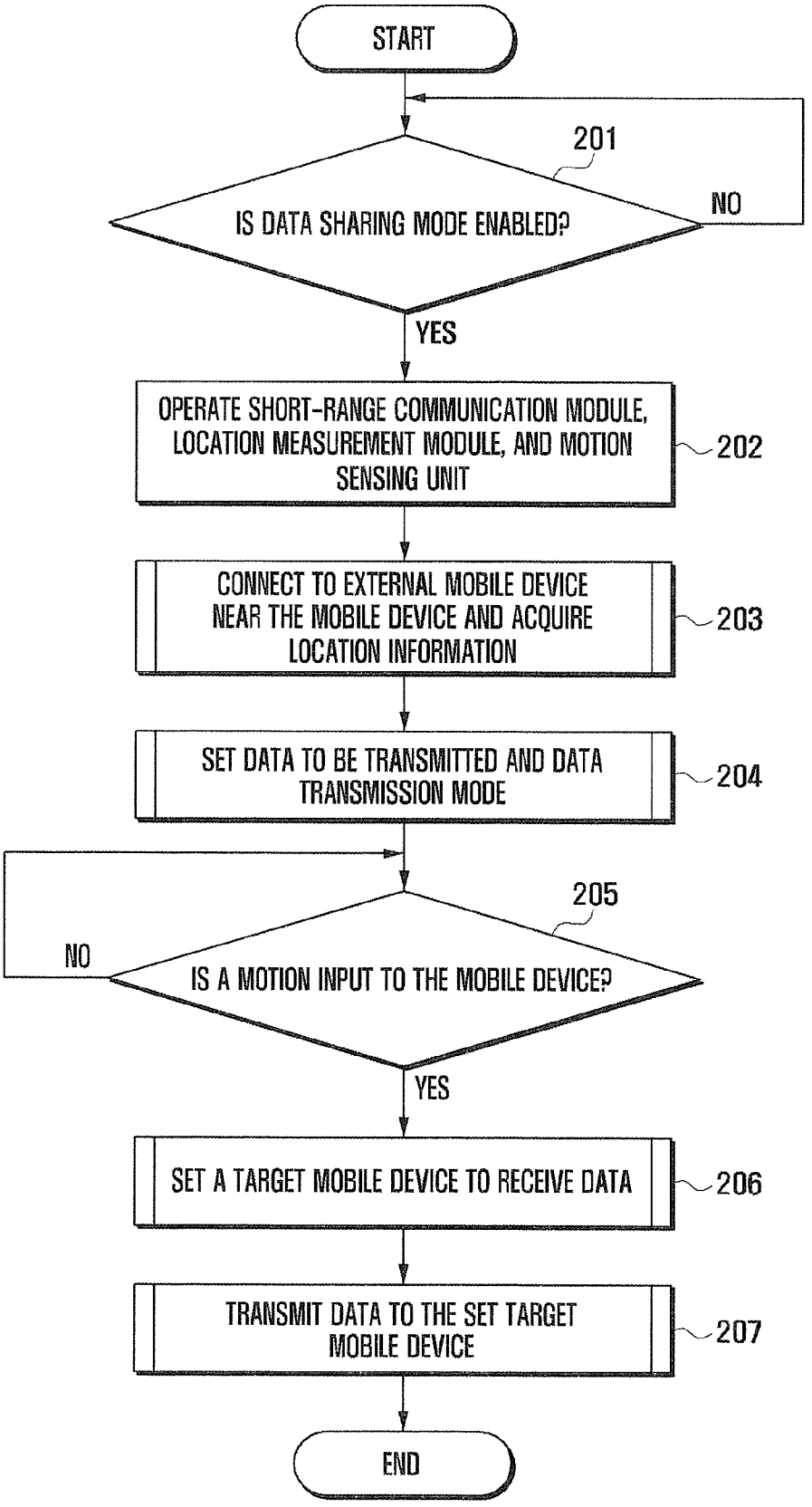

START
201
IS DATA SHARING MODE ENABLED?
NO
YES
OPERATE SHORT-RANGE COMMUNICATION MODULE, LOCATION MEASUREMENT MODULE, AND MOTION SENSING UNIT
202
CONNECT TO EXTERNAL MOBILE DEVICE NEAR THE MOBILE DEVICE AND ACQUIRE LOCATION INFORMATION
203
SET DATA TO BE TRANSMITTED AND DATA TRANSMISSION MODE
204
205
NO
IS A MOTION INPUT TO THE MOBILE DEVICE?
YES
SET A TARGET MOBILE DEVICE TO RECEIVE DATA
206
TRANSMIT DATA TO THE SET TARGET MOBILE DEVICE
207
END

FIG. 3

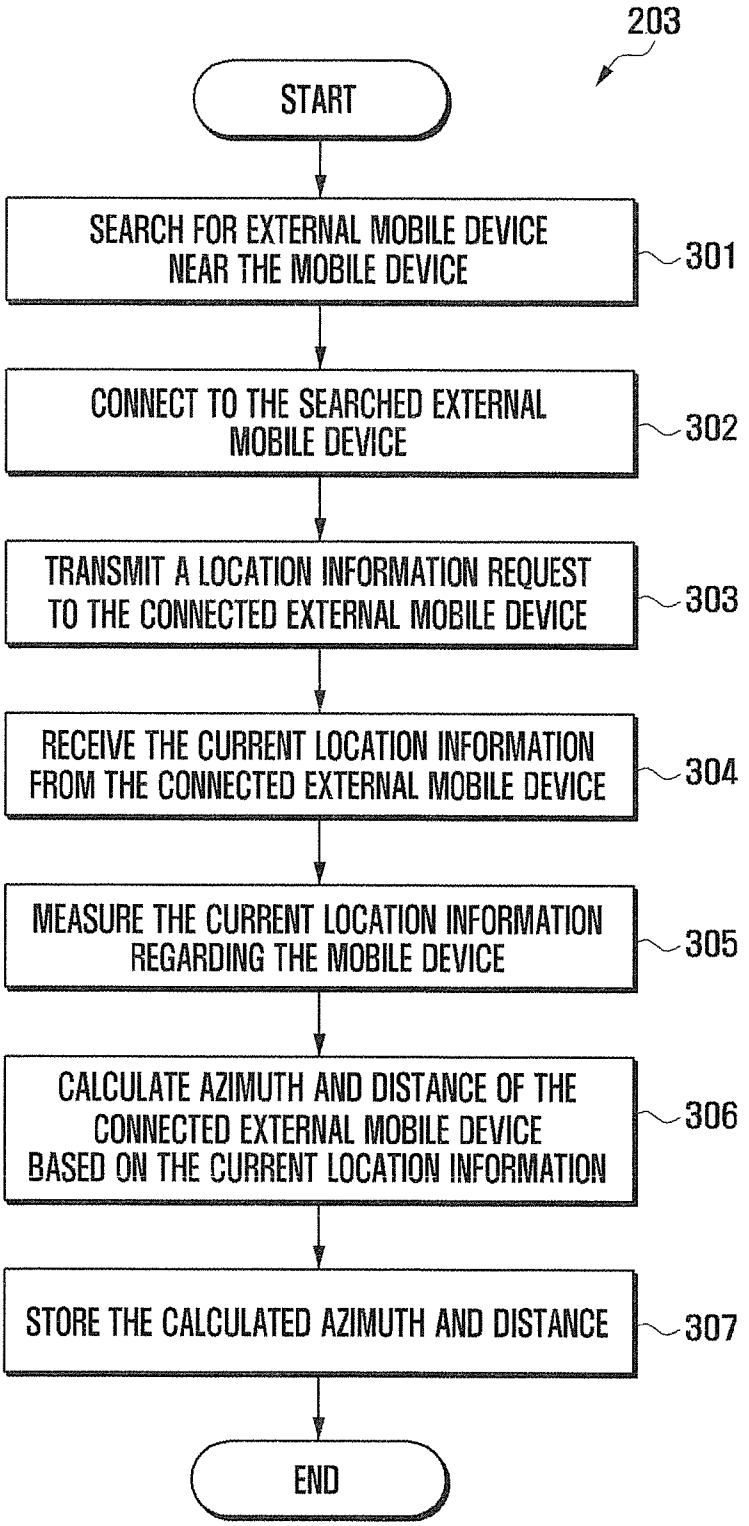

203
START
SEARCH FOR EXTERNAL MOBILE DEVICE NEAR THE MOBILE DEVICE
301
CONNECT TO THE SEARCHED EXTERNAL MOBILE DEVICE
302
TRANSMIT A LOCATION INFORMATION REQUEST TO THE CONNECTED EXTERNAL MOBILE DEVICE
303
RECEIVE THE CURRENT LOCATION INFORMATION FROM THE CONNECTED EXTERNAL MOBILE DEVICE
304
MEASURE THE CURRENT LOCATION INFORMATION REGARDING THE MOBILE DEVICE
305
CALCULATE AZIMUTH AND DISTANCE OF THE CONNECTED EXTERNAL MOBILE DEVICE BASED ON THE CURRENT LOCATION INFORMATION
306
STORE THE CALCULATED AZIMUTH AND DISTANCE
307
END

FIG. 4

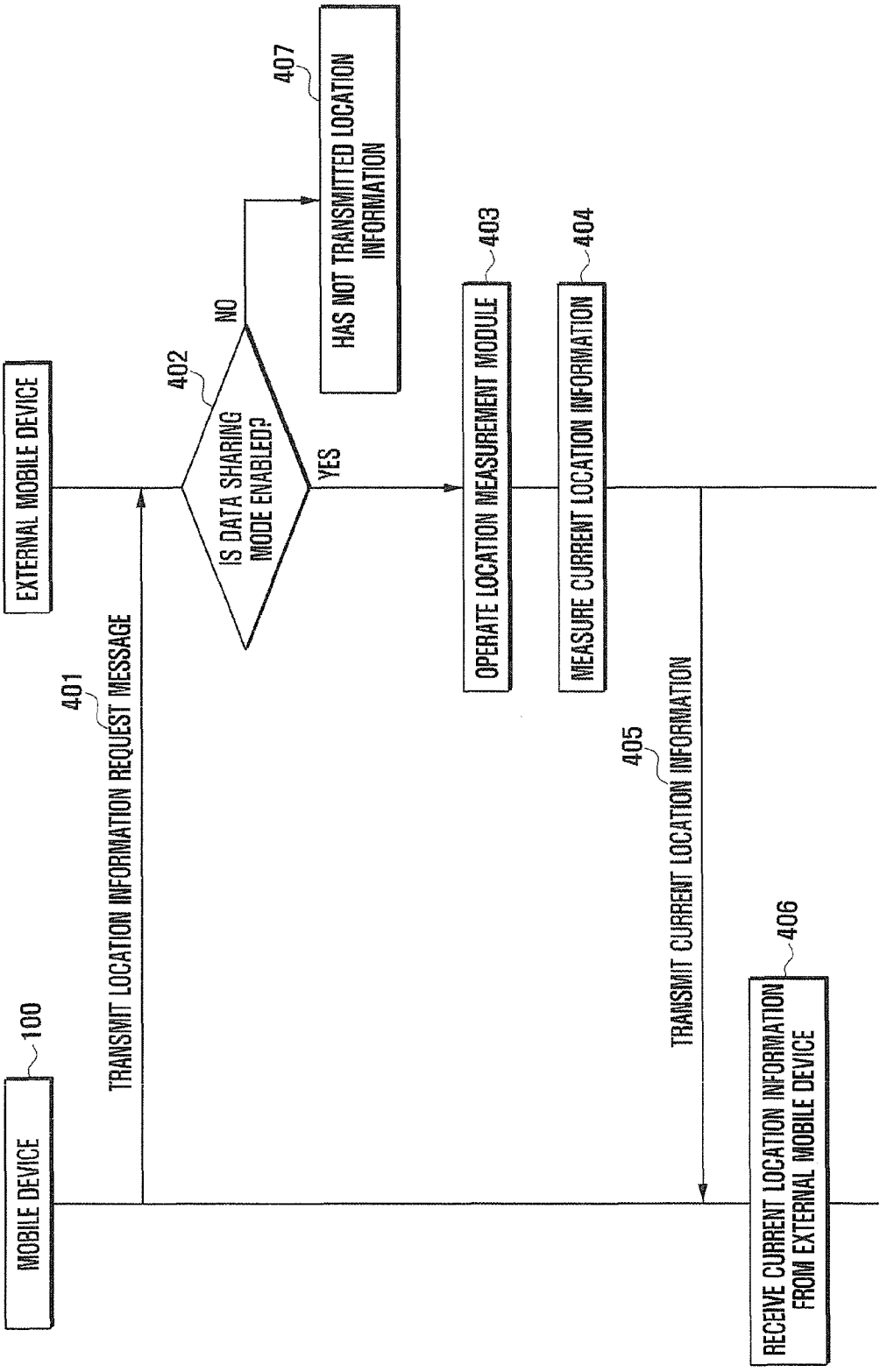

MOBILE DEVICE
100
EXTERNAL MOBILE DEVICE
401
TRANSMIT LOCATION INFORMATION REQUEST MESSAGE
402
IS DATA SHARING MODE ENABLED?
NO
YES
407
HAS NOT TRANSMITTED LOCATION INFORMATION
403
OPERATE LOCATION MEASUREMENT MODULE
404
MEASURE CURRENT LOCATION INFORMATION
405
TRANSMIT CURRENT LOCATION INFORMATION
406
RECEIVE CURRENT LOCATION INFORMATION FROM EXTERNAL MOBILE DEVICE

FIG. 5

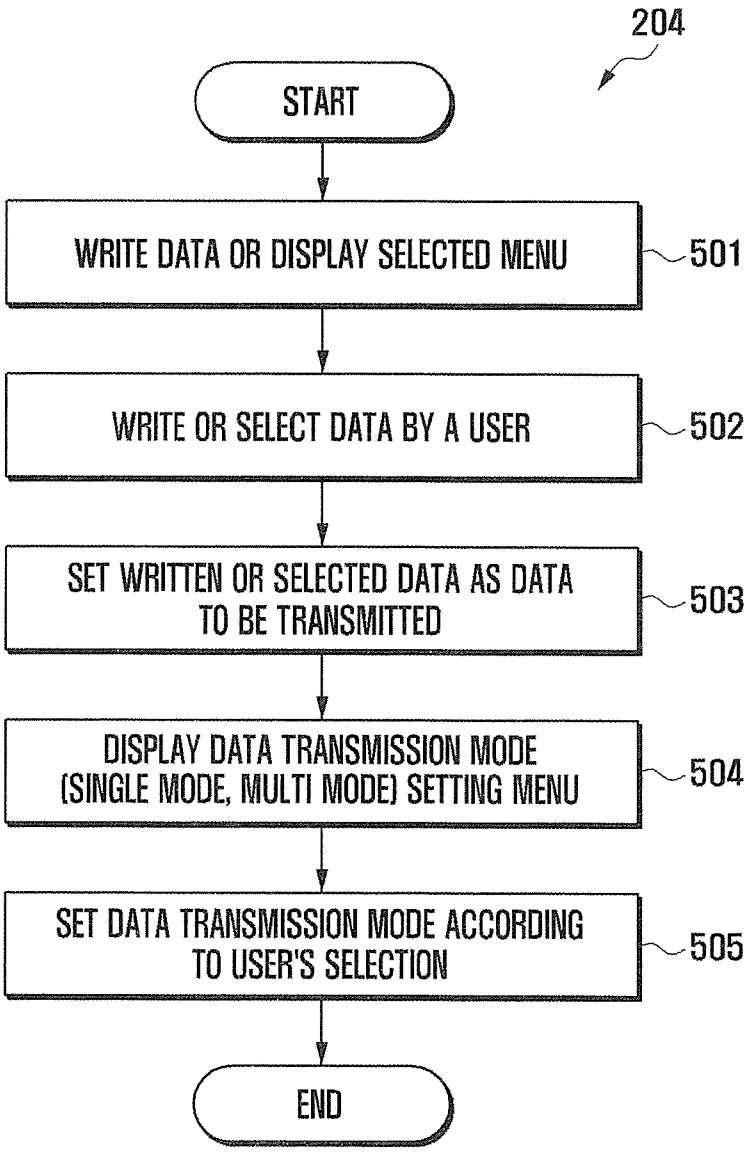

204
START
WRITE DATA OR DISPLAY SELECTED MENU
501
WRITE OR SELECT DATA BY A USER
502
SET WRITTEN OR SELECTED DATA AS DATA TO BE TRANSMITTED
503
DISPLAY DATA TRANSMISSION MODE (SINGLE MODE, MULTI MODE) SETTING MENU
504
SET DATA TRANSMISSION MODE ACCORDING TO USER'S SELECTION
505
END

FIG. 6

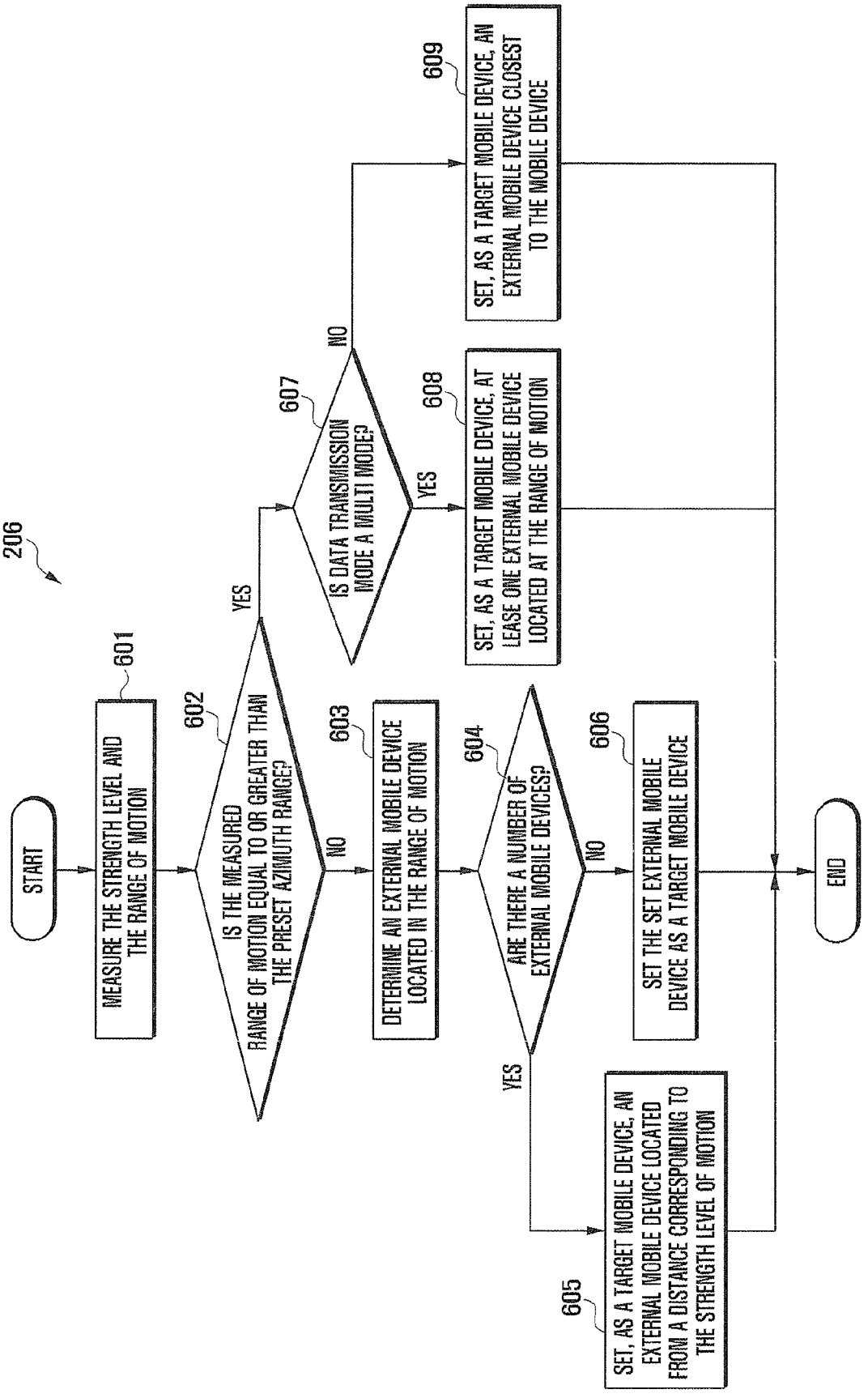

206
START
MEASURE THE STRENGTH LEVEL AND THE RANGE OF MOTION
601
IS THE MEASURED RANGE OF MOTION EQUAL TO OR GREATER THAN THE PRESET AZIMUTH RANGE?
602
YES
NO
IS DATA TRANSMISSION MODE A MULTI MODE?
607
YES
NO
SET, AS A TARGET MOBILE DEVICE, AT LEASE ONE EXTERNAL MOBILE DEVICE LOCATED AT THE RANGE OF MOTION
608
SET, AS A TARGET MOBILE DEVICE, AN EXTERNAL MOBILE DEVICE CLOSEST TO THE MOBILE DEVICE
609
DETERMINE AN EXTERNAL MOBILE DEVICE LOCATED IN THE RANGE OF MOTION
603
ARE THERE A NUMBER OF EXTERNAL MOBILE DEVICES?
604
YES
NO
SET, AS A TARGET MOBILE DEVICE, AN EXTERNAL MOBILE DEVICE LOCATED FROM A DISTANCE CORRESPONDING TO THE STRENGTH LEVEL OF MOTION
605
SET THE SET EXTERNAL MOBILE DEVICE AS A TARGET MOBILE DEVICE
606
END

FIG. 7A

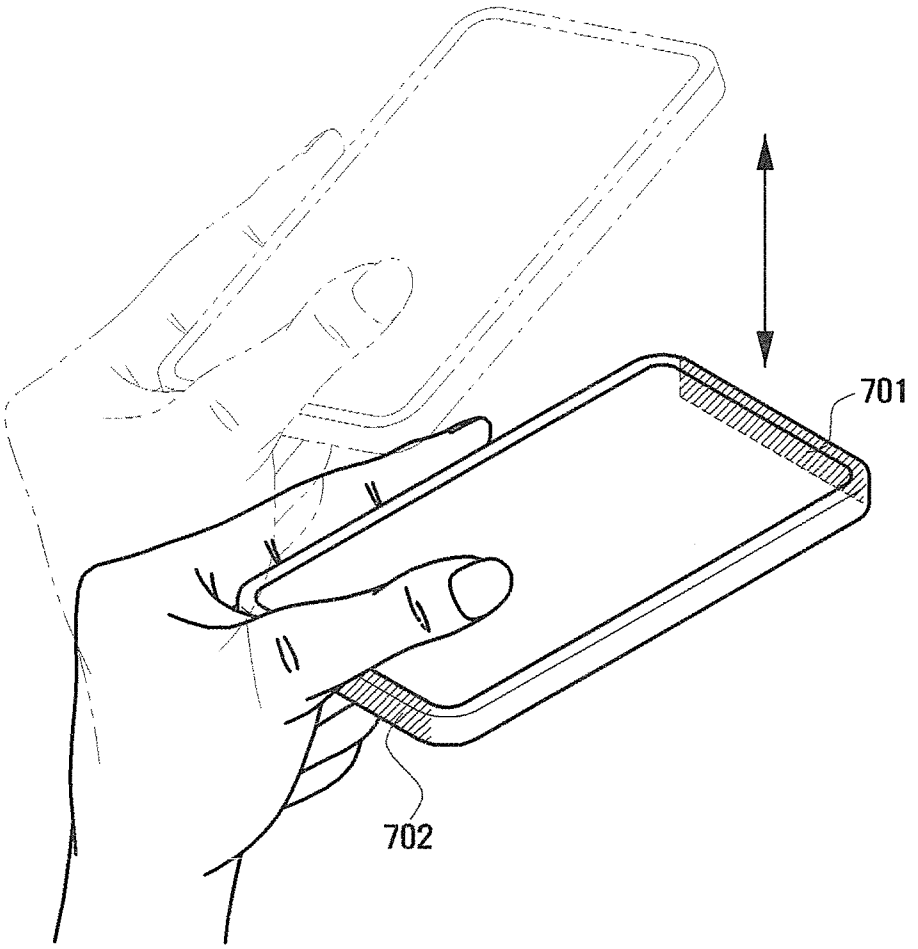


FIG. 7B

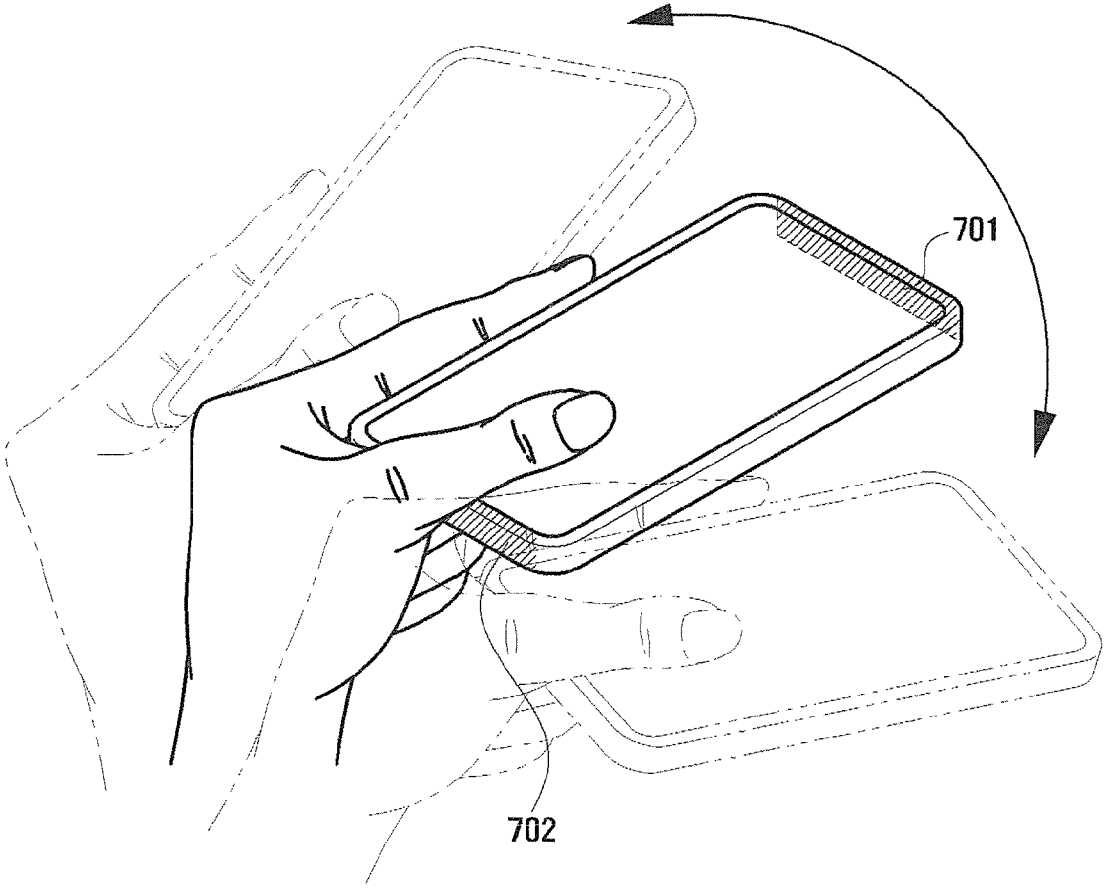


FIG. 8A

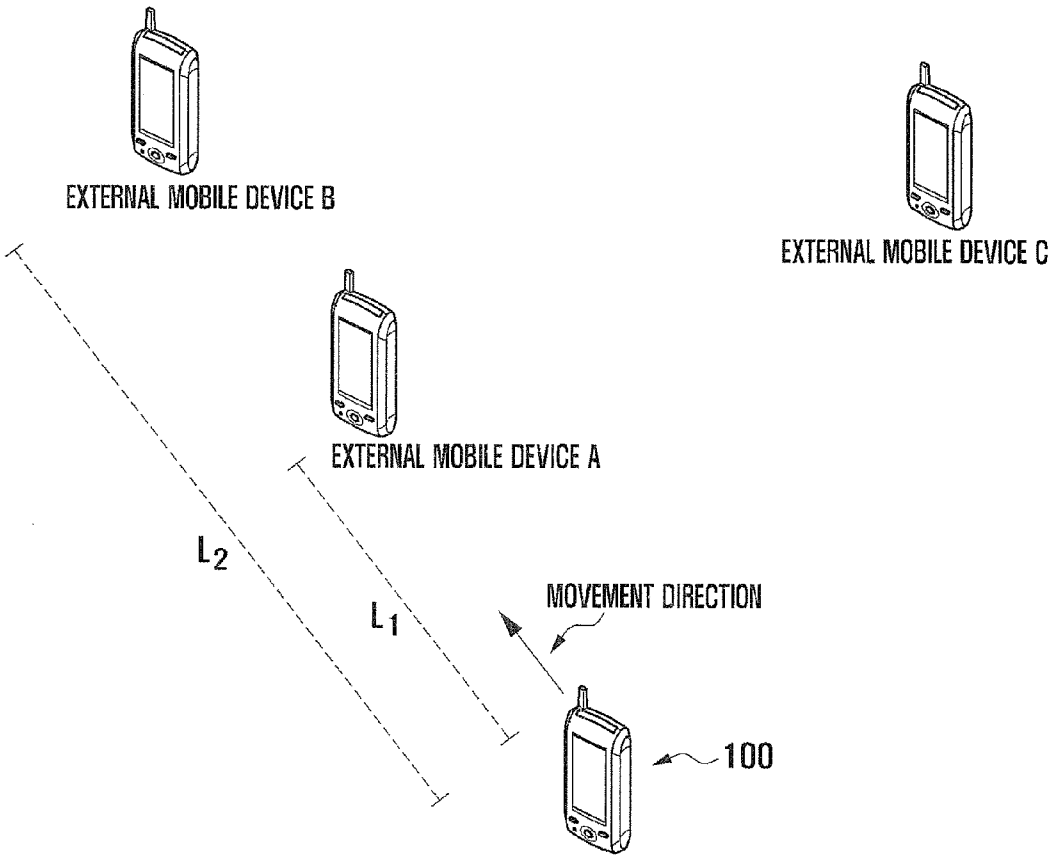
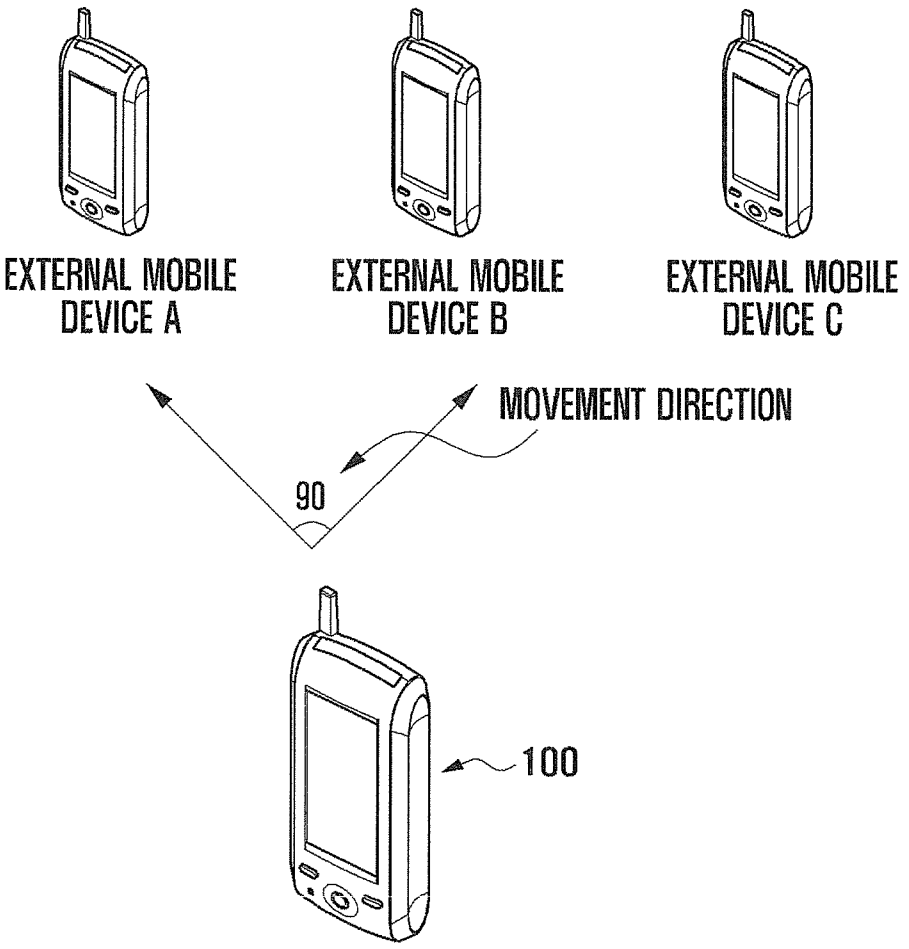

EXTERNAL MOBILE DEVICE B
EXTERNAL MOBILE DEVICE C
EXTERNAL MOBILE DEVICE A
L2
L1
MOVEMENT DIRECTION
100

FIG. 8B


EXTERNAL MOBILE DEVICE A
EXTERNAL MOBILE DEVICE B
EXTERNAL MOBILE DEVICE C
MOVEMENT DIRECTION
90
100

DATA TRANSMISSION METHOD AND MOBILE DEVICE ADAPTED THERETO

CROSS-REFERENCE TO RELATED APPLICATION(S) AND CLAIM OF PRIORITY

The present application claims priority under 35 U.S.C. §119(a) to a Korean Patent Application filed in the Korean Intellectual Property Office on Jan. 4, 2011 and assigned Serial No. 10-2011-0000608, the contents of which are herein incorporated by reference.

TECHNICAL FIELD OF THE INVENTION

This invention relates to data transmission systems, and more particularly, to a method for transmitting data in a mobile device via short-range communication and by recognizing the movement of the mobile device. The invention is also related to a system adapted to the data transmission method.

BACKGROUND OF THE INVENTION

Mobile devices are widely used because they can be easily carried and provide a variety of functions such as a voice call function. Mobile devices serve as multimedia communication devices because they can transmit data and also provide various additional services.

Mobile device users can transmit data, such as messages, contents files, and such, to called parties via their mobile devices by selecting data to be transmitted and entering called parties' phone numbers or ID's to their mobile devices. These processes must be performed although the called parties are near the calling users. When the calling users do not know the called parties' phone numbers, they must first ask the called parties for their phone numbers. The calling users may then enter the called parties' phone numbers into their mobile devices and transmit messages to the called parties' mobile devices. This inconveniences the mobile device users.

In particular, when a mobile device user wants to send his/her electronic business card (e-business card) to multiple people, conventional data transmission system requires for the user to first input all of the called parties' phone numbers to his/her mobile device.

New systems are required to allow users to easily transmit data, such as messages, contents files, and such, from their mobile devices to external mobile devices.

SUMMARY OF THE INVENTION

To address the above-discussed deficiencies of the prior art, it is a primary object to provide a method for transmitting data in a mobile device that enhances user convenience. The invention further provides a system adapted to the data transmission method.

In accordance with an embodiment of the invention, the invention provides a data transmission method in a mobile device. External mobile devices near the mobile device are searched. Location information for each external mobile device found near the mobile device is acquired. Data to be transmitted is set. A movement of the mobile device is recognized. At least one target mobile device is set to receive the data, based on the movement of the mobile device and the acquired location information of at the found external mobile devices. And data is transmitted to the at least one target mobile device.

In accordance with an embodiment of the invention, the invention provides a mobile device. the mobile device includes a short-range communication unit, a location measurement module, a motion sensing unit, and a controller. The short-range communication unit searches for external mobile devices near the mobile device, acquires location information for each external mobile device found near the mobile device, and transmits data to at least one target mobile device. The location measurement module measures a current location of the mobile device. The motion sensing unit senses a movement of the mobile device. And the controller sets the data to be transmitted, and sets the at least one target mobile device from among the found external mobile devices to receive the data based on the movement of the mobile device and the acquired location information of the found external mobile devices.

Before undertaking the DETAILED DESCRIPTION OF THE INVENTION below, it may be advantageous to set forth definitions of certain words and phrases used throughout this patent document: the terms "include" and "comprise," as well as derivatives thereof, mean inclusion without limitation; the term "or," is inclusive, meaning and/or; the phrases "associated with" and "associated therewith," as well as derivatives thereof, may mean to include, be included within, interconnect with, contain, be contained within, connect to or with, couple to or with, be communicable with, cooperate with, interleave, juxtapose, be proximate to, be bound to or with, have, have a property of, or the like; and the term "controller" means any device, system or part thereof that controls at least one operation, such a device may be implemented in hardware, firmware or software, or some combination of at least two of the same. It should be noted that the functionality associated with any particular controller may be centralized or distributed, whether locally or remotely. Definitions for certain words and phrases are provided throughout this patent document, those of ordinary skill in the art should understand that in many, if not most instances, such definitions apply to prior, as well as future uses of such defined words and phrases.

BRIEF DESCRIPTION OF THE DRAWINGS

For a more complete understanding of the present disclosure and its advantages, reference is now made to the following description taken in conjunction with the accompanying drawings, in which like reference numerals represent like parts:

FIG. **1** illustrates a schematic block diagram of a mobile device **100** according to an embodiment of the invention;

FIG. **2** illustrates a process for transmitting data in a mobile device **100**, according to an embodiment of the invention;

FIG. **3** illustrates a process for acquiring information regarding the location of an external mobile device according to an embodiment of the invention;

FIG. **4** illustrates a signal flow diagram of a process where a mobile device **100** receives the location information from an external mobile device, according to an embodiment of the invention;

FIG. **5** illustrates a process for setting a data transmission mode and data to be transmitted according to an embodiment of the invention;

FIG. **6** illustrates a process for setting a target mobile device to receive data according to an embodiment of the invention;

FIGS. **7**A and **7**B illustrate a user's motions applied to a mobile device **100** according to an embodiment of the invention; and

FIGS. **8**A and **8**B illustrate views for setting a target mobile device according to the movement of a mobile device **100**.

DETAILED DESCRIPTION OF THE INVENTION

FIGS. **1** through **8**B, discussed below, and the various embodiments used to describe the principles of the present disclosure in this patent document are by way of illustration only and should not be construed in any way to limit the scope of the disclosure. Those skilled in the art will understand that the principles of the present disclosure may be implemented in any suitably arranged mobile device. In the following embodiments of the invention, the term 'data' refers to a concept that includes all data that can be transmitted between mobile devices, for example, messages, contents files, and such.

The term 'data sharing mode' refers to one of the function modes in a mobile device that transmits/receives data to/from an external mobile device via short-range communication and by recognizing the motion applied thereto.

FIG. **1** illustrates a schematic block diagram of a mobile device **100** according to an embodiment of the invention. The mobile device **100** includes an RF communication unit **110**, an audio processing unit **120**, a short-range communication module **130**, a location measurement module **140**, a storage unit **150**, a motion sensing unit **160**, an input unit **170**, a display unit **180** and a controller **190**.

The RF communication unit **110** transmits/receives data, via RF communication, between the mobile device **100** and other external systems. The RF communication unit **110** includes an RF transmitter for up-converting the frequency of signals to be transmitted and amplifying the signals and an RF receiver for low-noise amplifying received RF signals and down-converting the frequency of the received RF signals. The RF communication unit **110** receives data via an RF channel and outputs it to the controller **190**. The RF communication unit **110** also transmits data, output from the controller **190**, via the RF channel.

The audio processing unit **120** includes coders and decoders (CODECs). The CODECs are comprised of a data CODEC for processing packet data, and such, and an audio CODEC for processing audio signals, such as voice signals, and such. The audio CODEC converts digital audio signals into analog audio signals and outputs them via a speaker. The audio CODEC also converts analog audio signals, received via a microphone, into digital audio signals.

The short-range communication module **130** directly communicates with external mobile devices without the use of a base station. The short-range communication module **130** may be implemented with a variety of communication modules such as a Bluetooth, a WiFi, a Zigbee, an infrared, a Near Field Communication (NFC), a Radio Frequency Identification (RFID), and such. In an embodiment of the invention, the short-range communication module **130** searches for external mobile devices near the mobile device **100** and connects to the searched external mobile device. The short-range communication module **130** transmits a location information request message to the connected external mobile device, and receives the location information. The short-range communication module **130** transmits data to a target mobile device according to an instruction of the controller **190**.

The location measurement module **140** measures a location of the mobile device **100**. The location measurement module **140** may be implemented with a Global Positioning System (GPS) module. The GPS module receives GPS signals from GPS satellites and measures the current location of the mobile device **100** using the signals. Although the location measurement module **140** can measure the current location of the mobile device **100** using only the GPS signals, it can also do so via an Assisted-GPS (A-GPS). The A-GPS measures the current location of a mobile device by using distance and a radio wave measured value between the mobile device and its adjacent mobile communication base station as well as GPS signals. When the location measurement module **140** measures the current location of the mobile device **100** based on the radio waves between the mobile device **100** and a number of base stations adjacent thereto, it can use trilateration. Alternatively, the location measurement module **140** may also be implemented with a Wi-Fi module. In that situation, when the mobile device **100** connects to an Access Point (AP), the location measurement module **140** can measure the current location of the mobile device **100** using the location information regarding the AP.

The storage unit **150** stores programs for operating the mobile device **100** and data generated when the programs are executed. The storage unit **150** is comprised of a program storage area and a data storage area.

The program storage area stores all programs for controlling the operation of the mobile device **100** and an operating system (OS) for booting the mobile device **100**. The program storage area also stores an application program for playing back multimedia contents, and such. The program storage area further stores application programs for optional functions such as a camera function, audio reproduction function, photograph or video playback, and such. The data storage area stores data generated when the mobile device **100** is used, for example, images, video, phone book, audio data, and such.

In an embodiment of the invention, the storage unit **150** stores data regarding distance values corresponding to the strength levels of motions of the mobile device **100**.

The storage unit **150** includes an external mobile device location information storage unit **151** that stores location information and identification-information regarding an external mobile device that is connected to the mobile device **100** via short-range communication. The external mobile device location information storage unit **151** stores azimuths and distances according to the external mobile devices that are calculated, based on the current location of the mobile device **100**, by an external mobile device location information acquiring unit **191**, which will be described later.

The motion sensing unit **160** senses a user's motions applied to the mobile device **100**. The motion sensing unit **160** includes a geomagnetic sensor **161** and an acceleration sensor **162**.

The geomagnetic sensor **161** is used to measure the direction of the movement of the mobile device **100**. The geomagnetic sensor **161** senses the terrestrial magnetism of the earth and provides it to measure an azimuth. When the user applies motion to the mobile device **100**, the geomagnetic sensor **161** senses the change in the azimuth of the mobile device **100**.

The acceleration sensor **162** is used to measure the strength level of motion of the mobile device **100**. When the user applies motion to the mobile device **100**, the acceleration sensor **162** senses the change in the acceleration with respect to x-, y- and z-axes for the user's applied motion, and then provides them for measuring the strength level of motion of the mobile device **100**.

The motion sensing unit **160** creates data regarding the strength level of motion and the movement direction of the mobile device **100** and outputs it to a target mobile device setting unit **193** which will be described later.

The motion sensing unit **160** may include a gyroscope. The gyroscope is a module that can measure the rotation and tilt of

the mobile device **100** and transmit data regarding the rotation direction and the degree of tilt of the mobile device **100** to the target mobile device setting unit **193**.

The input unit **170** generates key signals for controlling the operations of the mobile device according to user's key operations, and outputs them to the controller **190**. The input unit **170** is implemented with various types of keypads including numerical keys, alphabetical keys, and directional keys, for example a 3×4 keypad, a QWERTY keypad, and such. The input unit **170** is also implemented with a touch screen. The input unit **170** is further implemented with a button key, a jog key, a wheel key, and such. The input unit **170** creates input signals for executing applications of the mobile device **100** according to a user's inputs, and outputs them to the controller **190**. Examples of the applications are a call function, an audio playback function, a video playback function, an image display function, a camera function, a DMB broadcast view function, and such. In an embodiment of the invention, the input unit **170** creates instruction signals for activating a data sharing mode and for setting a data transmission mode, and data to be transmitted, and then outputs them to the controller **190**.

The display unit **180** may be implemented with a Liquid Crystal Display (LCD), an Organic Light Emitting Diode (OLED), an Active Matrix Organic Light Emitting Diodes (AMOLED), and such. The display unit **180** displays menus, input data, function-setting information, and addition information. For example, the display unit **180** displays a booting screen, an idle screen, a menu screen, a call screen, and application executing screens of the mobile device. In an embodiment of the invention, the display unit **180** also displays menu screens for setting a data sharing mode, for writing data, for selecting data, and for setting a data transmission mode.

The controller **190** controls the operation of the components in the mobile device **100**. The controller **190** includes an external mobile device location information acquiring unit **191**, a data setting unit **192**, and a target mobile device setting unit **193**.

The external mobile device location information acquiring unit **191** acquires location information regarding an external mobile device near the mobile device **100**, and stores it in the external mobile device location information storage unit **151**. The external mobile device location information acquiring unit **191** transmits a location information request message to at least one external mobile device located near the mobile device **100** via the short-range communication unit **130**, and receives information regarding the location where a corresponding external mobile device is currently located from the external mobile device. The external mobile device location information acquiring unit **191** controls the short-range communication unit **130** to measure the current location of the mobile device **100**. The external mobile device location information acquiring unit **191** calculates a distance and an azimuth of at least one external mobile device with respect to the location of the mobile device **100**, using the received information regarding the current location of the external mobile device and the information regarding the measured current location of the mobile device **100**. The external mobile device location information acquiring unit **191** then stores, in the external mobile device location information storage unit **151**, the azimuths and distances according to at least one or more external mobile devices that are calculated, based on their identification information.

The data setting unit **192** sets data to be transmitted to an external mobile device, and a data transmission mode. When the user writes new data or selects stored data, the data setting unit **192** sets the written or selected data as data to be transmitted. After that, the data setting unit **192** controls the display unit **180** to display a data transmission mode setting menu. The data transmission mode setting menu includes single and multi modes. In the single mode, the mobile device **100** transmits data to one external mobile device. In the multi mode, the mobile device **100** transmits data to a number of external mobile devices. When the data setting unit **192** receives a signal to select a single or multi mode via the input unit **170**, it sets a data transmission mode according to the user's selected signal.

The target mobile device setting unit **193** sets a target mobile device to receive data. When the user applies motion to the mobile device **100**, the target mobile device setting unit **193** measures the movement direct ion of the mobile device **100** via the motion sensing unit **160**, and sets an external mobile device located in the sensed movement direction as a target mobile device.

In an embodiment of the invention, when the mobile device **100** experiences a user's applied motion, the target mobile device setting unit **193** measures the direction and strength level of motion of the mobile device **100** via the motion sensing unit **160**, and detects an external mobile device in the measured direction of motion. The target mobile device setting unit **193** then determines whether there are two or more detected external mobile devices. When the target mobile device setting unit **193** ascertains that there are two or more detected external mobile devices, it sets, as a target mobile device, the external mobile devices that are located at a distance corresponding to the measured strength level of motion. In contrast, when the target mobile device setting unit **193** ascertains that there is one detected external mobile devices, it sets the determined external mobile device as a target mobile device.

When the mobile device **100** experiences the motion input by the user, the target mobile device setting unit **193** measures the strength level and the direction of motion of the mobile device **100** via the motion sensing unit **160** and determines whether the measured range of motion is equal to or greater than a preset range of azimuth. When the target mobile device setting unit **193** ascertains that the measured range of motion is equal to or greater than a preset range of azimuth, it determines whether the data transmission mode is set to a multi mode. When the target mobile device setting unit **193** ascertains that the data transmission mode is set to a multi mode, it sets, as a target mobile device, at least one external mobile device that is in the range of motion. In contrast, when the target mobile device setting unit **193** ascertains that the data transmission mode is set to a single mode, it sets, as a target mobile device, one of the determined external mobile devices that is closest to the mobile device **100**.

The configuration of the mobile device **100** has been described. The following description provides the method for transmitting data via the mobile device **100**.

FIG. **2** illustrates a process for transmitting data in a mobile device **100**, according to an embodiment of the invention.

The controller **190** determines whether a data sharing mode is set as an active state in the mobile device **100** (block **201**). In an embodiment of the invention, a 'data sharing mode' refers to one of the function modes for the mobile device **100** in which the mobile device **100** transmits/receives data to/from an external mobile device via short-range communication and by recognizing the motion applied to the mobile device **100**. The mobile device **100** includes a menu for setting the data sharing mode. The user can set the data sharing mode to be in an active or inactive state via the data sharing mode setting menu.

When a data sharing mode of the mobile device **100** is in an active state, the controller **190** controls the short-range communication unit **130** to search for external mobile devices and to connect to the searched external mobile device. The external mobile device may be configured in substantially the same way as the mobile device **100** illustrated in FIG. **1**. When the external mobile device is operated in an active data sharing mode and receives a connection request from the mobile device **100**, it can automatically connect to the mobile device **100**. In an embodiment of the invention, the controller **190** controls the display unit **180** to display a list of searched external mobile devices and connects to a user's selected external mobile device.

In addition, when a data sharing mode of the mobile device **100** is in an active state, the controller **190** connects to an external mobile device, and then controls the short-range communication unit **130** to transmit a location information request message thereto. When the external mobile device is operated in an active data sharing mode and receives the location information request message from the mobile device **100**, it measures its current location and transmits it to the mobile device **100**.

When the controller **190** ascertains that a data sharing mode is set to an active state in the mobile device **100** at block **201**, it operates the short-range communication unit **130**, the location measurement module **140**, and the motion sensing unit **160** (block **202**). When the controller **190** operates the motion sensing unit **160**, the geomagnetic sensor **161** and the acceleration sensor **162** are also operated. In an embodiment, when the short-range communication unit **130**, the location measurement module **140**, and the motion sensing unit **160** are already being operated, block **202** may be omitted.

The controller **190** communicates with an external mobile device near the mobile device **100** and acquires information regarding the location of the connected external mobile device via the external mobile device location information acquiring unit **191** (block **203**). Near the mobile device **100**, there may be at least one external mobile device including a short-range communication unit **130** that can communicate in substantially the same way as that of the mobile device **100**. The controller **190** controls the short-range communication unit **130** to search for at least one external mobile device near the mobile device **100** and connects to at least one searched external mobile device. The external mobile device location information acquiring unit **191** then acquires location information regarding at least one external mobile device, using the current location of the mobile device **100** and the current location of at least one external mobile device. The acquired location information corresponds to information regarding a distance and an azimuth with respect to the location of the mobile device **100**. Block **203** will be described in detail later referring to FIG. **3**.

The data setting unit **192** sets data to be transmitted and a data transmission mode (block **204**). The data transmission mode includes single and multi modes. In the single mode, the mobile device **100** transmits data to one external mobile device. In the multi mode, the mobile device **100** transmits data to a number of external mobile devices. Block **204** will be described in detail later referring to FIG. **4**.

The controller **190** determines whether the user applies motion to the mobile device **100**, via the motion sensing unit **160** (**205**). The controller **190** detects whether to change the azimuth of the mobile device **100**, via the geomagnetic sensor **161**, and also whether to change the acceleration of the mobile device **100**, via the acceleration sensor **162**. When a change is made in the azimuth or acceleration of the mobile device **100**, the geomagnetic sensor **161** or the acceleration sensor **162** creates a sensed signal and outputs it to the controller **190**. When the controller **190** receives the sensed signal from the geomagnetic sensor **161** or the acceleration sensor **162**, it concludes that motion is applied to the mobile device **100**.

When the controller **190** detects the motion applied to the mobile device **100**, the target mobile device setting unit **193** sets a target mobile device to receive data (block **206**). When the mobile device **100** is connected to a number of external mobile devices, the user can select one external mobile device or a number of external mobile devices and then transmit data to the selected external mobile device(s). The target mobile device setting unit **193** sets at least one target mobile device to receive data, based on the motion applied to the mobile device **100**. Block **206** will be described in detail later referring to FIG. **6**.

When the target mobile device to receive data is set at block **206**, the controller **190** transmits data to the target mobile device via the short-range communication unit **130** (block **207**). When the data transmission mode is in single mode, the controller **190** controls the short-range communication unit **130** to transmit data to one target mobile device. In contrast, when the data transmission mode is in multi mode, the controller **190** controls the short-range communication unit **130** to transmit data to a number of target mobile devices.

When the target mobile device detects that data is being received, it receives the data and stores it in the inner storage Alternatively, when the target mobile device detects that data is being received, it displays a message asking whether to receive data. When the user selects to receive data, the target mobile device receives the data and stores it in the inner storage. In an embodiment of the invention, the target mobile device determines whether the data sharing mode is in an active state. When the target mobile device ascertains that the data sharing mode is in an active state, it can directly receive data and then store it to the inner storage, without displaying a message asking whether to receive data. In contrast, when the target mobile device ascertains that the data sharing mode is in an inactive state, it displays a message asking whether to receive data, receives data when the user selects to receive data, and stores the received data in the inner storage.

FIG. **3** illustrates a process for connecting to an external mobile device near the mobile device and acquiring location information of the external mobile device (block **203** of FIG. **2**), according to an embodiment of the invention.

The controller **190** controls the short-range communication unit **130** to search for external mobile devices near the mobile device **100** (block **301**). When the short-range communication unit **130** is implemented with a Bluetooth communication module, it broadcasts an inquiry signal. When at least one external mobile device receives the inquiry signal, it transmits an inquiry response signal to the mobile device **100**. The inquiry response signal includes information regarding a Bluetooth device address BD_ADDR, a clock, and a class of device. When the controller **190** receives an inquiry response signal from at least one external mobile device via the short-range communication unit **130**, it transmits a device name request signal thereto. At least one external mobile device receives the request signal and the device name to the mobile device **100**. The controller **190** receives the device name via the short-range communication unit **130** and concludes that the external mobile device that has transmitted the device name is a searched mobile device. The controller **190** then controls the display unit **180** to display a list of searched Bluetooth devices including the device names, Bluetooth device addresses, classes of devices, and such.

In an embodiment, the short-range communication unit **130** may be implemented with a WiFi communication module that can support WiFi Peer to Peer (WiFi P2P). WFi P2P is a technology that can allow WiFi devices to directly connect to each other without an Access Point (AP). The short-range communication unit **130** scans the entire channel and transmits a probe request. External mobile devices near the mobile device **100** also scan the entire channel and then transmit probe requests. The controller **190** then enters a listen state, i.e., a standby state, with respect to a particular channel, via the short-range communication unit **130**. After a certain period of time has elapsed, the controller **190** performs a search process with respect to a particular channel. During the search, the short-range communication unit **130** transmits a probe request. Likewise, the external mobile devices near the mobile device **100** are also in a listen state, i.e., a standby state, with respect to a particular channel. After a certain period of time has elapsed, the external mobile devices also perform a search process with respect to a particular channel. When the mobile device **100** in a listen state receives a probe request from an external mobile device or an external mobile device in a listen state receives a probe request from the mobile device **100**, the mobile device **100** and the external mobile device perform a device search process for each other. The controller **190** controls the display unit **180** to display information regarding a searched device.

The controller **190** connects to the searched external mobile device via the short-range communication unit **130** (block **302**). When the controller **190** ascertains that the data sharing mode of the mobile device **100** is an active state, it controls the short-range communication unit **130** to directly connect to at least one external mobile device searched at block **301**. The controller **190** controls the display unit **180** to display a list of searched external mobile devices. When the user selects one of the external mobile devices via the input unit **170**, the controller **190** controls the short-range communication unit **130** to connect to the user's selected external mobile device.

When the short-range communication unit **130** is implemented with a Bluetooth communication module, it performs pairing and connecting processes with the searched external mobile device. During the pairing process, the controller **190** controls the display unit **180** to display a PIN code input field or a message asking whether to approve a pairing process. When the user inputs a correct PIN code to the PIN code input field or selects 'Yes' to approve the pairing process, the short-range communication unit **130** performs the pairing process with the searched external mobile device. In an embodiment, the controller **190** can determine whether the data sharing mode is an active state. When the controller **190** ascertains that the data sharing mode is an active state, it can directly perform a pairing process with all the searched external mobile devices, without displaying a PIN code input field or a message asking whether to approve the pairing process. Likewise, an external mobile device can determine whether the data sharing mode is an active state. When the external mobile device ascertains that the data sharing mode is an active state, it can directly perform a pairing process with a searched mobile device, without displaying a PIN code input field or a message asking whether to approve the pairing process.

After performing the pairing process, the short-range communication unit **130** connects to at least one external mobile device that is paired with the mobile device **100**. The connection corresponds to a process of establishing a channel to transmit/receive data between the mobile device **100** and the external mobile device.

In an embodiment, when the short-range communication unit **130** is implemented with a WiFi communication module, it performs a group formation process with at least one searched external mobile device. The short-range communication unit **130** performs a Group Owner (GO) negotiation process. The short-range communication unit **130** transmits a GO negotiation request to the searched external mobile device. The external mobile device receives the GO negotiation request and transmits a GO negotiation response to the mobile device **100**. The GO negotiation request and GO negotiation response include an intent value to determine a GO. The short-range communication unit **130** and the external mobile device compare the intent values with each other, and set a mobile device with a greater intent value than the other as the GO. The short-range communication unit **130** then performs a provisioning process, exchanging credential serving as information for joining a P2P group with the external mobile device and completes the group formation process. A connection is then established between the mobile device **100** and the external mobile device.

The external mobile device location information acquiring unit **191** controls the short-range communication unit **130** to transmit a location information request message to at least one external mobile device that is currently connected to the mobile device **100** (block **303**). An external mobile device receives the request message and measures its current location using the location measurement module. The external mobile device transmits the measured current location to the mobile device **100**.

The external mobile device location information acquiring unit **191** receives the information regarding the current location of the external mobile device from the external mobile device currently connected to the mobile device **100**, via the short-range communication unit **130** (block **304**). The information regarding the current location includes latitude and longitude.

When an external mobile device receives a location information request message from the mobile device **100**, it determines whether a data sharing mode is in an active state. When the external mobile device ascertains that a data sharing mode is in an active state, it transmits its current location information to the mobile device **100**. This is described in detail as follows, with reference to FIG. **4**.

FIG. **4** illustrates a signal flow diagram of a process in which a mobile device **100** receives the location information from an external mobile device, according to an embodiment of the invention.

The mobile device **100** transmits a location information request message **401** to an external mobile device. The external mobile device receives the location information request message **401** and determines whether a data sharing mode is in an active state (block **402**). When the external mobile device ascertains a data sharing mode is in an active state at block **402**, it operates the location measurement module (block **403**), and measures its current location via the module (block **404**). The external mobile device then transmits the current location information **405** regarding its current location to the mobile device **100**. The mobile device **100** receives the current location information regarding the external mobile device (block **406**). Meanwhile, when the external mobile device ascertains that the data sharing mode is in an inactive state at block **402**, it does not transmit the location information to the mobile device **100** (block **407**). That is, the external mobile device does not perform a location measurement process.

Referring back to FIG. **3**, after receiving the current location information regarding the external mobile device via the

short-range communication unit **130** at block **304**, the external mobile device location information acquiring unit **191** controls the location measurement module **140** to measure the current location of the mobile device **100** (block **305**). A current location includes latitude and longitude.

The external mobile device location information acquiring unit **191** calculates the azimuth and distance of at least one external mobile device currently connected to the mobile device **100**, based on the measured current location of the mobile device **100** (block **306**). The external mobile device location information acquiring unit **191** calculates a distance between the mobile device **100** and the external mobile device and an azimuth from the mobile device **100** to the external mobile device, using the current location of the mobile device **100** and the current location of the external mobile device. For example, the external mobile device location information acquiring unit **191** can acquire location information regarding an external mobile device, i.e., an azimuth of 92° E and a distance of 7 m. The external mobile device location information acquiring unit **191** calculates azimuths and distances for all external mobile devices that transmitted their current locations to the mobile device **100**.

The external mobile device location information acquiring unit **191** then stores the calculated azimuths and distances in the external mobile device location information storage unit **151** (block **307**). The external mobile device location information storage unit **151** stores azimuths and distances according to the identification information regarding external mobile devices.

In an embodiment, the external mobile device location information acquiring unit **191** may transmit a location information request message **401** to at least one external mobile device currently connected to the mobile device **100**, in a polling mode. Because locations of the mobile device **100** and external mobile devices may differ in real-time, the external mobile device location information acquiring unit **191** can periodically transmit a location information request message **401** to external mobile devices currently connected to the mobile device **100**. When the external mobile devices receive a location information request message **401**, they measure the current locations and then transmit them to the mobile device **100**.

Alternatively, external mobile devices may periodically measure their current locations and then transmit them to the mobile device **100**. After the external mobile devices have transmitted their first current locations to the mobile device **100**, they can periodically measure their current locations and transmit them to the mobile device **100** while they are connected to the mobile device **100**.

FIG. **5** illustrates a process for setting a data transmission mode and data to be transmitted (block **204** of FIG. **2**), according to an embodiment of the invention.

The data setting unit **192** controls the display unit **180** to display a data writing menu or a data selecting menu (block **501**). In an embodiment of the invention, the data writing menu refers to a menu that provides interfaces through which the user can directly create data. Examples of the data writing menu are a message writing menu, an email writing menu, a camera-photographing menu, and such. The data selecting menu refers to a menu that displays data written by the user or downloaded from external systems and provides interfaces through which the user can select corresponding data. Examples of the data selecting menu are a message box, a note menu, a photograph album menu, a video menu, an audio menu, and such.

After selecting a data writing menu or a data selecting menu at block **501**, the data setting unit **192** detects that the user has written or selected data (block **502**) The user can directly create data via the data writing menu or select corresponding data stored in the memory via the data selecting menu. The data setting unit **192** detects, via the input unit **170**, that the user has written or selected data.

The data setting unit **192** sets the data written or selected by the user as data to be transmitted (block **503**). The data setting unit **192** controls the display unit **180** to display a data transmission mode setting menu (block **504**). The data transmission mode setting menu includes a signal mode and a multi mode. In the single mode, the mobile device **100** transmits data to one external mobile device. In the multi mode, the mobile device **100** transmits data to a number of external mobile devices. The data setting unit **192** receives a signal to select a single or multi mode via the input unit **170**. The data setting unit **192** sets a data transmission mode according to the user's selection (block **505**).

FIG. **6** illustrates a process for setting a target mobile device to receive data (block **206** of FIG. **2**), according to an embodiment of the invention.

The target mobile device setting unit **193** measures the strength level and the range of motion of the mobile device **100** via the motion sensing unit **160** (block **601**). The target mobile device setting unit **193** controls the geomagnetic sensor **161** to measure the range of motion of the mobile device **100**. The target mobile device setting unit **193** also controls the acceleration sensor **162** to measure the strength level of motion of the mobile device **100**.

The target mobile device setting unit **193** determines whether the measured range of motion is equal to or greater than a preset azimuth range (block **602**). In an embodiment of the invention, the 'preset azimuth range' refers to a value to distinguish between the motions, whether the user points to one external mobile device or a number of external mobile devices. The present azimuth range may be expressed by the degree of an angle, such as 10°, 20°, and so forth. The user can make a motion with the mobile device **100** to point to one external mobile device, as shown in FIG. **7**A. For example, the user can vertically move the mobile device **100** up or down with the display unit **180** facing upwards. In that situation, because the top side **701** and the bottom side **702** of the mobile device **100**, which are used to sense the terrestrial magnetism, are not moved in the horizontal direction, the mobile device **100** does not detect that its azimuth is altered.

Likewise, the user can make a motion with the mobile device **100** to point to a number of external mobile devices, as shown in FIG. **7**B. That is, the user can horizontally move from side to side the mobile device **100** with the display unit **180** facing upwards. In that situation, because the top side **701** and the bottom side **702** of the mobile device **100** which are used to sense the terrestrial magnetism are moved in the horizontal direction, the mobile device **100** detects that its azimuth is altered.

In an embodiment of the invention, the preset azimuth range refers to a reference value to determine whether the user moves the top side of the mobile device **100** vertically or horizontally.

When the target mobile device setting unit **193** ascertains that the measured range of motion is less than a preset azimuth range at block **602**, it detects an external mobile device in the measured range of motion (block **603**). That is, the target mobile device setting unit **193** concludes that the user makes a motion to point out an external mobile device and detects external mobile devices in the measured range of motion.

The target mobile device setting unit **193** then determines whether there are two or more detected external mobile

devices (block **604**). For example, there may be two or more external mobile devices in the direction range where the user made a motion. In that situation, the target mobile device setting unit **193** detects two or more external mobile devices in the range of motion.

When the target mobile device setting unit **193** ascertains that the number of detected external mobile devices is two or more in the range of motion at block **604**, it sets, as a target mobile device, the external mobile device located from a distance corresponding to the strength level of motion measured at block **601** (block **605**).

In an embodiment of the invention, the storage unit **150** stores distance values matching strength levels of the movements. For example, strength levels of the movements **1**, **2**, and **3** match distance values '0~3 m,' '3~5 m,' and '5~10 m,' respectively. When the target mobile device setting unit **193** concludes that the movement corresponds to strength level 1 at block **601**, it sets, as a target mobile device, an external mobile device located within 0~3 m from the mobile device **100**.

In contrast, when the target mobile device setting unit **193** ascertains that one external mobile devices is detected in the range of motion at block **604**, it sets, as a target mobile device, the external mobile device determined at block **603** (**606**).

Meanwhile, when the target mobile device setting unit **193** ascertains that the measured range of motion is equal to or greater than a preset azimuth range at block **602**, it determines whether the data transmission mode is set as a single mode or a multi mode (block **607**). When the target mobile device setting unit **193** ascertains that the data transmission mode is set as a multi mode at block **607**, it sets, as a target mobile device, at least one external mobile device in the range of motion (block **608**).

In contrast, when the target mobile device setting unit **193** ascertains that the data transmission mode is set as a single mode at block **607**, it sets, as a target mobile device, one of the external mobile devices determined at block **603** that is closest to the mobile device **100** (block **609**).

FIGS. **8**A and **8**B illustrate views that describe the process for setting a target mobile device according to the movement of a mobile device **100**.

FIG. **8**A shows a view in which the user makes a motion with the mobile device **100** to point to an external mobile device A. When the mobile device **100** receives a user's motion to point to an external mobile device A, the target mobile device setting unit **193** detects external mobile devices A and B in the range of motion. Because the target mobile device setting unit **193** detects multiple external mobile devices in the range of motion, it can set, as a target mobile device, an external mobile device located from a distance corresponding to the strength level applied to the mobile device **100**. For example, it is assumed that distance values are '0~3 m,' '3~5 m,' and '5~10 m' corresponding to strength levels of motions 1, 2, and 3, respectively. When the measured motion is strength level 1, and distance L1 between the mobile device **100** and external mobile device A and distance L2 between the mobile device **100** and external mobile device B are 2 m and 4 m, respectively, the target mobile device setting unit **193** sets external mobile device A as a target mobile device. In contrast, when the strength level is 2, the target mobile device setting unit **193** sets external mobile device B as a target mobile device.

FIG. **8**B shows a view in which the user makes a motion with the mobile device **100** to point to an external mobile device B. When the user swings the mobile device **100** 90° from external mobile device A to B, the target mobile device setting unit **193** compares the range of motion with a preset azimuth range. When the preset azimuth range is set as 30°, the target mobile device setting unit **193** concludes that the range of motion is equal to or greater than the preset azimuth range. In addition, the target mobile device setting unit **193** determines whether the data transmission mode is a multi mode. When the target mobile device setting unit **193** ascertains that the data transmission mode is a multi mode, it sets, as target mobile devices, external mobile devices A and B. In contrast, when the target mobile device setting unit **193** ascertains that the data transmission mode is a single mode, it sets, as a target mobile device, one of the external mobile devices A and B that is closest to the mobile device **100**.

As described above, the data transmission method and system, according to the invention, can allow users to easily transmit data via their mobile devices. The data transmission method and system can also allow users to directly input the movement in the direction towards a called party to receive data to their mobile devices, thereby enhancing the intuitive use of their mobile devices.

Although the present disclosure has been described with an exemplary embodiment, various changes and modifications may be suggested to one skilled in the art. It is intended that the present disclosure encompass such changes and modifications as fall within the scope of the appended claims.

What is claimed is:

1. A method for transmitting data in a mobile device, the method comprising:

searching, by the mobile device, for external mobile devices near the mobile device;

connecting to at least one of the external mobile devices;

transmitting a location information request message to the at least one external mobile device connected to the mobile device;

receiving the location information from each of the at least one external mobile device connected to the mobile device;

responsive to recognizing at least one of a movement direction or strength level of motion of the mobile device, determining, by the mobile device, at least one target mobile device from among the external mobile devices as a function of (i) the recognized at least one of the movement direction or strength level of motion of the mobile device and (ii) a distance and an azimuth of the external mobile devices with respect to a current location of the mobile device, the distance and the azimuth of the external mobile devices being calculated from the received location information of the external mobile devices; and

transmitting data to the determined at least one target mobile device.

2. The method of claim **1**, wherein acquiring the location information comprises:

measuring the current location of the mobile device;

calculating the distance and the azimuth for each of the at least one external mobile device connected to the mobile device as a function of the current location of the mobile device; and

storing the calculated distance and azimuth.

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

displaying a data writing menu;

setting data entered by a user as the data to be transmitted;

displaying a data transmission mode setting menu including a single mode and a multi mode; and

setting the data transmission mode as one of the single mode and the multi mode, according to a user's selection.

4. The method of claim 3, wherein determining the at least one target mobile device comprises:

measuring the direction of motion of the mobile device; and

setting, as the at least one target mobile device, at least one of the external mobile devices that is in the measured direction of motion.

5. The method of claim 3, wherein determining the at least one target mobile device comprises:

measuring the direction and the strength level of motion input by the user;

detecting at least one of the external mobile devices in the measured direction of motion;

when more than one of the external mobile devices are detected in the measured direction of motion and the mobile device is in a single mode, setting one of the external mobile devices located at a distance corresponding to the measured strength level of motion as the at least one target mobile device; and

when one of the external mobile devices is detected in the measured direction of motion, setting the detected external mobile device as the at least one target mobile device.

6. The method of claim 3, wherein determining the at least one target mobile device comprises:

measuring a strength level and a range of motion input by a user;

determining whether the measured range of motion is not less than a preset azimuth range;

determining the data transmission mode when the measured range of motion is not less than a preset azimuth range; and

determining, as the at least one target mobile device, at least one of the external mobile devices in the range of motion when the data transmission mode is set to a multi mode.

7. The method of claim 6, further comprising:

determining, as the at least one target mobile device, one of the external mobile devices that is closest to the mobile device, when the data transmission mode is set to a single mode.

8. The method of claim 1, further comprising:

determining whether a data sharing mode of the mobile device is set to an active state; and

operating, when the data sharing mode is set to the active state, a short-range communication unit, a location measurement module, a geomagnetic sensor, and an acceleration sensor in the mobile device.

9. The method of claim 1, wherein setting the at least one target mobile device to receive the data as a function of the detected change of the mobile device comprises setting the at least one target mobile device to receive the data as a function of a sensed direction of the detected change of the mobile device.

10. A mobile device comprising:

a short-range communication unit configured to search for external mobile devices near the mobile device, receive location information from the each external mobile device, and transmit data to at least one target mobile device, connect to at least one of the external mobile devices, transmit a location information request message to the at least one external mobile device connected to the mobile device, and receive the location information from each of the at least one external mobile device connected to the mobile device;

a controller configured to, responsive to recognizing at least one of a movement direction or strength level of motion of the mobile device, determine the at least one target mobile device from among the external mobile devices as a function of (i) the recognized at least one of the movement direction or strength level of motion of the mobile device and (ii) a distance and an azimuth of the external mobile devices with respect to a current location of the mobile device, the distance and the azimuth of the external mobile devices being calculated from the received location information of the external mobile devices.

11. The mobile device of claim 10, wherein the controller is further configured to control a motion sensing unit configured to measure the current location of the mobile device, calculate the distance and the azimuth for each of the at least one external mobile device connected to the mobile device as a function of the measured current location of the mobile device, and store the calculated distance and azimuth in a storage unit.

12. The mobile device of claim 11, further comprising a display unit, wherein the controller is further configured to control the display unit to display a data writing menu on the display unit, set data entered by a user as the data to be transmitted, display a data transmission mode setting menu including a single mode and a multi mode on the display, and set the data transmission mode as one of the single mode and the multi mode, according to a user's selection.

13. The mobile device of claim 12, wherein the motion sensing unit comprises:

a geomagnetic sensor configured to measure the direction of motion of the mobile device; and

an acceleration sensor configured to measure the strength level of motion of the mobile device.

14. The mobile device of claim 10, wherein the short-range communication unit comprises at least one of a Bluetooth communication module, a WiFi communication module, a Zigbee communication module, an infrared communication module, a Near Field Communication (NFC) communication module, and a Radio Frequency Identification (RFID) communication module.

15. The mobile device of claim 13, wherein the controller is further configured to set at least one of the external mobile devices that is in the measured direction of motion as the at least one target mobile device.

16. The mobile device of claim 12, wherein the controller comprises a data setting unit configured to set the data transmission mode as one of the single mode and the multi mode.

17. The mobile device of claim 13, wherein the controller comprises a target mobile device setting unit configured to detect external mobile devices in the measured direction of motion, set one of the external mobile devices located at a distance corresponding to the measured strength level of motion as one of the at least one target mobile device when more than one of the external mobile devices are detected in the measured direction of motion and the mobile device is in a single mode, and set the detected external mobile device as the at least one target mobile device when one of the external mobile devices is detected in the measured direction of motion.

18. The mobile device of claim 16, wherein the motion sensing unit is further configured to measure a range of motion of the mobile device.

19. The mobile device of claim 12, wherein the controller comprises a target mobile device setting unit configured to determine whether a measured range of motion is not less than a preset azimuth range, determine the data transmission mode when the measured range of motion is not less than a preset azimuth range, and determine, as the at least one target

mobile device, at least one of the external mobile devices in the range of motion when the data transmission mode is set to a multi mode.

20. The mobile device of claim **19**, wherein the target mobile device setting unit is further configured to determine, as the at least one target mobile device, one of the external mobile devices that is closest to the mobile device, when the data transmission mode is set to a single mode.

21. The mobile device method of claim **10**, wherein the controller is further configured to determine whether a data sharing mode of the mobile device is set to an active state, and operate the location measurement module, the geomagnetic sensor, and the acceleration sensor when the data sharing mode is set to the active state.

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