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(54) **BUMP BUTTON**

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19, 2010, which is a continuation-in-part of
application No. 12/699,692, filed on Feb. 3, 2010, now
Pat. No. 8,577,292.

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H04B 7/26	(2006.01)
G06Q 20/32	(2012.01)
G06F 15/16	(2006.01)
H04B 5/00	(2006.01)
H04M 1/2745	(2006.01)
H04M 1/725	(2006.01)

(52) **U.S. Cl.**
CPC *H04B 7/26* (2013.01); *G06F 15/16* (2013.01);
G06Q 20/3278 (2013.01); *G06F 2200/1636*
(2013.01); *H04B 5/0056* (2013.01); *H04B*
5/0062 (2013.01); *H04M 1/274516* (2013.01);
H04M 1/7253 (2013.01)

(58) **Field of Classification Search**
CPC H04W 84/18; H04W 84/20; H04W 88/00;
H04W 8/02; H04W 88/02

USPC 455/41.1, 41.2, 41.3
See application file for complete search history.

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(57) **ABSTRACT**

A fixed bump button may: (1) report its identification to a
server connected to the internet when the button is bumped by
a mobile device; and/or (2) emit a beacon signal identifying
the button to a mobile device.

4 Claims, 5 Drawing Sheets

100

110

A

105

115

110

B

105
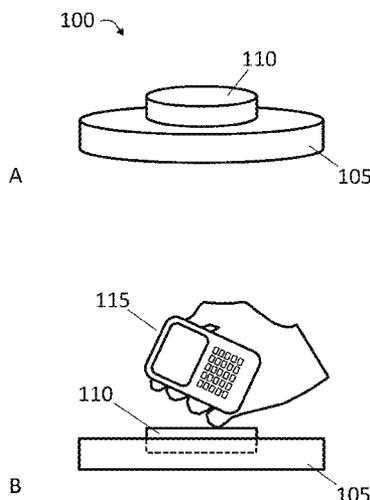
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100

110

105

A

115

110

105

B

Fig. 1

200

210

220

205

A

200

210

205

225

B

internet

Fig. 2

315

305

A

315

330

B

Fig. 3

400

405

Button or touch input device — 410

Microphone — 415

Camera — 420

Internet communications — 425

Processor and memory — 430

Beacon — 435

Fig. 4

500

505

510
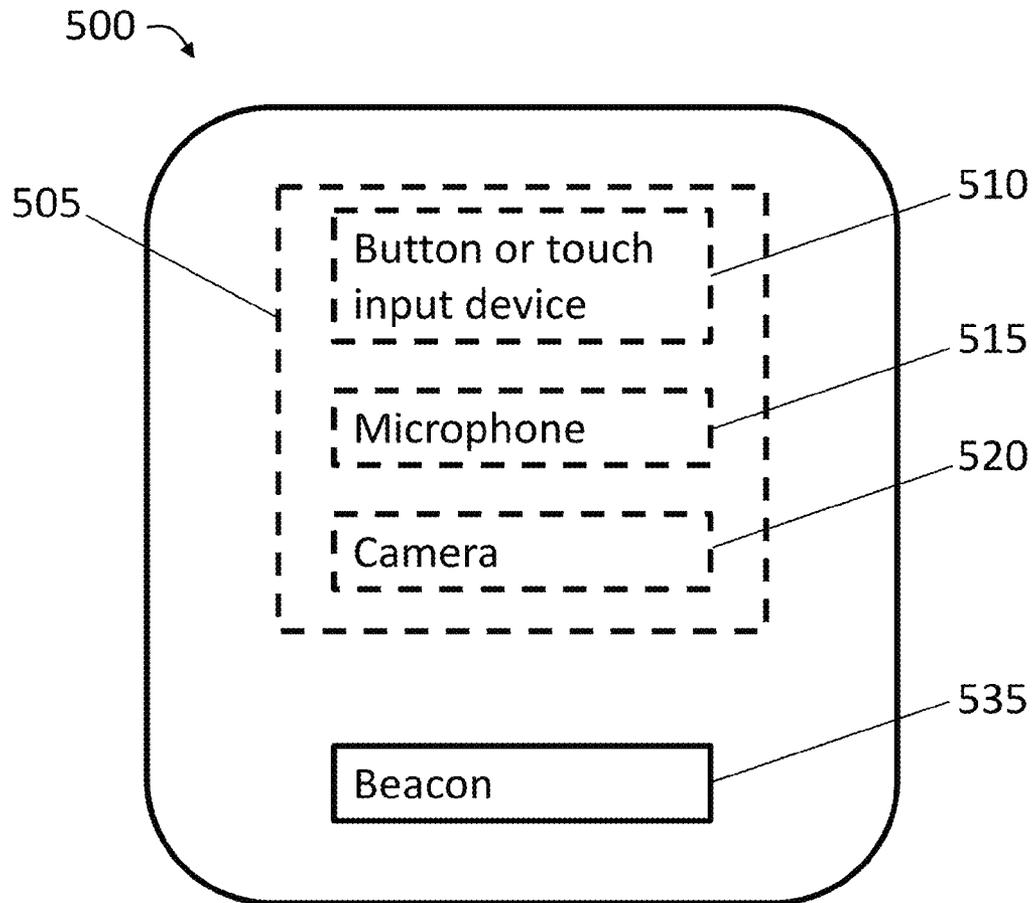Button or touch input device

515
Microphone

520
Camera

535
Beacon
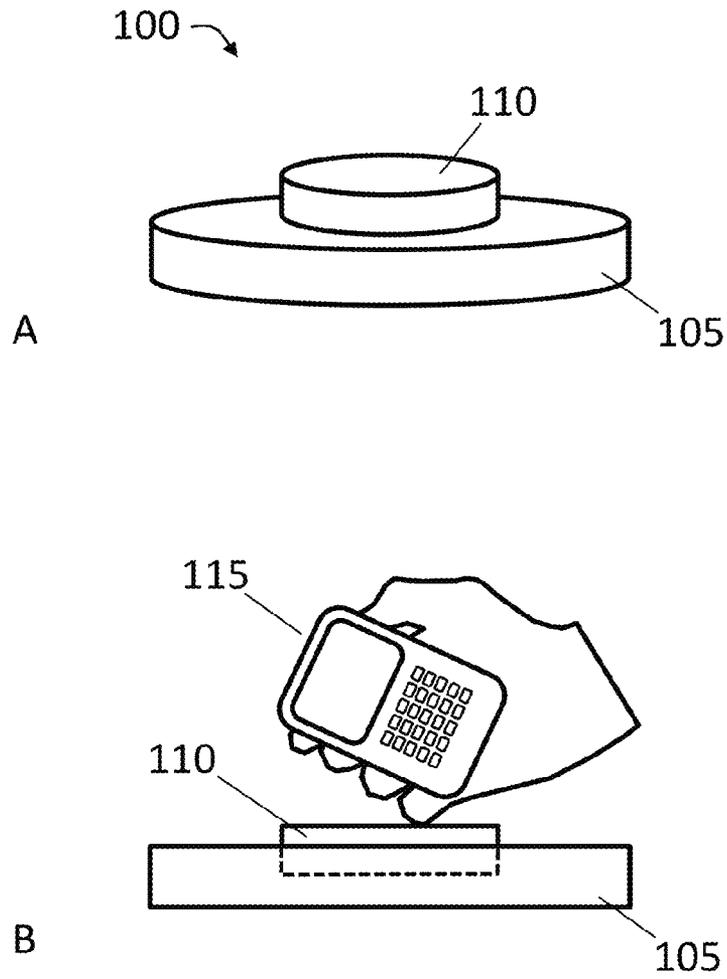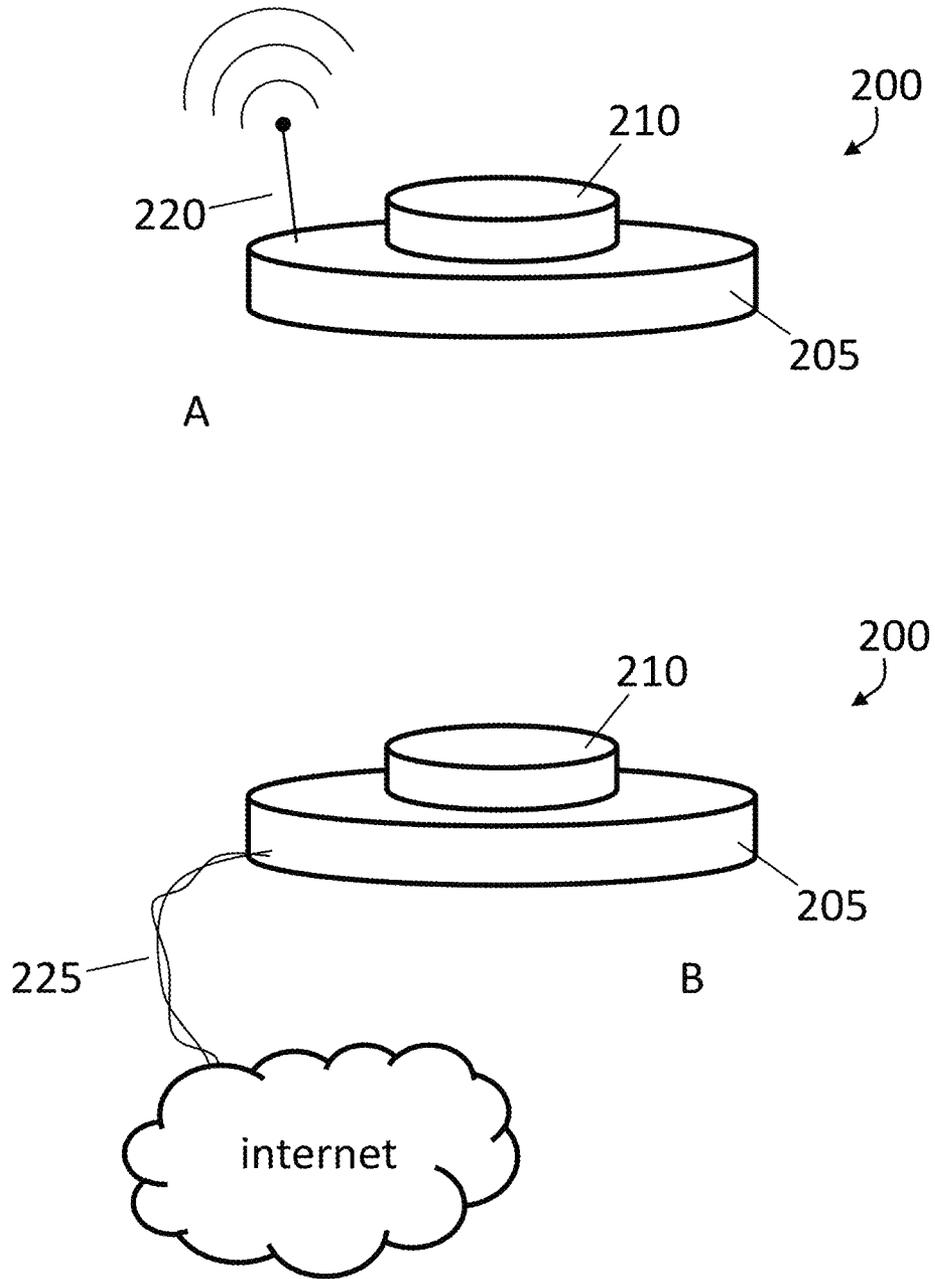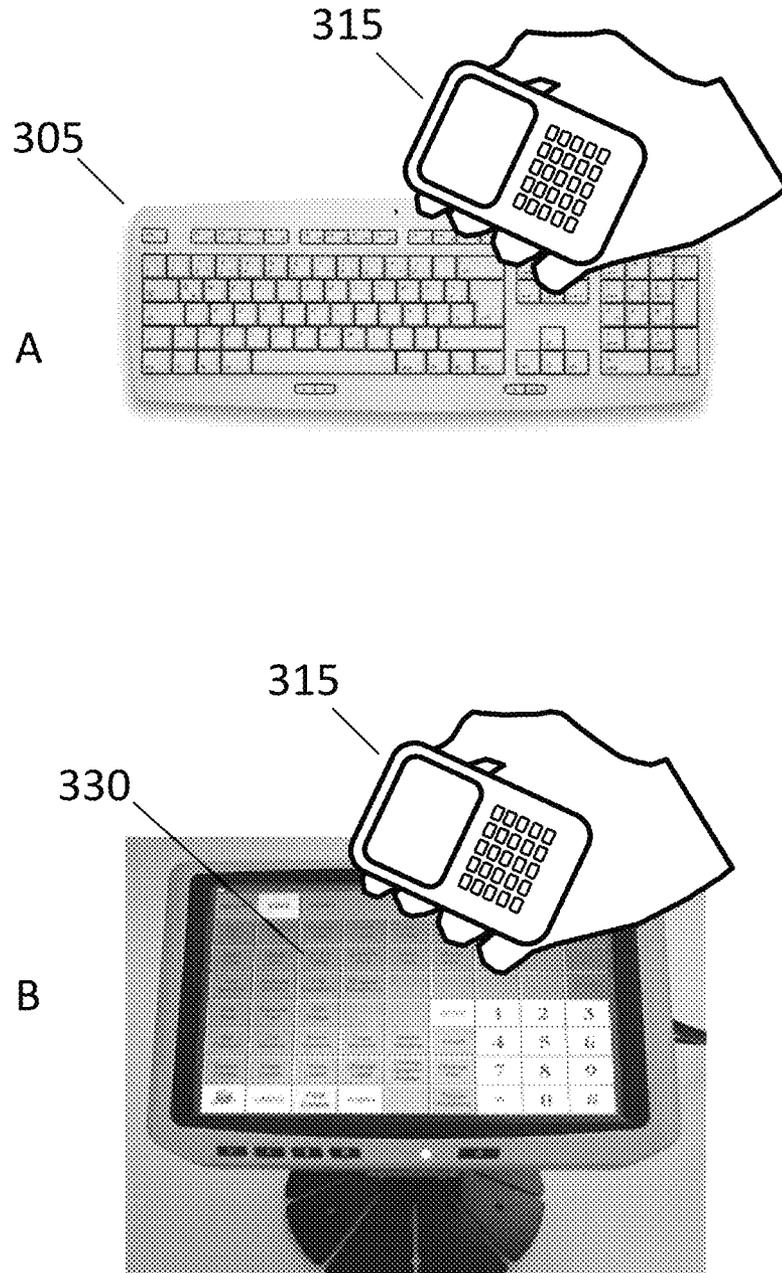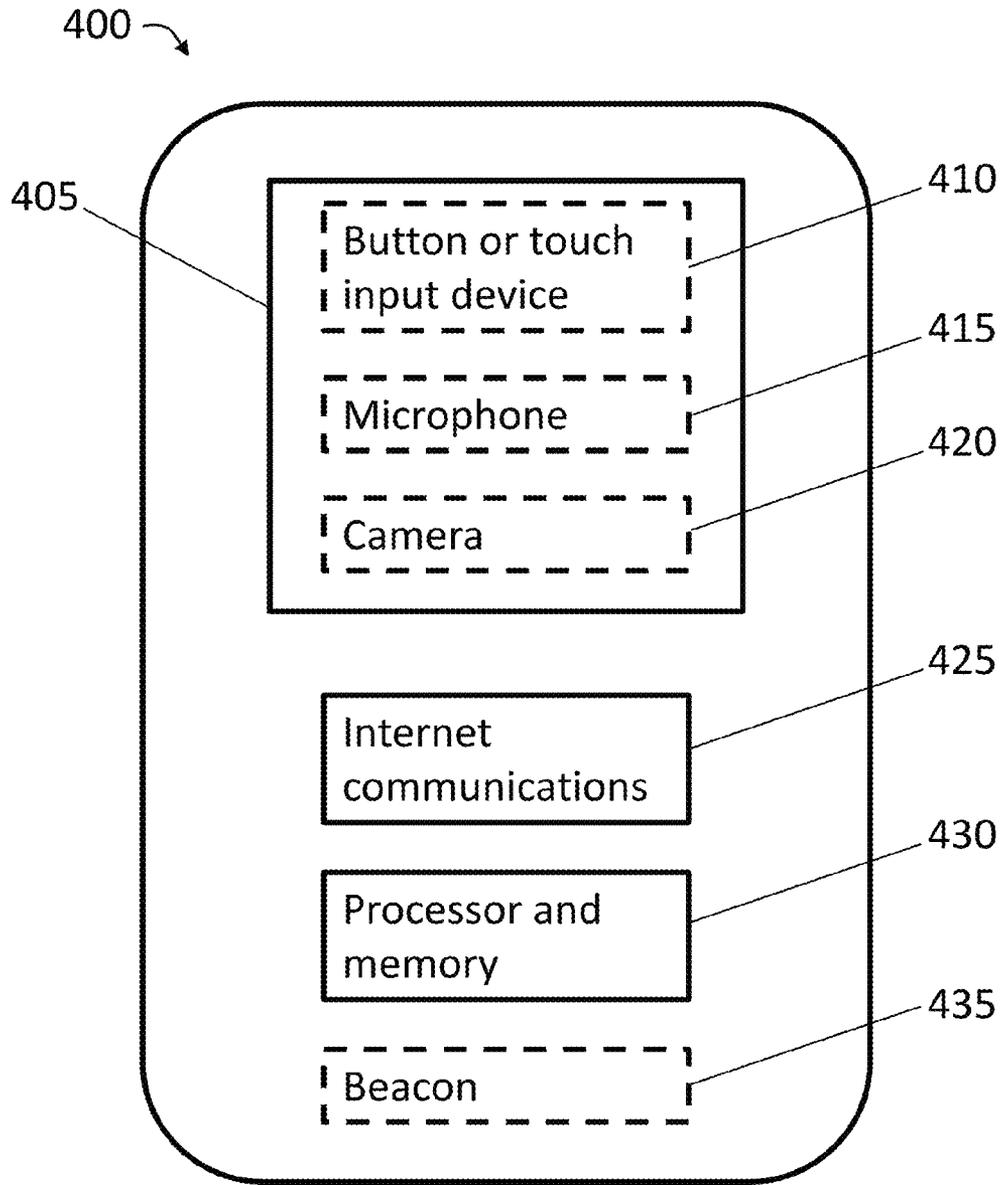
Fig. 5

BUMP BUTTON

RELATED APPLICATIONS

This application is a division of U.S. patent application Ser. No. 12/859,695, "Bump button", filed on Aug. 19, 2010 which is a continuation-in-part of U.S. patent application Ser. No. 12/699,692, "Bump validation", filed on Feb. 3, 2010 and incorporated herein by reference.

TECHNICAL FIELD

The disclosure is generally related to the field of information exchange between fixed and mobile electronic devices.

BACKGROUND

Recently a simple and quick way to exchange information between mobile electronic devices was developed. When people meet, they can bump their smart phones together to rapidly exchange business cards, music playlists, digital photos, money, or other information. The act of bumping tells a device to start information transfer.

Bumps between mobile devices occur when two devices at the same place at the same time indicate their intention to establish a connection for transferring information. Principles for determining when two devices are at "the same place at the same time" are described in U.S. patent application Ser. No. 12/699,692, "Bump validation", filed on 3 Feb. 2010 and incorporated herein by reference.

Bumps may also occur between mobile and fixed devices. If one of the participants in a bump is fixed at a known place, the problem of determining bump location for the fixed device is solved in advance. What are needed, therefore, are fixed bump terminals.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1A shows a fixed bump button.

FIG. 1B shows the button of FIG. 1A participating in a bump with a mobile device.

FIG. 2A shows a bump button communicating with the internet via a wireless connection.

FIG. 2B shows a bump button communicating with the internet via a wired connection.

FIG. 3A shows a mobile device bumping a keyboard.

FIG. 3B shows a mobile device bumping a touch screen.

FIG. 4 is a schematic block diagram of a bump button that may connect to the internet.

FIG. 5 is a schematic block diagram of a bump button that does not connect to the internet.

DETAILED DESCRIPTION

Bumps between electronic devices occur when two devices at the same place at the same time indicate their intention to establish a connection for transferring information. When a mobile device bumps another device that is fixed at a known place, the problem of determining the location of the fixed device is solved in advance.

FIG. 1A shows a fixed bump button 100, an example of a device that may be a fixed participant in a bump. FIG. 1B shows the button of FIG. 1A participating in a bump with a mobile device. In FIGS. 1A and 1B, a bump button includes a fixed base 105 and a button 110. In one configuration, base 105 includes a processor and memory, and an internet connection as described below. The bump button is designed to be

placed in a known, fixed location such as a cash register in a shop, an information kiosk in a train station, or fan club booth at a musical concert.

In FIG. 1B, mobile device 115 is bumping the fixed bump button. The act of bumping has depressed button 110 slightly into base 105. When a mobile device (e.g. 115) bumps a fixed bump button (e.g. 100), both devices report their intentions to a server. The mobile device sends a status report including time, position and bump request. The bump button need only send its identification, however. The bump button's location is fixed and already known to the server. Optionally, the button may also send the time of the bump to the server if the button is equipped with a clock.

FIGS. 2A and 2B show examples of bump buttons communicating via the internet. FIG. 2A shows a bump button communicating with the internet via a wireless connection while FIG. 2B shows a bump button communicating with the internet via a wired connection. In FIG. 2A fixed bump button 200 includes a fixed base 205 and a button 210. Base 205 includes a processor and memory. Button 200 also includes a wireless internet connection represented symbolically by antenna 220. The wireless connection may be based on Wi-Fi, Wi-Max, Bluetooth, EDGE, 3G or 4G cellular or other radio standards. In FIG. 2B button 200 is shown with a wired internet connection represented symbolically by wires 225. The wired connection may be based on cable television networks, telephone digital subscriber line, ethernet or other wired internet standards.

When a mobile device bumps a fixed bump button, a server receives information from both the mobile device and the fixed button. A few examples serve to illustrate how bump information may be used. In a first example, a bump button is located at the cash register of a retail shop such as a coffee shop, clothing store, supermarket, etc. A customer pays for a purchase by bumping his mobile device (e.g. smart phone, personal digital assistant, etc.) against the bump button. When the bump occurs, the mobile device sends position and time estimates, and a bump request to a server, and the fixed button sends its identification to the server. The server sends a message to the mobile device prompting the customer to enter an amount of money to be sent to the retail shop. Thus, the bump button helps the server match the customer and the retail shop and initiate an electronic payment.

In another example, a bump button is located at an information kiosk in a train station. A traveler bumps the button with his mobile device. When the bump occurs, the mobile device sends position and time estimates, and a bump request to a server, and the fixed button sends its identification to the server. The server sends a message to the mobile device that directs the device to display travel information to the traveler. The message might be the uniform resource locator for a train timetable web page, for example. Thus, the bump button helps the server match the traveler with information relevant to the traveler's current position.

In another example, a bump button is located at a fan club booth at a musical concert. When a music fan attending the concert bumps the button with her smart phone or other mobile device, the device sends position and time estimates, and a bump request to a server, and the fixed button sends its identification to the server. The server sends the fan's email address to a band playing in the concert or registers the fan as a "friend" of the band in a social network, as examples. Thus, the bump button helps the server match the fan with the band.

In another example, a person using a computer needs to enter identifying information (e.g. user name, password, personal identification number, encryption key, etc.) to access a web site or other online resource. The web site displays a

message: "bump now". The person bumps his mobile device against any of the keys on the computer's keyboard. The device sends position and time estimates, and a bump request to a server. The web site also reports the bump to the server. The server may then send identifying information to the web site on behalf of the person using the computer thus saving him from a tedious login process.

In another example, a sports fan is using a touch screen input device at stadium to buy beer from a vending machine. The fan bumps his mobile devices against the touch screen to initiate payment (as described above) and also to send an encrypted identification key that identifies him as someone old enough to buy beer. The bump button helps the server match the fan with the beer vendor and allows the vendor to offer additional services to the fan.

Many alternatives devices to the buttons depicted in FIGS. 1 and 2 are possible. For example, FIG. 3A shows a mobile device 315 bumping a keyboard 305 while FIG. 3B shows the device bumping a touch screen 330. The keyboard or touch screen is connected to a processor, memory and network connection so that it can transmit bump information to a server. A fixed bump device may also use a computer mouse button, camera, microphone or radio receiver, as examples, to detect the presence of a mobile device.

In dense user environments a bump button may emit a short-range beacon signal to help a mobile device improve its position estimate. For example, a bump button may emit a coded audio signal. A mobile device may use its microphone to record part of the audio signal. The audio recording may then be interpreted by the mobile device or sent to a server for further processing. A bump button may instead (or also) emit a radio or optical signal as a beacon. Further the beacon may be continuous or may be turned on briefly when a bump occurs. In either case, receipt of a beacon signal by a mobile device during a bump provides another way to validate the bump in the presence of multiple nearby mobile devices.

A bump button may be implemented in many different forms as described above. In one configuration, each of these share basic components as outlined in FIG. 4 which is a schematic block diagram of a bump button. In FIG. 4, fixed bump device ("button") 400 includes an input sensor 405, an internet communications unit 425, a processor and memory 430, and an optional beacon 435. Input sensor 405 may be a button or touch input device (e.g. touch screen) 410, a microphone 415 that listens for characteristic sounds (e.g. thuds, impacts) of a bump, a camera 420 that recognizes a picture (e.g. barcode) displayed by a mobile device, a radio receiver or another sensor. A fixed device supported by a spring may include an accelerometer as a sensor. A computer keyboard operating as a fixed bump device may use its keys to sense a bump.

In a basic form, a bump button has only one capability: when its sensor is triggered, it sends a message stored in memory to a server via the internet. The memory may be read-only memory as the message need only identify the bump button. The button's fixed location is already known to the server. Thus, a button's processor does not perform any general purpose computer function other than sending the message stored in the read-only memory

If a button also contains a clock, then the server may determine the button's clock offset as described in U.S. patent application Ser. No. 12/699,692, "Bump validation", filed on 3 Feb. 2010 and incorporated herein by reference. However, time reporting ability is not required in basic bump button implementations. A bump button's optional beacon may emit audio, radio and/or optical signals. The signals may be continuous tones or may contain coded information. Finally, the

beacon signals may be emitted continuously or briefly (e.g. a few seconds) when a bump occurs.

In another configuration, a fixed bump button does not include a system for communicating with the internet. FIG. 5 is a schematic block diagram of a bump button that does not connect to the internet, for example. In FIG. 5, fixed bump device ("button") 500 includes an optional input sensor 505 and a beacon 535. Input sensor 505 may be a button or other touch input device (e.g. touch screen) 510, a microphone 515 that listens for characteristic sounds (e.g. thuds, impacts) of a bump, a camera 520 that recognizes a picture (e.g. barcode) displayed by a mobile device, a radio receiver, a motion sensor such as an accelerometer or gyroscope, or another sensor. A fixed device supported by a spring may include an accelerometer as a sensor.

If a bump button constructed according to FIG. 5 has an input sensor, then the button may activate its beacon when its sensor is triggered. If the button does not have an input sensor, then the button's function is simply to emit its beacon signal continuously or at set repetition intervals. The bump button's beacon may emit audio, radio and/or optical signals. These beacon signals may be continuous tones or may contain coded information. An example of a radio beacon signal is a Wi-Fi broadcast of a button's MAC (media access control) address. Finally, the beacon signals may be emitted continuously or briefly (e.g. a few seconds) when a bump occurs.

A bump button that has no internet communication ability still adds information when a mobile device bumps it. When a mobile device bumps a beacon-only button, the mobile device reports the beacon signal, and thus the button's identity, to a server. The button's fixed location is already known to the server, so the location of the mobile device is known with improved accuracy compared to a case where no button is present.

Fixed bump buttons as described herein facilitate matching mobile device users with specific locations such as retail shops, information kiosks or vending machines. When mobile and fixed devices are matched in a bump, information transfers between the mobile device and a server can carry money, identification or other information. Fixed bump buttons in different forms may include internet connection ability and/or emit beacon signals.

The above description of the disclosed embodiments is provided to enable any person skilled in the art to make or use the disclosure. Various modifications to these embodiments will be readily apparent to those skilled in the art, and the principles defined herein may be applied to other embodiments without departing from the scope of the disclosure. Thus, the disclosure is not intended to be limited to the embodiments shown herein but is to be accorded the widest scope consistent with the principles and novel features disclosed herein.

What is claimed is:

1. A fixed device comprising:
an input sensor button configured to receive, from a nearby mobile device, an indication of an intention of the nearby mobile device to establish a connection to transfer information;
a beacon that, when triggered by the input sensor button, sends a short-range signal to the nearby mobile device, the short-range signal comprising a MAC address and identifying the fixed device,
wherein the fixed device is incapable of communication via the internet.

2. The device of claim 1 wherein the short-range signal is a coded audio signal.

3. The device of claim **1** wherein the short-range signal is a radio signal.

4. The device of claim **1** wherein the short-range signal is an optical signal.

* * * * *