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(54) **SYSTEM AND METHOD FOR REMOTELY CONTROLLING A DOMESTIC APPLIANCE**
SYSTEM UND VERFAHREN ZUR FERNSTEUERUNG EINES HAUSHALTSGERÄTS
SYSTÈME ET PROCÉDÉ POUR COMMANDER À DISTANCE UN APPAREIL MÉNAGER

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(73) Proprietor: **Vestel Elektronik Sanayi ve Ticaret A.S.**
45030 Manisa (TR)

(72) Inventors:
• **ÖZEN, Erol**
45030 Manisa (TR)

• **DALKILIC, Sercan**
45030 Manisa (TR)

(74) Representative: **Ascherl, Andreas et al**
KEHL, ASCHERL, LIEBHOFF & ETTMAYR
Patentanwälte - Partnerschaft
Emil-Riedel-Strasse 18
80538 München (DE)

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Description

[0001] The present invention relates to a system for remotely controlling a domestic appliance or for home automation according to claim 1, and a method according to claim 7.

Background of the Invention

[0002] Remote control of domestic appliances, such as washing machines, dishwashers or refrigerators for example, is a well-established technology. It has become increasingly common for users to control such domestic appliances remotely from a mobile device, such as a tablet computer or mobile phone. Such remote control generally takes place via a wireless communication protocol, such as wi-fi, Bluetooth™ or Z-wave™.

[0003] However, even if the domestic appliance and the mobile device are on the same wireless network, there can be a delay of up to about 1000 milliseconds between when a user starts to enter operating instructions for the domestic appliance to the mobile device and when the domestic appliance starts to receive those instructions. This delay is caused by the time taken for propagation of a wireless control signal containing the instructions from the mobile device via the wireless communication protocol to the domestic appliance. Such a delay is of less concern to a user if the user is not near to or cannot see the domestic appliance and therefore does not notice the delay, or if the user is near to and/or can see the domestic appliance, but only wishes to transmit a simple instruction, such as switching the domestic appliance on or off, for example. However, if the user wishes to enter a sequence of instructions in quick succession one after another or to adjust a continuously variable parameter of the domestic appliance, like its operating temperature for example, such a delay can be very annoying to the user if the user is near to and/or can see the domestic appliance and therefore notices the delay. This can significantly diminish the user's experience.

[0004] WO-A-2008/024915 describes a controller for a device transmitting commands across one or more communication channels. Each such channel may employ a separate medium, such as radio waves and infrared light. The controller may transmit two separate signals to a device, where one signal is sent via radio waves and the other by infrared light.

[0005] US-A-2016/0142157 describes a mobile device including an input reception unit for receiving at least one input through a user interface, a control information determination unit for determining control information corresponding to an operation of an external device based on the at least one input a sound wave data generation unit for generating sound wave data corresponding to the control information and an output unit for outputting a sound wave corresponding to the sound wave data.

Object of the Invention

[0006] It is therefore an object of the invention to provide a system for remotely controlling a domestic appliance or for home automation, and a method of remotely controlling a domestic appliance or of home automation.

Description of the Invention

[0007] The object of the invention is solved by a system for remotely controlling a domestic appliance or for home automation according to claim 1. Preferably, the system at least comprises a domestic appliance and a mobile device to run an application for domestic appliance control or home automation. The domestic appliance at least comprises a wireless communication device to receive a wireless control signal, and a microphone to receive an ultrasonic or high frequency audible control signal or an infrared receiver to receive an infrared control signal. The mobile device at least comprises a wireless communication module, and a loudspeaker or an infrared transmitter. The wireless communication module is operable according to the same wireless communication protocol as the wireless communication device of the domestic appliance and is to transmit the wireless control signal to the wireless communication module of the domestic appliance. The loudspeaker is to transmit the ultrasonic or high frequency audible control signal to the microphone of the domestic appliance. The infrared transmitter is to transmit the infrared control signal to the infrared receiver of the domestic appliance. The mobile device further comprises means configured to determine whether a user is entering instructions to the mobile device to remotely control the domestic appliance faster than a predetermined and if the user is instructions to the mobile device faster than the predetermined rate to transmit the user's instructions from the mobile device to the domestic appliance via the respective one of the loudspeaker or the infrared transmitter, whereas if the user is entering instructions to the mobile device at or slower than the predetermined rate, to transmit the user's instructions from the mobile device to the domestic appliance via the wireless communication module.

[0008] By "wireless communication device" and "wireless control signal" are respectively meant a device which communicates in the radio-frequency part of the electromagnetic spectrum and a radio-frequency control signal.

[0009] This solution is beneficial because the wireless communication device can be used to remotely control the

domestic appliance via a wireless control signal in a known fashion. However, either the microphone can be used to remotely control the domestic appliance via an ultrasonic or high frequency audible control signal as well or the infrared receiver can be used to remotely control the domestic appliance via an infrared control signal as well. In either case, if a user is near to and/or can see the domestic appliance, either an ultrasonic or high frequency audible control signal or an infrared control signal sent from the user's mobile device will be received directly by the domestic appliance at respectively either the speed of sound or the speed of light, without any delay caused by propagation of the wireless control signal. The domestic appliance will therefore start to operate according to instructions contained in the ultrasonic or high frequency audible control signal or in the infrared control signal immediately after these operating instructions have been entered by the user into the user's mobile device. The user's experience is thereby enhanced.

[0010] This solution is also advantageous because there is no need for any proximity sensing between the domestic appliance and the mobile device. Whereas two wireless-enabled devices can communicate directly with each other via a wireless protocol without the need for a wireless access point by using an ad hoc network, this requires proximity sensing between the two devices, which causes an initial delay in setting up the wireless communication. In contrast, with the present invention, when the user is close enough to the domestic appliance for any delay in the domestic appliance responding to the user's instructions to be of concern, the user's mobile device will also be close enough to the domestic appliance for either the microphone thereof to be able to receive the ultrasonic or high frequency audible control signal or the infrared receiver thereof to be able to receive the infrared control signal, and therefore eliminate the delay. On the other hand, if the domestic appliance is unable to receive the respective one of the ultrasonic or high frequency audible control signal or the infrared control signal from the user's mobile device because the mobile device is too far away, the user will also be too far away from the domestic appliance to be able to observe any delay caused by transmission of the user's instructions to the domestic appliance via the wireless control signal.

[0011] Moreover, this solution is also beneficial because it allows instructions received by the domestic appliance via the ultrasonic or high frequency audible control signal or via the infrared control signal to be corrected by instructions received via the wireless control signal. For example, the microphone may not be able to hear the ultrasonic or high frequency audible control signal properly because of interference from other sounds in the environment of the domestic appliance. If so, the domestic appliance will nonetheless start to respond to the ultrasonic or high frequency audible control signal immediately after the instructions have been entered by a user into the user's mobile device. However, operation of the domestic appliance can then be changed according to the instructions subsequently received via the wireless control signal due to the wireless propagation delay, if the instructions contained in the ultrasonic or high frequency audible control signal have been misinterpreted by the domestic appliance because of other sounds in the environment, for example.

[0012] The domestic appliance may, for example, be any one of a kitchen appliance, washing machine, dishwasher, tumble dryer, refrigerator, freezer, lighting, heating, ventilation, air conditioning or hot water system, water softener, security system, home entertainment system (including, but not limited, to home cinema system and/or hi-fi audio system), window, curtain or blind control system, swimming pool, sauna or spa, or home or garage access system.

[0013] Advantageous embodiments of the invention may be configured according to any claim and/or part of the following description.

[0014] In a preferred embodiment, the domestic appliance may further comprise a memory storing an identifying token transmissible via the wireless communication device, and the wireless communication device may be configured to transmit the identifying token. It would be possible for a domestic appliance according to the invention to be remotely controlled by a user without such an identifying token. However, if there are two or more such appliances close enough to each other for them both to be able to pick up the same ultrasonic or high frequency audible control signal or the same infrared control signal (as is typically the case in a kitchen, for example), it is preferable that an application for domestic appliance control or for home automation running on a user's mobile device should be able to tell which appliance is which by receiving such an identifying token from each such appliance, since the respective one of the ultrasonic or high frequency audible control signal or the infrared control signal can then be adapted by the application to instruct the correct appliance.

[0015] Preferably, the wireless communication device of the domestic appliance at least comprises a wireless local area network (LAN) communication device. For example, the wireless local area network communication device may be a wi-fi communication device, operable according to IEEE 802.11 standards. This is advantageous because it allows the domestic appliance to be remotely controlled as part of a local area network using a wireless communication protocol according to established standards.

[0016] Preferably, the wireless communication device at least comprises a wireless personal area network (PAN) communication device. For example, the wireless personal area network communication device may be a Bluetooth™ transceiver operable according to Bluetooth Special Interest Group (SIG) standards, or a Z-wave™ transceiver. This is advantageous because it allows the domestic appliance to be remotely controlled as part of a personal area network using a wireless communication protocol according to established standards.

[0017] The mobile device may, for example, be any one of a tablet computer, mobile phone, smart watch, personal

digital assistant or home automation console. US 2014/0253389 A, for example, describes a wi-fi enabled mobile device having an ultrasonic transducer, the mobile device being part of a system which uses wi-fi and ultrasonic signals for range-finding between devices.

[0018] Preferably, the loudspeaker of the mobile device for transmitting the ultrasonic or high frequency audible control signal is a dedicated ultrasonic transducer, additional to a loudspeaker of the mobile device which is used for hands-free operation of the mobile device and for playback of music, ringtones, etc. This allows the ultrasonic or high frequency audible control signal to be an ultrasonic control signal and therefore undetectable by a user of the mobile device. More preferably, the loudspeaker of the mobile device used for hands-free operation of the mobile device and for playback of music, ringtones, etc. is instead also used for transmitting the ultrasonic or high frequency audible control signal, and is modified to give it an extended high-frequency range above the top end of the normal range for human hearing. This also allows the ultrasonic or high frequency audible control signal to be an ultrasonic control signal and therefore undetectable to a user of the mobile device, but at less cost than providing an additional dedicated ultrasonic transducer. Most preferably, however, the loudspeaker of the mobile device which is used for hands-free operation of the mobile device and for playback of music, ringtones, etc. is also used for transmitting the ultrasonic or high frequency audible control signal, but without modification. This is less costly still. In such a case, however, the loudspeaker is preferably operable to transmit the ultrasonic or high frequency audible control signal at or towards the upper end of its normal frequency range. Such a frequency will then be either near to or above the top end of the normal range for human hearing, which is preferred because it is then less noticeable by a user and thus less intrusive.

[0019] The infrared transmitter may be an embedded infrared transmitter of the mobile device or may be an additional infrared blaster attached to the mobile device.

[0020] If the wireless communication device of the domestic appliance comprises a wireless local area network (LAN) communication device, the wireless communication module of the mobile device preferably at least comprises a wireless local area network (LAN) communication module. For example, the wireless local area network communication module of the mobile device may be a wi-fi communication module, operable according to IEEE 802.11 standards. This is advantageous since it allows the mobile device to remotely control the domestic appliance as part of a local area network using a wireless communication protocol according to established standards.

[0021] The wireless communication module of the mobile device may communicate directly with the wireless communication device of the domestic appliance using an ad hoc network. However, if the wireless communication module of the mobile device does comprise a wireless local area network (LAN) communication module, the system preferably further comprises a wireless access point. The wireless access point may, for example, have a wired connection to a router or be integrated into a wireless hub.

[0022] If the system does comprise a wireless access point, in a preferred embodiment, the system may further comprise a connection from the wireless access point to a cloud-based computing system and/or the internet. This has the advantage of allowing the domestic appliance to be controlled remotely via a cloud-based computing system and/or via the internet, in addition to being remotely controlled from the mobile device.

[0023] If the wireless communication device of the domestic appliance comprises a wireless personal area network (PAN) communication device, the wireless communication module of the mobile device preferably at least comprises a wireless personal area network (PAN) communication module. For example, the wireless personal area network communication module of the mobile device may be a Bluetooth™ transceiver operable according to Bluetooth Special Interest Group (SIG) standards, or a Z-wave™ transceiver. This is advantageous since it allows the mobile device to remotely control the domestic appliance as part of a personal area network using a wireless communication protocol according to established standards.

[0024] The present invention further relates to a method of remotely controlling a domestic appliance or of home automation. The method at least comprises transmitting a wireless control signal from a mobile device to a domestic appliance via a wireless communication protocol, and transmitting either an ultrasonic or high frequency audible control signal or an infrared control signal from the mobile device to the domestic appliance. The method further comprises determining whether a user is entering instructions to the mobile device to remotely control the domestic appliance faster than a predetermined rate. If the user is entering instructions to the mobile device faster than the predetermined rate, the method also comprises transmitting the user's instructions from the mobile device to the domestic appliance via the respective one of the ultrasonic or high frequency audible control signal or the infrared control signal. If, however, the user is entering instructions to the mobile device at the predetermined rate or slower, then the method also comprises transmitting the user's instructions from the mobile device to the domestic appliance via the wireless control signal.

[0025] Thus only instructions which are entered by a user to the mobile device faster than the predetermined rate will be transmitted to the domestic appliance via the ultrasonic or high frequency audible control signal or the infrared control signal, whereas the wireless control signal is used if not. This has the advantage of targeting use of the ultrasonic or high frequency audible control signal or the infrared control signal to those instances when a delay in transmitting the user's instructions to the domestic appliance would be more noticeable and therefore more annoying to the user.

[0026] If the ultrasonic or high frequency audible control signal is ultrasonic, it preferably has a frequency of from 20

to 45 kHz, more preferably from 22 to 33 kHz, and most preferably from 24 to 26 kHz. An ultrasonic frequency which is not more than about double the upper frequency limit for human hearing is preferred because it is less directional. On the other hand, if the ultrasonic or high frequency audible control signal is a high frequency audible signal, for example because it is constrained to be within the normal range for human hearing by the frequency response of the mobile device, then it preferably has a frequency of from 16 to 20 kHz, more preferably from 17 to 20 kHz, and most preferably from 18 to 20 kHz. In such a case, a frequency towards the top end of the normal range for human hearing is preferred because it is then less noticeable by a user and thus less intrusive.

[0027] In a preferred embodiment, the method further comprises storing a token identifying the domestic appliance in a memory of the domestic appliance, transmitting the token from the domestic appliance to the mobile device via the wireless communication protocol, transmitting the token from the mobile device to the domestic appliance via an ultrasonically or as a high frequency audible sound or via infrared, and comparing the token received by the domestic appliance ultrasonically or as a high frequency audible sound or via infrared with the token stored in the memory of the domestic appliance. If the token received by the domestic appliance matches the token stored in the memory of the domestic appliance, the method further comprises adjusting operation of the domestic appliance according to the respective one of the ultrasonic or high frequency audible control signal or the infrared control signal. This is beneficial because it allows the domestic appliance to identify whether or not the respective one of the ultrasonic or high frequency audible control signal or the infrared control signal contains instructions for its operation or for the operation of another domestic appliance. Thus two or more domestic appliances within audible or infrared range of the same mobile device may be controlled by ultrasonic or high frequency audible control signals bearing different tokens or by infrared control signals bearing different tokens.

[0028] If the user's instructions are transmitted from the mobile device to the domestic appliance via the respective one of the ultrasonic or high frequency audible control signal or the infrared control signal, the method preferably further comprises repeating transmission of the user's instructions from the mobile device to the domestic appliance via the wireless control signal, and comparing the user's instructions received by the domestic appliance via the respective one of the ultrasonic or high frequency audible control signal or the infrared control signal with the user's instructions received by the domestic appliance via the wireless control signal. If the user's instructions received via the respective one of the ultrasonic or high frequency audible control signal or the infrared control signal do not match the user's instructions received via the wireless control signal, then the method also comprises correcting operation of the domestic appliance initiated by the ultrasonic or high frequency audible control signal or by the infrared control signal according to the user's instructions contained in the wireless control signal. This has the advantage of allowing for any errors in transmission of the ultrasonic or high frequency audible control signal, for example as a result of noise in the environment of the domestic appliance, or in transmission of the infrared control signal, to be corrected, without delaying operation of the domestic appliance immediately following entry of the user's instructions into the mobile device.

[0029] Preferably, the method further comprises determining whether the domestic appliance is being remotely controlled according to a parameter having discrete values or according to a continuously variable parameter. If the domestic appliance is being remotely controlled according to a parameter having discrete values, the method also comprises transmitting a desired one of the discrete values to the domestic appliance from the mobile device via the wireless control signal. If, however, the domestic appliance is being remotely controlled according to a continuously variable parameter, the method also comprises transmitting a desired value of the continuously variable parameter to the domestic appliance from the mobile device via the respective one of the ultrasonic or high frequency audible control signal or the infrared control signal.

[0030] A parameter for control of the domestic appliance having discrete values may, for example, be a binary parameter, such as "on" and "off" or "start" and "stop", or it may be a parameter with more than two but a limited number of different values, such as several different spin speeds of a washing machine, for example. A desired value of such a parameter with discrete values may be entered into a mobile device by a user via one or more buttons displayed on a touch screen of the mobile device for example, which reflect similar physical buttons provided on the domestic appliance itself. On the other hand, a continuously variable parameter for control of the domestic appliance may, for example, be the operating temperature of a heating appliance or the audio volume of a home entertainment system. A desired value of such a continuously variable parameter may be entered into a mobile device by a user via one or more knobs and/or sliders displayed on a touch screen of the mobile device for example, which reflect similar physical knobs and/or sliders provided on the domestic appliance itself.

[0031] Thus according to this preferred embodiment, only instructions which are entered by a user to the mobile device to control a continuously variable parameter, for example via a knob and/or slider on the screen of the mobile device, will be transmitted to the domestic appliance via the ultrasonic or high frequency audible control signal or via the infrared control signal, whereas in other cases, for example when the user enters instructions to the mobile device via one or more on-screen buttons, the wireless control signal is used instead. This has the advantage of targeting use of the ultrasonic or high frequency audible control signal or of the infrared control signal to those instances where a delay in transmitting the user's instructions to the domestic appliance would be more annoying to the user.

[0032] If a desired value of the continuously variable parameter is transmitted to the domestic appliance from the mobile device via the respective one of the ultrasonic or high frequency audible control signal or the infrared control signal, the method preferably further comprises repeating transmission of the desired value of the continuously variable parameter from the mobile device to the domestic appliance via the wireless control signal, and comparing the desired value of the continuously variable parameter received by the domestic appliance via the respective one of the ultrasonic or high frequency audible control signal or the infrared control signal with the desired value of the continuously variable parameter received by the domestic appliance via the wireless control signal. If the desired value of the continuously variable parameter received via the respective one of the ultrasonic or high frequency audible control signal or the infrared control signal does not match the desired value of the continuously variable parameter received via the wireless control signal, then the method also comprises correcting operation of the domestic appliance initiated by the ultrasonic or high frequency audible control signal or by the infrared control signal according to information contained in the wireless control signal. This has the advantage of allowing for any errors in transmission of the ultrasonic or high frequency audible control signal, for example as a result of noise in the environment of the domestic appliance, or in transmission of the infrared control signal, to be corrected, without delaying operation of the domestic appliance immediately following entry of the user's instructions into the mobile device.

[0033] The present invention further relates to a computer program product or a program code or system for executing one or more than one of the herein described methods.

[0034] Further features, goals and advantages of the present invention will now be described in association with the accompanying drawings, in which exemplary components of the invention are illustrated. Components of the devices, systems and methods according to the invention which are at least essentially equivalent to each other with respect to their function can be marked by the same reference numerals, wherein such components do not have to be marked or described in all of the drawings.

[0035] In the following description, the invention is described by way of example only with respect to the accompanying drawings.

Brief Description of the Drawings

[0036]

Fig. 1 is a schematic diagram of a first embodiment of a system for remotely controlling a domestic appliance or for home automation; and

Fig. 2 is a schematic diagram of a second embodiment of a system for remotely controlling a domestic appliance or for home automation.

Detailed Description

[0037] Fig. 1 schematically shows a first embodiment of a system for remotely controlling a domestic appliance or for home automation. The system comprises a domestic appliance 100 responsive to remote control, a mobile device 200 and a wireless access point 300. In this embodiment, the domestic appliance 100 is a washing machine having a display screen and control panel 101 with a physical button and sliders, and a microphone 102 to receive an ultrasonic or high frequency audible control signal. Not visible in Fig. 1 but contained within the domestic appliance 100 is a wireless communication device to receive a wireless control signal. The washing machine may therefore be controlled both locally by operation of the control panel 101 by a user and remotely by receiving an ultrasonic or high frequency audible control signal via the microphone 102 and/or a wireless control signal via the wireless communication device within the appliance 100.

[0038] The mobile device 200 runs an application for domestic appliance control or home automation. The mobile device 200 has a touch-sensitive screen on which this application displays an on-screen button 201 and on-screen sliders 202 which respectively correspond to the physical button and sliders on the control panel 101 of the washing machine 100. A user may therefore manipulate the on-screen button and sliders 201, 202 to remotely control the washing machine 100. Not visible in Fig. 1 but also present within the mobile device 200 are a wireless communication module, which operates according to the same wireless communication protocol as the wireless communication device of the domestic appliance 100, and a loudspeaker. The wireless communication device of the domestic appliance 100, the wireless communication module of the mobile device 200 and the wireless access point 300 are elements of a wireless local area network (LAN).

[0039] In this embodiment, the wireless access point 300 is located a distance 500 away from both the domestic appliance 100 and the mobile device 200, so that the wireless access point 300 is not visible from either the domestic appliance 100 or the mobile device 200. On the other hand, the domestic appliance 100 is located a short distance 600

away from the mobile device 200, so that a user of the mobile device 200 can see operation of the washing machine 100.

[0040] During operation of the system according to this first embodiment, a user enters instructions for operation of the washing machine 100 into the mobile device 200 via the on-screen button and sliders 201, 202. The application running on the mobile device 200 causes the wireless communication module thereof to transmit a wireless control signal 400 to the wireless access point 300 which transmits the wireless control signal 400 to the washing machine 100. At the same time, the application running on the mobile device 200 causes the loudspeaker thereof to emit a corresponding ultrasonic or high frequency audible control signal 401. Since the distance 600 from the mobile device 200 to the domestic appliance 100 is only short, the ultrasonic or high frequency audible control signal 401 is received by the microphone 102 of the domestic appliance 100 almost instantaneously. Meanwhile, the wireless control signal 400 is subject to a wireless propagation delay from the mobile device 200 to the domestic appliance 100, which includes a wireless access point delay 301.

[0041] In this embodiment, instructions entered by the user into the mobile device 200 via the on-screen button 201 are transmitted to the washing machine 100 by the wireless control signal 400 alone. On the other hand, instructions entered by the user into the mobile device 200 using the on-screen sliders 202 are transmitted to the washing machine 100 via both the wireless control signal 400 and the ultrasonic or high frequency audible control signal 401. Since the wireless control signal 400 is subject to a wireless propagation delay from the mobile device 200 to the domestic appliance 100, the wireless control signal 400 is received by the wireless communication device of the washing machine 100 after the ultrasonic or high frequency audible control signal 401 is received by the microphone 102 thereof. The washing machine 100 can then compare the instructions contained in the wireless control signal 400 with those contained in the ultrasonic or high frequency audible control signal 401 and correct its operation to adjust for any errors in transmission of the ultrasonic or high frequency audible control signal 401 due, for example, to noise in the environment of the washing machine 100.

[0042] A token is embedded in the ultrasonic or high frequency audible control signal 401 by the application running on the mobile device 200. The token identifies the ultrasonic or high frequency audible control signal 401 as containing instructions intended for operation of this particular washing machine 100. The token was previously sent by the wireless communication device of the washing machine 100 to the mobile device 200 via the wireless access point 300, and is also stored in a memory (also not visible in Fig. 1) of the washing machine 100. Thus, upon receipt of the ultrasonic or high frequency audible control signal 401, the washing machine 100 is able to compare the token embedded in the ultrasonic or high frequency audible control signal 401 with the token stored in its memory, and confirm that the ultrasonic or high frequency audible control signal 401 is intended for remote control of this particular washing machine 100 and not for control of some other domestic appliance. The washing machine can therefore initiate operation according to the instructions contained in the ultrasonic or high frequency audible control signal 401 immediately upon their receipt and before any subsequent correction upon receipt of the wireless control signal 400.

[0043] Fig. 2 schematically shows a second embodiment of a system for remotely controlling a domestic appliance or for home automation. The system comprises a domestic appliance 100, a mobile device 200, a wireless access point 300, and a connection 302 from the wireless access point 300 to a cloud-based computing system and/or the internet 350. The domestic appliance 100 comprises elements and functions as described above in relation to the domestic appliance 100 of Fig. 1. The mobile device 200 also comprises elements similar to those described above in relation to the mobile device of Fig. 1. However, in the embodiment of Fig. 2, instructions entered by the user into the mobile device 200 via either the on-screen button 201 or the on-screen sliders 202 are transmitted to the washing machine 100 only via the wireless control signal 400 if the speed at which the user enters these instructions is at or below a predetermined rate. If, on the other hand, the user enters instructions into the mobile device 200 via either the on-screen button 201 or the on-screen sliders 202 above the predetermined rate, then these instructions are transmitted to the washing machine 100 both via the wireless control signal 400 and via the ultrasonic or high frequency audible control signal 401.

[0044] The embodiment of Fig. 2 also differs from the embodiment of Fig. 1 in that the wireless access point 300 is connected to a cloud-based computing system and/or the internet 350. This allows the domestic appliance 100 to be controlled remotely via the cloud-based computing system and/or via the internet, as well as from the mobile device 200.

[0045] In summary, therefore, the present invention provides a domestic appliance responsive to remote control, and a system and method for controlling such a device remotely. The domestic appliance comprises a wireless communication device and a microphone. The wireless communication device is configured to receive a wireless control signal and the microphone is configured to receive an ultrasonic or high frequency audible control signal. The control signals are for remote control of the domestic appliance from a mobile device running an application for domestic appliance control or home automation. The mobile device comprises a wireless communication module operating on the same wireless communication protocol as the wireless communication device of the domestic appliance, and a loudspeaker. The wireless communication module transmits the wireless control signal to the domestic appliance, and the loudspeaker transmits the ultrasonic or high frequency audible control signal to be picked up by the microphone of the domestic appliance. The wireless control signal is subject to a propagation delay, such as that caused by a wireless access point, whereas the ultrasonic or high frequency audible control signal is transmitted at the speed of sound. The ultrasonic or

high frequency audible control signal can therefore be used to initiate operation of the domestic appliance immediately after a user enters operating instructions therefor into the mobile device, and any transmission errors in the ultrasonic or high frequency audible control signal can be corrected once the wireless control signal is received thereafter.

Reference Numerals:

[0046]

100	Domestic appliance	301	Wireless access point delay
101	Display screen and controls	302	Internet connection with delay
102	Microphone	350	Internet
200	Mobile device	400	Wireless connection with delay
201	On-screen button: wireless only	401	Ultrasound or very high frequency audible connection
202	On screen slider: wireless and sound	500	Far
300	Wireless access point	600	Near and/or line of sight

Claims

1. A system for remotely controlling a domestic appliance or for home automation, the system at least comprising a domestic appliance (100) and a mobile device (200) to run an application for domestic appliance control or home automation;
the domestic appliance (100) at least comprising:
 - a wireless communication device to receive a wireless control signal (400); and
 - a microphone (102) to receive an ultrasonic or high frequency audible control signal (401) or an infrared receiver to receive an infrared control signal;
 the mobile device (200) at least comprising:
 - a wireless communication module operable according to the same wireless communication protocol as the wireless communication device of the domestic appliance (100) to transmit the wireless control signal (400) thereto; and
 - a loudspeaker to transmit the ultrasonic or high frequency audible control signal (401) to the microphone (102) of the domestic appliance or an infrared transmitter to transmit the infrared control signal to the infrared receiver of the domestic appliance;
 characterized in that
 - the mobile device (200) further comprises means configured to determine whether a user is entering instructions to the mobile device (200) to remotely control the domestic appliance (100) faster than a predetermined rate; and if the user is entering instructions to the mobile device (200) faster than the predetermined rate, to transmit the user's instructions from the mobile device (200) to the domestic appliance (100) via the respective one of the loudspeaker or the infrared transmitter; and
 - if the user is entering instructions to the mobile device (200) at or slower than the predetermined rate, to transmit the user's instructions from the mobile device (200) to the domestic appliance (100) via the wireless communication module.
2. A system according to claim 1, wherein the domestic appliance (100) further comprises a memory storing an identifying token transmissible via the wireless communication device thereof, and wherein the wireless communication device is configured to transmit the identifying token.
3. A system according to claim 1 or claim 2, wherein the wireless communication module of the mobile device (200) at least comprises a wireless local area network (LAN) communication module.
4. A system according to claim 3, the system further comprising a wireless access point (300).
5. A system according to claim 4, the system further comprising:

a connection (302) from the wireless access point (300) to a cloud-based computing system and/or the internet (350).

6. A system according to claim 1 or claim 2, wherein the wireless communication module of the mobile device (200) at least comprises a wireless personal area network (PAN) communication module.

7. A method of remotely controlling a domestic appliance or of home automation, the method at least comprising:

transmitting a wireless control signal (400) from a mobile device (200) to a domestic appliance (100) via a wireless communication protocol; and

transmitting either an ultrasonic or high frequency audible control signal (401) or an infrared control signal from the mobile device (200) to the domestic appliance (100);

characterized by:

determining whether a user is entering instructions to the mobile device (200) to remotely control the domestic appliance (100) faster than a predetermined rate;

if the user is entering instructions to the mobile device (200) faster than the predetermined rate, transmitting the user's instructions from the mobile device (200) to the domestic appliance (100) via the respective one of the ultrasonic or high frequency audible control signal (400) or the infrared control signal; and

if the user is entering instructions to the mobile device (200) at or slower than the predetermined rate, transmitting the user's instructions from the mobile device (200) to the domestic appliance (100) via the wireless control signal (401).

8. A method according to claim 7, further comprising:

storing a token identifying the domestic appliance (100) in a memory of the domestic appliance;

transmitting the token from the domestic appliance (100) to the mobile device (200) via the wireless communication protocol;

transmitting the token from the mobile device (200) to the domestic appliance (100) ultrasonically or as a high frequency audible sound or via infrared;

comparing the token received by the domestic appliance ultrasonically or via a high frequency audible sound or via infrared with the token stored in the memory of the domestic appliance; and

if the token received by the domestic appliance matches the token stored in the memory of the domestic appliance, adjusting operation of the domestic appliance (100) according to the respective one of the ultrasonic or high frequency audible control signal or the infrared control signal.

9. A method according to claim 7 or claim 8, further comprising:

if the user's instructions are transmitted from the mobile device (200) to the domestic appliance (100) via the respective one of the ultrasonic or high frequency audible control signal (401) or the infrared control signal, repeating transmission of the user's instructions from the mobile device (200) to the domestic appliance (100) via the wireless control signal (400);

comparing the user's instructions received by the domestic appliance via the respective one of the ultrasonic or high frequency audible control signal (401) or the infrared control signal with the user's instructions received by the domestic appliance via the wireless control signal (400); and

if the user's instructions received via the respective one of the ultrasonic or high frequency audible control signal (401) or the infrared control signal do not match the user's instructions received via the wireless control signal (400), correcting operation of the domestic appliance initiated by the ultrasonic or high frequency audible control signal or by the infrared control signal according to the user's instructions contained in the wireless control signal.

10. A method according to any one of claims 7 to 9, further comprising:

determining whether the domestic appliance is being remotely controlled according to a parameter having discrete values or according to a continuously variable parameter;

if the domestic appliance is being remotely controlled according to a parameter having discrete values, transmitting a desired one of the discrete values to the domestic appliance (100) from the mobile device (200) via the wireless control signal (400); and

if the domestic appliance is being remotely controlled according to a continuously variable parameter, transmitting a desired value of the continuously variable parameter to the domestic appliance (100) from the mobile device

(200) via the respective one of the ultrasonic or high frequency audible control signal (401) or the infrared control signal.

11. A method according to claim 10, further comprising:

if a desired value of the continuously variable parameter is transmitted to the domestic appliance (100) from the mobile device (200) via the respective one of the ultrasonic or high frequency audible control signal (401) or the infrared control signal, repeating transmission of the desired value of the continuously variable parameter from the mobile device (200) to the domestic appliance (100) via the wireless control signal (400);
 comparing the desired value of the continuously variable parameter received by the domestic appliance via the respective one of the ultrasonic or high frequency audible control signal (401) or the infrared control signal with the desired value of the continuously variable parameter received by the domestic appliance via the wireless control signal (400); and
 if the desired value of the continuously variable parameter received via the respective one of the ultrasonic or high frequency audible control signal (401) or the infrared control signal does not match the desired value of the continuously variable parameter received via the wireless control signal (400), correcting operation of the domestic appliance initiated by the ultrasonic or high frequency audible control signal or by the infrared control signal according to information contained in the wireless control signal.

Patentansprüche

- 1.** System zur Fernsteuerung eines Haushaltsgeräts oder zur Hausautomatisierung, wobei das System mindestens ein Haushaltsgerät (100) und eine mobile Vorrichtung (200) zum Ausführen einer Anwendung zur Haushaltgerätsteuerung oder Hausautomatisierung umfasst;
 wobei das Haushaltsgerät (100) mindestens Folgendes umfasst:

eine drahtlose Kommunikationsvorrichtung zum Empfangen eines drahtlosen Steuersignals (400); und
 ein Mikrofon (102) zum Empfangen eines Ultraschall- oder hörbaren Hochfrequenz-Steuersignals (401) oder einen Infrarotempfänger zum Empfangen eines Infrarot-Steuersignals;
 wobei die mobile Vorrichtung (200) mindestens Folgendes umfasst:

ein drahtloses Kommunikationsmodul, das gemäß dem gleichen drahtlosen Kommunikationsprotokoll wie die drahtlose Kommunikationsvorrichtung des Haushaltsgeräts (100) betriebsfähig ist, um das drahtlose Steuersignal (400) an es zu übertragen; und
 einen Lautsprecher zum Senden des Ultraschall- oder hörbaren Hochfrequenz-Steuersignals (401) an das Mikrofon (102) des Haushaltsgeräts oder einen Infrarotsender zum Senden des Infrarot-Steuersignals an den Infrarotempfänger des Haushaltsgeräts;

dadurch gekennzeichnet, dass

die mobile Vorrichtung (200) ferner Mittel umfasst, die ausgestaltet sind, um zu bestimmen, ob ein Benutzer schneller als mit einer vorbestimmten Rate Befehle in die mobile Vorrichtung (200) eingibt, um das Haushaltsgerät (100) fernzusteuern; und
 wenn der Benutzer Befehle schneller als mit der vorbestimmten Rate in die mobile Vorrichtung (200) eingibt, die Befehle des Benutzers von der mobilen Vorrichtung (200) über den entsprechenden von dem Lautsprecher oder dem Infrarotsender an das Haushaltsgerät (100) zu senden; und

wenn der Benutzer Befehle mit einer oder langsamer als die vorbestimmte Rate in die mobile Vorrichtung (200) eingibt, die Befehle des Benutzers von der mobilen Vorrichtung (200) über das drahtlose Kommunikationsmodul an das Haushaltsgerät (100) zu senden.

- 2.** System nach Anspruch 1, wobei das Haushaltsgerät (100) ferner einen Speicher umfasst, der ein Identifikationstoken speichert, das über die drahtlose Kommunikationsvorrichtung davon gesendet werden kann, und wobei die drahtlose Kommunikationsvorrichtung ausgestaltet ist, das Identifikationstoken zu senden.
- 3.** System nach Anspruch 1 oder Anspruch 2, wobei das drahtlose Kommunikationsmodul der mobilen Vorrichtung (200) mindestens ein Kommunikationsmodul für ein drahtloses lokales Netz (LAN) umfasst.

4. System nach Anspruch 3, wobei das System ferner einen drahtlosen Zugangspunkt (300) umfasst.
5. System nach Anspruch 4, wobei das System ferner Folgendes umfasst:
eine Verbindung (302) von dem drahtlosen Zugangspunkt (300) zu einem cloud-basierten Rechensystem und/oder dem Internet (350).
6. System nach Anspruch 1 oder 2, wobei das drahtlose Kommunikationsmodul der mobilen Vorrichtung (200) mindestens ein Kommunikationsmodul für ein drahtloses Personal Area Network (PAN) umfasst.
7. Verfahren zur Fernsteuerung eines Haushaltsgeräts oder zur Hausautomatisierung, wobei das Verfahren mindestens Folgendes umfasst:

Senden eines drahtlosen Steuersignals (400) von einer mobilen Vorrichtung (200) an ein Haushaltsgerät (100) über ein drahtloses Kommunikationsprotokoll; und

Senden von entweder einem Ultraschall- oder hörbaren Hochfrequenz-Steuersignal (401) oder einem Infrarot-Steuersignal von der mobilen Vorrichtung (200) an das Haushaltsgerät (100);

gekennzeichnet durch:

Bestimmen, ob ein Benutzer Befehle schneller als mit einer vorbestimmten Rate in die mobile Vorrichtung (200) eingibt, um das Haushaltsgerät (100) fernzusteuern;

wenn der Benutzer Befehle schneller als mit der vorbestimmten Rate in die mobile Vorrichtung (200) eingibt, Senden der Befehle des Benutzers von der mobilen Vorrichtung (200) an das Haushaltsgerät (100) über das entsprechende von dem Ultraschall- oder hörbaren Hochfrequenz-Steuersignal (400) oder das Infrarot-Steuersignal; und

wenn der Benutzer Befehle bei einer oder langsamer als die vorbestimmte Rate in die mobile Vorrichtung (200) eingibt, Senden der Befehle des Benutzers von der mobilen Vorrichtung (200) über das drahtlose Steuersignal (401) an das Haushaltsgerät (100).

8. Verfahren nach Anspruch 7, das ferner Folgendes umfasst:

Speichern eines Tokens, das das Haushaltsgerät (100) identifiziert, in einem Speicher des Haushaltsgeräts; Senden des Tokens von dem Haushaltsgerät (100) an die mobile Vorrichtung (200) über das drahtlose Kommunikationsprotokoll;

Senden des Tokens von der mobilen Vorrichtung (200) an das Haushaltsgerät (100) per Ultraschall oder als einen hörbaren Hochfrequenzton oder per Infrarot;

Vergleichen des durch das Haushaltsgerät per Ultraschall oder über einen hörbaren Hochfrequenzton oder per Infrarot empfangenen Tokens mit dem in dem Speicher des Haushaltsgeräts gespeicherten Token; und wenn das durch das Haushaltsgerät empfangene Token mit dem in dem Speicher des Haushaltsgeräts gespeicherten Token übereinstimmt, Anpassen des Betriebs des Haushaltsgeräts (100) gemäß dem entsprechenden von dem Ultraschall oder hörbaren Hochfrequenz-Steuersignal oder das Infrarot-Steuersignal.

9. Verfahren nach Anspruch 7 oder Anspruch 8, das ferner Folgendes umfasst:

wenn die Befehle des Benutzers von der mobilen Vorrichtung (200) über das entsprechende von dem Ultraschall- oder dem hörbaren Hochfrequenz-Steuersignal (401) oder das Infrarot-Steuersignal an das Haushaltsgerät (100) gesendet werden, Wiederholen des Sendens der Befehle des Benutzers von der mobilen Vorrichtung (200) über das drahtlose Steuersignal (400) an das Haushaltsgerät (100);

Vergleichen der durch das Haushaltsgerät über das entsprechende von dem Ultraschall- oder hörbaren Hochfrequenz-Steuersignal (401) oder das Infrarot-Steuersignal empfangenen Befehle des Benutzers mit den durch das Haushaltsgerät über das drahtlose Steuersignal (400) empfangenen Befehlen des Benutzers; und

wenn die über das entsprechende von dem Ultraschall- oder hörbaren Hochfrequenz-Steuersignal (401) oder das Infrarot-Steuersignal empfangenen Befehle des Benutzers nicht mit den über das drahtlose Steuersignal (400) empfangenen Befehlen des Benutzers übereinstimmen, Korrigieren des durch das Ultraschall- oder hörbare Hochfrequenz-Steuersignal oder durch das Infrarot-Steuersignal eingeleiteten Betriebs des Haushaltsgeräts gemäß den Befehlen des Benutzers, die in dem drahtlosen Steuersignal enthalten sind.

10. Verfahren nach einem der Ansprüche 7 bis 9, das ferner Folgendes umfasst:

Bestimmen, ob das Haushaltsgerät gemäß einem Parameter, der diskrete Werte aufweist, oder gemäß einem kontinuierlich variablen Parameter ferngesteuert wird;

wenn das Haushaltsgerät gemäß einem Parameter ferngesteuert wird, der diskrete Werte aufweist, Senden eines gewünschten von den diskreten Werten von der mobilen Vorrichtung (200) über das drahtlose Steuersignal (400) an das Haushaltsgerät (100); und

wenn das Haushaltsgerät gemäß einem kontinuierlich variablen Parameter ferngesteuert wird, Senden eines gewünschten Werts des kontinuierlich variablen Parameters von der mobilen Vorrichtung (200) über das entsprechende von dem Ultraschall- oder hörbaren Hochfrequenz-Steuersignal (401) oder das Infrarot-Steuersignal an das Haushaltsgerät (100).

11. Verfahren nach Anspruch 10, das ferner Folgendes umfasst:

wenn ein gewünschter Wert des kontinuierlich variablen Parameters von der mobilen Vorrichtung (200) über das entsprechende von dem Ultraschall- oder hörbaren Hochfrequenz-Steuersignal (401) oder das Infrarot-Steuersignal an das Haushaltsgerät (100) gesendet wird, Wiederholen des Sendens des gewünschten Werts des kontinuierlich variablen Parameters von der mobilen Vorrichtung (200) über das drahtlose Steuersignal (400) an das Haushaltsgerät (100);

Vergleichen des gewünschten Werts des kontinuierlich variablen Parameters, der durch das Haushaltsgerät über das entsprechende von dem Ultraschall- oder hörbaren Hochfrequenz-Steuersignal (401) oder das Infrarot-Steuersignal empfangen wurde, mit dem gewünschten Wert des kontinuierlich variablen Parameters, der durch das Haushaltsgerät über das drahtlose Steuersignal (400) empfangen wurde; und

wenn der gewünschte Wert des kontinuierlich variablen Parameters, der über das entsprechende von dem Ultraschall- oder hörbaren Hochfrequenz-Steuersignal (401) oder das Infrarot-Steuersignal empfangen wurde, nicht mit dem gewünschten Wert des kontinuierlich variablen Parameters übereinstimmt, der über das drahtlose Steuersignal (400) empfangen wurde, Korrigieren des Betriebs des durch das Ultraschall- oder hörbare Hochfrequenz-Steuersignal oder durch das Infrarot-Steuersignal eingeleiteten Betriebs des Haushaltsgeräts gemäß Informationen, die in dem drahtlosen Steuersignal enthalten sind.

Revendications

1. Système pour commander à distance un appareil ménager ou pour l'automatisation domestique, ce système comprenant au moins un appareil ménager (100) et un dispositif mobile (200) pour exécuter une application de commande d'appareil ménager ou d'automatisation domestique ;
l'appareil ménager (100) comprenant au moins :

un dispositif de communication sans fil pour recevoir le signal de commande sans fil (400) ; et
un micro (102) pour recevoir un signal de commande audible ultrasonore ou à haute fréquence (400) ou un récepteur d'infrarouges pour recevoir un signal de commande à infrarouges ;
le dispositif mobile (200) comprenant au moins :

un module de communication sans fil actionnable suivant le même protocole de communication sans fil que le dispositif de communication sans fil de l'appareil ménager (100) pour transmettre le signal de commande sans fil (400) à celui-ci ; et

un haut-parleur pour transmettre le signal de commande audible ultrasonore ou à haute fréquence (400) au micro (102) de l'appareil ménager ou à un transmetteur d'infrarouge pour transmettre le signal de commande à infrarouges au récepteur d'infrarouges de l'appareil ménager ;

caractérisé en ce que

le dispositif mobile (200) comprend en outre un moyen conçu pour déterminer si un utilisateur entre des instructions dans le dispositif mobile (200) pour commander à distance l'appareil ménager (100) plus vite qu'une vitesse prédéterminée ; et

si l'utilisateur entre des instructions dans le dispositif mobile (200) plus vite que la vitesse prédéterminée, pour transmettre les instructions de l'utilisateur du dispositif mobile (200) à l'appareil ménager (100) via l'appareil respectif parmi le haut-parleur ou le transmetteur d'infrarouges, et

si l'utilisateur entre des instructions dans le dispositif mobile (200) à la vitesse ou plus lentement que la vitesse prédéterminée, pour transmettre les instructions de l'utilisateur du dispositif mobile (200) à l'appareil ménager (100) via le module de communication sans fil.

2. Système selon la revendication 1, dans lequel l'appareil ménager (100) comprend en outre une mémoire stockant un jeton d'identification transmissible via son dispositif de communication sans fil et dans lequel le dispositif de communication sans fil est conçu pour transmettre le jeton d'identification

3. Système selon la revendication 1 ou la revendication 2, dans lequel le module de communication sans fil du dispositif mobile (200) comprend au moins un module de communication de réseau de zone locale sans fil (LAN).

4. Système selon la revendication 3, ce système comprenant en outre un point d'accès sans fil (300).

5. Système selon la revendication 4, comprenant en outre :
une connexion (302) depuis le point d'accès sans fil (300) avec un système informatique basé sur le nuage et/ou Internet (350).

6. Système selon la revendication 1, dans lequel le module de communication sans fil du dispositif mobile (200) comprend au moins un module de communication de réseau de zone personnelle sans fil (PAN).

7. Procédés de commande à distance d'un appareil ménager d'une automatisation domestique, ce procédé comprenant au moins :

la transmission d'un signal de commande sans fil (400) depuis un dispositif mobile (200) jusqu'à un appareil ménager (100) via un protocole de communication sans fil ; et

la transmission soit d'un signal de commande audible ultrasonore ou à haute fréquence (401), soit d'un signal de commande à infrarouges depuis le dispositif mobile (200) jusqu'à l'appareil ménager (100) ; **caractérisé par** la détermination de l'entrée ou non d'instructions par un utilisateur dans le dispositif mobile (200) pour commander à distance l'appareil ménager (100) plus vite qu'une vitesse prédéterminée ;

si l'utilisateur entre des instructions dans le dispositif mobile (200) plus vite que la vitesse prédéterminée, la transmission des instructions de l'utilisateur depuis le dispositif mobile (200) jusqu'à l'appareil ménager (100) via le signal respectif parmi le signal de commande audible ultrasonore à haute fréquence (400) ou le signal de commande à infrarouges, et

si l'utilisateur entre des instructions dans le dispositif mobile (200) à la vitesse ou plus lentement que la vitesse prédéterminée, la transmission des instructions de l'utilisateur depuis le dispositif mobile (200) jusqu'à l'appareil ménager (100) via le signal de commande sans fil (401).

8. Procédé selon la revendication 7, comprenant en outre :

le stockage d'un jeton identifiant l'appareil ménager (100) dans une mémoire de l'appareil ménager ;

la transmission du jeton depuis l'appareil ménager (100) jusqu'au dispositif mobile (200) via le protocole de communication sans fil ;

la transmission du jeton depuis le dispositif mobile (200) jusqu'à l'appareil ménager (100) par ultrasons par ultrasons ou sous forme d'un son audible à haute fréquence ou par infrarouges ;

la comparaison du jeton reçu par l'appareil ménager par ultrasons ou via un son audible à haute fréquence ou par infrarouges avec le jeton stocké dans la mémoire de l'appareil ménager ; et

si le jeton reçu par l'appareil ménager coïncide avec le jeton stocké dans la mémoire de l'appareil ménager, l'ajustement du fonctionnement de l'appareil ménager (100) en fonction du signal respectif parmi le signal de commande audible ultrasonore ou à haute fréquence ou le signal de commande à infrarouges.

9. Procédé selon la revendication 7 ou la revendication 8, comprenant en outre :

si les instructions de l'utilisateur sont transmises depuis le dispositif mobile (200) jusqu'à l'appareil ménager (100) via le signal respectif parmi le signal de commande audible ultrasonore (401) ou à haute fréquence ou le signal de commande à infrarouges, la répétition de la transmission des instructions de l'utilisateur depuis le dispositif mobile (200) jusqu'à l'appareil ménager (100) via le signal de commande sans fil (400) ;

la comparaison des instructions de l'utilisateur reçues par l'appareil ménager via le signal respectif parmi le signal de commande audible ultrasonore (401) ou à haute fréquence ou le signal de commande à infrarouges avec les instructions de l'utilisateur reçues par l'appareil ménager via le signal de commande sans fil (400) ; et
si les instructions de l'utilisateur reçues via le signal respectif parmi le signal de commande audible ultrasonore (401) ou à haute fréquence ou le signal de commande à infrarouges ne coïncident pas avec les instructions de l'utilisateur reçues via le signal de commande sans fil (400), la correction du fonctionnement de l'appareil

ménager initié par le signal de commande audible ultrasonore ou à haute fréquence ou le signal de commande à infrarouges en fonction des instructions de l'utilisateur contenues dans le signal de commande sans fil.

10. Procédé selon l'une quelconque des revendications 7 à 9, comprenant en outre :

la détermination du contrôle à distance ou non de l'appareil ménager en fonction d'un paramètre ayant des valeurs discrètes ou en fonction d'un paramètre variable en continu ;
si l'appareil ménager est commandé à distance en fonction d'un paramètre ayant des valeurs discrètes, la transmission d'une valeur désirée parmi les valeurs discrètes à l'appareil ménager (100) depuis le dispositif mobile (200) via le signal de commande sans fil (400) ; et
si l'appareil ménager est commandé à distance en fonction d'un paramètre variable en continu, la transmission d'une valeur désirée du paramètre variable en continu à l'appareil ménager (100) depuis le dispositif mobile (200) via le signal respectif parmi le signal de commande audible ultrasonore (401) ou à haute fréquence ou le signal de commande à infrarouges.

11. Procédé selon la revendication 10, comprenant en outre :

si une valeur désirée du paramètre variable en continu est transmise à l'appareil ménager (100) depuis le dispositif mobile (200) via le signal respectif parmi le signal de commande audible ultrasonore (401) ou à haute fréquence ou le signal de commande à infrarouges, la répétition de la transmission de la valeur désirée du paramètre variable en continu depuis le dispositif mobile (200) via le signal de commande sans fil (400) ;
la comparaison de la valeur désirée du paramètre variable en continu reçue par l'appareil ménager via le signal respectif parmi le signal de commande audible ultrasonore (401) ou à haute fréquence ou le signal de commande à infrarouges avec la valeur désirée du paramètre variable en continu reçue par l'appareil ménager via le signal de commande sans fil (400) ; et
si la valeur désirée du paramètre variable en continu reçue via le signal respectif parmi le signal de commande audible ultrasonore (401) ou à haute fréquence ou le signal de commande à infrarouges ne coïncide pas avec la valeur désirée du paramètre variable en continu reçue via le signal de commande sans fil (400), la correction du fonctionnement de l'appareil ménager initié par le signal de commande audible ultrasonore ou à haute fréquence ou le signal de commande à infrarouges en fonction des informations contenues dans le signal de commande sans fil.

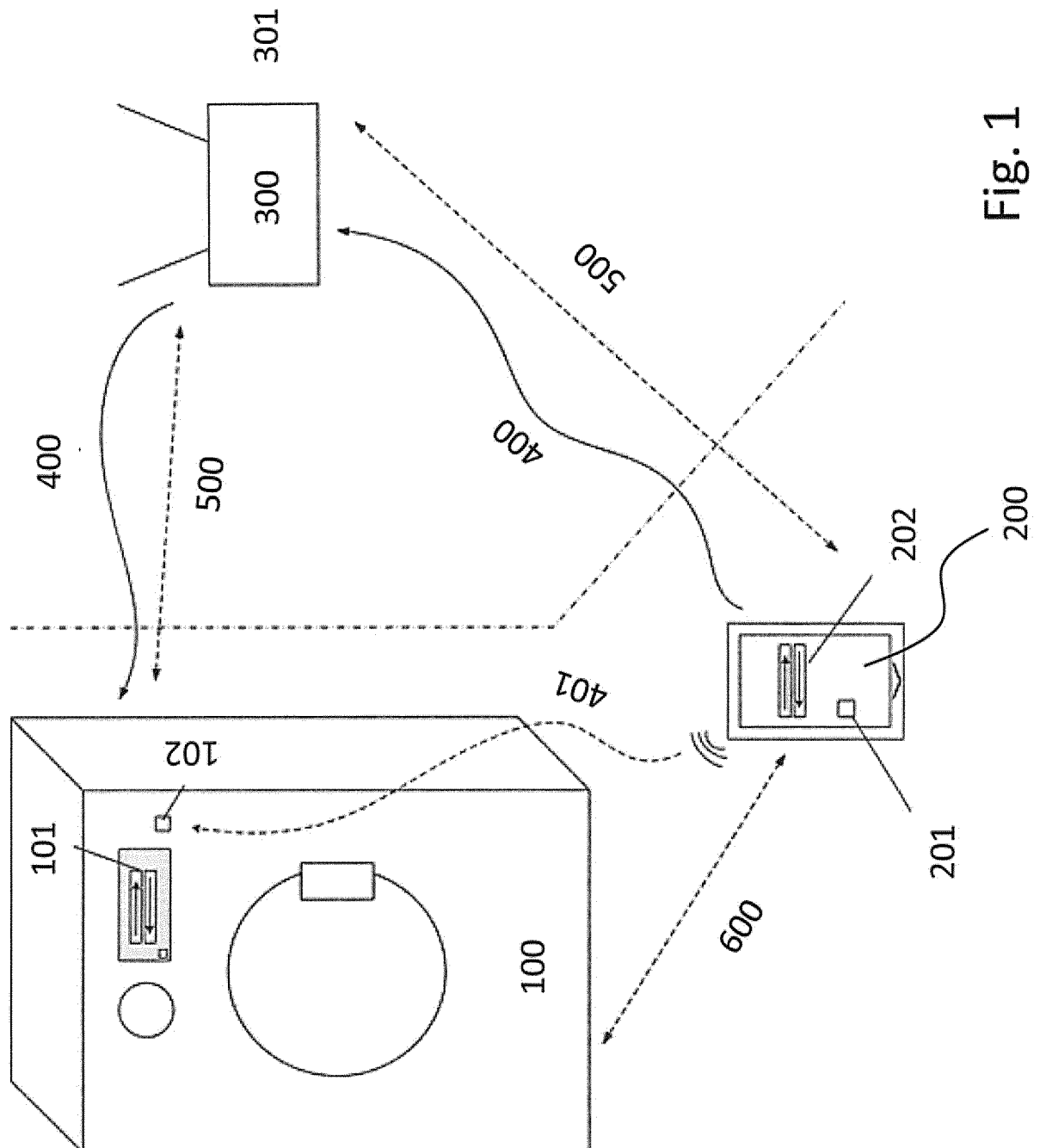
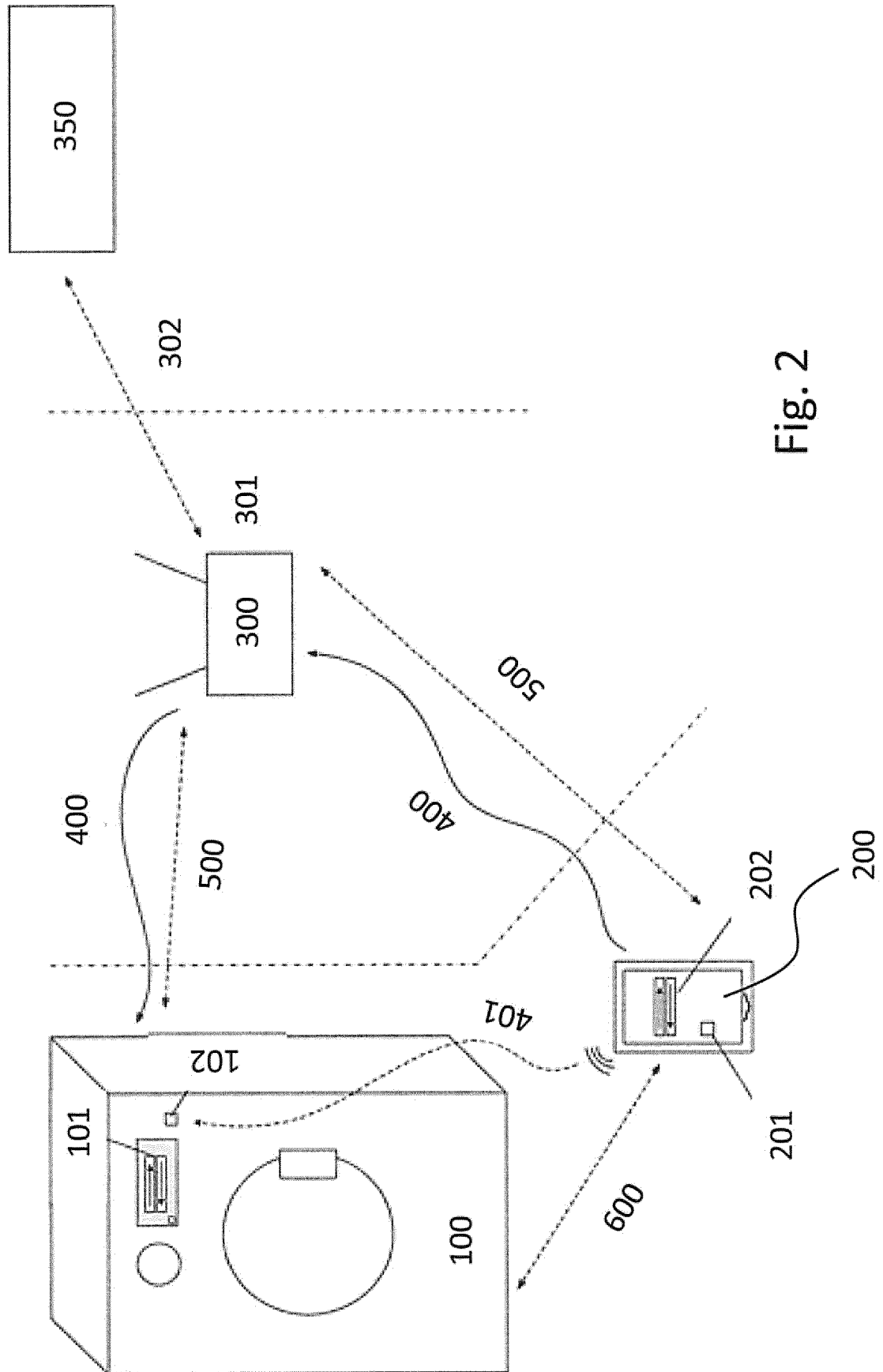


Fig. 1



REFERENCES CITED IN THE DESCRIPTION

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