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(57) Abstract: The present invention relates to a household appliance (1) comprising a body (2); a panel (3) provided on the body (2); a knob (4) which is detachably attached onto the panel (3); and a first control unit (5) which is disposed in the body (2) and which detects the data received from the knob (4).



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A HOUSEHOLD APPLIANCE COMPRISING A KNOB

The present invention relates to a household appliance comprising a portable knob.

Electrical household appliances comprising a knob are commonly known in the state of the art. Knobs which enable the adjustment of settings and switching to different levels of the household appliances are usually provided on the body of the household appliances and controlled by the user. Said knobs detect commands via mechanical or optical sensors and by means of the integrated structure thereof with the household appliance, transmit the choices made by the user to the control unit in the household appliance. The user can monitor the operation of the household appliance in real-time by means of a screen with a user interface or indicators provided preferably on the household appliance.

In recent years, the Internet of Things (IoT) which is the system of devices which communicate with each other via various communication protocols and form a smart network by sharing information by connecting to each other is developing rapidly and becoming a standard for household appliances of the future. While the Internet of Things aims to offer the customers user experiences never seen before, truly dependable systems which provide such functionality are yet to be developed. There are a lot of issues to be solved such as the communication between the device and the user and the way the user controls said features. The fact that independent devices with different features have separate and different user interfaces makes the user experience more complicated and the required efficiency cannot be obtained from the IoT infrastructure.

On the other hand, since each household appliance has a user interface and control knob, the diversity of user interfaces in the product range and thus, the costs of the devices increase. The fact that different household appliances (washing machine, mixer etc.) require control knobs is the biggest obstacle to the realization of a common user interface. Widely used fixed knob design decreases the flexibility in the user experience and the user cannot reach the operation information when the user is away from the household appliance. Even though there are portable knobs in the market, an application compatible with the household appliances is not

available yet. The lack of a knob which is compatible with different household appliances, providing access to all functions of the appliance and offering a common interface is still a widely encountered problem.

In the state of the art European Patent Application No. EP3273321, a household appliance is disclosed, comprising a knob which is fixed to the front panel of a gas
5 cooker and which functions as a controller.

In the state of the art International Patent Application No. WO2016082891, a household appliance is disclosed, comprising a knob with illumination function which is suitable for use in household appliances.

10 The aim of the present invention is the realization of a household appliance comprising a knob having communication features.

The household appliance realized to attain the aim of the present invention, explicated in the first claim and the claims thereof, comprises a body; a panel which is disposed on the body; a knob which is detachably attached onto the panel; and a
15 first control unit which is provided in the body and which detects the data received from the knob. The first control unit detects the data transmitted by the knob in response to the user commands and renders the control of the household appliance more flexible for the user.

The household appliance of the present invention comprises a transmitter which is
20 disposed in the body and which transmits an identification signal predetermined by the producer; a receiver which is disposed on the knob and which receives the signal transmitted by the transmitter; and the knob which has a second control unit provided in the knob for detecting the identification signal received by the receiver. The knob can be paired with the household appliance as the identification signal
25 specific to the household appliance transmitted by the transmitter is received by the receiver on the knob and detected by a second control unit. Thus, the pairing process is performed without the need for user intervention, providing ease of use.

In another embodiment of the present invention, the household appliance comprises the knob having the second control unit which has a plurality of menus/programs
30 corresponding to the identification signals predetermined by the producer and

which identifies the menu corresponding to the signal transmitted from the transmitter and also having a screen which enables the identified menu to be displayed. A user interface specific to the household appliance provided with the knob and the menu corresponding to the features of the household appliance can be displayed. By creating a common interface for different household appliances, a structure which can be integrated with a plurality of appliances is obtained with the knob. A simple and easy to use interface solution is developed by means of a screen content such as menu, etc. by taking advantage of visual content.

In another embodiment of the present invention, the household appliance comprises the knob which has a first wireless connection means enabling the commands received from the user to be transmitted, and the first control unit which has a second wireless communication means enabling the commands to be detected. The data and commands are transmitted from the knob to the household appliance or from the household appliance to the knob by means of the wireless connection means without the need for using physical connections. By means of the wireless connection, the changes made by the user via the screen and such can be transmitted to the household appliance and the operating conditions of the household appliance or the appliance data can be transmitted to the knob.

In an embodiment of the present invention, the household appliance comprises the knob which has an angle sensor suitable to be used by touching and turning, enabling the commands entered by the user to be detected. Data can be transmitted to the control unit of the knob as the user touches or turns the knob. Said sensor provided around the knob creates a tactile sensation and thus, the user can easily feel the entered commands. The angle sensor in the form of a mechanical, optical or magnetic sensor provided here generates angle data depending on the 360-degree turning ability of the knob and the user control based on the angle data analyzed by the second control unit can be monitored on the screen. Thus, the user can perform selections on the screen without any difficulty. Different user experiences can be obtained with various encoder structures such as optical, magnetic, etc.

In another embodiment of the present invention, the household appliance comprises a first magnetic holder group which has equal magnetic properties and which is

equidistantly positioned in the knob and a second magnetic holder group which is positioned in the panel and which has the same arrangement as the first magnetic holder group. By means of the equal pushing and pulling magnetic forces, a structure which automatically aligns with the nearest 90-degree position independently of the angle the structure is placed onto the panel is obtained. Thus, the knob shifts to a symmetrical position in the vertical and horizontal directions without the need for manual adjustment by the user.

In another embodiment of the present invention, the household appliance comprises the knob having a motion sensor which detects movement, and the second control unit having two separate modes, that is an active mode wherein the movement of the user is detected by the motion sensor and the screen is turned on, and a sleep mode wherein the movements of the user are not detected and the screen is turned off. The second control unit which keeps the screen turned on for a predetermined time period by detecting the movements of the user in a limit range and turns the screen off when no movement is detected in the limit range for a predetermined time period is provided in the knob. Thus, a knob with improved energy efficiency is obtained and a method which enables the movements around the household appliance to be controlled by the user is realized. The interaction between the knob and the user is maximized.

In another embodiment of the present invention, the household appliance comprises the knob having a vibration motor which provides tactile feedback to the user based on the data received by the second control unit in the body. The frequency and the intensity of the vibrations can be adjusted by the user by means of the knob. The user is enabled to receive feedback from the region touched by the user by means of the vibrational feedback delivered to the user through the knob during any level and setting adjustment. Thus, the quality perception of the user is improved.

In another embodiment of the present invention, the household appliance comprises a knob which has a first energy unit providing wireless charging function and a second energy unit disposed in the body and providing energy. Thus, in addition to the dry cells and batteries, the knob is enabled to be charged via the household appliance whereon the knob is placed. The flexibility of use is further increased for

the user and thus, a cost-effective solution is provided by eliminating the need for additional adapters and similar devices.

By means of the he present invention, different household appliances are enabled to be controlled via a single knob by means of a receiver and a transmitter. By
 5 means of a single knob which can create a common interface for different household appliances, flexibility of use is provided for the user and a cost-effective solution is provided by eliminating the need for a plurality of knobs.

A household appliance realized in order to attain the aim of the present invention is illustrated in the attached figure, where:

10 Figure 1 - is the perspective view of the household appliance and the knob.

The elements illustrated in the figures are numbered as follows:

1. Household appliance
2. Body
3. Panel
- 15 4. Knob
5. First control unit
6. Transmitter
7. Receiver
5. Second control unit
- 20 9. Screen
10. First wireless connection means
11. Second wireless connection means
12. Angle sensor
13. First magnetic holder group
- 25 14. Second magnetic holder group
15. Motion sensor

16. Vibration motor

17. First energy unit

18. Second energy unit

A: Active mode

5 U: Sleep mode

The household appliance (1) comprises a body (2); a panel (3) provided on the body (2); a knob (4) which is detachably attached onto the panel (3); and a first control unit (5) which is disposed in the body (2) and which detects the data received from the knob (4). The data transmitted by the knob (4) in response to the user commands is detected by the first control unit (5) and thus, the user can control the household appliance (1) easily. The detachable structure of the knob (4) provides ease of service.

The household appliance (1) of the present invention comprises a transmitter (6) which is disposed in the body (2) and which transmits an identification signal predetermined by the producer; a receiver (7) which is disposed on the knob (4) and which receives the signal transmitted by the transmitter (6); and the knob (4) which has a second control unit (8) provided in the knob (4) for detecting the identification signal received by the receiver (7). Signal transmission technologies such as RFID, NFC or BLE can be used for the receiver (7) and the transmitter (6). Thus, any electromagnetic interference is avoided and since the pairing can only occur near the household appliance (1), user needs are satisfied.

The knob (4) can be paired with the household appliance (1) as the identification signal specific to the household appliance (1) transmitted by the transmitter (6) is received by the receiver (7) on the knob (4) and detected by the second control unit (8). For example, different identification signals are specified for microwave oven, oven and refrigerator. When the signal is detected by the second control unit (8), the knob (4) is paired with the household appliance (1) and the authorization permission of the household appliance (1) is given to the knob (4). In short, a specific identification signal value similar to the identification number of each household appliance (1) is provided and the update of the identification signals of

the household appliance (1) can be preferably used in the present invention. Thus, the pairing process is performed without the need for user intervention.

In another embodiment of the present invention, the household appliance (1) comprises the knob (4) having the second control unit (8) which has a plurality of
5 menus/programs corresponding to the identification signals predetermined by the producer and which identifies the menu corresponding to the identification signal received from the transmitter (6) and also having a screen (9) which enables the identified menu to be displayed. In this embodiment, a user interface specific to the household appliance (1) whereon the knob (4) is placed and the menu corresponding
10 to the features of the household appliance (1) can be displayed on the screen (9) of the knob (4). By creating a common interface for different household appliances (1), a structure which can be integrated with a plurality of appliances (1) is obtained with the same knob (4). The type of the household appliance (1) whereon the knob (4) is placed is detected by means of the second control unit (8) which identifies the
15 data received by the receiver (7) by means of a database saved in the memory thereof. For example, when the knob (4) is placed on a microwave oven, the display (9) indicators and the menu is composed of heating values and similar symbols, and when placed on a refrigerator, the screen (9) display consists of cooling levels and similar symbols. The screen (9) which is positioned parallel to the panel (3) is
20 provided on the outer surface of the knob (4) facing the user. The screen (9) can be rectangular or circular and can be provided with indicators adjacent to the knob (4) which show levels and preferences. In different embodiments of the present invention, TFT, LCD, OLED or LED screens (9) can be used. By means of using various coloring and illumination designs for the screen (9) interface, ease of use
25 specific to the household appliance (1) or the user can be provided.

In another embodiment of the present invention, the household appliance (1) comprises the knob (4) which has a first wireless connection means (10) enabling the commands received from the user to be transmitted to the first control unit (5) of the household appliance (1), and the first control unit (5) which has a second
30 wireless communication means (11) provided in the body (2), enabling the transmitted commands to be detected. The data and commands are transmitted from the knob (4) to the household appliance (1) or from the household appliance (1) to

the knob (4) by means of the wireless connection means (10, 11) without the need for using physical connections. By means of the Internet of Things protocol which has become a standard for the household appliances (1), the communication between the household appliance (1) and the knob (4) can be realized using protocols such as BLE (Bluetooth Low Energy), ZigBee, Z-Wave, WLAN and NFC. Both the setting changes made by the user and the notifications or the information regarding the instantaneous operational condition sent by the household appliance (1) to inform the user can be transferred bidirectionally by means of said protocols. Thus, a communication network with low energy consumption and high data transfer rate is obtained.

In another embodiment of the present invention, the household appliance (1) comprises the knob (4) which has an angle sensor (12) suitable to be used by touching and turning, enabling the commands entered by the user to be detected. Said angle sensor (12) can be provided in various forms as per preference such as an optical sensor with an optical encoder which provides a very sensitive detection, a magnetic sensor having a magnetic band which occupies less space and Hall-effect sensor or a mechanical sensor having a mechanical encoder which provide tactile sensation. The angle sensor (12) in the form of an optical, magnetic and mechanical sensor provided here generates angle data depending on the 360-degree turning ability of the knob (4), and the user control based on the angle data analyzed by the second control unit (8) can be monitored on the screen (9).

In another embodiment of the present invention, the household appliance (1) comprises a first magnetic holder (13) group which has equal magnetic properties and which is equidistantly positioned in the knob (4) and a second magnetic holder group (14) which is disposed in the body (2) and which has the same arrangement as the first magnetic holder group (13). By means of a structure which automatically aligns with the nearest 90 degree position independently of the angle the structure is placed onto the panel (3) thanks to equal pushing pulling magnetic forces, the N-S poles are enabled to always overlap. Thus, the knob (4) automatically shifts to a symmetrical position without the need for manual adjustment by the user.

In another embodiment of the present invention, the household appliance (1) comprises the knob (4) having a motion sensor (15) which detects movement, and the second control unit (8) having two separate modes, that is an active mode (A) wherein the movement of the user is detected by the motion sensor (15) and the screen (9) is turned on, and a sleep mode (U) wherein the movements of the user are not detected and the screen (9) is turned off. Optical, capacitive, ultrasound or RF measurement techniques can be used in the motion sensor (15) which detects the limit range. Thus, characteristics such power consumption, precision, etc. of the motion sensor (15) used in the present invention can be diversified. In the active mode (A), the screen (9) is kept turned on for a predetermined time period and the sleep mode (U) is activated if there isn't any movement detected during said time period. If a movement is detected, said time period is restarted repeatedly and the active mode (A) continues. Thus, both energy saving is ensured and the user is provided with the information regarding the movements around the present invention.

In another embodiment of the present invention, the household appliance (1) comprises the knob (4) having a vibration motor (16) which provides tactile feedback to the user. By means of said motors known as LRA (Linear Resonant Actuator) vibration motor (16) or encoder motor, a design with customized the frequency and intensity specifically for the user is provided. For example, if the number of options in the program A is X and the number of options in the program B is Y, the angle of vibration frequency for program A is $360/A$ degrees and the angle of vibration frequency for program B is $360/B$ degrees. The knob (4), when not placed onto the household appliance (1), can provide the user with warnings (time lapse, cooking, alarm etc.) by means of vibrations. Thus, with each step of the knob (4), an increasing or decreasing tactile warning or feedback can be sent to the user and thus, a user experience with a better sensation is provided.

In another embodiment of the present invention, the household appliance (1) comprises a knob (4) which has a first energy unit (17) providing wireless charging function and a second energy unit (18) which is disposed in the body (2) for energizing the knob (4). Thus, in addition to the dry cells and batteries, the knob is enabled to be charged through the household appliance (1) whereon the knob (4) is

placed. The energy transfer can be realized by means of electromagnetic induction or radiation. Induction and radiation can be performed on the coil in the knob (4), and the energy can be stored in the battery. The batteries can be charged even when placed onto the household appliance (1) without the need for using additional devices and continuous usage is provided compared to cable solutions.

In short, different household appliances (1) can be controlled by means of the knob (4) of the present invention, and the need for using any interfaces and such on the household appliance (1) is eliminated. The user places the knob (4) on the desired household appliance (1) and the knob (4) automatically pairs with the household appliance (1) by means of the receiver (7) and the transmitter (6), thus enabling the household appliance (1) to be controlled. In the embodiments wherein a screen (9) is provided on the knob (4), a menu/interface specific to the household appliance (1) is displayed on the screen (9). In different embodiments, a standard interface which can be adapted to different household appliances (1) can be displayed. By means of the present invention, the user can control a plurality of household appliances (1) with the same knob (4) and by means of the wireless connection means (10, 11), the knob (4) can control the connected household appliance (1) until being placed on another household appliance (1) after being separated from the household appliance (1). Thus, the user can pair the knob (4) for example with an oven or a cooktop so as to control the household appliance (1) remotely. In different embodiments of the present invention, the knob (4) can pair with household appliances (1) via the wireless connection means (10, 11). In other words, the user can see the connectable/pairable household appliances (1) on the screen (9) of the knob (4) and can connect to the desired household appliance (1). Thus, the user can control all the household appliances (1) by means of the knob (4) without the need for being next to the appliances (1).

By means of the present invention, a household appliance (1) is realized, comprising a knob (4) which can identify the household appliance (1) whereon the same is placed by means of a receiver (7) and a transmitter (6) as per the preferences of the producer. By means of a single knob (4) which can create a common interface for different household appliances (1), flexibility of use is provided for the user and a

cost-effective solution is provided by eliminating the need for a plurality of knobs
(4).

CLAIMS

1. A household appliance (1) **comprising** a body (2); a panel (3) provided on the body (2); a knob (4) which is detachably attached onto the panel (3); and a first control unit (5) which is disposed in the body (2) and which detects the data
5 received from the knob (4), **characterized by**
- a transmitter (6) which is disposed in the body (2) and which transmits an identification signal predetermined by the producer;
 - a receiver (7) which is disposed on the knob (4) and which receives the signal transmitted by the transmitter (6); and
 - 10 - the knob (4) which has a second control unit (8) provided in the knob (4) for detecting the identification signal received by the receiver (7).
2. A household appliance (1) as in Claim 1, **characterized by** the knob (4) having the second control unit (8) which has a plurality of menus/programs corresponding to the identification signals predetermined by the producer and
15 which identifies the menu corresponding to the identification signal received from the transmitter (6) and also having a screen (9) which enables the identified menu to be displayed.
3. A household appliance (1) as in Claim 1 or Claim 2, **characterized by** the knob (4) which has a first wireless connection means (10) enabling the commands
20 received from the user to be transmitted, and the first control unit (5) which has a second wireless communication means (11) enabling the transmitted commands to be detected.
4. A household appliance (1) as in any one of the above claims, **characterized by** the knob (4) comprising a angle sensor (12) suitable for being
25 used by touching and turning, enabling the commands entered by the user to be detected.
5. A household appliance (1) as in any one of the above claims, **characterized by** a first magnetic holder (13) group which has equal magnetic properties and which is equidistantly positioned in the knob (4) and a second

magnetic holder group (14) which is disposed in the body (2) and which has the same arrangement as the first magnetic holder group (13).

6. A household appliance (1) as in any one of the above claims, **characterized by** the knob (4) having a motion sensor (15) which detects movement, and the second control unit (8) having two separate modes, that is an active mode (A) wherein the movement of the user is detected by the motion sensor (15) and the screen (9) is turned on, and a sleep mode (U) wherein the movements of the user are not detected and the screen (9) is turned off.

7. A household appliance (1) as in any one of the above claims, **characterized by** the knob (4) comprising a vibration motor (16) providing tactile feedback to the user.

8. A household appliance (1) as in any one of the above claims, **characterized by** a knob (4) which has a first energy unit (17) providing wireless charging function and a second energy unit (18) which is disposed in the body (2) and which provides energy.

9. A knob (4) suitable for use in household appliances as in any one of the above claims, **characterized by** a receiver (7) for receiving the identification data of the household appliance (1) and a second control unit (8) detecting the user commands and transmitting the same to the household appliance (1).

10. A knob (4) as in Claim 9, **characterized by** the screen (9) which enables the menu/interface of the household appliance (1) to be displayed.

11. A knob (4) as in Claim 9 or Claim 10, **characterized by** a first wireless communication means (10) which provides wireless communication with the household appliances (1).

1 / 1

Figure 1

