FORM 2

THE PATENTS ACT, 1970
(39 OF 1970)
AND
THE PATENT RULES, 2003

COMPLETE SPECIFICATION
(See section 10 and rule 13)

Title of Invention:

CONTACTLESS DOORBELL APPARATUS

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The following specification particularly describes the invention and the manner in which it is to be performed.

FIELD OF INVENTION

[0001] The present invention is generally related to a doorbell, more particularly, relates to a contactless doorbell apparatus.

BACKGROUND OF INVENTION

[0002] The subject matter discussed in the background section should not be assumed to be prior art merely as a result of its mention in the background section. Similarly, a problem mentioned in the background section or associated with the subject matter of the background section should not be assumed to have been previously recognized in the prior art. The subject matter in the background section merely represents different approaches, which in-and-of-themselves may also be inventions.

[0003] Typically, doorbells enable a visitor present outside of an entry point, such as a door of a building to alert a person inside the entry point that the visitor would like to talk to a person present inside the building. However, due to the increase in widespread surface adhering viruses which transmit from one person to another person because of physical contact with objects around them thus preventing widespread of such heinous micro viruses our invention focuses on development non-contact doorbells button using integrated sensor technology. As doorbell manual switches are exposed to the large number of foreign substances due to direct contact with multiple people, thus to ensure the safety of person and prevent the spread of communicable diseases which transmits through surface contact.

[0004] US patent publication US20080048809A1 titled ‘Non – contact Switch’ discloses operational configuration of non – contact switch which is a magnetic switch which integrates MR sensor which detects magnetic flux when any magnetic material is brought in close contact of it,

accordingly its initiate switching action but this switch restricts switching action when some nonmagnetic material is brought in its vicinity.

[0005] US patent US7239235B2 titled 'Non-contact sensor idle validation switch' illustrate the operational mode of switching using sensory input from the sensor such as proximity sensor. When the sensor senses some object its control circuit gets configure to switch i.e. state B otherwise circuit remains on state A. The main disadvantage such type of switch in the doorbells is that it initiate false triggering when a certain entity or insect other than human reaches the vicinity of the switch.

[0006] US patent US3454869A titled "Proximity Sensing System" presents the operational functionality and reliability of operation of implementing Proximity sensing system instead of mechanical switches for switching action in a certain operational domain which is subjected to varying external conditions of vibrations, shocks, chemical corrosives, adverse weather conditions. But proximity sensing system is unable to detect the nature of object i.e. human, animals, non – living objects, whereas in case of doorbell ringing operation it is necessary to detect human motion for true triggering otherwise system may initiate false triggering on detecting any object.

[0007] US patent US6612404 titled 'Contactless hall effect push-button switch' discloses the functional operation of non-contact switching mechanism using hall – effect principles. The system uses a Hall-effect sensor integrated with a microchip which initiates the triggering action based upon data receives from the Hall-effect sensor. The sensor scope of detection is only limited to magnetic substances i.e. whenever an object of magnetic nature reaches near the Hall-effect sensor its changes its output signal state which is then processed by a microchip to attain some actuation, hence this contactless switch fails to operate which detection object is non-magnetic.

[0008] Therefore there is a need for a non-contact, and efficient contactless doorbell apparatus to detect a wavegesture of a visitor to trigger the doorbell.

[0009] Thus, in view of the above, there is a long-felt need in the industry to address the aforementioned deficiencies and inadequacies.

[0010] Further limitations and disadvantages of conventional and traditional approaches will become apparent to one of skill in the art through comparison of described systems with some aspects of the present disclosure, as outlined in the remainder of the present application and regarding the drawings. In some embodiment, the numbers expressing quantities or dimensions of items, and so forth, used to describe and claim certain embodiment of the invention are to be understood as being modified in some instances by the term “about.”

[0011] Accordingly, in some embodiment, the numerical parameters outlined in the written description and attached claims are approximations that can vary depending upon the desired properties sought to be obtained by a particular embodiment. In some embodiment, the numerical parameters should be construed in light of the number of reported significant digits and by applying ordinary rounding techniques. Notwithstanding that the numerical ranges and parameters setting forth the broad scope of some embodiment of the invention are approximations, the numerical values outlined in the specific examples are reported as precisely as practicable. The numerical values presented in some embodiment of the invention may contain certain errors necessarily resulting from the standard deviation found in their respective testing measurements. As used in the description herein and throughout the claims that follow, the meaning of “a,” “an,” and “the” includes plural reference unless the context dictates otherwise. Also, as used in the description herein, the meaning of “in” includes “in” and “on” unless the context dictates otherwise. The recitation of ranges of values herein is merely intended to serve as a shorthand method of referring individually to each separate value falling within the range. Unless otherwise indicated herein, each value is incorporated into the specification as if it were individually recited herein. All methods described herein can be performed in any suitable order unless otherwise indicated herein or otherwise clearly contradicted by context. The use of any examples, or exemplary language (e.g. “such as”) provided with respect to a certain embodiment herein is intended merely to better illuminate the invention and does not pose a limitation on the scope of the invention otherwise claimed. No language in the specification should be construed as indicating any non-claimed element essential to the practice of the invention.

[0012] Groupings of alternative elements or embodiment of the invention disclosed herein are not to be construed as limitations. Each group

member can be referred to and claimed individually or in any combination with other members of the group or other elements found herein. One or more members of a group can be included in, or deleted from, a group for reasons of convenience and/or patentability. When any such inclusion or deletion occurs, the specification is herein deemed to contain the group as modified thus fulfilling the written description of all groups used in the appended claims.

SUMMARY OF THE INVENTION

[0013] A contactless doorbell apparatus is provided substantially, as shown in and/or described in connection with at least one of the figures.

[0014] An aspect of the present disclosure relates to a contactless doorbell apparatus that includes a doorbell housing, an ultrasonic sensor, a human detection sensor, a wave detection sensor, a switch, a controller, a light indicator, and a power source. The ultrasonic sensor is configured to detect an indication suggestive of a hand of a visitor within a predefined distance towards the doorbell housing. The human detection sensor is configured to detect the hand of the visitor on receiving the indication from the ultrasonic sensor. The wave detection sensor is coupled with the human detection sensor to detect a wave gesture from the hand of the visitor. The switch is configured to generate a chime signal for a predefined time duration on the detection of the wave gesture from the wave detection sensor. The controller is configured with the ultrasonic sensor, the human detection sensor, the wave detection sensor to execute a plurality of instructions related to the detection of the hand of the visitor within the predefined distance, and generating the chime signal for the predefined time duration. The light indicator is coupled with the switch to indicate a plurality of colors corresponding to a plurality of states. The power source supplies power to the ultrasonic sensor, the human

detection sensor, the wave detection sensor, the switch, the controller, and the light indicator.

[0015] In an aspect, the light indicator is configured to indicate a first color indicative of an active state of the doorbell housing to respond to the wave gesture of the visitor.

[0016] In an aspect, the light indicator is configured to indicate a second color indicative of an active chime state when the switch is generating the chime signal for the predefined time duration.

[0016] In an aspect, the ultrasonic sensor, the human detection sensor, the wave detection sensor, the switch, the light indicator, and the power source are positioned within the doorbell housing.

[0017] In an aspect, the power source comprising an external power source electrically connected to a power system of a building; and a battery.

[0018] In an aspect, the doorbell housing is attached to the building.

[0019] In an aspect, the predefined distance is at least 25 centimeters.

[0020] In an aspect, the predefined time duration is at least 5 seconds.

[0021] In an aspect, the controller switches the ultrasonic sensor to a sleep mode after a predefined operational time duration when the ultrasonic sensor does not detect the indication suggestive of the hand of the visitor within the predefined distance.In an aspect, the predefined operational time duration is at least 5 minutes.

[0022] Accordingly, one advantage of the present invention is that it increases the operational life of the contactless doorbell apparatus on battery power.

[0023] Accordingly, one advantage of the present invention is that it can be integrated with any mechanical switches, thus allow non-contact switching.

[0024] Accordingly, one advantage of the present invention is that it is an economical contactless doorbell apparatus that provides high sensitivity and durability as compared to mechanical switches.

[0025] Accordingly, one advantage of the present invention is that it recognizes only human's waving gesture.

[0026] Accordingly, one advantage of the present invention is that it prevents the spread of surface adhering viruses from person to person.

[0027] These features and advantages of the present disclosure may be appreciated by reviewing the following description of the present disclosure, along with the accompanying figures wherein like reference numerals refer to like parts.

BRIEF DESCRIPTION OF THE DRAWINGS

[0028] The accompanying drawings illustrate the embodiment of systems, methods, and other aspects of the disclosure. Any person with ordinary skills in the art will appreciate that the illustrated element boundaries (e.g., boxes, groups of boxes, or other shapes) in the figures represent an example of the boundaries. In some examples, one element may be designed as multiple elements, or multiple elements may be designed as one element. In some examples, an element shown as an internal component of one element may be implemented as an external component in another and vice versa. Furthermore, the elements may not be drawn to scale.

[0029] Various embodiment will hereinafter be described in accordance with the appended drawings, which are provided to illustrate, not limit, the scope, wherein similar designations denote similar elements, and in which:

[0030] FIG. 1 illustrates an implementation view of a contactless doorbell apparatus, in accordance with an embodiment of the present subject matter.

[0031] FIG. 2 illustrates a block diagram of the various components of the present contactless doorbell apparatus, in accordance with at least one embodiment.

[0032] FIG. 3 illustrates a schematic view of the controller, in accordance with at least one embodiment.

[0033] FIG. 4 illustrates a schematic diagram of the present contactless doorbell apparatus, in accordance with at least one embodiment.

[0034] FIG. 5 illustrates a perspective view of the light indicator, in accordance with at least one embodiment.

[0035] FIG. 6 illustrates an integrated view of the positioning of the ultrasonic sensor, the human detection sensor, the wave detection sensor, according to an embodiment of the present invention.

[0036] FIG. 7 illustrates a schematic view of the detection range of the ultrasonic sensor, according to an embodiment of the present invention.

[0037] FIG. 8 illustrates a flow diagram of thepresent contactless doorbell apparatus, according to an embodiment of the present invention.

DETAILED DESCRIPTION OF THE EMBODIMENTS HEREIN.

[0038] The present disclosure is best understood with reference to the detailed figures and description set forth herein. Various embodiments have been discussed with reference to the figures. However, those skilled in the art will readily appreciate that the detailed descriptions provided herein with respect to the figures are merely for explanatory purposes, as the methods and systems may extend beyond the described embodiments. For instance, the teachings presented and the needs of a particular application may yield multiple alternative and suitable approaches to implement the functionality of any detail described herein. Therefore, any approach may extend beyond certain implementation choices in the following embodiments.

[0039] References to “one embodiment,” “at least one embodiment,” “an embodiment,” “one example,” “an example,” “for example,” and so on indicate that the embodiment(s) or example(s) may include a particular feature, structure, characteristic, property, element, or limitation but that not every embodiment or example necessarily includes that particular feature, structure, characteristic, property, element, or limitation. Further, repeated use of the phrase “in an embodiment” does not necessarily refer to the same embodiment.

[0040] Methods of the present invention may be implemented by performing or completing manually, automatically, or a combination thereof, selected steps or tasks. The term “method” refers to manners, means, techniques and procedures for accomplishing a given task including, but not limited to, those manners, means, techniques, and procedures either known to or readily developed from known manners, means, techniques and procedures by practitioners of the art to which the invention belongs. The descriptions, examples, methods, and materials presented in the claims and the specification are not to be construed as

limiting but rather as illustrative only. Those skilled in the art will envision many other possible variations within the scope of the technology described herein.

[0041] FIG. 1 illustrates an implementation view 100 of a contactless doorbell apparatus 102, in accordance with an embodiment of the present subject matter. According to an embodiment, the contactless doorbell apparatus 102 is integrated with an existing manual doorbells button 104 of a building 106. According to an embodiment, the contactless doorbell apparatus 102 replaces the existing manual doorbells button 104 to ensure contactless triggering of the doorbell on detecting a wave gesture 108 from a visitor.

[0042] FIG. 2 illustrates a block diagram of the various components of the present contactless doorbell apparatus 102, in accordance with at least one embodiment.FIG. 2 is explained in conjunction with FIG. 1. The contactless doorbell apparatus 102 includes a doorbell housing 502 (shown in FIG. 5), an ultrasonic sensor 202, a human detection sensor 212, a wave detection sensor 204, a switch 206, a controller 302 (shown in FIG. 3), a light indicator 208, and a power source 210. The ultrasonic sensor 202 measures the distance of the hand of the visitor and configured to detect an indication suggestive of a hand of the visitor within a predefined distance towards the doorbell housing. In an embodiment, the predefined distance is at least 25 centimeters or 250 mm.In an embodiment, the ultrasonic sensor 202, the human detection sensor 212, the wave detection sensor 204, the switch 206, the light indicator 208, the power source 210, and the controller302 are positioned within the doorbell housing 502. In an embodiment, the doorbell housing 502is water-resistant and/or waterproof. The doorbell housing 502 can be made from metal or plastic, such as molded plastic. In some embodiments, the doorbell housing 502 is made from brushed nickel or aluminum. Rubber

seals can be used to make the doorbell housing 502 water-resistant or waterproof.

[0043] The human detection sensor 212 is a PIR sensor that detects the hand of the visitor on receiving the indication from the ultrasonic sensor 202. The wave detection sensor 204 is coupled with the human detection sensor to detect a wave gesture from the hand of the visitor. The switch 206 is a hand motion detection bell switch that is configured to generate a chime signal for a predefined time duration on the detection of the wave gesture from the wave detection sensor 204. In an embodiment, the switch 206 enables a visitor to sound a chime (e.g., a speaker or another sound emission device located inside the building) through his/her wave gesture. According to an embodiment, the chime is digital or mechanical. The chime can be located inside of the building to which the doorbell is attached. In some embodiments, the chime is a speaker attached to the building.

[0044] The light indicator 208 is coupled with the switch 206 to indicate a plurality of colors corresponding to a plurality of states.In an embodiment, the light indicator 208 is configured to indicate a first color indicative of an active state of the doorbell housing 502 to respond to the wave gesture of the visitor. In an embodiment, the light indicator 208 is configured to indicate a second color indicative of an active chime state when the switch is generating the chime signal for the predefined time duration.According to an embodiment herein, the light indicator is LEDs.

[0045] The power source 210 supplies power to the ultrasonic sensor 202, the human detection sensor 212, the wave detection sensor 204, the switch 206, the controller 302, and the light indicator 208.In an embodiment, the power source 210 includes an external power source electrically connected to a power system of a building; and a battery. The

external power source can be 230 VAC and the battery can supply 9 V DC battery supply.

[0046] FIG. 3 illustrates a schematic view 300 of the controller 302, in accordance with at least one embodiment.The controller 302 is configured with the ultrasonic sensor 202, the human detection sensor 212, the wave detection sensor 204 and a feedback module 306 to process 304 a plurality of instructions to the detection of the hand of the visitor within the predefined distance, and generating the chime signal 308 for the predefined time duration. In an embodiment, the predefined time duration includes but not limited to 5 seconds.FIG. 4 illustrates a schematic diagram 400 of the present contactless doorbell apparatus, in accordance with at least one embodiment.FIG. 4 is explained in conjunction with FIG. 3. The controller 302 switches the ultrasonic sensor to a sleep mode after a predefined operational time duration when the ultrasonic sensor 202 does not detect the indication suggestive of the hand of the visitor within the predefined distance. In an embodiment, the predefined operational time duration is at least 5 minutes. The power source is an external power source 402 electrically connected to a power system of a building; and a battery.In an embodiment, the controlled 302performs switching operation using various sensors and implements various analytics mechanisms with coherent functional computing data structure and embedded it into the Atmega328 chip which distinguishes humans from other entities such as animals (crawling lizards, etc.) or other objects of different nature other than human.In an embodiment, the controller 302 includes a memory to store sensed data. The memory can be a non-volatile memory or a volatile memory. Examples of non-volatile memory may include, but are not limited to flash memory, a Read Only Memory (ROM), a Programmable ROM (PROM), Erasable PROM (EPROM), and Electrically EPROM (EEPROM) memory. Examples of volatile memory may include but are not limited to Dynamic Random Access Memory (DRAM), and

Static Random-Access memory (SRAM). According to an embodiment herein, the contactless doorbell apparatus includes a power converter (230 VAC to 12VDc), an LM2596S DC-DC buck converter power supply, and a 5V relay.

[0047] FIG. 5 illustrates a perspective view 500 of the light indicator 208, in accordance with at least one embodiment. In an embodiment, the light indicator 208 (shown in FIG. 2) is placed on the outer surface of the doorbell housing 502. To ensure the user/visitor about ringing bell status, light indicator differentiated in red color 504 and green color 506. The red color 504 indicates the user that the contactless doorbell apparatus is in an active state and can respond to human hand waving action/gesture and green color 506 indicates ringing bell status. Thus, when the user waves within a sensory range (25cm/250 mm) of the present contactless doorbell apparatus, it recognizes the action and triggers the chime/bell. FIG. 7 illustrates a schematic view 700 of the detection range of the ultrasonic sensor 202, according to an embodiment of the present invention.

[0048] FIG. 6 illustrates an integrated view 600 of the positioning of the ultrasonic sensor 202, the human detection sensor 212, and the wave detection sensor 204 within the doorbell housing 502, according to an embodiment of the present invention. To prevent false triggering of the bell because of action of some other entity such as wall-crawling lizards, insects, and motion within the vicinity of the contactless doorbell apparatus, the contactless doorbell apparatus recognizes the human and its waving action using the human detection sensor 212, and the wave detection sensor 204. The detection operation is executed using ultrasonic sensor 202 to detect the distance of hand, the human detection sensor 212 detects human physical movements. In an embodiment, the wave detection sensor 204 is an IR sensor to detect waving motion. Thus, using integrated sensor technology, the present contactless doorbell apparatus

performs successful triggering of the bell and plays a major role to minimize the spread of surface adhering viruses such as coronavirus.

[0049] As used herein, and unless the context dictates otherwise, the term “configured to” or “coupled to” is intended to include both direct coupling (in which two elements that are coupled to each other contact each other) and indirect coupling (in which at least one additional element is located between the two elements). Therefore, the terms “configured to”, “configured with”, “coupled to” and “coupled with” are used synonymously. Within the context of this document terms “configured to”, “coupled to” and “coupled with” are also used euphemistically to mean “communicatively coupled with” over a network, where two or more devices can exchange data with each other over the network, possibly via one or more intermediary device.

[0050] It should be apparent to those skilled in the art that many more modifications besides those already described are possible without departing from the inventive concepts herein. The inventive subject matter, therefore, is not to be restricted except in the spirit of the appended claims. Moreover, in interpreting both the specification and the claims, all terms should be interpreted in the broadest possible manner consistent with the context. In particular, the terms “comprises” and “comprising” should be interpreted as referring to elements, components, or steps in a non-exclusive manner, indicating that the referenced elements, components, or steps may be present, or utilized, or combined with other elements, components, or steps that are not expressly referenced.

[0051] FIG. 8 illustrates a flow diagram 800 of the present contactless doorbell apparatus, according to an embodiment of the present invention. At step 802,a visitor approaches the doorbell housing. At step 804, an ultrasonic sensor measures the distance of the hand of the visitor from the doorbell housing. At step 806, the human detection sensor detects the

hand of the visitor. At step 808, a wave detection sensor detects a wave gesture from the hand of the visitor. At step 810, a switch generates a chime signal or rings the bell for a predefined time duration on the detection of the wave gesture from the wave detection sensor.

[0052] The present contactless doorbell apparatus is implemented in dealing with switching operation of high-power rating devices which often led to shock due to high current and earthing conditions of the place. Thus, the present contactless doorbell apparatus serves multiple purposes in switching application i.e. prevent the spread of surface adhering viruses due to direct contact and switching of high-power units without subjecting to shocks and other electrical injuries. Thus the present contactless doorbell apparatus is portable and can be installed at any desires location using mechanical fitting as used in electrical switch installation.

[0054] No language in the specification should be construed as indicating any non-claimed element as essential to the practice of the invention.

[0055] It will be apparent to those skilled in the art that various modifications and variations can be made to the present invention without departing from the spirit and scope of the invention. There is no intention to limit the invention to the specific form or forms enclosed. On the contrary, the intention is to cover all modifications, alternative constructions, and equivalents falling within the spirit and scope of the invention, as defined in the appended claims. Thus, it is intended that the present invention cover the modifications and variations of this invention, provided they are within the scope of the appended claims and their equivalents.

CLAIMS:

We claim:

1. A contactless doorbell apparatus (102), comprising:

a doorbell housing (502);

an ultrasonic sensor (202) configured to detect an indication suggestive of a hand of a visitor within a predefined distance towards the doorbell housing (502);

a human detection sensor (212) configured to detect the hand of the visitor on receiving the indication from the ultrasonic sensor (202);

a wave detection sensor (204) coupled with the human detection sensor (212) to detect a wave gesture from the hand of the visitor;

a switch (206) configured to generate a chime signal for a predefined time duration on detection of the wave gesture from the wave detection sensor (204);

a controller (302) configured with the ultrasonic sensor (202), the human detection sensor (212), the wave detection sensor (204) to execute a plurality of instructions related to the detection of the hand of the visitor within the predefined distance, and generating the chime signal for the predefined time duration;

a light indicator (208) coupled with the switch (206) to indicate a plurality of colors corresponding to a plurality of states; and

a power source (210) to supply power to the ultrasonic sensor (202), the human detection sensor (212), the wave detection sensor(204), the switch (206), the controller (302), and the light indicator (208).

2. The contactless doorbell apparatus (102) according to claim 1, wherein the light indicator (208) is configured to indicate a first color indicative of an active state of the doorbell housing (502) to respond to the wave gesture of the visitor.

3. The contactless doorbell apparatus (102) according to claim 1, wherein the light indicator (208) is configured to indicate a second color indicative of an active chime state when the switch is generating the chime signal for the predefined time duration.

4. The contactless doorbell apparatus (102) according to claim 1, wherein the ultrasonic sensor (202), the human detection sensor (212), the wave detection sensor (204), the switch (206), the light indicator (208), the power source (210) are positioned within the doorbell housing (502).

5. The contactless doorbell apparatus (102) according to claim 1, wherein the power source (210) comprising an external power source electrically connected to a power system of a building; and a battery.

6. The contactless doorbell apparatus (102) according to claim 1, wherein the doorbell housing (502) is attached to the building.

7. The contactless doorbell apparatus (102) according to claim 1, wherein the predefined distance is at least 25 centimeters.

8. The contactless doorbell apparatus (102) according to claim 1, wherein the predefined time duration is at least 5 seconds.

9. The contactless doorbell apparatus (102) according to claim 1, wherein the controller (302) switches the ultrasonic sensor to a sleep mode after a predefined operational time duration when the ultrasonic sensor (202) does not detect the indication suggestive of the hand of the visitor within the predefined distance.

10. The contactless doorbell apparatus (102) according to claim 1, wherein the predefined operational time duration is at least 5 minutes.

Dated this 10/06/2020

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ABSTRACT

CONTACTLESS DOORBELL APPARATUS

Disclosed is a contactless doorbell apparatus (102) that includes a doorbell housing (502), an ultrasonic sensor (102), a human detection sensor (212), a wave detection sensor (204), a switch (206), a controller (302), and a light indicator (208). The ultrasonic sensor (202) detects an indication suggestive of a hand of a visitor within a predefined distance towards the doorbell housing (502). The human detection sensor (212) detects the hand of the visitor on receiving the indication from the ultrasonic sensor (202). The wave detection sensor (204) detects a wave gesture from the hand of the visitor. The switch (206) generates a chime signal for a predefined time duration on the detection of the wave gesture from the wave detection sensor (204). The controller (302) executes instructions related to the detection of the hand of the visitor within the predefined distance and generates the chime signal for the predefined time duration. The light indicator (208) indicates colors corresponding to a plurality of states. **The most illustrative drawing: FIG. 2.**