

## **Device, System and Method for Controlling An Operation**

### **TECHNICAL FIELD**

[0001] The present invention relates generally to a device, system and method for controlling an operation.

[0002] Although the present invention will be described with particular reference to controlling a an operation comprising a switching or signaling action or event for an electrical or electronic circuit, it will be appreciated that it may be used in respect of additional or alternative operations.

### **BACKGROUND ART**

[0003] An electric switch is a device operable to interrupt or divert flow of electrical energy or current in an electrical or electronic circuit. That is, “break” the circuit.

[0004] Traditionally, an electric switch has the form of a manually operated electromechanical device comprising one or more sets of electrical contacts, which are connected to external circuits. Each set of contacts can be in a first or “closed” state, in which electrical energy can flow between the contacts, and a second or “open” state, in which there is no electrical energy flow between the contacts.

[0005] Early electric switches used “quick break” technology, such as the light switch invented by John Henry Holmes in 1884. His quick-break switch solved the problem of the contacts of an electric switch developing electric arcing whenever the circuit was opened or closed – a damaging condition that reduces an electric switch’s working life.

[0006] Fundamentally, such switches operate by translation of a mechanical action into a switching action, with a first position of an actuating means such as a mechanical component of the switch, manually moveable by a user, corresponding to the closed state and a second position of the mechanical component corresponding to the open state.

[0007] In variations of the technology, rather than switching electricity, manipulation of the switch to the closed state closes a contact that does not switch electricity but rather provides an input to signal an action. In this regard, many input devices for signaling systems are constructed using similar technology to electric switches.

[0008] This same technology, soft switching versions or variations of the same, or electronic derivatives of the technology where manual input (switching or signaling) is transferred to electrical signals, is still in use today in almost every ordinary switch in the world, controlling devices and systems including, for example, those for lighting, heating and cooling, power, and generating an alert or alarm, such as a nurse call switch. Despite this ever growing list of applications for the switch, the device itself has, fundamentally, remained unchanged for over 50 years with the quick-break technology still in use in almost every ordinary light switch in the world today, as well as in many other forms of electric switch.

[0009] Differences between switches presently available reside mainly in their aesthetic design or appearance, and particularly in the type of actuating means. Popular varieties include push button, toggle, rocker, tamper resistant, voltage class, mercury, pull chain/cord, dimmer and electronic mechanisms.

[0010] Switches are often recessed within a finished wall of a construction. Typically, a pattress box houses the switch within a recess in the wall, and it is covered by a plastic, glass, ceramic, or metal faceplate to prevent contact with live components such as terminals of the switch. There are various mounting techniques and methods employed to secure the switch in its desired location.

[0011] Typically, visual and tactile features of the switch and associated components, such as the shape, configuration, pattern, ornamentation, look and/or feel of the faceplate and actuating means are available in a variety of fixed variations determined by a manufacturer of the switch.

[0012] Despite their ubiquity and longevity, the traditional switch has a number of inherent shortcomings or problems.

[0013] Firstly, as mentioned above, switches are manufacturer-defined. That is, the manufacturer decides on the aesthetics of the device such as the design, size, function, material and colour, according to what they believe are the needs of the

market, and then produces them on a mass scale. The consumer is then left with the challenge of selecting the most suitable product according to the style, colour, décor and function of a room, for example, where the switch is to be installed. As a result, choice is limited to manufacturers' creativity rather than that of consumers.

[0014] A traditional switch comprises various mechanical parts; even newer developed electronic switches retain a number of mechanical or electro mechanical pieces as part of their construction. As with any mechanical or electro mechanical part, continued use causes wear and worn switches become less reliable and may present a safety risk or hazard. Any movement of electrical wiring associated with the switch can cause it to fray, increasing the likelihood of electrocution, fire or burns. Additionally, worn switches may become a fire or electrocution hazard. If exposed to moisture or direct water ingress, such as in a bathroom, kitchen or other wet area, the switch may also cause electrocution. Whilst waterproof switching is available to overcome this, they are generally not a décor item, do not match other switches that would be used in the same areas and are considerably more expensive as they are a specifically built switch.

[0015] Switches are actuated by touch which allows the transfer or transmission of microorganisms detrimental to human health. The faceplates of switches, for example, can become breeding grounds for pathogens such as bacterium, especially as the inherent design of a switch provides ample collection points such as irregular surface finishes or grooves on their outer surface. Environmental factors when switches are, for example, located in places like hospitals, bathrooms or kitchens add to the possibility of infection. Switches therefor by nature are responsible for the transfer of pathogens, the transfer of which is especially dangerous for a place such as a hospital or restaurant.

[0016] It is against this background that the present invention has been developed.

## SUMMARY OF INVENTION

[0017] It is an object of the present invention to overcome, or at least ameliorate, one or more of the deficiencies of the prior art mentioned above, or to provide the consumer with a useful or commercial choice.

[0018] Other objects and advantages of the present invention will become apparent from the following description, taken in connection with the accompanying drawings, wherein, by way of illustration and example, a preferred embodiment of the present invention is disclosed.

[0019] According to a first broad aspect of the present invention, there is provided a device for controlling an operation, the device comprising:

a controller;

a storage means for storing electronic program instructions for controlling the controller; and

an input means;

wherein the controller is operable, under control of the electronic program instructions, to:

receive at least one instruction via the input means, the at least one instruction comprising a command associated with the operation; and

implement the operation according to the command.

[0020] Preferably, the device further comprises an output means.

[0021] Preferably, the device further comprises connection means for operably connecting and disconnecting the input means and/or the output means to the device.

[0022] The input means and/or the output means may comprise modules interchangeably connectable to the device.

[0023] The controller may comprise computer processing means, in which case the instruction may comprise, or be converted by operation of the input means, into data or at least one signal for the computer processing means.

[0024] The input means may comprise user input means, in which case the at least one instruction may comprise at least one user instruction inputted by a user via the user input means. Additionally, or alternatively, the input means may

comprise machine input means, operable to receive at least one instruction from a machine, device or system.

[0025] The input means may comprise one or more sensors or detectors operable to sense data relating to or associated with the operation, the instruction and/or the command and to communicate the sensed data to the controller. The data communicated may comprise the instruction or command and/or a representation thereof.

[0026] Preferably, the device further comprises a display for displaying a user interface. The display may comprise a static display, and/or a dynamic display. In the case of a dynamic display, it may comprise a graphical display screen operable to be altered or updated electronically. Additionally, or alternatively, the display may comprise an indication means, which may comprise a visual indication, provided by one or more light sources such as a Light Emitting Diode (LED), a tactile indication, provided by one or more tactile sources such as a vibration generating device, and/or an aural indication, provided by one or more aural sources, such as a buzzer or alarm, for example.

[0027] The display, user interface and input means may be integrated, to allow for instructions to be inputted or received, and for output or feedback to be displayed. The integration may comprise a touchscreen implemented, for example, using Projected Capacitive Touch, Resistive Touch, and/or Inductive Touch technology. Alternatively, the display, user interface and input means may be discrete.

[0028] The output or feedback displayed may comprise a visual output, preferably including alphabetic, numeric and/or graphics, a tactile output, and/or an aural output, or a combination thereof.

[0029] Preferably, the display comprises a changeable fascia.

[0030] The display may be protected by a removable cover. Preferably, the cover is adapted to prohibit or mitigate to at least some extent retention and/or transmission of at least one pathogen. In a preferred embodiment, the adaption comprises making the cover smooth or substantially smooth. Preferably, the cover is fabricated from at least one of a plastic, glass, metal, and/or antibacterial material. In a preferred form, the antibacterial material comprises inherently antibacterial silver ions.

[0031] Preferably, the operation comprises at least one of: a switching action; a signaling action; a recording action; a data logging action; and a power management action.

[0032] Preferably, the storage means is operable to store information or data. The information or data may be associated with the operation. In such an embodiment, where the display comprises a dynamic graphical display screen, it is preferred that the controller is operable, under control of the electronic program instructions, to display a list of available information or data via the display, and that the command comprises a selection of the available information or data from the list.

[0033] According to a second broad aspect of the present invention, there is provided a method for controlling an operation, the method comprising:

storing electronic program instructions for controlling a controller; and

controlling the controller via the electronic program instructions, to:

receive at least one instruction via an input means, the at least one instruction comprising a command associated with the operation; and

implement the operation according to the command.

[0034] According to a third broad aspect of the present invention, there is provided a computer-readable storage medium on which is stored instructions that, when executed by a computing means, causes the computing means to perform the method according to the second broad aspect of the present invention as hereinbefore described.

[0035] According to a fourth broad aspect of the present invention, there is provided a computing means programmed to carry out the method according to the second broad aspect of the present invention as hereinbefore described.

[0036] According to a fifth broad aspect of the present invention, there is provided a data signal including at least one instruction being capable of being received and interpreted by a computing system, wherein the instruction implements the method according to the second broad aspect of the present invention as hereinbefore described.

[0037] According to a sixth broad aspect of the present invention, there is provided a system for controlling an operation comprising a device according to the first broad aspect of the present invention as hereinbefore described.

#### BRIEF DESCRIPTION OF THE DRAWINGS

[0038] In order that the invention may be more fully understood and put into practice, preferred embodiments thereof will now be described with reference to the accompanying drawings, in which:

Figure 1 depicts a schematic diagram of a device for controlling an operation in accordance with an aspect of the present invention;

Figures 2 and 3 depict exploded diagrams of the device of Figure 1;

Figures 4A and 4D depict front views of a faceplate and a cover of the device of Figure 1, and Figures 4C and 4B depict rear views of the faceplate and the cover of the device of Figure 1;

Figures 5A to 5S depict examples illustrating the customisable nature of the interface of the device of Figure 1; and

Figures 6 and 7 depict exploded diagrams of an alternative embodiment of the device of Figure 1.

#### DESCRIPTION OF EMBODIMENTS

[0039] In the drawings, like features have been referenced with like reference numbers.

[0040] In Figures 1, 2 and 3, there is depicted an embodiment of a device 10 for controlling an operation in accordance with an aspect of the present invention. An alternative embodiment of the device 10 is depicted in Figures 6 and 7.

[0041] The device 10 comprises a plurality of components, subsystems or modules operably coupled via appropriate circuitry and connections to enable the device 10 to perform the functions and operations herein described. The device 10 comprises suitable components necessary to receive, store and execute

appropriate computer instructions such as a method for controlling an operation in accordance with an embodiment of the present invention.

[0042] Particularly, the device 10 comprises computing means which in this embodiment comprises a controller 12 and a storage means, medium or device 14 for storing electronic program instructions for controlling the controller 12, and an input means 16. As will be described in further detail, the controller 12 is operable, under control of the electronic program instructions, to: receive at least one instruction via the input means, the at least one instruction comprising a command associated with the operation; and implement the operation according to the command. The instruction may comprise, or be converted by operation of the input means, into data or at least one signal for the controller 12.

[0043] In the embodiment described, the operation comprises a switching action or event, and the device 10 is operable to function as a light switch for lighting.

[0044] On receipt of a first instruction comprising a first or "on" command, the device 10 is operable to implement a first or "closed" state, in which electrical energy or current can flow between contacts of a lighting apparatus (not shown) coupled to the device 10, or to otherwise signal the lighting apparatus, to enter a first state or mode of operation. The first state or mode of operation of the lighting apparatus may comprise an "on" or active condition, in which light is produced.

[0045] On receipt of a second instruction comprising a second or "off" command, the device 10 is operable to implement a second or "open" state, in which there is no electrical energy or current flow between contacts of the lighting apparatus, or to otherwise signal the lighting apparatus, to enter a second state or mode of operation. The second state or mode of operation of the lighting apparatus may comprise an "off" or inactive condition, in which no light is produced.

[0046] It should be appreciated that any apparatus, device or system desired to be controlled or operated may be operably coupled to the device 10, including those for lighting, heating and cooling, communication, including communication of voice and/or image data, access control, power, and generating an alert or alarm, such as a nurse call switch. For example, the technology of the invention is equally applicable to operation of general power outlets/general purpose outlets (GPOs) (electrical power points/sockets) and power boards and in one embodiment is

adapted to allow for operable connection of devices or systems to a source of electrical energy. The devices or systems may comprise an alternating current (AC) powered device, in which case the adaption may comprise an electrical socket into which a corresponding connection of the device may be plugged. Once so connected to the device 10, the (power) controller 12 is operable to control the flow of energy from the electrical energy source to the device.

[0047] It should also be appreciated that the invention is not limited in regard to the operation, and in alternative embodiments may comprise additional and/or alternative operations comprising other actions or events, including a signaling action and a power management action. Similarly, the invention is not limited in regard to the number of instructions and commands that can be received and acted upon, and in alternative embodiments may be operable to receive any number of instructions and commands, each resulting in a corresponding respective action being implemented. For example, and as will be described in further detail below, the device 10 of the described embodiment is operable to receive instructions and implement corresponding actions additional to the first and second instructions hereinbefore described, including third and fourth instructions relating to production of light or illumination between the limits or extremes of "on" and "off", that is, dimming or partially on/off.

[0048] The controller 12 comprises processing means in the form of a processor.

[0049] The storage device 14 comprises read only memory (ROM) and random access memory (RAM).

[0050] The device 10 is operable to communicate via one or more communications link(s) (not shown), which may variously connect to one or more external or other devices (not shown) such as servers, personal computers, terminals, wireless or handheld computing devices, landline communication devices, or mobile communication devices such as a mobile (cell) telephone. At least one of a plurality of communications links may be connected to an external computing network through a telecommunications network. The one or more communication link(s) may comprise a pluggably connectable communication device. The one or more communication link(s) implement machine input means, via which the device can receive at least one instruction from a machine, device or system.

[0051] The device 10 is capable of receiving instructions that may be held in the ROM or RAM and may be executed by the processor. The processor is operable to perform actions under control of electronic program instructions, as will be described in further detail below, including processing/executing instructions and managing the flow of data and information through the device 10.

[0052] The electronic program instructions are provided via a single software application ("app") or module which may be referred to as a control app. In the embodiment described, the device 10 and the app are marketed under the trade mark iQSwitch™. The app can be downloaded from a website (or other suitable electronic device platform) or otherwise saved to or stored on the storage device 14 of the device 10. In the embodiment, the app relates to a basic switching operation as herein described. In embodiments of the invention, alternative software modules providing electronic program instructions for more advanced operations, functions and actions, such as home automation, communication, or power management, may be installed, upgrading the device 10 accordingly.

[0053] The software app, or software, electronic instructions or programs for the computing components of the device 10, can be written in any suitable language, as are well known to persons skilled in the art. In embodiments of the invention, rather than being a single software app, the electronic program instructions may comprise a set or plurality of software, electronic instructions or programs and can be provided as stand-alone application(s), via a network, or added as middleware, depending on the requirements of the implementation or embodiment.

[0054] The device 10 also includes an operating system which is capable of issuing commands and is arranged to interact with the software app to cause the device to carry out the respective steps, functions and/or procedures in accordance with the embodiment of the invention described herein.

[0055] In alternative embodiments of the invention, the software may comprise one or more modules, and may be implemented in hardware. In such a case, for example, the modules may be implemented with any one or a combination of the following technologies, which are each well known in the art: a discrete logic circuit(s) having logic gates for implementing logic functions upon data signals, an application specific integrated circuit (ASIC) having appropriate combinational logic gates, a programmable gate array(s) (PGA), a field programmable gate array

(FPGA), a microcontroller provided as on-chip configurable logic cells (CLC), and the like.

[0056] The computing means can be a system of any suitable type, including: a programmable logic controller (PLC); digital signal processor (DSP); microcontroller; personal, notebook or tablet computer, or dedicated servers or networked servers.

[0057] The processor can be any custom made or commercially available processor, a central processing unit (CPU), a data signal processor (DSP) or an auxiliary processor among several processors associated with the computing means. In embodiments of the invention, the processing means may be a semiconductor based microprocessor (in the form of a microchip) or a macroprocessor, for example.

[0058] In embodiments of the invention, the storage means, medium or device can include any one or combination of volatile memory elements (e.g., random access memory (RAM) such as dynamic random access memory (DRAM), static random access memory (SRAM)) and non-volatile memory elements (e.g., read only memory (ROM), erasable programmable read only memory (EPROM), electronically erasable programmable read only memory (EEPROM), non-volatile random access memory (NVRAM), including flash memory, programmable read only memory (PROM), tape, compact disc read only memory (CD-ROM), etc.). The storage means, medium or device may incorporate electronic, magnetic, optical and/or other types of storage media. Furthermore, the storage medium can have a distributed architecture, where various components are situated remote from one another, but can be accessed by the processing means. For example, the ROM may store various instructions, programs, software, or applications to be executed by the processing means to control the operation of the device 10 and the RAM may temporarily store variables or results of the operations.

[0059] The use and operation of computers using software applications is well-known to persons skilled in the art and need not be described in any further detail herein except as is relevant to the present invention.

[0060] Furthermore, any suitable communication protocol can be used to facilitate communication between any subsystems or components of the device 10, and the

device 10 and other devices or systems, including wired and wireless, as are well known to persons skilled in the art and need not be described in any further detail herein except as is relevant to the present invention.

[0061] Where the words “store”, “hold” and “save” or similar words are used in the context of the present invention, they are to be understood as including reference to the retaining or holding of data or information both permanently and/or temporarily in the storage means, device or medium for later retrieval, and momentarily or instantaneously, for example as part of a processing operation being performed.

[0062] Additionally, where the terms “system”, “device”, and “machine” are used in the context of the present invention, they are to be understood as including reference to any group of functionally related or interacting, interrelated, interdependent or associated components or elements that may be located in proximity to, separate from, integrated with, or discrete from, each other.

[0063] Furthermore, in embodiments of the invention, the word “determining” is understood to include receiving or accessing the relevant data or information.

[0064] The input means 16 may comprise one or more sensors or detectors operable to sense data relating to or associated with the operation, the instruction and/or the command and to communicate the sensed data to the controller 12. The data communicated may comprise the instruction or command and/or a representation thereof. The sensors may comprise, for example, an embedded motion or proximity sensor. Additionally, or alternatively, the sensors may comprise one or more of: an ambient light sensor, a sound sensor, an infrared (IR) sensor, and a reader such as a security card reader. It should be appreciated that the invention is not limited in this regard, and in alternative embodiments any appropriate sensor or combination of sensors may be used.

[0065] In preferred embodiments of the invention, the device 10 is adapted for connection to a plurality of input means 16, which may each comprise a different input device, and/or a plurality of output means, which may each comprise a different output device. The adaption preferably comprises a set of connections for connecting selected input means 16 and/or selected output means to the device 10.

[0066] At least one of the input means 16 preferably comprises user input means 18, operable to allow instructions to be inputted by a user. Preferably, and in the embodiment described, the device 10 further comprises at least one output means in the form of a display 20 for displaying a user interface 22.

[0067] The display 20 may comprise a static display, and/or a dynamic display. In the case of a dynamic display, it may comprise a graphical display screen operable to be altered or updated electronically. The screen may comprise, for example, a liquid crystal display (LCD). Additionally, or alternatively, the display may comprise an indication means, which may comprise any one or more of: a visual indication, provided by one or more light sources such as a Light Emitting Diode (LED), for example; a tactile indication, provided by one or more tactile sources such as a vibration generating device, for example; and/or an aural indication, provided by one or more aural sources, such as a buzzer or alarm, for example.

[0068] The display 20, user interface 22 and input means 16 may be integrated, to allow for instructions to be inputted or received, and for output or feedback to be displayed. The output or feedback displayed may comprise a visual output, preferably including alphabetic, numeric and/or graphics, a tactile output, and/or an aural output, or a combination thereof, depending on the implementation.

[0069] In the embodiment of the invention, the display 20 for displaying the user interface 22 and the user input means 18 are integrated in a touchscreen 24. In alternative embodiments these components may be provided as discrete elements or items.

[0070] The touchscreen 24 of the embodiment is implemented using Projected Capacitive Touch (PCT) technology and is operable to sense or detect the presence and location of a touch and/or a gesture within a display area of the device 10. Sensed "touchings" of the touchscreen 24 and/or "gestures" within range are inputted to the device 10 as commands or instructions and communicated to the controller 12. In alternative embodiments of the invention, other touchscreen technologies may be used, including Resistive Touch, and/or Inductive Touch technology, for example. It should be appreciated that the user input means is not limited to comprising a touchscreen, and in alternative embodiments of the invention any appropriate device, system or machine for

receiving input, commands or instructions may be used. In the embodiment described, once the control app is installed on the device 10, the controller 12 is operable, under control of the control app, to present, via the touchscreen 24, a sequence of electronic pages, screens and forms to a user or operator of the device 10 allowing for the inputting or capture of instructions or commands pertinent to an operation to be implemented.

[0071] In embodiments of the invention, for example comprising a static display, only a printed screen finish with graphics and LEDs may be provided, rather than an active user interface.

[0072] Preferably, the storage device 14 additionally stores information and/or data. The information and/or data may relate to or be associated with the operation, and may comprise an action to be implemented upon receipt of a corresponding command instruction. Additionally, or alternatively, it may relate to or be associated with one or more of the devices or systems coupleable to the device 10, or to one or more images displayable via the touchscreen 24, for example. In alternative embodiments of the invention, additional or alternative information or data may be stored.

[0073] In such embodiments, it is preferred that the controller 12 is operable, under control of the electronic program instructions, to display a list of available information and/or data via the touchscreen 24, and that the instructions comprise a set up command comprising a selection of the available information and/or data from the list, the selection specifying how the device 10 will function thereafter until an alternative selection is made. In this manner, the user is able to advantageously customize the function of the device 10 and what is displayed via the touchscreen 24.

[0074] At least some of the information and/or data, and selections made, are stored or saved in a database 26 or databank residing on the storage device 14 and accessible by the controller 12 under control of the control app. These may be installed as part of the app. The controller 12 is arranged to interact with the database 26 to cause the device 10 to carry out the respective steps, functions and/or procedures in accordance with the embodiment of the invention described herein.

[0075] Others of the information and/or data are stored or saved remotely, for example in one or more remote databases residing on respective storage means, mediums or devices of one or more remote systems or devices and accessible by the device 10 via the one or more communications link(s). The controller 12 is arranged to facilitate user interaction with the one or more remote databases, to make the remotely stored information or data available.

[0076] It will be understood that the database(s) may reside on any suitable storage device, which may encompass solid state drives, hard disc drives, optical drives or magnetic tape drives. The database(s) may reside on a single physical storage device (as in the embodiment described) or may be spread across multiple storage devices.

[0077] The database 26 is coupled to the controller 12 and in data communication therewith in order to enable information and data to be read to and from the database 26 as is well known to persons skilled in the art. Any suitable database structure can be used, and there may be one or more than one database. In embodiments of the invention, the database 26 can be provided locally as a component of the device 10 (such as in the storage device 14) or remotely such as on a remote server, as can the electronic program instructions. In an embodiment, several computers or devices can be set up in this way to have a network client-server application.

[0078] In the embodiment, the controller 12 and the storage device 14 are housed within a container or housing in the form of a pattress box 28. The shape and dimensions of the pattress box 28 are such that they comply with standard sizes accepted in industry or otherwise regulated, allowing the device 10 to be retrofitted to any existing wiring within a home or commercial building or other structure as well as being installed in new constructions. The pattress box 28 is provided with ports (not shown) facilitating the operative coupling of the device 10 to one or more external or remote devices or systems, where wiring is required. The ports in the embodiment are an implementation of the abovementioned adaption for connecting selected input means 16 and/or selected output means to the device 10.

[0079] Means for closing the controller 12 and the storage device 14 within the housing 28 is provided in the form of a protective cover 30. The cover 30 seals the

housing 28 and functions as a protective layer, preventing users from making physical contact with electrically live electronic components of the device 10. Once sealed with the cover 30, this combination of components may be considered a first part or "half" of the device 10.

[0080] As depicted in Figures 4A to 4D, in the embodiment, ports or apertures 30A are provided in the cover 30 facilitating coupling means for operably coupling or connecting an interchangeable faceplate 32 to the housing 28 and the controller 12 and storage device 14 contained therein.

[0081] Once connected or plugged together, the interchangeable faceplate 32 is provided adjacent or on top of the protective cover 30, and comprises the touchscreen 24 and a front cover 34. Between the touchscreen 24 and the front cover 34 facing means in the form of a fascia 36 may be removeably retained.

[0082] The combination of components forming the faceplate 32, which may be referred to as a switch face, may be considered a second part or "half" of the device 10. The coupling means may comprise any suitable couple, connection or attachment, including a fixed connector and/or a flexible connector, allowing the two parts or halves of the device 10 to be operably "plugged" together. In this regard, any suitable means for coupling the two parts of the device 10, or components thereof, together, may be used. These may include, for example, mounting options of at least one of clips, magnetic connections, press fit, and adhesive.

[0083] In alternative embodiments of the invention, the second part of the device 10 may comprise additional and/or alternative input means 16 and/or output means, and a plurality of interchangeable second part devices (including the switch face as described), which may have the form of modules, may be provided for connecting to the first part of the device 10 as desired. Such modules may include at least one of: a nurse call point (described in further detail hereafter); a communications system such as an intercom (with or without video capability); security devices such as a biometric reader, card reader, and radio-frequency identification (RFID) reader; and an input keypad. In embodiments of the invention, a wide range of interchangeable modules may be provided for a user to interact with.

[0084] In alternative embodiments of the invention, the touchscreen 24 (or other components of the input means, user interface, and display as appropriate) are contained within, or otherwise fixed to, the housing 28 so that it is provided as part of a unit with the controller 12 and the storage device 14. In such embodiments, the interchangeable faceplate 32 comprises the front cover 34 and (optionally) the facing means.

[0085] In the embodiment described, the front cover 34 is fabricated from a clear or transparent plastic material so that the fascia 36 is visible thereunder and protected thereby. The front cover 34 is preferably adapted to prohibit or mitigate to at least some extent retention and/or transmission of at least one pathogen. In the embodiment, the front cover 34 comprises a smooth or substantially smooth surface 34A, free from any irregularities, roughness, or projections. This provides hygiene benefits as it makes the front cover 34 easy to clean, and there are no grooves or recesses in the faceplate 32 in which pathogens may become lodged or harboured.

[0086] In alternative embodiments, the front cover 34 may be fabricated from additional or alternative materials or a combination thereof, including, for example, glass or metal. For increased hygiene in health care, hospitality, or industrial environments, for example, the front cover 34 may advantageously comprise antibacterial material such as one comprising inherently antibacterial silver ions. For use in some environments, such as schools, parks or public spaces, for example, where vandalism is common, the front cover 34 may itself act as or be provided with a protective outer surface, to mitigate or prevent damage of the device 10 by vandalism.

[0087] The interchangeable outer plastic layer of the faceplate 32 allows users to change the front fascia 36 safely, without making contact with live electronics (shielded behind the protective cover 30). Furthermore, there is no risk of water ingress as the inner patrix box 28 is watertight. As such, the embodiment of the invention is much safer than a traditional electric switch. Furthermore, as the software breaker lies within the switch (i.e. device 10) as opposed to a traditional fuse box, the embodiment also reduces or eliminates the risk of overload. A programmable overload switch may automatically trigger in the case of an overload condition being detected.

[0088] Once installed, in a wall for example, the only component of the device 10 visible through the front cover 34 is the fascia 36 (if present) or the touchscreen 24 (if the fascia 36 has been removed). Accordingly, in the embodiment, from a visual perspective the "switch" provided by the device 10 is either the fascia 36 or the touchscreen 24, as appropriate.

[0089] As hereinbefore described, a major issue with traditional wall-mounted electric switches is that the consumer is subjected to the designs created by the manufacturers. Not just any switch on the market suits unique décor elements such as coloured paint, wallpaper or panelling, for example.

[0090] The faceplate 32, and fascia 36, comprise interchangeable interface design panels that may be provided with any desired features, including those of shape, configuration, pattern and/or ornamentation of any colour, and can be removeably inserted into position and changed as often as a user wishes. By changing the faceplate 32 and/or the fascia 36, the visual features of the "switch" provided by the device 10 can be easily designed to match the consumer's individual specifications, such as a switch that follows the pattern of wallpaper, or a child-friendly colour scheme or shape, or a modern, multi-functional switch for a living room, for example, or any other personal taste.

[0091] In the embodiment, via an online applications shop, store or website, a user is able to communicate a specification for a desired or custom "switch" design to a provider. The specification specifies one or features desired by the user, including shape, colour, and graphics images, for example and whether a new faceplate 32 and/or fascia 36 is desired. The provider is able to provide the required item in one of two ways in the embodiment, depending on the specification order. One is as a completely new faceplate that allows the user to unplug the current faceplate 32 and install the new one. This allows for changes to features such as shape and size as well as colour, image and/or texture. The new faceplate may be transported to the user. The second is as an artwork insert only, that is a replacement fascia 36 that allows the user to change the features of pattern and or ornamentation of the design but not the size or shape, and which may be downloaded and printed by the user via an appropriate device, or transported to the user. Both types are compatible with the same rear parts, i.e. the first half of the device 10, and are fully interchangeable. They may be clipped

in/clipped out. In the described embodiment, changing the previous faceplate 32 and/or fascia 36 for the new ones will not expose the user to 240V AC and is allowable under current regulations (where required) in Australia that prohibit works on 240V AC switches unless the person carrying out the works is a licensed electrician.

[0092] Figures 5A to 5S depict examples illustrating the customisable nature of the interface of the device 10.

[0093] In the embodiment described and depicted in the drawings, as the device 10 is intended to control an operation comprising a switching action in respect of a light, the fascia 36 comprises images in the form of a first representation 36A of light bulb, a second representation 36B of a light bulb with a "+" or increase illumination indication, and a third representation 36C of a light bulb with a "-" or decrease illumination indication.

[0094] When the fascia 36 is retained adjacent the touchscreen 24, the first representation 36A is positioned such that touching of it by a user will be sensed by the touchscreen 24 and inputted to the device 10 as a first instruction (if presently in the second state) or a second instruction (if presently in the first state) and communicated to the controller 12 as hereinbefore described.

[0095] The second representation 36B is positioned such that touching of it by a user will be sensed by the touchscreen 24 and inputted to the device 10 as a third instruction comprising a third or "increase illumination" command, upon receipt of which the device 10 is operable to implement a third or "increase illumination" state, or to otherwise signal the lighting apparatus, to enter a third state or mode of operation. The third state or mode of operation of the lighting apparatus may comprise an "increase illumination" condition, in which the brightness of the light produced is increased.

[0096] The third representation 36C is positioned such that touching of it by a user will be sensed by the touchscreen 24 and inputted to the device 10 as a fourth instruction comprising a fourth or "decrease illumination" command, upon receipt of which the device 10 is operable to implement a fourth or "decrease illumination" state, or to otherwise signal the lighting apparatus, to enter a fourth state or mode of operation. The fourth state or mode of operation of the lighting apparatus may

comprise an "decrease illumination" condition, in which the brightness of the light produced is decreased.

[0097] In cases where the fascia 36 has been removed, and the "switch" provided by the device 10 is the touchscreen 24, selected image(s) may be generated and displayed via the touchscreen 24 as hereinbefore described to provide the desired visual appearance for the "switch".

[0098] It can be appreciated that the embodiment of the invention provides a "switch" which has a modular nature and allows for variations, whereas switches of the prior art tend to be fixed in nature as hereinbefore described.

[0099] In embodiments of the invention, a "basic" switch (or GPO where such functionality is provided as hereinbefore described) is formed by attachment of the switch (or other function) face, which may be any appropriate size or shape, of the second part of the device 10 to the first part (which may be referred to as a basic switching unit) of the device 10. The addition of the communication capability provided by the one or more communications link(s) results in the device 10 being an intelligent connected switch. Advantages are provided by such embodiments in that they allow a user to determine and select the level of sophistication and features of the switch as well as how they communicate with it.

[00100] In addition to use as an alternative to traditional wall mounted electric switches, embodiments of the invention are particularly suited to application in splashbacks and nurse call systems.

[00101] Glass splashbacks are a popular item in bathrooms, kitchens and commercial environments where water and other fluids are prone to splash.

[00102] Installing a traditional electric switch near or on a splashback is extremely dangerous because of the risk of water ingress into the switch and electrocution.

[00103] Embodiments of the invention can be installed behind a glass (or other) surface of the splashback, with the splashback surface taking the place of the front cover 34 in the embodiment described, thereby eliminating the risk of water ingress.

[00104] In such an embodiment, the display of the device 10 comprises LED indicators operable to shine or transmit light through the glass of the splashback. These remain switched off until a sensor in the form of an embedded motion or proximity sensor of the device 10 installed behind the glass detects motion. Upon such an event, the LEDs illuminate to show the user the key areas of the glass for switching, that is those portions of the glass proximate to the user input means. The device 10 further comprises timing means in the form of a timer operable to turn off the LEDs after a set time period or duration after the last input from the user. Alternatively, there may not be a motion or proximity sensor and the first touch detected will activate the LEDs and again a timer switches them off after a preset time. There may also be an indicator LED operable to show a user where the switch, i.e. device 10, is located behind the splashback. This may be steadily lit or pulsing at a preset interval.

[00105] Such an application of the invention may be highly attractive for a consumer interested in an aesthetically appealing look since the switch remains essentially hidden from view when not in use. It only becomes visible upon a sensed motion, such as a wave of the hand, before fading again into the background after use.

[00106] It can be appreciated that such an application allows for a very hygienic installation and has safety benefits in that water ingress is not possible or at least mitigated.

[00107] A nurse call unit is a device that allows patients in health care to call for help. Some comprise a simple emergency assist button and others allow for verbal communication. A nurse call unit is typically found near the patient's bed, and is essential for a bedridden patient in times of need, or for a nurse or loved one who requires additional assistance. Ultimately, nurse call buttons provide patients with a sense of security, and for the staff members and loved ones, peace of mind.

[00108] The traditional format of the nurse call system is flawed, however, as it possesses all of the issues inherent in traditional switches. But while a faulty traditional switch in a home or office is wearisome, a faulty nurse call switch has the potential to be fatal.

[00109] Embodiments of the invention are ideal as a nurse call unit because they are reliable, safe and customisable to the needs of a medical centre. For example, in medical centres, combinations of light switches and call points in a single unit allow for easy access to emergency assistance call when needed. A code blue, for example, could be called from any switch in a building instead of only at specific points.

[00110] As described previously, embodiments of the invention allow for hygienic installation in situations where it is critical.

[00111] The above and other features and advantages of the embodiment of the invention will now be further described with reference to the device 10 in use.

[00112] A user installs and executes the software application of the device 10.

[00113] The user then interfaces with the device 10 and provides user instructions via the touchscreen 24. The device 10 operates to implement the operation in accordance with the user instructions and commands received.

[00114] As desired, the user varies the faceplate 32 and/or fascia 36, and other modules of the device 10 in embodiments where provided.

[00115] It will be appreciated that the embodiment of the invention provides several advantages.

[00116] Firstly, embodiments of the invention are fully customizable. Unlike the manufacturer-defined traditional switches, the device 10 of the embodiment is not constrained by a predetermined fixed form. Consumers are therefore in control of the shape, colour, material, function and size of the "switch" – all of which can be easily and frequently changed as tastes and trends change over time.

[00117] Furthermore, the embodiment of the device 10 has no moving parts or components – it is purely electronic. All features of the switching operation are controlled electronically instead of, as with standard switching, all or part via mechanical or electro-mechanical contacts.

[00118] It will be appreciated by those skilled in the art that variations and modifications to the invention described herein will be apparent without departing from the spirit and scope thereof. The variations and modifications as would be apparent to persons skilled in the art are deemed to fall within the broad scope and ambit of the invention as herein set forth.

[00119] Throughout the specification and claims, unless the context requires otherwise, the word "comprise" or variations such as "comprises" or "comprising", will be understood to imply the inclusion of a stated integer or group of integers but not the exclusion of any other integer or group of integers.

[00120] Throughout the specification and claims, unless the context requires otherwise, the term "substantially" or "about" will be understood to not be limited to the value for the range qualified by the terms.

[00121] It will be clearly understood that, if a prior art publication is referred to herein, that reference does not constitute an admission that the publication forms part of the common general knowledge in the art in Australia or in any other country.

## CLAIMS

1. A device for controlling an operation, the device comprising:  
  
a controller;  
  
a storage means for storing electronic program instructions for controlling the controller; and  
  
an input means;  
  
wherein the controller is operable, under control of the electronic program instructions, to:  
  
receive at least one instruction via the input means, the at least one instruction comprising a command associated with the operation; and  
  
implement the operation according to the command.
2. The device of claim 1, further comprising an output means.
3. The device of claim 1 or 2, further comprising connection means for operably connecting and disconnecting the input means and/or the output means to the device.
4. The device of claim 3, wherein the input means and/or the output means comprise modules interchangeably connectable to the device.
5. The device of any one of the preceding claims, wherein the controller comprises computer processing means, and the instruction comprises, or is converted by operation of the input means, into data or at least one signal for the computer processing means.
6. The device of any one of the preceding claims, wherein the input means comprises at least one of: user input means, and the at least one instruction comprises at least one user instruction inputted by a user via the user input

means; and machine input means, operable to receive at least one instruction from a machine, device or system.

7. The device of any one of the preceding claims, wherein the input means comprises one or more sensors operable to sense data relating to or associated with the operation, the instruction and/or the command and to communicate the sensed data to the controller.
8. The device of claim 4, wherein the data communicated comprises the instructions or command and/or a representation thereof.
9. The device of claim 2, or of any one of claims 3 to 8 when dependent on claim 2, wherein the output means comprises a display for displaying a user interface.
10. The device of claim 9, wherein the display comprises at least one of: a static display; a dynamic display; a graphical display screen operable to be altered or updated electronically; an indication means comprising a visual indication provided by one or more light sources; a tactile indication provided by one or more tactile sources; and an aural indication provided by one or more aural sources.
11. The device of claim 9 or 10, wherein the display, user interface and input means are integrated, to allow for instructions to be inputted or received, and for output or feedback to be displayed.
12. The device of claim 11, wherein the integration comprises a touchscreen.
13. The device of claim 12, wherein the touchscreen is implemented using Projected Capacitive Touch, Resistive Touch, and/or Inductive Touch technology.
14. The device of any one of claims 11 to 13, wherein the output or feedback displayed comprises at least one of: a visual output including alphabetic characters, numeric characters, and/or graphics; a tactile output, and/or an aural output, or a combination thereof.

15. The device of any one of claims 9 to 14, wherein the display comprises a changeable fascia.
16. The device of any one of claims 9 to 15, wherein the display is protected by a removable cover.
17. The device of claim 16, wherein the cover is adapted to prohibit or mitigate to at least some extent retention and/or transmission of at least one pathogen.
18. The device of claim 17, wherein the adaption comprises making the cover smooth or substantially smooth.
19. The device of any one of claims 16 to 18, wherein the cover is fabricated from at least one of a plastic, glass, metal, and/or antibacterial material.
20. The device of claim 19, wherein the antibacterial material comprises inherently antibacterial silver ions.
21. The device of any one of the preceding claims, wherein the operation comprises at least one of: a switching action; a signaling action; a recording action; a data logging action; and a power management action.
22. The device of any one of the preceding claims, wherein the storage means is operable to store information or data associated with the operation.
23. The device of claim 22, when dependent on claim 9, wherein the controller is operable, under control of the electronic program instructions, to display a list of available information or data via the display, and the command comprises a selection of the available information or data from the list.
24. A method for controlling an operation, the method comprising:  
  
storing electronic program instructions for controlling a controller; and  
  
controlling the controller via the electronic program instructions, to:

receive at least one instruction via an input means, the at least one instruction comprising a command associated with the operation; and

implement the operation according to the command.

25. A computer-readable storage medium on which is stored instructions that, when executed by a computing means, causes the computing means to perform the method according to claim 24.
26. A computing means programmed to carry out the method according to claim 25.
27. A data signal including at least one instruction being capable of being received and interpreted by a computing system, wherein the instruction implements the method according to claim 26.
28. A system for controlling an operation comprising a device according to any one of claims 1 to 23.