FORM 2

THE PATENTS ACT, 1970

(39 OF 1970)

AND

THE PATENT RULES, 2003

**COMPLETE SPECIFICATION**

(See section 10 and rule 13)

Title:

# "An AUTOMATIC ELEVATOR KEY PANEL DISINFECTING SYSTEM"

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**The following specification describes the invention and the manner in which it is to be performed:**

**Field of Invention:**

The invention relates to an automatic elevator key panel disinfecting system. More particularly, the invention relates to an automatic elevator key panel cleansing system which prevents transmission of communicable diseases which generally transmit when person suffering from flue, viruses or communicable skin diseases get in contact with lift operating panel for movement of lift (elevator) from one floor to another.

**Background of the Invention:**

In view of recent increase in communicable disease such as COVID19, it is eminent that system and methods are developed for prevention of spread of such fatal diseases. It is also established that most frequently touched surfaces such as an elevator key panel be automatically cleaned to strop community spread.

Though certain manual approaches have been implemented such as toothpick to operate the button of the lift, these toothpicks can too be infected if person intentionally sneeze or spit on them, these scenarios had been witness in coronavirus affected countries

US8774966B2 patent title “autonomous surface cleaning robot for wet and dry cleaning” illustrate the functioning of floor cleaning robots which consist of

separate units for collection of waste, applying cleansing agent, and clearing of cleansing fluid form the floor. The system operational working is limited to floors only and is not applicable to vertical surfaces as focus of our invention for cleansing of lift control panel.

US6883201B2 patent title “Autonomous floor cleaning robot” discloses optimize subsystem which is capable of self-adjustable cleaning head of vacuum which consist of dual stage brush assembly having counter rotating and asymmetric brushes to enhance surface cleaning but this system cannot be utilize for vertical smooth metal surfaces such as lift control panels and doesn’t have sensor integrated unit which will allow system to initiate cleansing process simultaneously as embedded in our invention.

US20140165328A1 patent title “Autonomous cleaning machine” presents integrated brush system which is capable of cleaning foreign substances from the floor. Dual brush unit in the machine allow first brush unit to clean up the foreign substances and second brush unit separate foreign unit form the cleaning brush, so that all the foreign particles on the floor can be stored into isolated trash section of the machine. But this system cannot be utilized to remove or clean virus or bacterial adhere to surfaces as it doesn’t utilize any cleansing agent for the operation.

US9370290B patent title “Systems and Methods for autonomous mopping of a floor surface” disclose the operational functionality of robot which utilizes cleaning and solvent mixture for mopping of floor, the travel path of the robot is configured according to the area of operation, but this robot cannot be used for cleaning of vertical surfaces and is mostly concern with maneuvering operational task on the floor whereas our system can easily be installed on any vertical surfaces and allows efficient cleaning of vertical surfaces thus depriving it from viruses and surface adhering.

None of the system above, discloses or even suggest an elevator key panel cleaning system.

**Summary of Invention:**

In this disclosure, whenever a composition, an element or a group of elements is preceded with the transitional phrase "comprising", it is understood that we also contemplate the same composition, element or group of elements with transitional phrases "consisting essentially of”, "consisting", "selected from the group of consisting of, "including", or "is" preceding the recitation of the composition, element or group of elements and vice versa

According to an embodiment of the invention, there is provided an elevator panel cleaning system, said system comprises of a sensor which detects presence of a human hand, a cleaning agent storage vessel, a means for spreading the cleaning agent over the panel;

a spraying actuator;characterized in that when the sensor detects presence of human hand, a duct from the cleaning agent opens to spray the cleaning agent through the spray actuator, and the means for spreading the cleaning agent over the lift panel is turned on to wipe over the lift panel.

Yet according to another embodiment of the invention, the system is IoT enabled and can communicate an authority about refilling of the cleaning agent storage vessel.

Yet according to another embodiment of the invention,the IOT microcontroller is 32 bit NODEMCU LUA microcontroller which allow communication to the user through IOT medium and notify cleansing agent level to the user.

Yet according to another embodiment of the invention, the cleansing agent vessel has a level monitoring sensor (FS-IR02) for real time monitoring of cleansing agent on an IOT Server Ubidots.

Yet according to another embodiment of the invention, the sensor isPIR detection sensor which has detection angle of 120 degree and range of 3 m.

Yet according to another embodiment of the invention,the means for spreading the cleaning agent is a wiper attached to scissor mechanism which allows spreading and wiping operation of cleansing agent which can cover rectangular area on the lift control panel.

**Brief description of drawings:**

Figure 1 shows a perspective view of placement of components of the invention.

Figure 2 shows a scissor mechanism for operating the wiping mechanism according to an embodiment of the invention.

Figure 3 shows block diagram for showing communication between all components of the invention, according to a preferred embodiment.

**Detailed description of Invention:**

When an infected person touches control button/key of panel of an elevator, the germs (viruses, bacteria) transmit from infected person body to lift control

panel button and stays there for few hours to few days. Thus if any secondary person gets into contact of same panel, the same germs (virus, bacteria) get transmitted to his body. To minimize such widespread of germs through direct contact of the germs through the control panel, there is developed a system which gets activated as soon as the panel is touched.

Figure 1 shows components of the system. The elevator panel**4** cleaning system **100**, comprises of a pair of sensors **1, 1a** which detects presence of a human hand, a cleaning agent storage vessel **2**, a means **5** for spreading or spraying the cleaning agent over the panel **4**.

According to an embodiment of the invention, the sensor **1** isPIR detection sensor, with a detection angle of 120 degree and range of 3 m and the other sensor **1a** is a UV sensor.

The PIR **1** is human detection sensor which is capable of detecting human. When person bring his hand near the control panel of the lift then, presence is detected by PIR Sensor.

The ultrasonic sensor **1a** is used to detect the distance of the object. Therefore, the ultrasonic senor **1a** prevent false detection of PIR sensor, as PIR sensor has detection range of 3-5m therefore to detect human hand in particular scope of area i.e. lift control panel ,ultrasonic sensor has been integrated with PIR sensor.

A spraying actuator **5** spreads the cleaning agent over the panel after receiving information from the sensor **1.** A duct from the cleaning agent storage vessel **2** opens to spray the cleaning agent through the spray actuator**5**. Once, the spray actuator **5** is turned on, a means **6** for wiping the cleaning agent over the lift panel**4** is turned on to wipe over the lift panel**4**. The means **6** for wiping cleaning agent over the panel is a wiper which movement is controlled by a scissor mechanism **7 (shown in Figure 2)**which allows spreading and wiping operation of cleansing agent which can cover rectangular area on the lift control panel. The scissor mechanism **7** comprises of a stepper motor **8** and a coupling **9** for controlling the movement of the wiper, which is attached to a scissor lift **10**. The scissor lift **10** is attached on a shaft **11** attached to the coupling **9**. When the shaft **11** moves clockwise the scissor lift **10** is expanded to drop the wiper **6** over the panel. When the shaft **11** moves rotates anticlockwise, the scissor lift **10** is retracted to move the wiper **6** upwards the panel **4.**Using scissor mechanism in wiper control unit allows flexible movement of wiper in the vertical direction and too makes whole electromechanical system compact and portable.

According to a preferred embodiment of the invention, the system **100** of the invention is IoT enabled and can communicate an authority about refilling of

the cleaning agent storage vessel. **Figure 3** shows a block diagram for showing communication between the components of the invention. The pair of sensors **1, 1a** is connected to a controller **12** which after processing the input from sensor **1** initiate the actuator **5**.

The data from the sensors is processed by ESP82566 nodeMCU controller **12** which is illustrated in the schematics in Figure 3, after processing of sensor data by the controller, the actuator **5** is initiated.

The step by step approach of operational execution of our system is illustrated below.

As shown in the above schematic diagram different sub system such as **sensors unit** consisting of (PIR- Human Hand detection sensor **1**, Ultrasonic sensor **1a** – distance measurement sensor, Liquid level sensor **3** – FS-IR02 (sanitizer level measurement), **actuator unit consisting** of stepper motor **8** controlling wiper**6** linear movement and **spraying actuator unit** which sprays cleansing agent on the control panel **4**.

All sensors and actuator units are connect to the controller **12** ESP8266 nodeMCU as shown in the above schematic diagram.

The process of operation ability of different subunit is illustrated below.

When the user bring his hand near the control panel of the lift for giving instruction, then his hand is detected by the sensor unit and detection status “USER OPERATING LIFT CONTROL PANEL” is recorder by the controller, when the user retrieve his hand after giving the command on the lift control panel, then sensors will send status ‘USER HAND IS REMOVED FROM LIFT CONTROL PANEL’. This status will allow the controller to initiate **spraying actuator unit.**

Spraying actuator unit**5** consist of Mist nozzles (Spray operation)connected to a **mini suction pump 14** which as whole allow cleansing agent to spray on the cleansing panel **4**.

After the cleansing agent is sprayed by the spraying actuator unit, the controller **12** initiate the stepper motor**8** to allow wiper to spread and wipe the cleansing agent on the control panel **4**.

TheIoT microcontroller is 32 bit NODEMCU LUA microcontroller which allow communication to the user through IOT medium and notify cleansing agent level to the user.

According to an embodiment of the invention, the cleansing agent vessel also comprises of a sensor. Said sensor is a level monitoring sensor (FS-IR02) for real time monitoring of cleansing agent on an IOT Server Ubidots.

Using integrated sensor technology (PIR Sensor & Ultrasonic Sensors) which severs in detecting human hand during operation on the control panel then autonomously execute the cleaning process once person sets operational command in the lift. According to an embodiment of the invention, the portability and compactness allow system to be utilizes in cleaning of any vertical surfaces including windows panel, metal walls etc

Best Mode of working:

The cleansing system is any disinfecting/sainitizing/germicidal agent such as Hydrogen peroxide, or surgical spirit. Use of spraying system allow finite spreading of the cleansing agent and allow effective volume utilization of it. Through spraying system configuration, the amount of cleansing agent utilize per spraying process is 3 ml. Thus, if capacity of cleansing agent container is 500 ml, the autonomous system can clean the panel 166 times which is highly efficient and cost effective.

Implementation of IOT sensor technology allows real time monitoring of level of cleansing agent in the cleansing container, if level of cleansing agent reaches to 25% , the system will trigger the notification “Refile the Cleansing

agent ” on IOT server which can easily be monitored on the workplace computers of on smart phones.

For further efficiency, specific id’s are assign to different autonomous cleansing agent attach inside the lift as well as on the outside panel of the lift, which act as entry gate into the lift. The advantage of assigning virtual id to the system is that, user can easily detect the position of the system which need refilling of cleansing agent.

Implementation of virtual id’s assigned to system embedded at different places i.e. inside lift as well as on the entrance door of the lift at different floor. The virtual id system will allow to track system which require refilling of the cleansing agent.

Using IOT technology system trigger a notification signal “Refill the cleansing agent” when the level of cleansing agent in the vessel reached to 25% of its capacity. The notification signal may include certain parameters – location of system, level of cleansing agent in the vessel attached to the system. Hence allow user to refill it in the given time.

The system flexibility of controlling precise movement of wiper unit over specific range enhances by implementing scissor lift mechanism which makes the system compact and portable.

The speed of wiper control unit can be adjusted according to the user requirement.

The system can be operated on 230V ac and 24-12V Dc making it compatible to work with any standard power supply.

Implementation of IOT technology autonomous monitoring of cleansing agent in the system to generate the notification to fill up the cleansing when its level reached to 25% of its volume.

Further areas of applicability of the present invention will become apparent from the detailed description provided hereinafter. It should be understood that the detailed description and specific examples, while indicating the preferred embodiment of the invention, are intended for purposes of illustration only and are not intended to limit the scope of the invention.

While the embodiments of the present invention have been disclosed above, but its use is not limited to the description set forth and described embodiments, which can be applied to various fields suitable for the present invention, for the person skilled in the art, can be easily realized a further modification, thus without departing from the generic concept claims and

equivalents as defined by the scope of the present invention is not limited to the specific details shown and described herein with legend.

Claims:

We claim:

1. An elevator panel cleaning system, said system comprises of atleast one sensor which detects presence of a human hand,

a cleaning agent storage vessel,

a means for spreading the cleaning agent over the panel;

a spraying actuator;

characterized in that when the sensor detects presence of human hand, a duct from the cleaning agent opens to spray the cleaning agent through the spray actuator, and the means for spreading the cleaning agent over the lift panel is turned on to wipe over the lift panel.

2. The elevator panel cleaning system, as claimed in claim 1, wherein the system is IoT enabled and can communicate an authority about refilling of the cleaning agent storage vessel.

3. The elevator panel cleaning system as claimed in claim 2, wherein the IOT microcontroller is 32 bit NODEMCU LUA microcontroller which allow communication to the user through IOT medium and notify cleansing agent level to the user.

4. The elevator panel cleaning system as claimed in claim 2, wherein the cleansing agent vessel has a level monitoring sensor (FS-IR02) for real time monitoring of cleansing agent on an IOT Server Ubidots.

5. The elevator panel cleaning system as claimed in claim 1, wherein the sensor is PIR detection sensor which has detection angle of 120 degree and range of 3 m.

6. The elevator panel cleaning system as claimed in claim 1, wherein the system comprises a PIR sensor and a UV sensor, for detection of human hand.

7. The elevator panel cleaning system as claimed in claim 1, wherein the means for spreading the cleaning agent is a wiper attached to scissor mechanism which allows spreading and wiping operation of cleansing agent which can cover rectangular area on the lift control panel.

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## ABSTRACT

### An AUTOMATIC ELEVATOR KEY PANEL DISINFECTING SYSTEM

The invention relates to an automatic elevator key panel disinfecting system. More particularly, the invention relates to an automatic elevator key panel cleansing system which prevents transmission of communicable diseases which generally transmit when person suffering from flue, viruses or communicable skin diseases get in contact with lift operating panel for movement of lift (elevator) from one floor to another. The elevator panel **4** cleaning system **100**, comprises of a pair of sensors **1, 1a** which detects presence of a human hand, a cleaning agent storage vessel**2**, a means**5** for spreading or spraying the cleaning agent over the panel **4**. Refer to Figure 1.