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SMART SANITIZATION BOOTH

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ABSTRACT

Corona or COVID-19 is a worldwide pandemic which spreads globally since few months. This is a communicable disease and spread on a fast pace. For this disastrous pandemic we don't have any vaccine or medicine to cure it, the only way to cure this pandemic is to follow certain precautions in which Social distancing maintenance, covering face with mask and washing hands is main steps to take precautions from this Corona pandemic. Many government agencies and private corporations take part in various activities to deal with the virus of COVID-19.Sanitization of roads, vehicles, offices and public places plays an significant role in dealing with this virus. As this virus is communicable and spreads from coming in contact with the positive-tested patients of COVID-19. Sanitization booth helps in reducing the effect of virus on the surface, which is infected by the COVID-19 positive patients.

KEYWORDS *– Body temperature, Heart Beat, Sprinkler, Nozzles, Sanitization tank, Sensors, Normal Human body parameters, Monitoring Booth.*

I. Introduction

Coronavirus disease or COVID-19 is an infectious disease, belongs to family of MERS virus. There are many symptoms seems to be reflect the virus presence in the body of humans like difficulty in breathing, Sneezing, Eyes itching, etc. In humans these virus cause many other diseases like Respiratory tract infections that range from mild to lethal. Mild illness symptoms are common cold, which is caused by other virus, so here is hard to distinguish between the common virus and coronavirus.

Almost every country in this world suffer from this Coronavirus. In India, till date there is 1,38,000 confirmed cases in which 43,000 are active cases, and this virus infects more people day-by-day so, to reduce the effect of this virus we have to perform certain precautions, in which Sanitization is the main element which helps in fighting with this virus. Disinfection of public places including Offices, Schools, Colleges, Buses, Metros, etc. is important so that the effect of virus is slow down and things goes smoothly as previously.

This device is developed for the sanitization purpose in commercial places and educational institutes like Offices, Schools, Colleges, Shopping Malls, etc. This device plays an important role in dealing with the non-infected person before entering into the campus and office premises.

II. Problem Statement

The world is in chaos after to the outbreak of the pandemic Covid-19. There is fright in people as the virus can spread through people by simply a touch. At present, the world is under lockdown to avoid the spread of this virus. But, as a matter of fact, the lockdown will not last always. We have to safe and prepared so as to stop the virus from spreading after the lockdown.

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III. Methodology

As a solution to the problem stated above, we have designed a smart sanitization booth. This booth is designed with sensor (heartbeat and temperature), microcontroller and a display. The health of the person entering into this booth will be predicted with the help of the sensors. When the person enters into this booth, then the sensor senses the temperature and heartbeat, thereby using artificial intelligence the microcontroller will help in predicting the health of this person. If the person is found to be healthy, then the sanitizer is sprayed over the person through nozzles, and the entry is allows into the campus. But, the booth predicts an unhealthy person, then the alarm buzzes and the person is denied from entering into the campus. The number is recorded of all people who were allows to enter into the campus. And record can be maintained.

IV. How this Device Works

The parameters of human health like Temperature and Heart beat predicts the health of a person. If the parameters is showing some changes in the normal parameters then person is feeling unhealthy. Data in the form of Temperature and Heart beat are always present in the human body, which is used in this device which tells the user about the working state.

Microcontroller is an open source controller used in this device which acts as a common platform for sensors to dumb their data and also in a common language so that all components can establish connection. Data receives from various sensors is collected and then sent to platform securely.

Microcontroller collects the various statistics and data from the sensors and perform analytics as per the command prompt in the device hardware. A comparable statistics is observed by the sensors and valuable information from that data is extracted as per requirements.

Finally, the results are shared with other functional unit for further processing. It is the simple process of taking data from the Human body and then performing logics on them. After performing logics, output is shared with the monitoring unit. Fig 1. Illustrates the simple flowchart of the device.

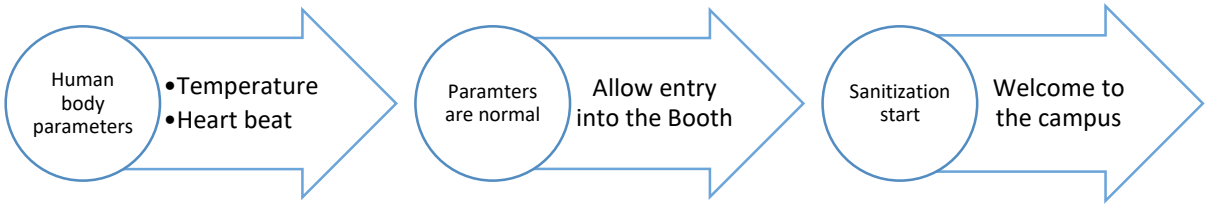

Fig 1: Working of the device

V. Feasibility of Design

The booth allows entry from one direction only. It can predict the health of every person entering into this booth. The booth is designed in a structure of a cuboid. The booth can help in the prediction of the person; whether healthy or infected, and entry is allows accordingly. The range of the healthy person is stored in the microcontroller, initially, which helps in the prediction process. The healthy person is allows to enter into the campus, after spraying the sanitizer over him through the nozzles, present in the booth. If the person is found to be infected, then the entry is denied and an alarm buzzes to alert the guards. Record of people entering into the campus is recorded and can be maintained.

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VI. Block Diagram

6.1 Module 1

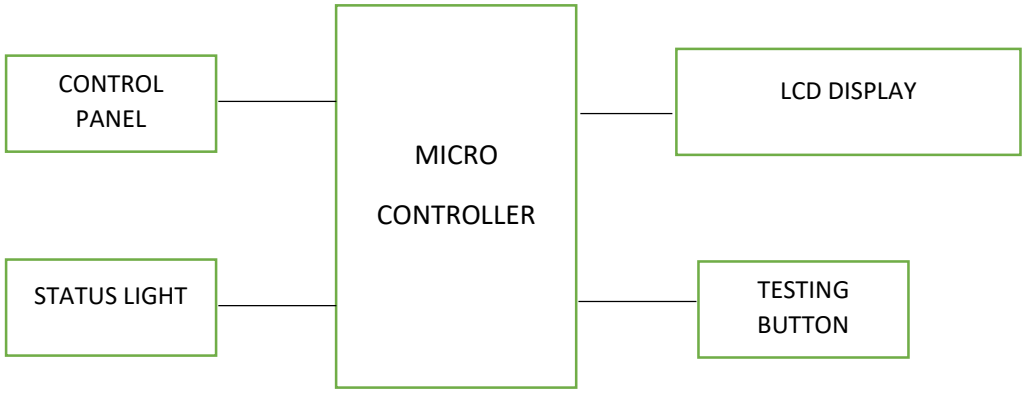

Fig 2: Basic Block diagram of module 1

Figure 2 represents the block diagram of Module 1 or Stage 1 of this Sanitization Booth. In this Microcontroller is connected with various components like Control panel, Status Light, LCD Display, Testing button. When the power is supplied to the Microcontroller all the components is activated, when we push the testing button the device is ready to sense the body parameters like Temperature and Heartbeat, the status of the parameters is shown by the Status lights and current status is showing on the LCD Display. If the body parameters is matched with the parameters of healthy person then the person is allows to enter in the Sanitization booth. If the sensor senses some deflection in the body parameters then it deny the entry. In the case of entry denied, person is suggest to settle for 5 minutes then again tested, if the sample is rejected three times then the person is found to be unhealthy.

6.2 Module 2

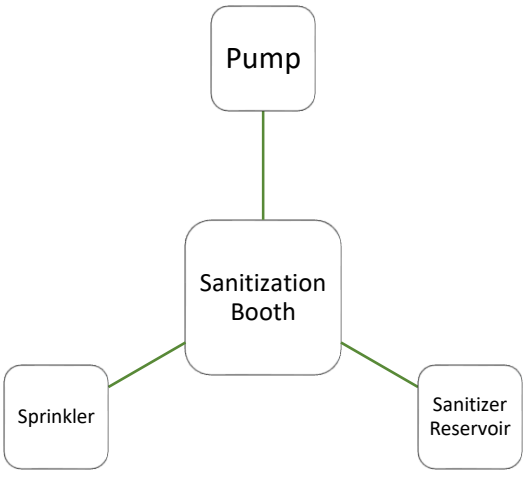

Fig 3: Block Diagram of Module 2

Figure 3 represents the block diagram of Module 2, this is the stage after the monitoring of the person body parameters. In this stage there is a booth in which various components like Pump, Sanitizer reservoir. Nozzles and Sprinklers are to be install to perform the Sanitization process. When the Module 1 completes the Health testing process it displays a message on the screen that the healthy to enter the sanitization booth. When the Module 2 receives the signal from Module 1, they start the sprinklers after 5 second and person permits to enter in the booth. The sanitizer stored in the reservoir get to the sprinklers, here we installed 6 sprinklers- 2 on the side walls for the hands sanitization and 4 on the roof

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side for full body sanitization. The sprinklers automatically shut down after few seconds and person is ready to enter into the premises.

VII. Flowchart of the Model

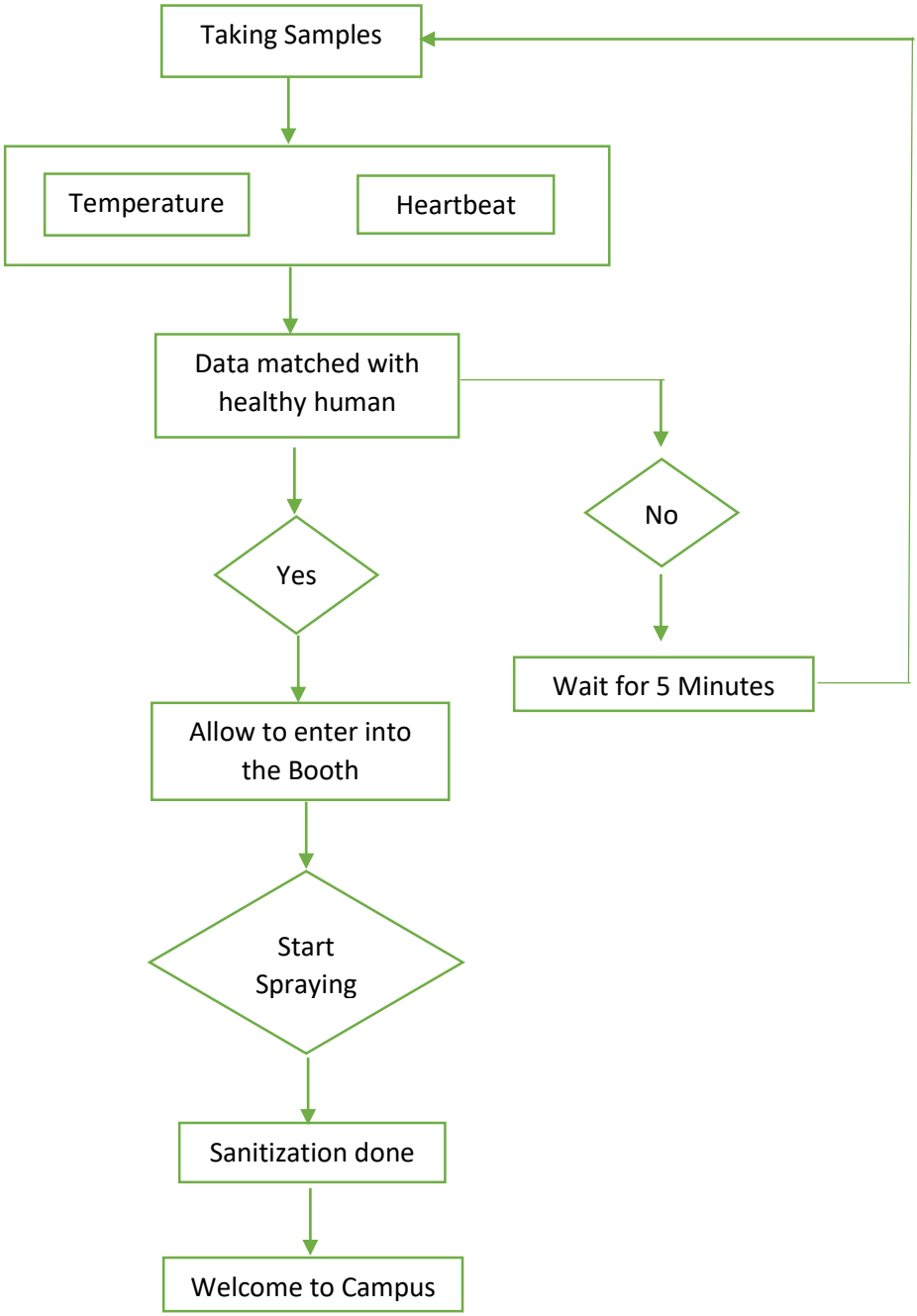

Fig 4: Flowchart of working of the model

Figure 4 shows the working of the model in the form of flowchart. Firstly, the Module 1 takes the parameters of the body and if the person is found to be healthy then it allows to enter in the Booth otherwise instruct to wait for 5 minutes and again taking sample. When the sanitization process completes it will allow the person entry in the campus.

VIII. Components

8.1 Arduino Uno

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Arduino Uno is a concise and breadboard-friendly microcontroller mount based on ATmega328. Its weight is just 7g. It is used because device needed to be small, lightweight wearable device for sufferers. Moreover, the sensors used in device are analog sensors and it consists of 8 analog input pins. There are 22 digital input output pins (6 of which are PWM). It operates at 5V with a clock speed of 5 MHz

8.2 Heartbeat Sensor

The heartbeat sensor working on the principle of photoplethysmography. This sensor is used to monitor the heartbeat of human body. There is a device present in this sensor which pass a light and the change in light intensity predicts the change in heartbeat.

8.3 Infrared Temperature Sensor

Infrared temperature or IR sensor shows the reading when there is change found in Electromagnetic waves within the range of 700 nm – 14000 nm. If the intensity of radiation exceeds this range then sensor does not catch any wave and shows no deflection. These sensor works on the infrared rays falls on the photo detector present in it.

8.4 PIR Motion Sensor

PIR sensor is very useful sensor which is helpful in detecting the motion of a human within the range of this sensor. This sensor has compact size, consumes low power and inexpensive features which makes it more compatible in this project.

8.5 Sprinklers

Sprinklers is a nozzle type structure which is used to spray liquid form substance. These covers large areas which is helpful in sprinkling the sanitizer on the human body, which covers large body area of the humans.

8.6 High Pressure Pump

A pump is a device which is helpful in pumping anything form lower altitude to higher altitude. In this device high pressure pump is used to transfer sanitizer from reservoir into the sprinklers through nozzles for sanitization purpose inside the booth.

8.7 Sanitizer Reservoir

Sanitizer reservoir is used to store sanitizer liquid which is to be feed to the sprinklers when motor starts pumping it to upper side. This include disinfectant which is used to sanitize the person when he enters into the booth.

IX. Hardware of the Device

Fig 4: Sprinkler installed in booth

Fig 5: Health Monitoring unit of the device

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The above figures shows the real time hardware of the device. Figure 4 shows the Sprinklers installed in the booth, which is operated after the command is send by the Health monitoring unit shown in the figure 5. The Health monitoring unit helps to get the information about health like Temperature and Heartbeat. If these two parameters matched with the healthy person's parameter then he will be allow to enter into the booth.

X. Result

The Smart Sanitization Booth can help everyone in maintaining safety and stop the virus from spreading. The healthy person is sanitized as well, as a safety measure so that the sanitization will destroy the virus, if any. This booth can be installed at the entrance of every building, shop or institute, and it will help in maintaining the safety of every individual in that building, as the infected will not be allows from entering. Furthermore, the healthy person is sanitized as well, so as to destroy any germs or virus.

XI. Conclusion

Pandemic Covid-19 has stopped the world, as it is spreading like a wild fire, and no cure has been found. Therefore, every individual remains with one option and that is to maintain distance and precautions so that it does not spread. But, the world cannot be stopped forever, and life has to begin at some point, therefore the government has allows to open shops and malls with a strict warning, and that is to maintain distance amongst each other. The Smart Sanitization Booth can be installed at the entrances of these shops, and every person entering, can be monitored. This way, we can avoid any interaction with an infected person and the spread of the virus can be stopped.

XII. Advantages

- This booth is highly economical in terms of cost and consumption of sanitizer in every spray.
- It can be relocated easily.
- It can be operated manually, or it can operate automatically as well.
- The power consumption is low (i.e. 50 W) when the pump is used, while power consumption is 2.5 W during testing and standby mode.
- Health status is checked of every new person entering into the campus.
- The booth is completely automated equipped with a timer for proper sprinkler of sanitizer.
- Proper management of sanitizer is possible to get best of it.
- Number of entries is recorded and this record can be maintained.

XIII. Future Scope

- The pro version of this booth can operate fully automatically. It also has a special gate structure which can thermally scan the person entering into the booth. It is also equipped with certain advanced functions.
- The lite version has a contactless button, in which the booth starts spraying the sanitizer for a fixed interval of time, as soon as it senses a presence of a person. This booth is highly economical and is specially designed for micro scale industries.

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