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Automatic wireless health instructor for schools and colleges

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ABSTRACT

The suggested work demonstrates the preventive measures that can be used in schools and colleges during the present pandemic, which are the most important considerations once all of the institutions have reopened. Right now, sanitizers are the most important goods. According to WHO's new standards and regulations, a high level of sanitization is required to live. Despite the fact that all guidelines have been implemented, the majority of students are irresponsible, exacerbating the current scenario. To keep a student's hand sterilised, the proposed design incorporates an automatic hand sanitizer and a temperature detection system based on their ID card. The specific status of the student will be delivered to the class coordinator's mobile phone via genitourinary syndrome of menopause GSM whenever a person wishes to do it, even if there is no contact with the sanitising machine. Our method also uses a camera to snap a picture of the student, which can be viewed on a computer if any of the students do not answer. This also verifies the student's attendance, and the temperature of a specific student will be checked without the student's contact or touch in order to ensure safety and security. This allows everyone to keep an eye on the students while adhering to regulatory regulations.

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1. INTRODUCTION

Fever is a sign of COVID-19 that may be examined without contact, as we all know. Furthermore, ambient temperature can be quite useful in determining the precise value of human body temperature, which is affected by environmental humidity. Furthermore, environmental temperature and humidity levels increase the likelihood of COVID-19 transmission. If we can find non-contact temperature sensors for both the environment and the body, it will be highly useful for accurate monitoring of sick persons. Common techniques for preventing the transmission of COVID-19 include utilising alcohol-based handsanitizer. Taking the person's temperature, keeping a safe distance from anyone coughing or sneezing, using a mask, and staying at home if we are sick. We can check the temperature automatically using a gate equipped with a temperature sensor, which is designed as a portable tool. This technology can also be used in places like train stations, airports, and shopping malls where large crowds gather, and it can be controlled remotely via

internet of things (IoT). The author uses a silicon band gap temperature sensor that enables for personal contact temperature testing screening. The author [1]-[5] uses a fuzzy rule base approach to precisely predict the number of daily cases.

The authors of this research [6]-[10] built a facial mask verification system in a smart city network, where all public spaces are monitored by CCTV cameras. This is accomplished through the usage of a deep learning network. The proposed system can monitor COVID-19 users via IoT. If a user scans with a thermal scanner and his body temperature is higher than normal, a pop-up message will appear, asking if the user has a fever, sore throat, or breathing problems. If this is the case, the suggested system will provide appropriate guidance. Infrared thermography is used instead of standard temperature sensors for automatic investigation of temperature distribution in regions of interest. This review paper discusses the different applications of this in medical disciplines. Different sanitizer containers are available on the market, and the author of this paper devised an automatic hand sanitizer system that is adaptable with a variety of designs. It's made out of polylactic acid and printed on a 3D printer. When we deploy dispensers in public settings, most ultrasonic, infrared-based dispensers fail because to interference from sunshine, vehicle sound, and other factors. In order to circumvent this, the author uses a laser-based sensing device in an automated touch-free method. It is well established that typical thermometers require a person to monitor the temperature. The author of this study proposed a non-contact temperature measuring device that uses AI technology to detect facial masks. No frontline employees are required to do continual checks with this gadget. In addition to temperature and mask detection, computer vision techniques were used to include social distancing check [11]-[15].

An integrated hardware system in our research comprises of two sensors that capture ambient and human body temperature readings separately. With anlight-emitting diode LED screen, we can employ infrared temperature sensors that are incorporated to provide temperature metrics [16]-[20]. COVID-19's ambient temperature measurement is still under investigation, and there is no data to support this notion. When a person presents their radio-frequency identification RFID card, the radio-frequency identification RFID reader reads the card, and we also use a contactless infrared thermometer to measure the person's body temperature [21]-[25], and if the temperature is too high and no mask is worn, admission is denied. Furthermore, all data is sent to the class organiser and is monitored by the appropriate administration.

2. DESIGN AND IMPLEMENTATION

The CNN algorithm has been incorporated in the current system architecture, as illustrated in Figure 1. Wearable IoT gadget, smartphone app, and cloud server are the three essential components. The Raspberry Pi Zero was used to implement the hardware portion, which comprises of nodes. In terms of software, the smartphone application programming interface is used to connect with users, and a fuzzy decision making system is also used on the cloud server. Initially, the nodes acquire particular data from participants and update their decision-making processes to assist users in a variety of situations, such as referring to a doctor, keeping physical distance from others, and receiving notifications about high-risk places.

The step-by-step techniques used in our suggested system design are shown in Figures 2 and 3 with the design architecture block diagram. It clearly demonstrates how our whole system works.

a. It instructs the user to sterilise his or her hands.
b. When a person reveals their card, the radio-frequency identification RFID reader scans it and displays the information on the liquid crystal display LCD display for that individual.
c. A temperature sensor is utilised to detect the individual's temperature, which is shown on the liquid crystal display LCD and monitored through IoT.
d. If the person's temperature is normal, we'll use OpenCV to recognise faces in real time from a live broadcast through our camera using OpenCV.
e. If a mask is discovered using image processing, the person's details are sent to their class organiser through genitourinary syndrome of menopauseGSM.
f. It will send a notification to their parents as well as their class coordinator if the temperature is abnormal and the mask is not detected. This will aid in the prevention of the spread of COVID-19.
g. Those who are not wearing a mask will be reminded to do so.

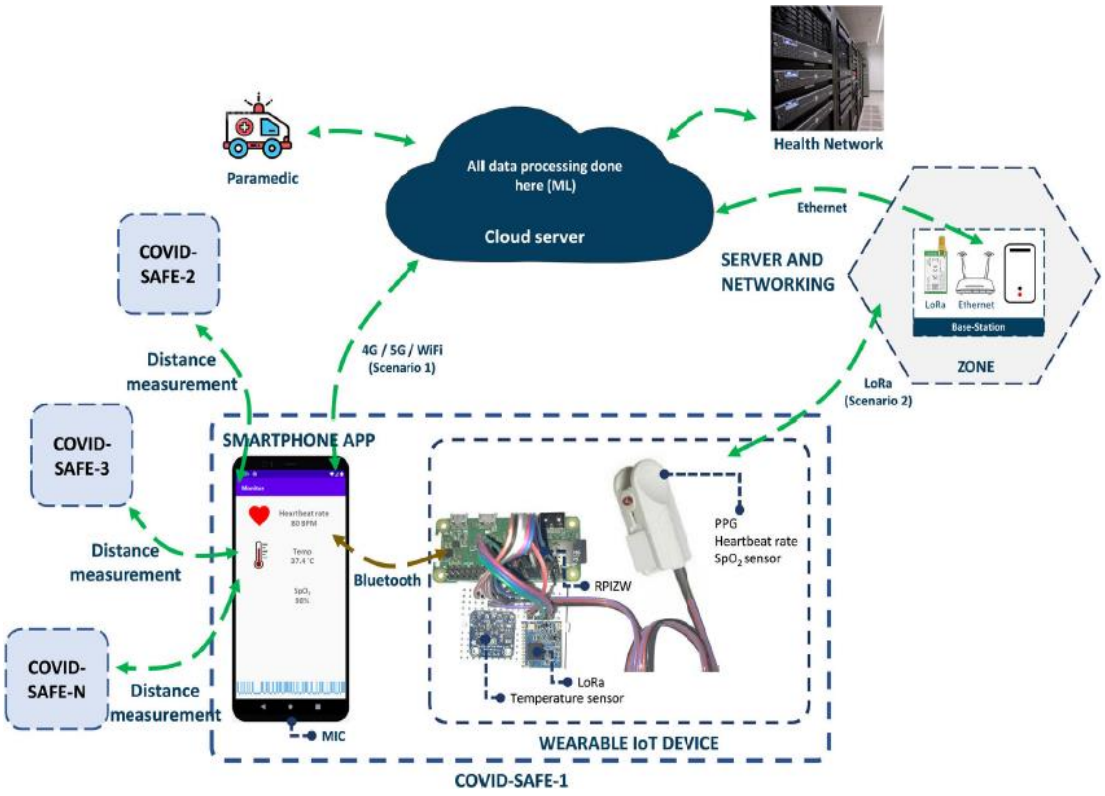

Figure 1. Block diagram of existing system

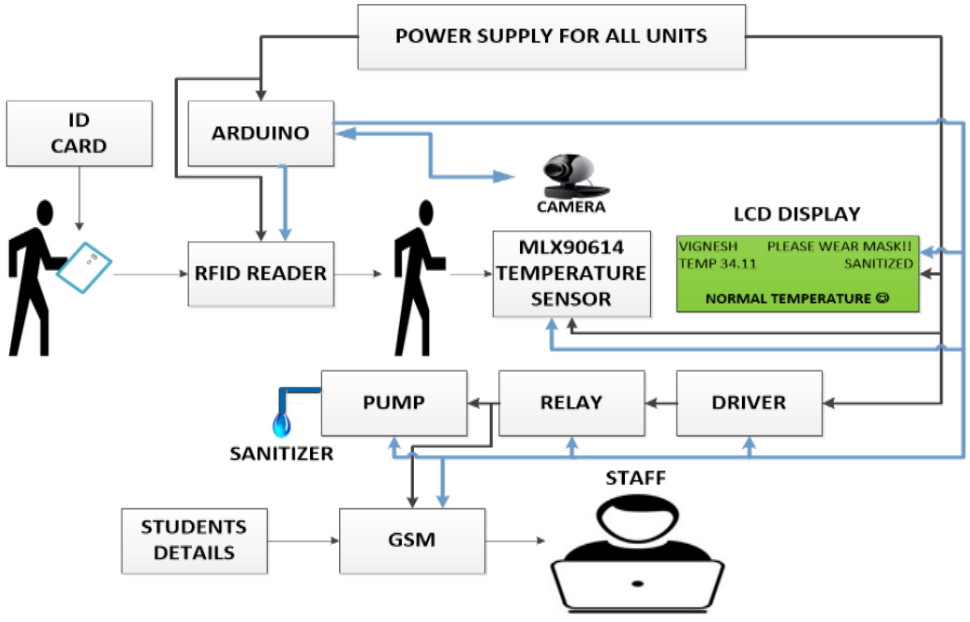

Figure 2. Block diagram of proposed system

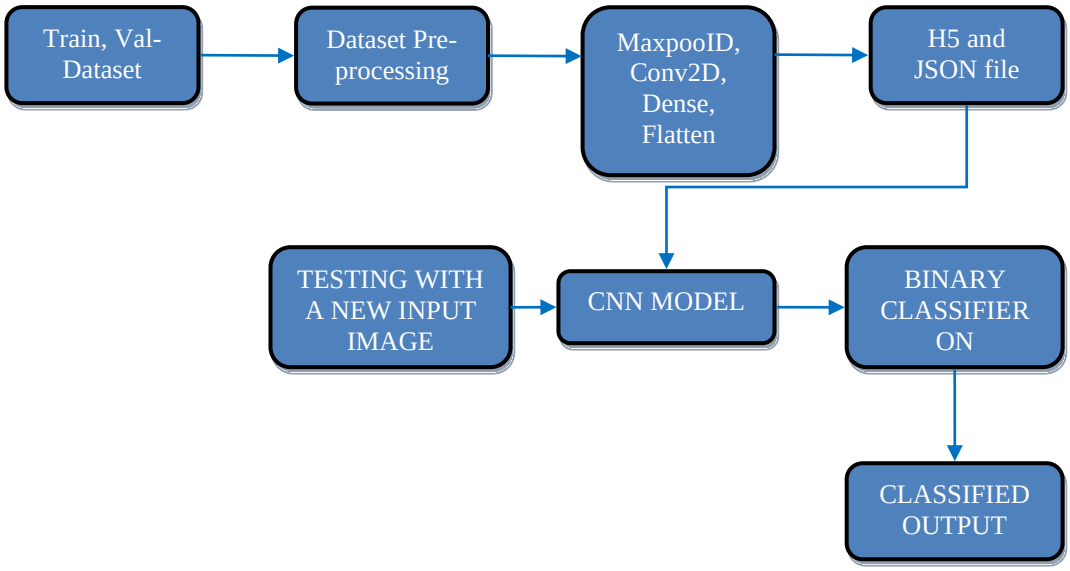

Figure 3. Architectural diagram of mask detection

3. CNN ALGORITHM IMPLEMENTATION

CNNs are a kind of deep learning, feed-forward artificial neural network that is extensively used for a variety of analysis. They combine metaphors with numerical data to create a visual representation. It may make use of a multilayer perceptron with minimum pre-processing requirements. It's a lot like regular neural networks. They're made up of neurons with pre-programmed biases and weights. Each neuron gets many inputs, conducts a dot product, and optionally adds a non-linearity to the result. At rest, the whole network articulates to produce the function from raw input data on one end to the class on the other. It is possible to form a clear notion that the inputs enable us to encode certain possessions into the CNN process, so making the forward function more efficient to execute. The number of parameters in the network is drastically reduced. An input is considered by a neural network, which transforms it via a sequence of hidden layers.

3.1. Layers in CNN

There are five different layers in CNN: input layer, convolutional layer, pooling layer, fully connected layer, output layer which is shown in Figures 4 and 5.

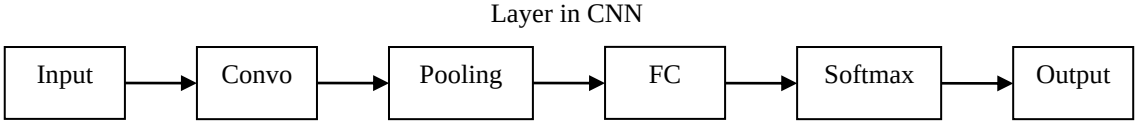

Figure 4. Layers of CNN

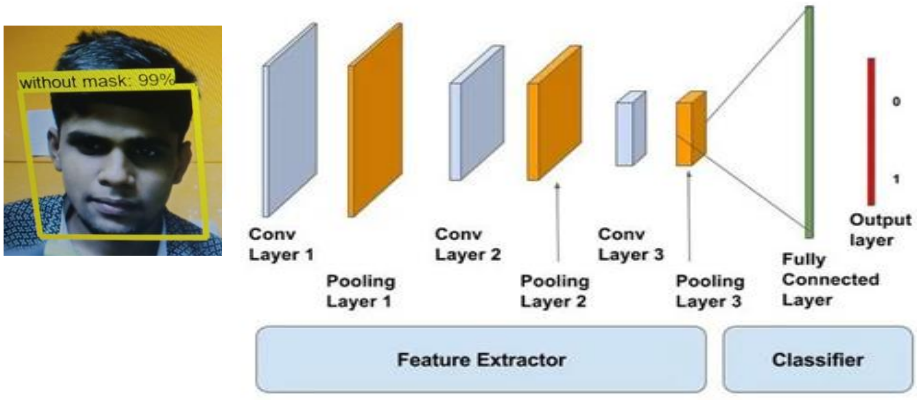

Figure 5. Structure of CNN

4. RESULTS AND DISCUSSIONS

It is common knowledge that scientists and engineers have worked hard to develop a vaccine for the present epidemic, that new testing facilities have been established, and that monitoring systems have been improved. Mobile and web-based solutions based on questionnaires are now being created to track the health of people. As a technical authority, we must protect our student community from the epidemic as soon as classes begin. We can perceive, record, monitor, and react to this present circumstance using a wireless communication device. We evaluated the literature on COVID-19, monitoring strategies, and a proposed radio-frequency identification RF ID-based strategy in this work.

Multiple sensors with an integrated platform are utilised in this study to monitor temperature without having to touch the patients like other current temperature measuring systems. The suggested technique has also been proven to increase the accuracy of infrared temperature readings in experiments. We created anradio-frequency identification RFID-based contactless temperature monitoring system utilising an Arduino and a contactless temperature sensor for this. When students scan the radio-frequency identification RFID card, the gadget measures the students' body temperature and allows them to log in using their name and temperature. This information is communicated to the class advisor automatically through genitourinary syndrome of menopauseGSM. The Arduino uno MLX90614, an EM18 radio-frequency identification RFID reader, a genitourinary syndrome of menopauseGSM module, a pump, and a driver relay circuit with sanitizer control were all used in this project. Figure 6 shows a snapshot of the full gadget. The benefits include: Continuous monitoring of COVID 19 patients over a length of time of 24 hours a day, seven days a week. It is a life-saving device, it prevents illness from spreading.

Sensors and actuators play a vital part in wireless communication device methods in general. The proposed work includes two separate sensors, including an infrared temperature sensor for measuring temperature and displaying it on anlight-emitting diode LED screen. It also contains the ambient humidity, which is useful for distinguishing it from earlier pandemics of a similar kind. Figure 7 shows how anradio-frequency identification RFID reader tracks the card and records the student's attendance. The pump is used to sanitise the area. It transmits the information to their coordinator over genitourinary syndrome of menopauseGSM after gathering all of the essential characteristics.

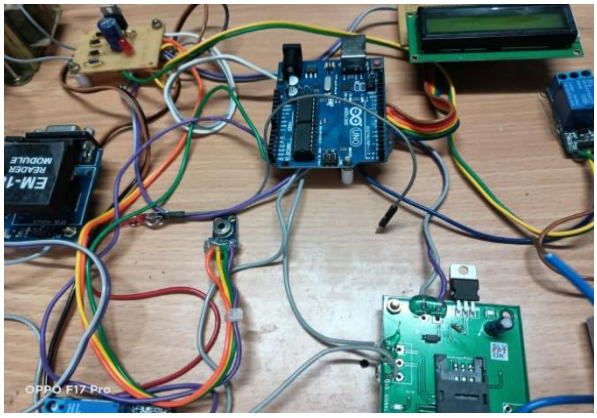

Figure 6. Snapshot of proposed system

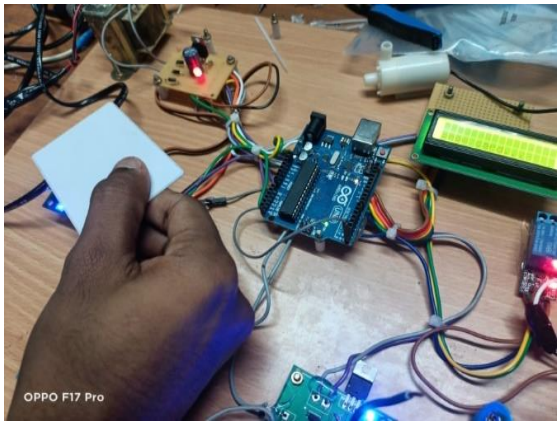

Figure 7. Snapshot of RFID reader trace card

To prevent the disease from spreading, we employed an MLX90614 temperature sensor to monitor the student's precise body temperature. We employed a non-contact temperature sensor, and the reading will be presented on the liquid crystal display LCD screen with the precision indicated in Figure 8. All of these connections are made to the Arduino, which is the proposed system's microcontroller. Using a computer and a camera, run a Python programme that uses the CNN algorithm to guarantee the existence of the student's mask, as illustrated in Figures 9 and 10. It sends data serially to the microcontroller and shows the result on the liquid crystal display LCD display, alerting the learner if the mask is not worn.

It sends a message to the student's designated coordinator after verifying all of the essential criteria. If it detects an abnormal temperature, it will send a text message through genitourinary syndrome of menopause GSM to their parents as well as their coordinator's phone. The Arduino is used to process the device, create computer code, and upload it to the physical board. The radio-frequency identification RFID reader, temperature sensor, sanitising machine, camera, and genitourinary syndrome of menopause GSM are all controlled by the Arduino. The input voltage ranges between 7 and 12 volts. The gadget tracks people

using their ID cards, scans their temperature, checks for masks, sanitises their hands, registers their attendance, and sends the student's information to their staff's mobile phone through genitourinary syndrome of menopauseGSM. If their fever rises over normal, a notification will be sent to their parents, alerting them to seek medical attention. To disinfect hands, a contactless sanitising machine employs a driver, relay, and pump. After registering attendance and guaranteeing the existence of a mask, the sanitising machine activates and identifies the person who should use it. Image processing techniques and cameras are employed to guarantee the existence of the mask; if the mask is not recognised, the individual is alerted to wear the mask. The liquid crystal display LCD display shows all of the processed information. If a person does not meet all of these requirements, he or she will not be permitted to visit the campus.

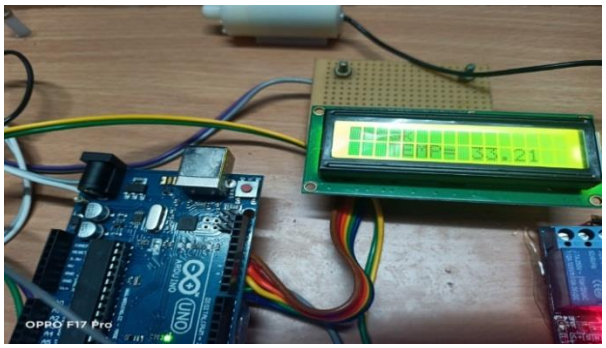

Figure 8. Snapshot of LCD display with output

Figure 9. Snapshot of CNN algorithm output

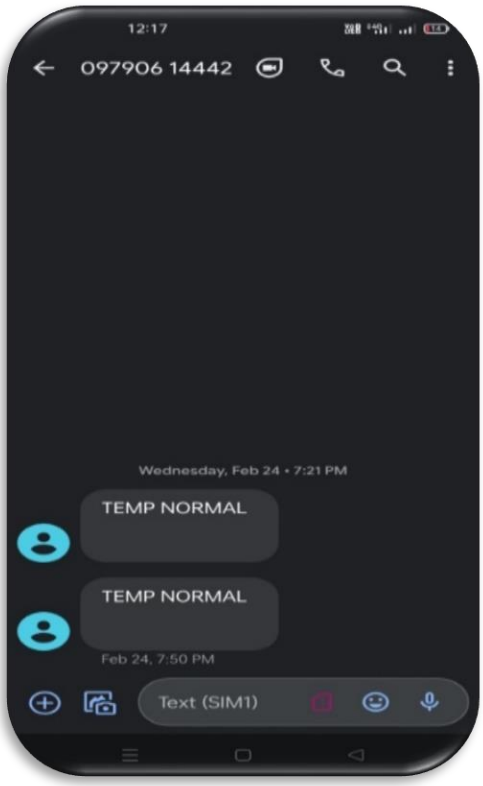

Figure 10. Snapshot of alert messages in mobile phones

5. CONCLUSION

The main goal and outcome of this project is to provide an automated contact-free equipment for health checks, sanitization, attendance, and assuring the presence of a mask to avoid disease transmission. When things return to normal, the corona virus may be stopped from spreading by executing our idea. We employed a wireless device to prevent transmission between people and gadgets since it is a transmission illness, and it is also a cost-effective technology in comparison to the current one. We were able to effectively retrieve the output of the mlx90614 temperature sensor, as well as the attendance of the person, the automated sanitizer, the sending of reports to the staff, and the presence of the mask. This invention will be important in the future in preventing the transmission of communicable illnesses from one person to another, not only for covid, but for all types of communicable diseases. It will also be beneficial in determining the person's health indicators and attendance. As a result, we may infer that the goal of our study is to use a contactless technique to inhibit the transmission of the corona virus. This is only for the benefit of students and faculty at schools and universities.

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