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Covid-19 Smart & Hygienic Mask with Health Monitoring Database

M.Priyadharshini [1], S.Priyanka Devi[2], V.Sushmitha[3], Dr.M.P.Chitra[4]

[1,2,3]*B.E. Electronics and Communication Engineering, Panimalar Institute of Technology, Chennai.*
[4]*Head of the department, Dept of Electronics and Communication Engineering,Panimalar Institute of Technology, Chennai, Tamil Nadu, India.*

Abstract - *Health is one of humanity's most pressing issues. Over the last ten years, healthcare has gotten a lot of coverage. At the end of 2019 and the beginning of 2020, several human cases of novel coronavirus infection were confirmed. Wearing a face mask has been mandatory in many countries as a result of the outbreak of covid-19, and its usefulness in combating the pandemic has been proven. In the event that you and those around you become unknowingly infected with the virus that triggers COVID-19, masks provide some security for you and those around you. Temperature calculation is important for COVID-19 identification, and many countries still use it as an instant test to assess if tourists or people are contaminated. This project has developed a smart and sanitary mask that can be used in the event of a pandemic. This reusable and hygienic Covid-19 mask protects against the corona virus. While wearing the mask, the health monitoring and warning system will be triggered. The biosensor data will be visualized and uploaded to the IoT cloud.*

Key Words: **Covid Mask, Health monitoring, bio-sensors.**

1. INTRODUCTION

The outbreak of COVID-19, a novel infectious flu-like respiratory disease caused by the SARS-Cov-2 virus (also known as coronavirus), has impacted almost every aspect of people's lives around the world since the last days of the previous year. It was first discovered in China, but it soon spread to other continents in a matter of weeks.

One of humanity's greatest problems is health. Healthcare has received a lot of coverage over the last ten years. Multiple human cases of novel coronavirus infection were identified at the end of 2019 and the beginning of 2020. Microorganisms such as bacteria and viruses are inactivated by UV light, which disinfects both the air and solid surfaces. As a result of these realities, governments have implemented a variety of health and safety measures to minimize disease transmission, including mandatory indoor mask use, social distancing, quarantine, self-isolation, and restricting citizens' travel within country borders and abroad, often in conjunction with the prohibition and cancellation of large public events and gatherings.

Despite the fact that the pandemic seemed to be weakening at times, due to the uncertain situation, most safety regulations are still in place. Coronavirus disease causes many changes in our daily routines, attitudes and behaviors, ranging from workplace activity to social interactions, sport, and entertainment. Since, health care services are such an important part of our society, an E-health monitoring system based on the Internet of Things has been created, in which various criteria are taken into account to calculate and assess a person's current health status using a smart mask. The aim of this paper is to develop and introduce a cost-effective IoT-based healthcare system for people who go to public places during a pandemic.

We currently only have a standard form of mask with N-95 protection, which filters bacteria but does not destroy viruses. Air purifiers are effective at removing dust, but they are only useful indoors. Some air purifiers emit an excessive amount of ions and even ozone gas into the air, which can be harmful. A standard mask cannot be used to track an individual's health. The proposed system would address these flaws in the current system. The proposed solution, based on the obtained results, is usable for its intended purpose under certain performance constraints Furthermore, it is based on open hardware and free software, which is a clear and attractive benefit for such systems.

In Section 2, the most current work on facial mask detection is discussed. The proposed methodology for designing the entire system is outlined in Section 3. The results of the established method are discussed in Section 4. Section 5 is where the inference is drawn. Finally, in Section 6, the shortcomings of possible future works are portrayed.

2. RELATED WORKS

In the meanwhile, varied systems for COVID-19 in sensible town networks are designed. Some air purifiers unharness excess quantity of ions within the air and even gas which may be harmful. N-95 mask filter the microorganism however not kill the virus. And health observation of a private isn't doable by victimization traditional mask. To the most effective of our information, there's no methodology

that integrates all of those aspects of execution on cheap IoT devices.

3. METHODOLOGY

The projected system would address these flaws within the current system. Bio-sensors for health observation, like the Resistance Temperature Detector (RTD), Heartbeat device, and Air Quality device, are employed in the projected model to boost mask potency. The monitored information will be displayed on the digital display whereas being at the same time updated to the IoT cloud server through the employment of the Wi-Fi module. The mask is going to be sterilized supported the standing of the infrared device. Our main objective is to supply a strong COVID-19 safety management answer that produces the foremost of IoT devices so as to be each efficient and realistic.

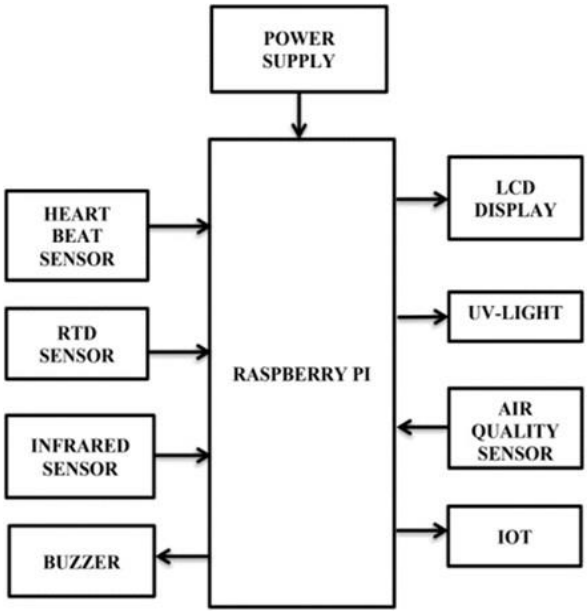

Fig -1: Block diagram of the proposed system.

3.1 Raspberry PI 3B+

The Raspberry Pi Foundation revealed the Raspberry Pi 3 B+ on March 14, 2018. It's an improved version of the Raspberry Pi 3 B model, which was released in 2016. It's a small computer board with a CPU, GPU, USB ports, I/O pins, Wi-Fi, Bluetooth, USB, and network boot capabilities, and it can perform certain functions similar to a normal computer. The features of the B+ models are nearly identical to those of the B model; however, USB and Network Boot, as well as Power over Ethernet, are only available on the B+ model. This computer also has two additional USB ports. The SoC (system on chip) is a single chip that houses both the CPU and the GPU. It's even quicker than the Pi 2 and Pi 3 models. The dual-band Wi-Fi 802.11ac operates at 2.4GHz and 5GHz for improved coverage in wirelessly demanding settings, and Bluetooth 4.2 with BLE support is available.

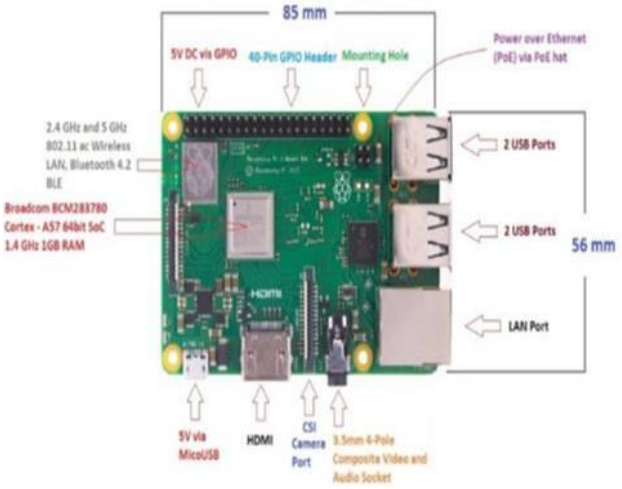

Fig -2: Raspberry PI 3B+

3.2 IOT

The Internet of Things (IoT) is a network of everyday objects that are embedded with electronics, software, sensors, and networking that allows data to be exchanged. Basically, a small networked device is linked to something, allowing data to flow back and forth. A small networked machine can be combined with lightbulbs, toasters, refrigerators, flower pots, watches, fans, planes, trains, cars, or anything else around you to accept input (especially object control) or gather and generate informative output.

This means that computers will pervade every aspect of our lives — pervasive embedded computing devices that are uniquely recognizable and linked to the Internet. The Internet of Things is really beginning to take off thanks to low-cost, networkable microcontroller modules.

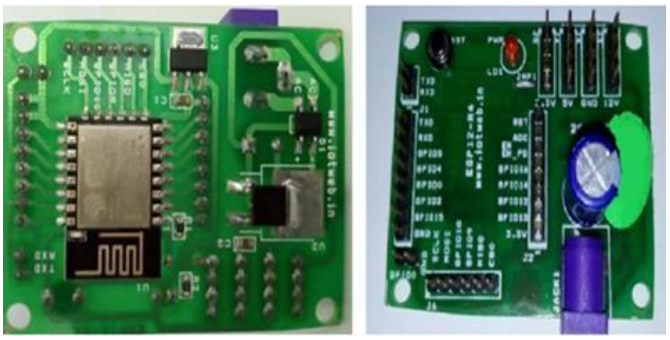

Fig -3: Internet of Things

3.3 Bio-Sensors

3.3.1 IR Sensor

An infrared sensor can detect motion as well as measure the heat of an object. Infrared radiation is emitted by an IR LED. The surface in front of the LED is illuminated by this radiation. The amount of light reflected varies depending on the reflectivity of the surface. This reflected light strikes a reverse biased infrared sensor. The number of electron-hole pairs generated is proportional to the strength of incident IR radiation. When the force of the incident ray changes, so does the voltage around the resistor.

The resistances and output voltages change in relation to the magnitude of the IR light obtained as it falls on the photodiode.

Fig -4: Infrared sensor

3.3.2 Air Quality Sensor

Monitoring of gases emitted is critical in today's technological setting. Monitoring of gases is important in everything from home appliances like air conditioners to electric chimneys and protection systems in industries. Gas sensors respond spontaneously to the gas present, keeping the device aware of any changes in the concentration of molecules in the gaseous state.

The gas sensor module is made up of a steel exoskeleton that houses a sensing feature. The MQ-8 gas module is mounted on a printed circuit board with a 5VDC operating voltage. Where both the analogue and digital methods will be used to obtain sensor output values.

Fig -5: MQ-8 Gas sensor

3.3.3 RTD Sensor

Temperature can be measured more precisely with the LM35 than with a thermistor. The resistance of an RTD (Resistance Temperature Detector) varies as the temperature changes. The LM35 is an IC temperature sensor with a proportional output to the temperature (in 0C). Since the sensor circuitry is sealed, it is not vulnerable to oxidation or other processes. As the sensor's temperature rises, the resistance rises with it.

Fig -6: Temperature sensor

3.3.4 Heart beat Sensor

When a finger is placed on the HEART BEAT sensor, it produces a digital signal of heat beat. The beat LED flashes in sync with each heart beat when the HEART BEAT detector is activated. Here a high-intensity type LED and an LDR are used to detect HEART BEAT. A photo diode or a photo transistor may be used as a sensor. The finger is placed in between the LCD and LED. For identification, the skin may be illuminated with visible (red) light that is emitted or mirrored. At each pulse, it operates on the principle of light modulation through blood flow through the finger. This digital output can be directly connected to the microcontroller to calculate the BPM rate.

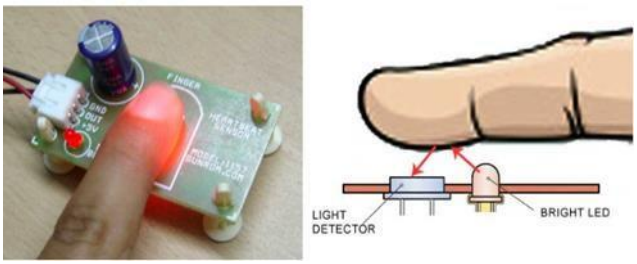

Fig -7: Heart beat sensor

3.4 LCD

Liquid crystal displays (LCDs) use liquid crystals to produce visible images. A simple LCD module used in DIY electronic projects and circuits is a 16 x 2 liquid crystal display. Character-based LCDs are most commonly based on Hitachi's HD44780 controller or other controllers that are compatible with HD44580. It also ensures that the liquid crystal display is guided around the positions of pixels during its interfacing with a microcontroller. The monitored data from the bio sensors will be displayed on the LCD, and the data will be updated to the IoT cloud server using the Wi-Fi module at the same time.

Fig -8: LCD display

4. RESULT ANALYSIS

Based on the performance data shown on the IoT screen, we can see that the package performs as expected. At the same time, the biosensor data is sent to the IoT cloud. The average body temperature of an organism should be between 97.5 to 99.6 degrees Fahrenheit. When a person's body temperature rises above 100 degrees Fahrenheit, he or she has viral fever, which can be detected using an RTD sensor. Adults' natural heart rates should be between 60 and 100 beats per minute, which can be determined with a heartbeat monitor.

When the infrared sensor detects UV radiation, the light is switched off, and the virus is destroyed so that it can be reused. By refreshing the IoT screen after the bio sensor values are registered, we can see the difference. As a consequence, by wearing this smart mask, one's wellbeing is kept track of.

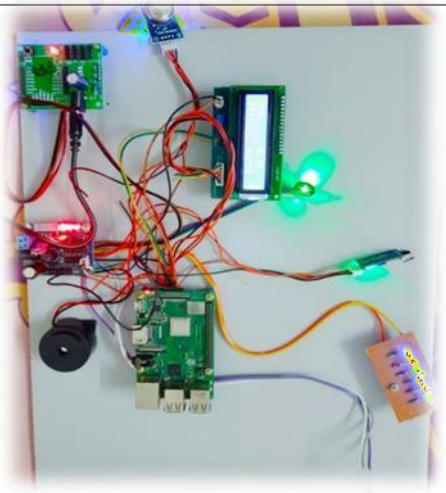

Fig -9: The kit

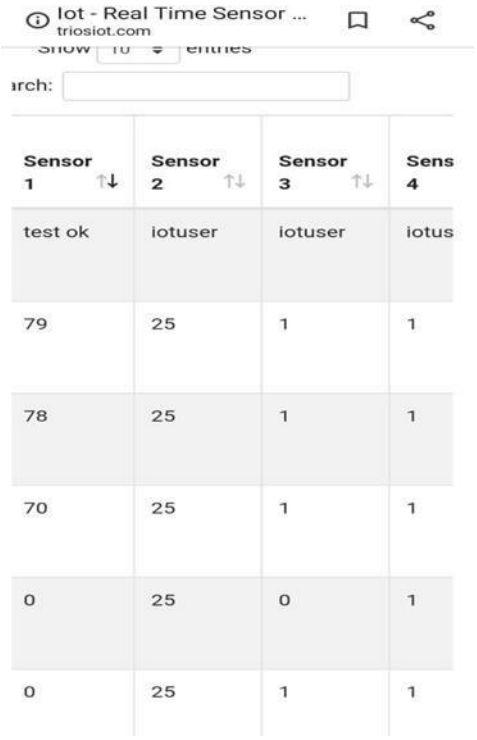

Fig -10: IOT screen on Mobile

5. CONCLUSION

This paper presents a system for a smart city to decrease the spread of coronavirus. Mask-wearing has become a new standard in many communities in the COVID-19 pandemic since it is successful in containing communicable diseases. The increased demand for surgical masks and respirators has resulted in a global supply and raw material shortage. As a result, many people have turned to making their own masks, recycling old masks, or settling for masks that provide less protection than is needed.so we

have come up with smart and hygienic mask where the UV-light will kill the virus in the mask and the mask will be sterilized depending on the state of the infrared sensor.

6. LIMITATIONS AND FUTURE WORKS

This project has a smart and hygienic mask that can be used during a pandemic. This Covid-19 mask is reusable and hygienic, and it protects against the corona virus.

The health monitoring and warning system will be triggered when wearing the mask. The data from the biosensors will be displayed and submitted to the IoT cloud. Although further testing and evaluation is needed to fully develop the smart mask's merits and recognize remaining design challenges and trade-offs, the preliminary results are extremely promising.

The proposed protection can be added to existing masks as a reusable assembly, or it can be used to create new mask designs, as seen here. For certain applications, it may even be able to fully replace conventional masks. These subjects will be the subject of our future study.

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