Real-Time Health Monitoring System for Remote Covid-19 Patients Using Smartphone and Wearable Sensors

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Abstract **Corona virus is a novel virus that has never been detected in humans and causes the COVID-19 corona virus disease. This disease was first detected in December 2019 in Wuhan, China, and has since spread around the world. The virus is readily transmitted from person to person, allowing it to spread quickly. Fever and cough are two typical COVID-19 symptoms that can be quickly detected. Since the virus epidemic, public places have used thermal scanning as well as cough monitoring using infrared thermometers and 33 BLE sense to check cough and body temperature in order to distinguish the infected among the crowd. This safety is also missing because it takes a long time to monitor each person's body temperature, and the most important factor is that direct contact with the infected could pass it to the person who performs the screening procedure or from the person in charge of screening to the people who are being screened. Using a smart machine, this study proposes the creation of a system that can detect the corona virus automatically from thermal and cough parameters with minimal human intervention. Thermal scanner technology is built into the device and paired with smart phone technology to provide real-time data on the screening process.**

Keywords —Health monitoring, Covid-19, Temperature, Cough detection, Patient health monitoring, Arduino, Fever detection.

I. INTRODUCTION

Health tracking has been a global problem in people's lives today. The quality of life is determined by the state of one's health, which is influenced by environmental and surgical factors. COVID19 is a historic pandemic that is wreaking havoc on the entire planet, and people are developing a slew of new devices to combat it. The vital signs of the human body must be measured in order to determine one's health status. The average body temperature is between 36.5 and 37.5 degrees Celsius. Hypothermia is defined as a state of health below this limit, whereas fever and hyperthermia are defined as states of health above this limit. Individual body temperature measurement is influenced by a number of factors, including age, exertion, illness, and the location of the measurement on the body. HBT can be measured using mercurial and contactless thermometers in the nasal and axillary areas. In this project, we create a system that detects cough and measures body temperature in order to identify infected in a crowd and avoids infection. Furthermore, the proposed device is equipped with facial-recognition technologies and can view the pedestrian's personal details as well as take their temperatures automatically. The healthcare sector has strong expectations for this proposed design, as it could be able to help deter the corona virus from spreading further.

A. Problem on hand

Fever, dry cough, and tiredness are typical symptoms of corona virus infection. In some cases, the affected person can also experience pains as well as aches, a runny nose, sore throat, nasal discharge, or diarrhea. Any individuals afflicted with the infection, on the other hand, have no symptoms and are unconcerned. To prevent infection from such individuals, we created a device that detects infection early on.

II. LITERATURE REVIEW

Recent advancements in technology and microelectronics devices have enabled the production of innovative low-cost screening instruments that can be used by citizens for health prevention. Sensors in medical devices translate diverse types of vital signs from the human body into electrical signals. As a result, healthcare management solutions that include non-invasive and wearable sensors as well as integrated contact mediums provide a cost-effective alternative for living a relaxed home life. This paper describes the use of an Arduino controller including various

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sensors as well as an open source internet link to remotely measure human body temperature (HBT). The proposal tracking device connects to the internet through a wireless fieldity (wifi) connection and connects to an online interface on a mobile phone or device. An Arduino controller, LM-35 (S1) and MLX-90614 (S2) temperature sensors, and an ESP-wifi shield module make up the proposed system. The gathered result demonstrates that using internet of things (IoT) software, real-time temperature control data can be transmitted to an authentic observer. According to the results of this study, the average difference in temperature among Sensor S1 and S2 is around 15oC [1].

This paper proposes an optimised sensor interface for non-contact temperature control. The adopted approach which is built on the integrated combination of an infrared thermometer and a capacitive humidity sensor, can offer a fast and precise method for remotely detecting both atmospheric and body temperature in pandemic conditions like COVID-19, while preventing direct interaction with humans. The ambient temperature knowledge is effectively utilized to derive a correction formula for the precise extraction of body temperature from the normal infrared sensor calculation. The work provides full information on the proposed platform's configuration, as well as related simulation findings on fluctuations in atmospheric temperature, relative humidity, and body temperature. Experimental assumptions are also addressed in order to include a comprehensive evaluation of the experimental method [2]

Fever is among the most common signs of COVID-19, but because of the infectious nature of the disease, measuring it can be difficult. As a result, it's critical to detect patients' temperatures as soon as possible, preferably without touching. In the other hand, both epidemiological and laboratory experiments have revealed that ambient temperature will influence Coronavirus survival and dissemination, implying that in the case of COVID-19, constant temperature control, both ambient and body temperature, is a must-do job. The use of thermographic structures in pandemic conditions, such as COVID-19, may be critical for determining the initial temperature for medical purposes, namely:

• Initial individual temperature monitoring during the triage phase in a public health emergency to ascertain the importance of fever and increased temperature in terms of potential affection.

•Temperature measurement in high-throughput environments, such as office buildings, airports, and so on. Additional control of air temperature will greatly aid in improving the precision of human body temperature monitoring, which is influenced by environmental humidity.[3]

III. PROPOSED SYSTEM

Due to their interdependency, this section discusses the operating flow of three subsystems in order to complete the whole application. Image processing module, which is in charge of data processing of optical and thermal cameras, is also a required device feature, outside the decision-making module. When necessary, the smart device is also given the duty of collecting the appropriate data. If the temperature is detected to be higher than average, the device sends an alert. To identify someone who is suggesting as a COVID-19 infected, the officer will collect data on people's faces and temperatures. The smart helmet that has been proposed is made up of three parts. Figure no.1 shows schematic of proposed system.

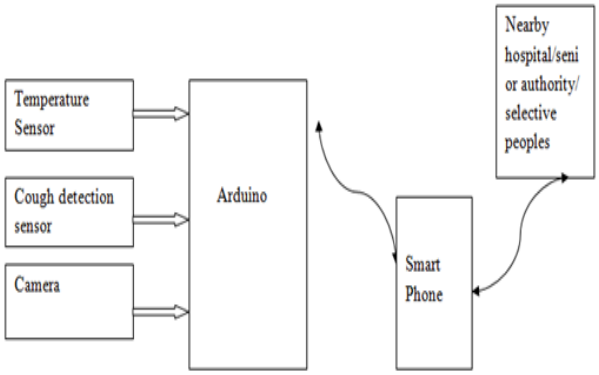

Figure no.1 Design of proposed system.

The input point of the mechanism, which includes the thermal camera, optical camera, and cell phone programme, is the first section of the system. The second phase of device construction was processor development. The microcontroller processor was implemented using the Arduino IDE package to code the source code in this section. The programed allows the processor to compile the requisite commands and source code. Meanwhile, the mechanism's output source was the subject of the system's third section. The following diagram depicts the project's flow:

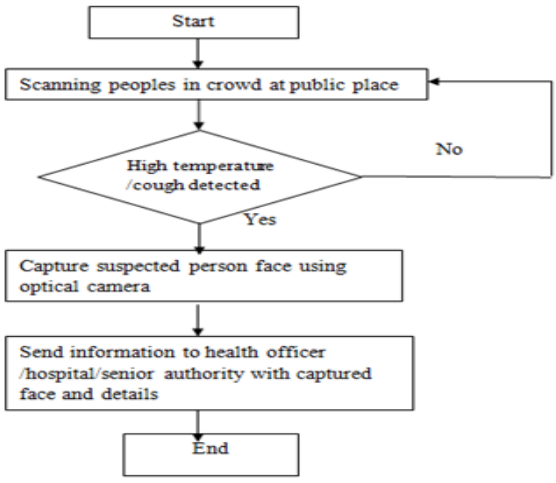

Figure no.2 Flow chart

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IV. ADVANTAGES

A. Combine data recording and analysis

When the test/recording is in progress, data will be analyzed.

B. Management notifications for "no miss"

If the temperature deviates from the set parameters, an alert may be produced. Companies can react to temperature fluctuations quickly with wireless temperature warning systems, preventing product degradation.

C. Check temperature readings from everywhere

Data can be tracked directly over the internet and via cloud-based temperature control through wireless temperature monitoring systems. The SI unit for magnetic field strength H is A/m. However, if you wish to use units of T, either refer to magnetic flux density B or magnetic field strength symbolized as $\mu_0 H$. Use the center dot to separate compound units, e.g., "$A \cdot m^2$."

D. Save time on set-up

Wireless temperature control systems take far less time to set up than hardwired data loggers, and they are also easier to deploy.

E. Greater accuracy percentage and reliability

Temperature accuracy of 0.10°C. Temperatures may be tracked from outside the fridge, autoclave, or storage container without disrupting the environment during the operation, thanks to wireless data loggers.

V. APPLICATION

1. It is designed specifically for Covid-19.
2. Can be used in public spaces to check people's temperatures and identify coughs.
3. Suitable for use in schools and colleges
4. It has commercial applications.

VI. EXPECTED CONCLUSION

As a result, the current proposed study was a success, and it will provide a convenient way for Covid-19 to effectively regulate temperature and cough in real time. As opposed to the costs of instruments used to calculate environmental factors, this method is lightweight and cost competitive to some degree. Based on the above review, it is clear that nested wired devices should be supplemented by wireless sensor networks in order to obtain reliable data and prevent a number of potentially dangerous problems.

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