ENHANCING PUBLIC SAFETY WITH FACE MASK DETECTION USING IOT TECHNOLOGY

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ABSTRCT

In the wake of the COVID-19 pandemic, ensuring public safety has become paramount. The widespread adoption of face masks has been a crucial measure in preventing the transmission of the virus. This paperpresents a novel approach for enhancing the public safetyby detecting the presence of face masks using touch sensor techniques and integrating the data using an Internet of Things (IoT) application.

The integration of IoT technology allows for remote monitoring, data aggregation, and real-time notifications. Authorities can access a web-based dashboard or mobile application to view the collected data, track compliance rates, and identify potential hotspots where non-compliance is prevalent. Furthermore, the data collected can be utilized for analytics and forecasting to support proactive decision- making in public health and safety management.

The proposed system offers several advantages over traditional manual monitoring methods. It provides a non-intrusive and automated approach to face mask detection, reducing the need for manual intervention and minimizing the risk of contact-based infections.

Additionally, the integration of temperature and pulserate measurements offers valuable insights into individuals' health conditions, enabling early identification of potential health risks [1].

In conclusion, this paper presents a comprehensive approach to enhance the public safety by leveraging face mask detection using the Touch sensor and integrating the pulse sensor and BMP180 sensor for health parameters. The IoT integration facilitates real-time monitoring, data analysis, and proactive decision- making, enabling effective enforcement of face mask regulations. The proposed system holds promise for applications in public spaces, healthcare facilities, and various other settings to safeguard public health duringtimes of infectious disease outbreaks.

Keywords: IOT, Touch, Pulse and BMP180 sensors.

INTRODUCTION

One of the most important worldwide problems facing medical institutions today is pandemics. More than 56.4 million people had been identified as having SARS- COV-2 infection as of November 19, 2020, and more than 1.35 million had perished as a consequence of the coronavirus, demonstrating the worldwide increase in COVID-19 cases. Numerous symptoms, including a fever, shortness of breath, a chronic dry cough, taste loss, nausea, sore throat, vomiting, headache, low oxygen saturation, and overall body pain, may be present.

Patients with hypoxemia and irregular heartbeats have a worse likelihood of survival. Due to insufficient medical care, failure to recognize hypoxemia and a quick pulse might have deadly results. Consequently, it's essential to pay special attention to every detail.

People may benefit from IoT-based arrangements for routine health check-ups because getting appointments can be time-consuming and difficult for the majority of people. The Internet of Things (IoT) has emerged as an important innovation with several uses. It especially refers to any physical system that acquires and exchanges data across wireless networks without the intervention of a person. Because of the significant increase in COVID- 19 cases that surfaced during the second wave, every country is struggling to offer appropriate care to patients. The main health markers of a person are their pulse rate and body temperature [2]. The primary goal of this

project is to create and deploy an innovative Internet of Things based face mask detection system that allows users to measure factors including heart rate and body temperature rate while wearing a mask [3]. They can be beneficial in a variety of public, educational, and other settings.

LITERATURE SURVEY

1. S. Nair, N Augustine, & L Varghese developed a Smart health monitoring system. The main aim is to transfer thedata from patient to doctor through wireless communication. The device helps in monitoring thehealth of the person and if there is any problem then it sends alert to the carer or guardian. It was published in 2020.

2. M. M. Khan, S. Mehnaz, A. Shaha, M. Nayem, S.Bourouis propose a IoT-Based Smart HealthMonitoring System for COVID-19 Patients. This was mainly developed for COVID-19 patients, an IoT based smart health monitoring system was created. The system is controlled by a mobile Io application, and during crises, both the patient and the doctor can receive notifications from this system. It was published in 2021

3. V. B. Shalini developed a Smart Health Care Monitoring System based on Internet of Things (IOT) in 2021. A smart health monitoring system is implemented that uses blood pressure and heart rate sensors linked to an ARDUINO UNO board to monitor a patient's health.

4. F. M. Yassin, N. A. Sani, and S. N. Chin proposed a Analysis of heart rate and body temperature from the wireless monitoring system using Arduino. This was developed in 2019. The idea of this is to monitor the patients of ICU to ease the work for the nurse and doctorof monitoring more frequently. Different kinds of LEDsare used to indicate thehealth of the patient.

PROPOSED METHOD

The proposed system utilizes the BMP180 sensor,which can measure temperature and comparing the temperatures of the face and the surroundings, is used inthe suggested system. Touch sensor is used to determinewhether a face mask is present or not. A pulse sensor is

also used to measure pulse rates, which can offeradditional information about the wearer's health.

The parameters received from the BMP180 sensor andthe pulse sensor are gathered and delivered to an IoT application using the ESP01 module to provide real-time monitoring and seamless data transmission. The Internet of Things (IoT) application acts as a hub, data

collection and analysis from multiple sensors located in diverse locations. This makes it possible to monitor and identify people wearing face masks effectively, enabling quick intervention or enforcement measures [4].

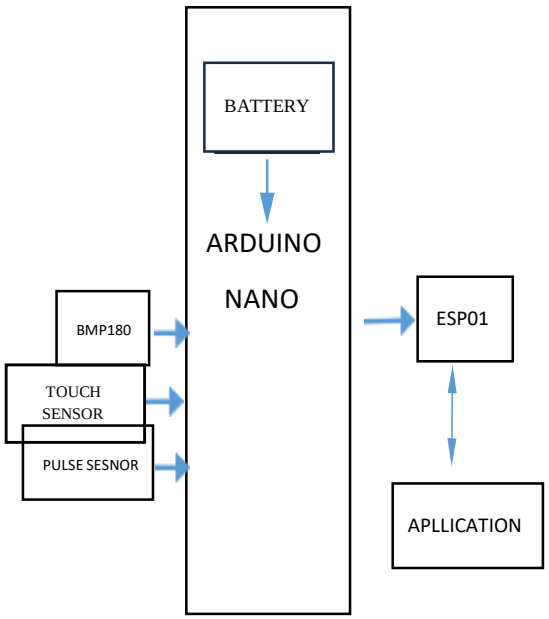

FIG:Block Diagram

In this proposed system, the health monitoring system consists of a variety of sensors like a Pulse sensor, a Temperature sensor, a Touch sensor and an Arduino NANO microcontroller. The IoT system will notify the user via the application if there are any changes in the user's health based on standard parameters [5]. THINKSPEAK is the application which is used in the device.

A typical resting heart rate falls within the range of 60to 100 beats per minute, while the average body temperature of a human is approximately 37 degreesCelsius.

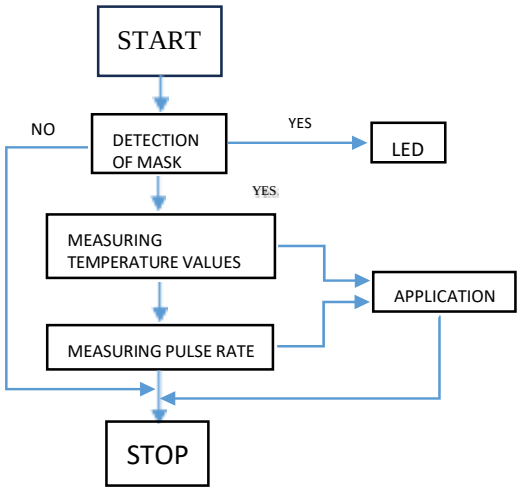

Fig:FlowChart

The project begins with a touch sensor-based mask detection, and if the detection was successful, a red light will illuminate; otherwise, nothing will occur. Followingthe mask's detection, the temperature and pulse rate weremeasured and communicated to an Application [6][7].

ADVANTAGES

1. Accurate facemask detection: The system can reliablytell whether someone is wearing a facemask or not by contrasting the ambient temperature with body temperature. This may be essential for enforcing the rules on mask use in public areas.

2.Temperature and heart rate can both be monitored in real time by the system. This can be helpful in locations like hospitals, offices, and public spaces where it's important to continuously check vital signs.

3.When utilised with an IoT application, the ESP01 Wi-Fi module enables wireless data transfer. This makes it simple to gather and analyse data from several locationsat once since it enables remote monitoring and data analysis.

4.Cost-effective: The system's components, including the ESP01 Wi-Fi module, an Arduino Nano microcontroller, a BMP180 sensor, and a pulse sensor,

are reasonably priced and easily accessible. As a result, the system is more affordable, enabling greater adoption and implementation.

RESULT

We receive precise values every second in the internet of things application. We are able to determine the temperatures and pulse rates after at which the primary mask detection occurred.

Fig:Hardware

Fig:Representation of parameters in Application

FUTURE SCOPE

1.A Convolutional Neural Networks (CNN)based mask identification system that provided great accuracy but was only able to recognise the front face of the mask.

2.If one or more health indicators rise over threshold levels, a GSM module can be used to determine the person's location.

CONCLUSION

We have successfully integrated a face mask detection, body temperature, and pulse rate measurement system into this gadget. This gadget can be utilised in public spaces like universities, schools, businesses, retail establishments, etc. The parameters are measured after the system determines if the character is wearing a mask.

When examined, the temperature and pulse sensors exchange readings with an application that monitors thepulse rate and scans the user's body temperature.

This challenge enables the automated response, eliminating the requirement for a human to view the COVID-19 protocols. It is possible to fully perfect face mask detection accuracy. In the end, detecting the temperature of the mask and frame can assist us inreducing the enormous concentration of persons withoutmasks in one location, lowering the risk of igniting. In terms of accuracy and processing time, the present vector utility, neural network, and selection tree approaches are compared to the proposed version. The proposed method outperformed the existing algorithms overall, according to experimental results.

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