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AN IOT-BASED, GSM ENABLED PATIENTS WEARABLE HEALTH TRACKER

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ABSTRACT

With an enhancement in technology and data measuring sensors, there have been strived to utilize the new technical knowledge in various areas to improve the standard of human life. One of the fields of research that has been seen in the healthcare sector. Nowadays health issues have become a major problem that will be difficult to recognize earlier. Integrating Remote patient monitoring in chronic disease management can improve an individual's quality of life. It allows patients to be independent, prevents complications, and reduces personal costs. RPM facilitates these by providing care at the home. In addition, these patients and their caretakers feel comfort knowing that patients are being monitored continuously and that if problems arise required medication can be given. This is important when patients are managing self-care processes such as being paralyzed, immobilized, etc.

As a result, this project attempted to solve a healthcare problem currently everyone is facing. The project's main objective was to design a remote healthcare system comprised of three divisions. The first portion is used for detecting patients' vitals using particular sensors, the second is for sending data to cloud storage, and the last is for arranging the collected data for remote viewing. This data is analyzed by a doctor or guardian to monitor a patient's health progress and take the required measures within a time.

Keywords: IoT Cloud, Arduino, GSM, Sensor, Microcontroller.

I. INTRODUCTION

Designing an RPM that has a heart rate detection system, temperature detection system, humidity detection system, gas detection system, and SPO2 detection system. A doctor or health specialist can use this system to monitor all vital health parameters of the patient.

i) The temperature sensor, wet sensor, gas sensor, pulse sensor, ECG, and SPO2 modules along with the microcontroller, ESP module, and GSM module. The data collected was transmitted to a receiver module.

ii) ECG consists of a non-invasive infrared finger detector, a designed circuit for cardiac signal microcontroller. The detected analog signal was then digitized to give a digital value that was read on the serial plotter.

iii) A simple cloud server has a database for all the vital data to be accessed remotely whenever required.

II. LITERATURE REVIEW

[1] In this project, medical practitioners and family members of patients are provided with a system to monitor the patients from a remote place. During the COVID-19 pandemic, this system plays a vital role in monitoring patients from a distance. Existing monitoring systems in the hospital are wired to a different machine for monitoring purposes. Since the machines are wired at the bedside close to patients, this enforces a lot of challenges to doctors and nurses interfering with their daily routine of monitoring the patients and getting updates on patients' conditions. This paper presents an IoT-based portable monitoring system that can be fixed for the remote patient without the necessity of constraining the patient with wires and monitoring the patient closely. This device will measure and show the status of the health of the patient's vitals. In this device, the MQTT server protocol is implemented and integrated with all vital sensors which include LM35 temperature sensors, AD8232 ECG sensors, and MAX30100 pulse oximeter to transmit the data to node-red and ThingSpeak for monitoring. The ThingSpeak is a platform that provides real-time sensor data in graphical form on a webpage and all data captured from sensors are updated in a centralized database for further analysis.

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[2] After the outbreak of the COVID-19 pandemic, in March 2020 in China, around 6.2 million people were affected by the disease till November 2020. Till today there has been no proven cure discovered apart from taking precautions by wearing a mask and social distancing. This situation has infused a new challenge of personal identification from masked images without the use of biometrics. In this paper, a dataset of 20000 pictures was generated using a Raspberry Pi 4 camera module. The given dataset was classified into 20 different classes where 10 classes belonged to masked faces and the other 10 classes belonged to biometric imprints. In this paper, the proposed solution included complex convolutional neural network-based classifiers that provide data classification and recognized the persons in real-time using a Raspberry Pi 4 module. Further, it helped in achieving higher accuracy of 97.67% in masked faces and 100% accuracy in biometric imprints.

[3] The breakdown of the COVID pandemic has impacted the global economy and day-to-day life by continuing the spread rapidly around the globe. So an intelligent technology system is the need of the hour to prevent the further spread and help people to return to their daily routine. A smart system integrated into existing infrastructure will help make the workspace functional in a safer environment. In this paper, the proposed solution is to formulate an IoT-based application that will help in automating most everyday activities and prevent people from touching various objects and surfaces in offices. The system is named as qToggle and provides an efficient framework interconnecting smart devices through which employees can interact with devices without physically touching them. This qToggle device comprises ESP8266/ESP8285 chips, Raspberry Pi Boards, and smart sensors to control the series of appliances and sensors.

III. OBJECTIVE

The scope of this project is to develop a wearable device for monitoring covid patients. To design such a system, the main processes were:

1. First, a related sensor must be worn on the patient's body.
2. The microcontroller collects the analog values from the sensors and converts them into digital values.
3. Those sensor values are sent to the cloud by the WiFi module.
4. These sensor values can be accessed by the officials from the cloud via smart terminals and applications such as ThingSpeak, Thingshow..etc.
5. GSM is used to send SMS alert messages to given phone numbers in case of emergency.

IV. PROPOSED SYSTEM

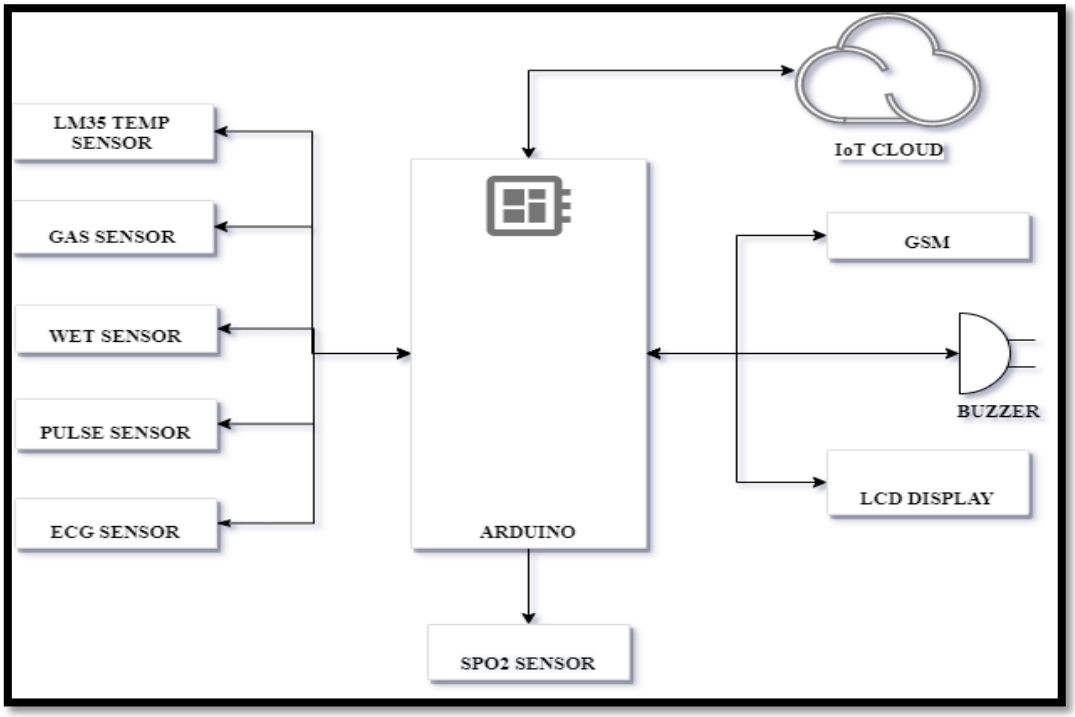

Figure 1: Block Diagram

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Considering the ongoing pandemic and unpredictable symptoms have increased the flow of patients to the hospitals, which has made the medical practitioners' task more challenging. The proposed solution is a system integrated with sensors that will help identify incoming patients quickly for covid symptoms by minimizing the gap and providing data on the health status of the patients. Further to this, captured patient data is processed for doctors' reference with recommended insights on various health parameters. The proposed system ensures to collect the all data-related vitals of patients through an Arduino microcontroller which further, relays the datasets to the cloud. On the cloud, patient data is processed and computed to generate the required analytics and insights on individual patient health status. This processed data is further sent back to a medical practitioner or caretakers as a notification or alert through SMS/ Email in case of any emergencies.

V. REQUIREMENT ANALYSIS

HARDWARE	SOFTWARE
• Arduino Uno. • LM35 Temperature sensor. • Gas sensor. • Pulse sensor. • SPO2 Module. • WiFi module • GSM • LCD • Buzzer	• Arduino IDE

VI. WORKING

The given system transmitting device which comprises of microcontroller and sensors in the form of a wearable device will be wired by the patient. Further to this, sensors will capture the health vitals status and will be computed by Arduino microcontroller. The computed data will be transmitted to the cloud platform using GSM or WIFI technology which is integrated with the device. The doctors are provided with access to a cloud platform i.e ThinkSpeak to monitor the condition of the patients using a desktop or mobile devices. This paper proposes the architecture of an Arduino-based IoT cloud-based health check-up system integrated with health monitoring sensors and GSM/Wifi technology to transmit the data to a centralized platform.

VII. CONCLUSION

Integrated sensor technology is used in areas such as clinic and is very useful in tracking health variation of patients under home quarantine who needs special care. Because of the rapid rise in covid19, there is a lack of ICU units leads to failure in the healthcare sector. The IoT cloud and GSM-based system were developed to detect and isolate the infected person. Specialists staying at a distance can monitor the patient's condition so that the life of the patient can be saved.

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