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A Survey on IOT Based Patient Monitoring System

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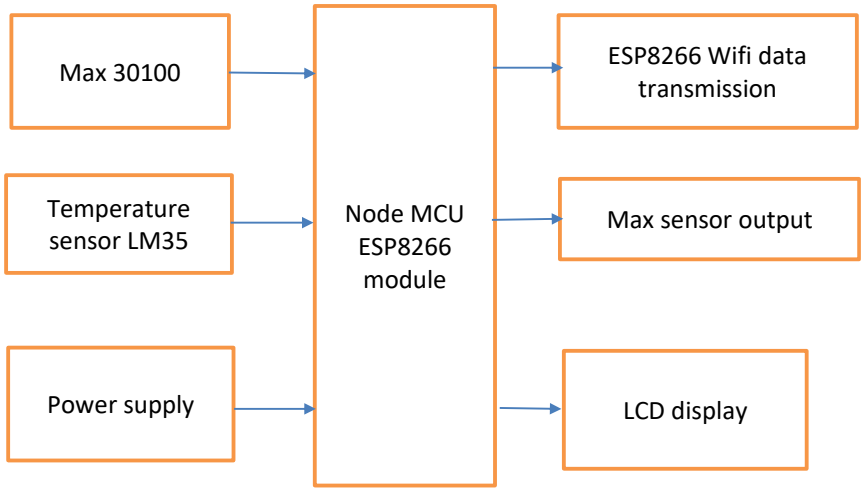
ABSTRACT—

Now-a-days Health-care environment has developed science and knowledge based on Wireless-Sensing node Technology oriented. Patients are facing a problematic situation of unforeseen demise due to the specific reason of heart problems and heart attack. The reason behind this unfortunate situation is the unavailability of good medical services to patients at the needed time. This is for specially monitoring the old age patients and informing doctors and loved ones. So, we are proposing an innovative project to dodge such unpredictable death rates that uses multiple higher accuracy sensors and uses internet to communicate to the doctors and their care takers in case of emergencies. This system uses temperature and heartbeat sensor for tracking patients' health. Both the sensors are connected to the Node MCU ESP8266. To track the patient's health in turn interfaced to a LCD display and wi-fi connection to send the data to the web-server (Wireless sensing node). If the system detects any abnormal changes in oxygen level and pulse rate of patient it given an alert as well as send SMS to the registered doctor number using this proposed project. This system also shows patients' temperature and blood Pressure tracked live data with timestamps over the Internetwork. Thus, by using IoT (Internet of Things) technology this project works very efficiently, and user can take care of their loved once. By monitoring their health conditions periodically.

Keywords—Node MCU, ESP8266, IOT (*Internet of Things****)***

I. Introduction

Our project describes the representation of patient monitoring system is in two ways of Human body temperature monitoring and blood pressure and oxygen rate. The IoT based Patient monitoring system is developed with the use of the hybrid microcontroller named Node MCU ESP8266 Module and MAX30105 sensor. In this practical we use temperature sensors LM35 and body temperature monitoring such as DSB-1800 The main moto of our project was to create a easy and flexible environment for the doctors to monitor the patient with following the norms which were affected during the covid pandemic which also follows the concept of social distancing. Benefits of this project is that this would provide a precise outcome for the details of the patient's health stats and that would be helpful for the nurses and doctors to monitoring and analysis for further medications and provision. Also, this helps for the nurses to keep the record of the patients as earlier it was difficult to do so. With this technology doctors can monitor the patients and also the management technology used in our project for calling the ambulance when the condition is out of control while the patient is in the house is provided in our project we are also into making advance development in our system .Looking moreover into our system it have been looking forward to make more advance use of sensor to make this as a complete patient monitoring system.



II. Literature Survey

The understating of the term "I0T" is to make the use of various flexible environments providing software for the analyzing the data which is transmitted from various electronic and communication devices.

. The initial opinion for the "IoT phase is divided into criteria, specifications and implementation" is comparable to software development overall. The WSN is a significant part of IoT, and it also plays an important role in its healthcare applications. They are known for their high-end and miscellany wireless control systems over other regular devices. Working on the WSN for pulse rates and oxygen saturation was emphasized by *Rotariu and Manta,2012*. On the other hand, ECG and blood pressure sensors mounted on the mobile telephone in 2016. With the IoT approach in the health analogy, the wireless network improves. Tan et al used Wi-Fi technology for its 2012 work in the control area to relay messages on different body functionality, such as blood pressure, pulse rate, body temperature and oxygen saturation.

A. Body Temperature Monitoring

High blood pressure shows the heart pumping through the body powerfully. The method of IoT promotes the diagnosis and treatment of health problems, including blood pressure (BP), hemoglobin (HB), levels of blood sugar and abnormal cell growth. An IoT system for blood pressure, diabetes and obesity treatment.

B. Oxygen Saturation Monitoring System

Oxygen Saturation Monitoring System- Body temperature control and tracking is an essential component in health applications. Homeostasis changes depend on the temperature of the body, based on the m-IoT principle. On the top of an IoT unit, the body temperature control device is centered on the home port. It supports the control and calculation of the temperature infrared detection and RFID module.

Table 1. Medical Application of IoT

C. Maintaining the Integrity of the Specifications

Accessing Technology	***Development Method***	***Merits***	***Demerits***	***Usage***
RHHC [Remote Home Healthcare]	Continua Reference Architecture	Reduce device cost, save time; improve communication, Simplifies complex Task.	Decision making problem, Interrupted information	Chronic diseases management
PAN, LAN-IF	Continua Health Alliance	More Efficient, Cost effective	Low data rate while compare with other network, short range (10M)	Primary Prevention, General wall begin
Body Area Network	Mobile phone-based architecture.	Large scale implementation,256 device per network, Timely medical care	Range (2-5meter), Network density (2-4 m)	Care elderly, Disable person, Diabetics
Wireless Body Area Network	Windowing and learning based technique.	Geographical large area location monitoring.	Low security, complicated and complex task, High cost.	Cardiac, Rehabilitation, Diabetics, Home care chronic
M-IOT	Heterogeneous,3-Tier Structure	Tele treatment services,	Easily deployable, easily prone to hacking	Neurology, Obstetric trauma care, pulmonary medicine

The Pulse oximeter is used to measure oxygen in the blood continuously. The use of IoT with pulse oximetry is useful for technical applications. The benefit of IoT-based pulse oximetry is addressed by CoAP- based health care system studies. This system is wired to Bluetooth and links the sensor directly to Monera. To track remote patients, an IoT-based norm and low-pulse oximeter is used.

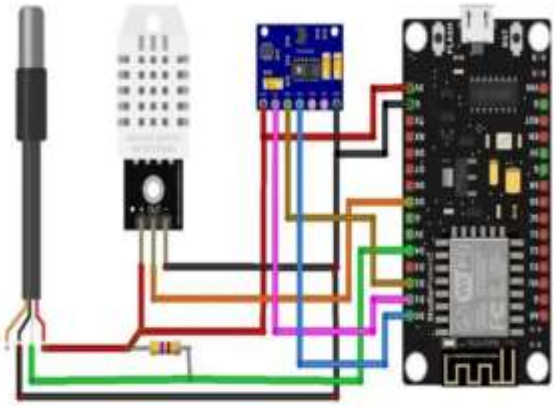
Patel et al. developed an IoT-based remote patient monitoring system for home healthcare. The system utilized wearable sensors to monitor vital signs and collected data through a gateway device. The data were transmitted to a cloud platform, where advanced analytics and machine learning algorithms were applied to detect anomalies and provide personalized healthcare recommendations.

Johnson et al. developed an IoT-enabled smart healthcare system for patient monitoring in hospitals. The system incorporated various sensors, including oxygen saturation and pulse rate sensors, to continuously monitor patients' vital signs. The collected data were securely transmitted to a central monitoring station, where healthcare providers could access and analyze the information in real-time.

Table 2. Comparison of Methodologies used in the survey

References.	***Methodology***	***Advantages***	***Disadvantages***
[1]	Context Model through OWL and SWRL (Semantic Web Rule Language)	Contextual recommendations such as workout routine and healthy eating habits apart from regular monitoring	Recommendations are so general and not personalized for each treatment.
[2]	Monitoring through Smartphone by Indoor Localization Algorithm	Wi-Fi-fingerprints are used to find the location of patients in indoor environment during emergency situation.	Data may not be accurate always due to environmental interference by Wi-Fi-signals.
[3]	Wearable Monitoring devices	Portable and user-friendly	Inaccurate data due to wrong positioning of devices
[4]	K53 Tower System platform	Custom monitoring through single platform of hardware and software	Multiple applications lead to complexity
[5]	IOT with smart devices	Real-time data access and intelligent data integration	Constant updating and upgradation of devices is needed.
[6]	Wellbeing monitoring through Wireless Sensor Network and cloud computing using IoT	Cost efficient technique and ubiquitous monitoring	Not easy to deploy WSN nodes compared to wired networks.
[7]	Health monitoring through Wireless Body Area Sensor Network (WBASN)	Easy addition of new sensors to existing system	Sensors should be low in complexity, small in size, light weight and easy configurable.
[8]	Cipher text Policy Attribute Based Encryption (CP-ABE) for data security	Access based policy towards data protection	Difficult to implement in non-interactive group of networks
[9]	Technology Acceptance Model	Widely recognized technologies to be used for easy access	Adoption of new technologies is difficult to equip with for elders

III. Circuit Diagram



Circuit Diagram

IV. Conclusion

Oxygen levels in patients with COVID-19 decrease over time, and patients can quickly die if immediate action is not taken. In this regard, an IoT-based intelligent health monitoring system has been developed for COVID-19 patients. The system works through an IoT-based application that allows both medical staff and patients to receive alerts from the system in the event of an emergency. so people can effectively use this system anywhere. As the entire system is IoT-based, more advanced features may be added in the future.

It also provides a comprehensive look at the components used in the system and the usefulness of each component. We provide a list of strategies that can be implemented to plan this system. From the very beginning of the development of this system, our goal was to create a well-configured, application-based device that could be used while it was in vogue. The device can be used by people suffering from COVID-19 and many other infectious diseases which affect such as “chronic obstructive pulmonary disease (COPD)” and asthma. Affordable, non-invasive and versatile, the system makes it easy to monitor patient health from anywhere. It also notifies affected individuals and health care providers in real time about situations that require immediate attention. This system will help reduce the number of patients by providing adequate health care in Bangladesh, including rural areas.

Therefore, this system is very important in medicine as it helps to increase the life expectancy of people around the world. In the future, additional sensors may be added to this system to monitor other physiological parameters of the human body.

V. Future Scope

IoT efficiently connects patients, clinics, doctors, and hospitals to organize and coordinate diagnosis and treatment at different locations. During the pandemic, privacy and confidentiality are major concerns for healthcare systems as they traverse unsecured systems. A patient's medical record consisting of personal records, clinical conditions, diagnostic results, and relevant medications. These are considered sensitive data. Hackers can change health-related details. This can lead to misdiagnosis and misdiagnosis of illness, inadequate treatment, and increased the rate of mortality. Medical data transmissions tracked via IoT devices are prone to security concerns.

IoT is one of the major sources collecting vast amounts of data. Due to the vast amount of data collected from patient records, researchers must take care in storing, accessing, transferring, and processing the vast amounts of data generated.

Visualization is needed to provide complex results so that COVID-19 patients can easily use and learn from them. To allow analysis of patient data to be computed as output, or to allow output from statistical analysis to be used and transformed into visualizations. IoT applications include COVID-19 patients frequently transferring data from themselves and other things to the cloud. Such a process quickly drains the battery capacity of both the Mono and the Gateway. Energy efficiency is therefore an important open question in both data processing and transmission.

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