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Remote Patient Health Monitoring System

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Abstract: ***With an improvement in technology and miniaturization of sensors, there have been attempts to utilize the new technology in various areas to improve the quality of human life. One main area of research that has seen an adoption of the technology is the healthcare sector. The people in need of healthcare services find it very expensive this is particularly true in developing countries. As a result, this project is an attempt to solve a healthcare problem currently society is facing. The main objective of the project was to design a remote healthcare system. It's comprised of three main parts. The first part being, detection of patient's vitals using sensors, second for sending data to database and the last part was providing the detected data for remote viewing. Remote viewing of the data enables a doctor or guardian to monitor a patient's health progress away from hospital premises. The Internet of Things (IoT) concepts have been widely used to interconnect the available medical resources and offer smart, reliable, and effective healthcare service to the patients. Health monitoring for active and assisted living is one of the paradigms that can use the IoT advantages to improve the patient's lifestyle. In this project, I have presented an IoT architecture customized for healthcare applications. The aim of the project was to come up with a Remote Health Monitoring System that can be made with locally available sensors with a view to making it affordable if it were to be mass produced. With an improvement in technology and miniaturization of sensors, there have been attempts to utilize the new technology in various areas to improve the quality of human life. One main area of research that has seen an adoption of the technology is the healthcare sector. The people in need of healthcare services find it very expensive this is particularly true in developing countries.***

Keywords: IoT, MCU, Oxygen Level, Humidity

I. INTRODUCTION

The Internet of Things (IoT) concepts have been widely used to interconnect the available medical resources and offer smart, reliable, and effective healthcare service to the patients. Health monitoring for active and assisted living is one of the paradigms that can use the IoT advantages to improve the patient's lifestyle. A Remote Patient Health Monitoring System is an extension of a hospital medical system where a patient's vital body state can be monitored remotely. Traditionally the detection systems were only found in hospitals and were characterized by huge and complex circuitry which required high power consumption. Continuous advancement in the semiconductor technology industry have led to sensors and microcontrollers(MCU) that are smaller in size, faster in operation, low in power consumption and affordable in cost. This has further seen development in the remote monitoring of vital life signs of patients especially the elderly. The aim of the project was to come up with a Remote Patient Monitoring System that can be made with locally available sensors with a view to making it affordable if it were to be mass produced.

II. METHODOLOGY

Remote health monitoring can provide useful physiological information in the home. This monitoring is useful for elderly or chronically ill patients who would like to avoid a long hospital stay. Wireless sensors are used to collect and transmit signals of interest and a processor is programmed to receive and automatically analyse the sensor signals. In this project, you are to choose appropriate sensors according to what you would like to detect and design algorithms to realize your detection. Examples are the detection of a fall, monitoring cardiac signals. Using a single parameter monitoring system an approach to a remote health monitoring system was designed that extends healthcare from the traditional clinic or hospital setting to the patient's home. The system was to collect a pulse detection system data, temperature data and few other parameters.

Design a Remote Patient Health Monitoring System (RPHMS) which has heartbeat detection system, a fall detection system, temperature detection system, a humidity detection system, a toxic gas and air quality detection system and SPO2 detection system. A doctor or health specialist can use the system to monitor remotely of all vital health parameters of the patient or person of interest. During design the following characteristics of the future medical applications adhered:

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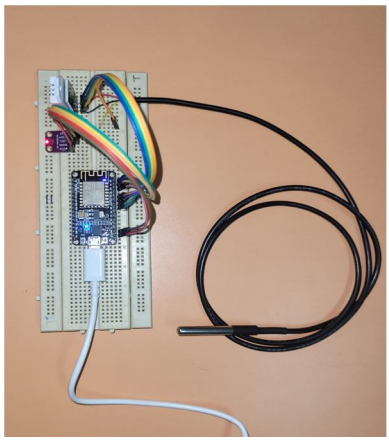


Fig. 1 Implementation of the system

1) Integration with current trends in medical practices and technology
2) Real-time, long-term, remote monitoring, miniature, wearable sensors and long battery life of adesigned device.
3) Assistance to the elderly and chronic patients. The device should be easy to use with minimalbuttons.

III. DESCRIPTION

A Remote health monitoring system is an extension of a hospital medical system where a patient's vital body state can be monitored remotely. Traditionally the detection systems were only found in hospitals and were characterized by huge and complex circuitry which required high power consumption. Continuous advances in the semiconductor technology industry have led to sensors and microcontrollers that are smaller in size, faster in operation and low in power consumption.. This has further seen development in the remote monitoring of vital life signs of patients especially the elderly. The remote health monitoring system can be applied in the following scenarios:

A patient is known to have a medical condition with unstable regulatory body system. This is in cases where a new drug is introduced to a patient. A patient is prone to heart attacks or may have suffered one before. The vitals may be monitored to predict in advance any indication of the body status. Critical body organ situation; the situation leading to the development of a risky life-threatening condition. This is for people at an advanced age and maybe having failing health conditions. In recent times, several systems have come up to address the issue of remote health monitoring. The systems have a wireless detection system that sends the sensor information wirelessly to a remote server. Some even adopted a service model that requires one to pay a subscription fee. In developing countries, this is a hindrance as some people cannot use them due to cost issue involved. There is also the issue of internet connectivity where some systems to operate, good quality internet for a real-time remote connection is required. Internet penetration is still a problem in developing countries. Many of the systems were introduced in the developed countries where the infrastructure is working perfectly. In most cases, the systems are adapted to work in developing countries. To reduce some of these problems there is need to approach the remote detection from a ground-up approach to suit the basic minimal conditions presently available in developing countries.

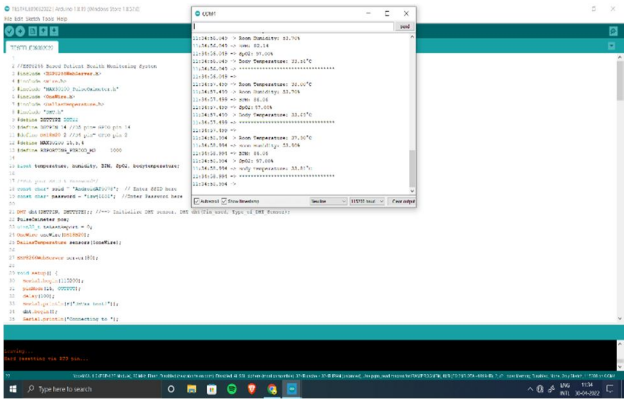


Fig. 2 Output results

Analysis: Working of this project

1) Patients vitals are monitored by the sensors

2) Real-time metrics are visible on the dashboard

3) Sensor takes some time to re-calibrate the patients' oxygen level.

4) Final readings are visible in graphical time-series format in the dashboard.

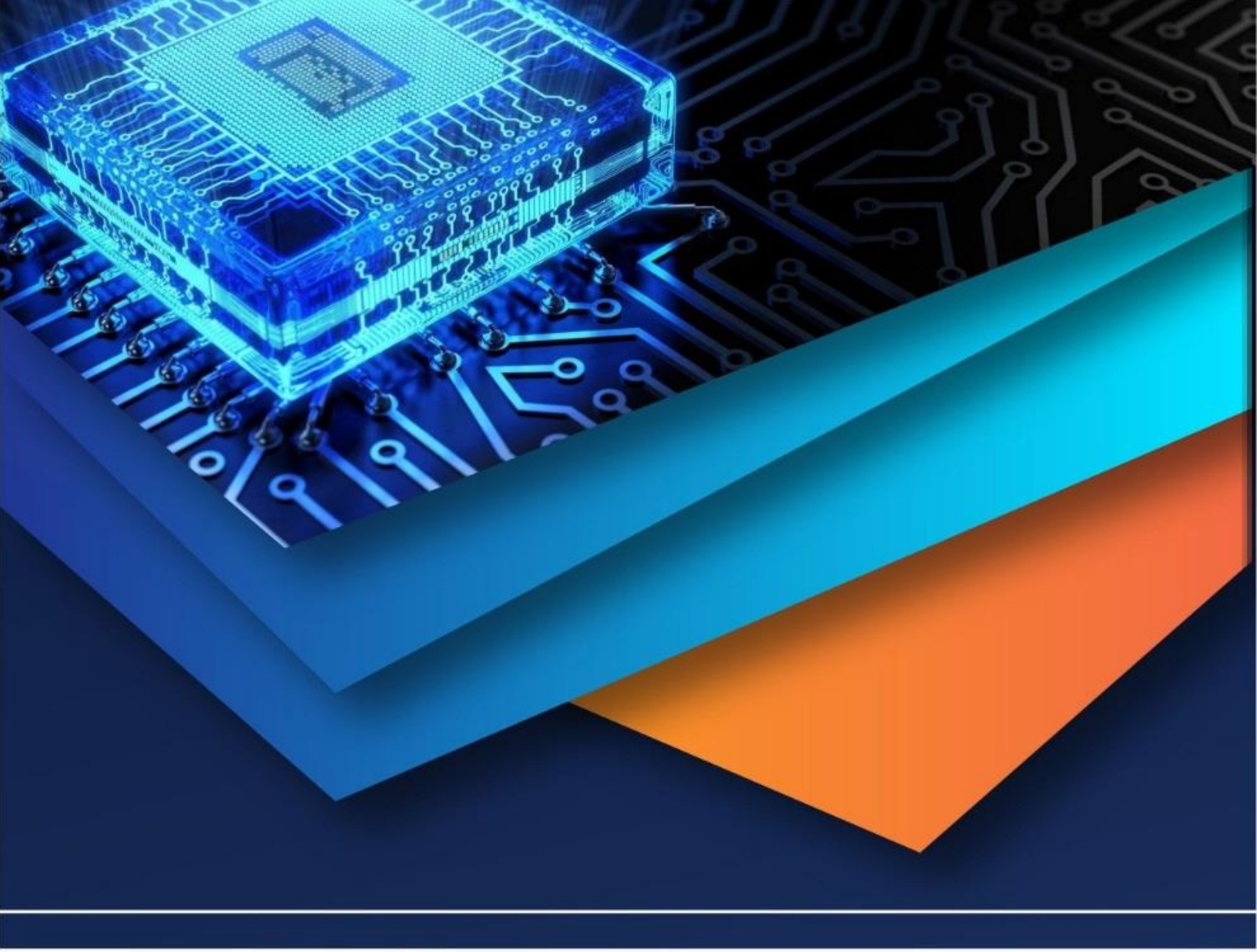
IV. CONCLUSION AND FUTUREWORK

Core objective of our project is to make it easier for the doctors to keep track of their patients' health and gain insights for further medical investigation. This whole phenomenon of digitization will transform our outlook towards health and would help in making patients more aware with regards to their health. Application of Internet of Things (IoT) in health care industry is the next big idea that is relentlessly pursued by major health care providers across the globe. Taking a multi-dimensional approach by monitoring the patient's temperature as well as their oxygen levels, along with the ambient temperature of the room makes the patient report generation quite comprehensive and accurate. As far as further work is concerned, improving the accuracy is of utmost importance for us. We would thrive to improve the accuracy and efficiency of our project.

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