



REMOTE PATIENT HEALTH MONITORING SYSTEM USING IOMT

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Abstract:

Now a days for Emergency cases treatment is very challenging task to the doctor's in physically. This paper addresses the healthcare problem currently the society is facing. The main objective of this project is to design a remote healthcare system. Remote patient health monitoring system is an IoT device which could be used with patients or elderly at our homes whose real time health readings such as temperature, blood pressure and electro-cardiogram could be monitored remotely on a handheld device. This IoT device will automatically send alert to the users in case of an emergency which in this case would be fluctuation of the readings of the sensors beyond the normal range. This device is build using thermometer, electro-cardiogram sensor and sphygmomano meter attached to an arduino which transfer its data to servers using a wifi-module which monitors the diseases like fever, blood pressure, heart related diseases. The servers then compute the data which can be displayed on hand held devices. In case the values received from the sensors is outside the normal range then an

alert will be sent to the user from the doctor remotely.

1.Introduction:

The term IOT was invented by Kevin Ashton in 1999. Based on this another term is invented called IOMT(Internet Of Medical Things). Now a days, giving treatment to the huge number of patients is a big challenging task. So monitoring health conditions physically and frequently is more burden for the health department. In this case, Responding to the patient problem is not much faster which may cause the death of the patient. Before two years back the COVID has encounter to the society which we can't do the treatment for patient physically. Keeping in mind all these situations we wants to design a system that monitors patient health condition remotely by using sensors and microcontrollers which will be helpful for both patient and doctors.

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Previously it is impossible to monitor the patient by doctor in remote areas during critical conditions. So we introduced a method which continuously monitors the patient condition and automatically sends the data to server, so the doctor can access the data continuously and we can intimate caretaker when patient is in critical condition.

In previous methods, monitoring of patient can be done only by using different instruments for different parameters. So, we decided to monitor required conditions of patient by assembling different instruments in a single module. Nowadays IoT is the widely used technology. The growth of internet is tremendous and has been further extended to connecting things through internet. All devices are connected to one another with various smart technologies to create worldwide ubiquitous network called Internet of Things (IoT). We recorded the data of each sensor and uploaded the data into the server. We observed the data on many devices using internet with secured login and password.

The increased use of mobile technologies and smart devices in the area of health has caused great impact on the world. Health experts are increasingly taking advantage of the benefits these technologies bring, thus generating a significant improvement in health care in clinical settings. Likewise, countless ordinary users are being served from the advantages of the M-Health (Mobile Health) applications and E-Health (health care supported by ICT) to improve, help and assist their health.

According to the constitutions of World Health Organization (WHO) the

highest attainable standard of health is a fundamental right for an individual. As we are truly inspired by this, we attempt to propose an innovative system that puts forward a smart patient health tracking system that uses sensors to track patient vital parameters and uses internet to update the doctors so that they can help in case of any issues at the earliest preventing death rates.

Patient Health monitoring using IoT is a technology to enable monitoring of patients outside of conventional clinical settings (e.g. in the home), which may increase access to care and decrease healthcare delivery costs. This can significantly improve an individual's quality of life. It allows patients to maintain independence, prevent complications, and minimize personal costs. This system facilitates these goals by delivering care right to the home. In addition, patients and their family members feel comfort knowing that they are being monitored and will be supported if a problem arises.

Due to IoT-based health monitoring systems, it has become possible for users to get the necessary physiological information while sitting at home. This system has made life easier for elderly patients, as for them, the long way to the hospital can be both difficult and tiring. In this paper, we have chosen some specific sensors to detect certain problems. The system will collect data on the patient's heartbeat, oxygen saturation level, temperature, and other parameters.

Remote patient monitoring (RPM) is a subcategory of homecare telehealth that allows patients to use mobile medical devices and technology to gather patient-generated health



data (PGHD) and send it to healthcare professionals. Common physiological data that can be collected with RPM programs include vital signs, weight, blood pressure and heart rate. Once collected, patient data is sent to a physician's office by using a special telehealth computer system or software application that can be installed on a computer.

RPM is frequently used to help patients that require chronic, post-discharge or senior care. By connecting high-risk patients with remote monitoring, it can notify healthcare organizations of potential health issues or keep track of patient data between visits. Additionally, RPM could be used by businesses that want to record workmen's compensation cases, making sure employees are on the right path to return to work.

Paper Statement:

In the patient monitoring also needs detect emergencies when they occur. Conventional patient monitoring monitors the physiological signals constantly but they are not provided to the medical personal in real time and in some hospital patient monitoring system not use this. The problem found in such hospital is that continuous monitoring of physiological parameters is done for ICU patients, But the monitors are local to the room in which the patient is admitted. Physician has to frequently visit the patient and asses his/her condition by analyzing the measured parameters such as Temperature, Blood pressure, Pulse, Oximeter, ECG and Heartrate which is more difficult to health department. So this project addresses the above problem and provides a solution by implementing RPHM(Remote Patient Health

Monitoring) system which reduces the time, cost and saves the patients life.

Objective:

The main objective is to design a patient Remote Health Monitoring System(RHM) that monitors patient health conditions digitally. Another objective is giving health assistance to the patient's who are in critical stage, persons who are attacked by the covid and older persons. A Remote Patient Monitoring System (RPMS) aims to effectively manage the hospital resources through patient monitoring at home. RPMS is an IoT-based solution for patient monitoring that supports the automatic collection and transmission of patient data to remote databases.

2.Literature Survey:

[1]"A review of remote health monitoring systems" by M. B. Al-Zinati, A. Al-Bayatti, and A. Al-Rashdan (2017): This paper reviews various remote health monitoring systems and highlights the key challenges in designing such systems. The authors propose a framework for designing a remote health monitoring system that takes into account the user requirements, the communication network, and the data analytics.

[2]"IoT-based remote health monitoring systems: a review" by M. M. N. A. Al Mawla and S. S. M. Chowdhury (2020): This paper provides a comprehensive review of IoT-based remote health monitoring systems. The authors highlight the key features of such systems, including the sensors used, the communication protocols, and the data analysis techniques.



[3]"A system for remote health monitoring using IoT" by K. Venkatesan, N. G. Shanmugam, and P. Vengattaraman (2019): This patent describes a system for remote health monitoring using IoT. The system includes sensors for monitoring various health parameters, such as blood pressure, heart rate, and temperature. The sensor data is transmitted to a cloud-based platform for storage and analysis.

[4]"IoT-based wearable device for remote health monitoring" by S. S. Deka and S. S. Medhi (2018): This patent describes an IoT-based wearable device for remote health monitoring. The device includes sensors for monitoring various health parameters, such as heart rate, blood pressure, and oxygen saturation. The sensor data is transmitted to a mobile app for analysis and visualization.

[5]"A smart watch-based remote health monitoring system" by L. Liu and Y. Wang (2018): This paper proposes a smart watch-based remote health monitoring system. The system includes sensors for monitoring various health parameters, such as heart rate, blood pressure, and oxygen saturation. The sensor data is transmitted to a mobile app for analysis and visualization.

[6]"A review of remote health monitoring systems - a review of the literature" by T. J. Istepanian, J. Hu, and Y. H. Philip, in Journal of Telemedicine and Telecare, 2008. This paper provides a comprehensive review of various remote health monitoring systems, including those that use IoT devices.

[7]"IoT-based Remote Health Monitoring System: Design and Implementation" by R.

Sharma and V. K. Singh, in International Journal of Computer Applications, 2017. This paper presents a design and implementation of an IoT-based remote health monitoring system, which can monitor various physiological parameters of patients.

[8]"IoT-Based Remote Patient Monitoring System for Chronic Diseases" by K. S. Sathish Kumar, P. Shanthi, and K. Saranya, in International Journal of Engineering and Technology, 2018. This paper proposes an IoT-based remote patient monitoring system for chronic diseases, which uses sensors to monitor various physiological parameters and sends the data to a cloud server.

[9]"An IoT-based Remote Health Monitoring System using Wearable Sensors" by A. Al-Fuqaha, M. Guizani, M. Mohammadi, M. Aledhari, and M. Ayyash, in IEEE Access, 2015. This paper presents an IoT-based remote health monitoring system using wearable sensors, which can monitor various physiological parameters such as heart rate, blood pressure, and body temperature.

[10]"IoT-enabled remote health monitoring system for elderly care" by N. Khan, N. Javaid, and Z. A. Khan, in Journal of Ambient Intelligence and Humanized Computing, 2019. This paper proposes an IoT-enabled remote health monitoring system for elderly care, which uses wearable sensors to monitor the health status of elderly people and sends the data to a cloud server for analysis.

[11] "Remote health monitoring system based on Internet of Things technology" by Jianjun Li and Honghao Gao (2018). This paper discusses the use of IoT technology for remote

health monitoring and provides an overview of various IoT-based health monitoring systems.

Overall, the literature survey shows that remote health monitoring systems using IoT are gaining popularity due to their ability to provide real-time health data and facilitate remote healthcare services. The key components of such systems include sensors, communication networks, and data analytics techniques.

3. Proposed Methodology:

Define the problem: Clearly identify the problem the remote health monitoring system is intended to solve. This could be monitoring vital signs, tracking medication adherence, or detecting falls, among other potential use cases.

Determine the requirements: Based on the problem definition, determine the requirements for the remote health monitoring system. This includes the types of sensors needed, the data transmission frequency, and the user interface.

Select IoT hardware: Select the appropriate IoT hardware that can meet the requirements of the system. This includes selecting sensors, microcontrollers, and communication modules.

Develop software: Develop the software to process the data received from the sensors and transmit it to the cloud. This includes developing firmware for the microcontrollers, creating a data processing pipeline, and building a cloud-based data storage and analysis platform.

Implement security: Implement security features to protect the data transmitted from the IoT devices. This includes encryption, authentication, and access control.

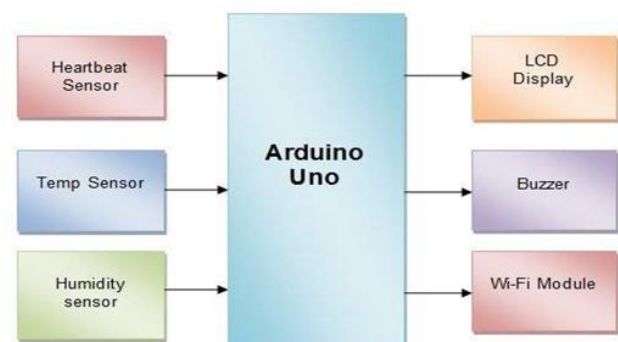
Develop user interface: Develop an intuitive and user-friendly interface for users to interact with the system. This could be a mobile application, a web application, or both.

Obtain patents: File patents for the novel aspects of the remote health monitoring system. This could include the hardware, software, and user interface components.

Deploy and maintain: Deploy the system in the intended environment and provide ongoing maintenance and support. This includes software updates, hardware replacement, and troubleshooting.

Overall, the development of a patient remote health monitoring system using IoT requires careful planning and execution to ensure that it meets the needs of the users and provides a unique solution to the problem.

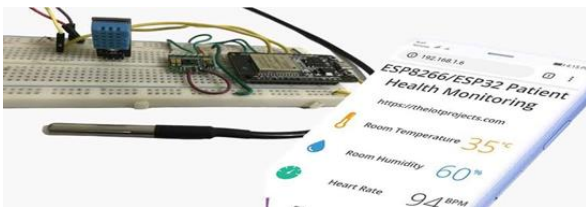
3.1 Methodology:



In this paper we are going to build a RHM(Remote Patient Health Monitoring System)using IOMT. Firstly we will attach the sensors to the patients body namely

MAX30100102 pulse oximeter, DS18B20 Temperature Sensor and DHT11 Humidity and Temperature which collects the data from the patient. Thereafter the data is sent to the thing speak platform using the HTTP protocol. There the data will be processed and analyzed for remote viewing. And along with readings it also generates the unique IP address, by typing that IP address any person or doctor can monitor the patient's health conditions remotely.

4.Result:



This paper monitors or tracks the patient health parameters like body temperature, room temperature, room humidity, pulse of the person remotely, which is more helpfully for patient.

5.Conclusion:

Remote Patient Monitoring Systems combined with professional medical devices are feasible, effective, and safe for the purpose of improving post operative outcomes. Finally this project monitors the health conditions of patient remotely. Remote Patient Monitoring systems are especially useful because they let the patients live their life while at the same time afford constant medical attention. The need for visiting the clinic/doctor is pushed to only deserving cases. Offline or online RPM devices are effective patient companions at all times. RPM systems can be used by even seemingly healthy people who may foresee health problems in the future. RPM systems

will continue to evolve with increasing awareness, utilization and improving technologies.

6.Future Scope:

The future scope for patent remote health monitoring systems using IoT is significant. As technology continues to advance and become more accessible, remote health monitoring systems are likely to become even more prevalent and sophisticated. Some potential areas for future development and innovation include:

Artificial intelligence (AI) and machine learning (ML): Incorporating AI and ML into remote health monitoring systems can improve the accuracy of data analysis, enable predictive modeling, and support personalized care.

Wearable technology: The use of wearable devices such as smartwatches, fitness trackers, and medical-grade wearables can enhance the data collection process and provide real-time monitoring of health parameters.

Integration with electronic health records (EHRs): Integrating remote health monitoring systems with EHRs can facilitate seamless data transfer between healthcare providers, improve communication, and support more informed decision-making.

Remote patient monitoring for chronic conditions: Remote health monitoring systems can support patients with chronic conditions by providing continuous monitoring and early intervention, reducing the risk of complications and hospitalization.



Blockchain technology: Incorporating blockchain technology into remote health monitoring systems can improve data security, privacy, and interoperability.

User experience design: User experience design can play a critical role in the success of remote health monitoring systems by ensuring that they are easy to use, engaging, and meet the needs of the users.

Overall, the future of patent remote health monitoring systems using IoT is likely to be characterized by ongoing innovation and refinement, as well as increasing adoption and integration with other healthcare technologies and services.

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