VIRTUAL CARE TAKER-ONLINE PATIENT MONITORING SYSTEM

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ABSTRACT

Every human is busy in their own scheduled life, whether to take care of themselves or their families. Humans are facing a problem of unexpected deaths due to lack of medical care at the right time. The aim of this project is to monitor a patient without any presence of a guardian, it is also used for the patients who are living away from their families or guardians.

Technology plays the major role in healthcare not only for sensory devices but also in communication, recording and display device. It is very important to monitor various medical parameters and post operational days. Hence the latest trend in healthcare communication method using IOT is adapted. Internet of things serves as a catalyst for the healthcare and plays prominent role in wide range of healthcare applications.

The Arduino picks up the sensor data and sends it to the network through GSM and hence provides real time monitoring of the health care parameters for doctors. The data can be accessed anytime by the doctor. The Arduino is also connected with buzzer to alert the caretaker about variation in sensor output. But the major issue in virtual care taker-online patient monitoring system is that the data as to be securely transmitted to the destination end and provision is made to allow only authorized user to access the data.

At the time of extremity situation alert message is sent to the doctor through GSM module connected to the controller. Hence quick provisional medication can be easily done by this system. This system is efficient with low power consumption capability, easy setup, high performance and time to time response.

The fundamental element of people's needs is health. Humans face a haul of surprising death and plenty of diseases because of varied diseases that are a result of lack of treatment to the patients at right time. The main objective of this project is to develop a reliable sensible patient health observance system victimization IoT so the attention professionals will monitor their patients. The sensors will be either worn or be embedded into the body of the patients, to unendingly monitor their health. The knowledge collected in such a fashion will behold on, analysed, and well-mined to try and do the first prediction of diseases.

A mobile device-based attention observance system is developed which may offer period on-line data regarding physiological conditions of a patient primarily consists of sensors, the information acquisition unit, Arduino, and programmed with code. The patient's temperature, heartbeat rate, pressure level, graph knowledge square measure monitored, displayed, and hold on by the system and sent to the doctor's and patient's mobile containing the appliance.

The healthcare landscape is continuously evolving, and with the advent of Internet of Things (IoT) technology, remote patient monitoring has become increasingly feasible and efficient. This paper proposes a novel approach termed "Virtual Caretaker" for online patient monitoring, leveraging IoT devices and cloud-based platforms to provide real-time healthcare support and supervision.

The Virtual Caretaker system comprises a network of interconnected IoT devices, including wearable sensors, smart home devices, and medical instruments, all designed to collect comprehensive data about the patient's health status and environmental conditions. These devices are seamlessly integrated into the patient's daily life, ensuring minimal disruption while maximizing data accuracy and availability.

Overall, the Virtual Caretaker system represents a paradigm shift in healthcare delivery, offering a scalable and cost-effective solution for remote patient monitoring and management. By harnessing the power of IoT technology and cloud computing, this innovative platform has the potential to revolutionize the way healthcare is delivered, improving outcomes, enhancing patient experience, and reducing the burden on healthcare systems worldwide.

1. INTRODUCTION

The primary goal of this project is to develop a smart patient health monitoring system in such a way that we can get all the necessary and detailed information of the disease. The proposed system measures the body temperature, pulse rate and ECG data. Health is

always a major concern in every growth the human race is advancing in terms of technology. Like the recent corona virus attack that has ruined the economy of China to an extent is an example how health care has become of major importance. In such areas where the epidemic is spread, it is always a better idea to monitor these patients using remote health monitoring technology.

Remote Patient Monitoring arrangement empowers observation of patients outside of customary clinical settings (e.g. at home), which expands access to human services offices at bring down expenses. The fundamental element of people's needs is health. Humans face a haul of surprising death and plenty of diseases because of varied diseases that are a result of lack of treatment to the patients at right time. The main objective of this project is to develop a reliable sensible patient health observance system victimization IoT so the attention professionals will monitor their patients.

In today's social insurance framework for patients who stays in home during post operational days checking is done either via overseer/ medical caretaker. Ceaseless observing may not be accomplished by this system, on the grounds that anything can change in wellbeing parameter inside of part of seconds and amid that time if guardian/attendant is not in the premises causes more noteworthy harm. So, with this innovation created period where web administers the world gives a thought to add to another keen health awareness framework where time to time constant checking of the patient is accomplished.

OBJECTIVES

- To develop a reliable patient health monitoring system.
- To measure the body temperature, heartbeat rate and ecg.
- To design a system to store patient data.
- To do analysis of collected data of sensors.
- To get health related information in understandable format.

SCOPE OF THE PROJECT

This project will help in monitoring the patient's health which will be helpful for doctors and patients both. It will help in reducing and early prediction of disease. The core objective of this project is the design and implementation of a smart patient health tracking system that uses Sensors to track patient health and uses internet to inform their loved ones in case of any issues.

The objective of developing monitoring systems is to reduce health care costs by reducing physician office visits, hospitalizations, and diagnostic testing procedure. Each of our bodies utilizes temperature and also pulse acknowledging to peruse understanding wellbeing.

In this manner IOT set up tolerant wellbeing following framework viably utilizes web to screen quiet wellbeing measurements and spare persists time. 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 and out of them. Likewise, countless ordinary users are being served from the advantages of the MHealth (Mobile Health) applications and E-Health (health care supported by ICT) to improve, help and assist their health. Applications that have had a major refuge for these users, so intuitive environment.

The Internet of things is increasingly allowing to integrate devices capable of connecting to the Internet and provide information on the state of health of patients and provide information in real time to doctors who assist. It is clear that chronic diseases such as diabetes, heart and pressure among others, are remarkable in the world economic and social level problem.

The aim of this article is to develop an architecture based on an ontology capable of monitoring the health and workout routine recommendations to patients with chronic

diseases. Through connected devices, it becomes easy for doctors and physicians to monitor patients' health. Also, real-time monitoring can save lives in a medical emergency like diabetic attacks, heart failure, asthma attacks, etc.

By means of a smart medical device connected to the smartphone app, collecting medical and other required health data will not be challenging. IoT devices collect and transfer health data like- blood pressure, oxygen, and blood sugar levels, weight, and ECGs.

By using IoT enabled devices, doctors can monitor patients in real-time. Thus, the process of real-time monitoring at distinct places can help patients cut down not-so-necessary visits to doctors, hospital stays and re-admissions. Devices like Audemix reduces manual work which a doctor has to do during patient charting. The device is powered by voice commands and also captures the patient's data. While doing so, it makes the patient's data accessible for review.

2. LITERATURE SURVEY

- Patient-Monitoring Systems, Reed M. Gardner & M. Michael Shabot, Year 2014To meet the increasing demands for more acute and intensive care required by patients with complex disorders, new organizational units—the ICUs—were established in hospitals beginning in the 1950s. The earliest units were simply postoperative recovery rooms used for prolonged stays after open-heart surgery. Intensive-care units proliferated rapidly during the late 1960s and 1970s.

- The types of units include burn, coronary, general surgery, open-heart surgery, pediatric, neonatal, respiratory, and multipurpose medical-surgical units. Today there are an estimated 75,000 adult, pediatric, and neonatal intensive care beds in the United States. IoT-Based Health Monitoring System for Active and Assisted Living, Ahmed Abdel Gawad, School of Engineering and Technology,

Central Michigan University, Mt. Pleasant, MI 48859, USA, Year 2017.

- The Internet of Things (IoT) platform offers a promising technology to achieve the aforementioned healthcare services, and can further improve the medical service systems IoT wearable platforms can be used to collect the needed information of the user and its ambient environment and communicate such information wirelessly, where it is processed or stored for tracking the history of the user.

- Such a connectivity with external devices and services will allow for taking preventive measure (e.g., upon foreseeing an upcoming heart stroke) or providing immediate care (e.g., when a user falls down and needs help). Recently, several IoT systems have been developed for IoT healthcare and assisted living applications. IOT based health monitoring systems, Nayna Gupta & Sujata Pandey, Year 2012.

- In this fast pace world, managing work and health simultaneously have become a matter of concern for most of the people. Long waiting hours at the hospitals or ambulatory patient monitoring are well known issues. The issues demand for a health monitoring system which can monitor the daily routine.

- The study of "IoT" was comprehensive and montages relations and constraints. The main goal of "IoT" is to ensure that, in conjunction with "electronic sensor" devices, Internet-based communications and the sending and reception of information are conventionally accessible.

- In a report "28.4 billion IoT users in 2017 and by 2020 they are going up to 50.1 billion" remained the result of one report. "IoT", according to scientific charity, provides a range of services. "Wi-Fi, mobile phone, NFC, GPS etc." is continuity of contact.

- According to Mohammed (2015) the key distribution is required to secure the e-health applications. A protocol for key management which allows the captured data to be transferred in a secured channel was proposed. An IoT

deployment in healthcare needs more security because the data of any patients is more sensible and it should not be misused by any bad elements in the society.

• Rohan Tabish et al (2014) Application saves readings from the sensors into a file that can be downloaded by a remote server using a free Cloud service such as Ubuntu.

• Debiao and Sherali (2016) discussed the security requirements and authentication schemes for RFID based on elliptic Curve Cryptography (ECC).

• Systematic and professional testing methods should be carried out. The designs should always be taken into account for any failure, and the designs chosen should be demonstrated to be durable over time. While Saini et.al developed its healthcare system, the consumer was the subject of the study: the programmed specifications used a basic design methodology similar to typical software development courses.

• 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 in 2012. Yuehong etc., on the other hand, and ECG and blood pressure sensors mounted on the mobile telephone in 2016.

• With the IoT approach in the health analogy, the wireless network improves, he said. 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. J.J.R. and Wannenburg. Bluetooth was introduced into the smart phone by Malekianc to track patients further.

• Tao et. al (2009) developed a wearable sensor system to monitor the movements of the patients. The system was calibrated to a threshold level less than 5percent with the aim of minimizing the error rate of the captured data. Stefano et. al (2012) proposed a detection system to monitor the movements of patients which recognizes a drop and automatically sends a request for help to the care takers.

• Gennaro et. al (2012) developed a personal health diagnosis based on the symptoms of the patient. A huge amount of collected data is used to analyze the disease and risk of the patients. Franca et. al (2012) has discussed that the innovations of the new generation systems are the development of continuous monitoring features for the patient and the improvement of workflows and productivity of medical personal. There has been emphasize on the various wireless technologies and the advantages of using those technologies for faster communication. eHealth Service Support in IPv6 Vehicular Networks by Imadali S et al (2012).

• This paper provides an IPv6 vehicular platform which integrates e-Health devices and allows sending captured health-related data to a Personal Health Record (PHR) application server in the IPv6 Internet. Security is a key concern in the IoT devices management. The four identified security requirements are (i) Secure authentication and authorization, (ii)Secure bootstrapping of objects and transmission of data, (iii)Security of IoT data, (iv)Secure access to data by au- theorized persons.

• Jieranet. al (2012) developed a RFID technology and intelligent systems, which detects the disinfected articles and alerts the medical staff to wash the hands after the contact with the disinfectant articles. IoT techniques can be used to promote healthcare in a better way.

3. EXISTING SYSTEM

● The system used before in health observance is that the fastened observance system, which might be detected only the patient is within the hospital or bed. It takes abundant time for

doctors additionally as patients. within the existing system, the patient has to get hospitalized for normal observance or routine medical.

● The systems are mensuration the health parameter of the patient and send by it through totally different platform like Bluetooth protocol many more.

● These are used for under short-range communication to transfer the information. The doctor cannot fetch all the small print in the slightest degree times.

We all are ware that in hospital, either the nurse or the doctor has to visit physically from one person to another for checkups and monitoring the conditions of patient, which is not possible to monitor their conditions continuously. Thus, any critical situations cannot be found easily unless any doctor or nurse checks the person's health at that moment. This can be a hectic for the doctors who have to take care of a lot number of patients in the hospital.

4. PROPOSED SYSTEM

Our proposed system continuously monitoring patient's vital signs and sense abnormalities. The monitored data is shared with the medical staff. Upon encountering any abnormalities, the system can send alerts to the medical staff about the abnormal parameter. Thus, it can reduce the need for manual monitoring which currently is done by the medical staff. Our proposed system sends the data from sensors to android application.

The application of IoT in the healthcare industry enables the automation of time-consuming activities that previously allowed human mistake. For instance, many hospitals today use networked equipment to regulate the temperature and airflow in operating rooms.

1. Reduced Errors – IoT allows for the accurate collection of data, automated workflows and minimized waste, but most importantly it reduces the risk of error.

2. Decreased costs – With IoT, patient monitoring can be done in real-time, drastically cutting down the need for doctors going out and making visits. Connected home care facilities will help to reduce hospital stays and readmissions of the patients.

3. Better patient experience –A connected healthcare system creates an environment that meets each patient's needs. Dedicated procedures, enhanced treatment options and improved diagnosis accuracy make for a better patient experience.

4. Quick proper treatment – With real-time data healthcare providers can continuously monitor patients. This means that they can spot and provide quick treatment to any of the serious patients in time

5.Homecare – Patients can be monitored in the convenience of their own homes using M2M. To the patient, sensors are attached to various medical devices, such as heart rate monitors. Data collected is sent to the hospital where a qualified member of staff analyses it for any abnormalities.
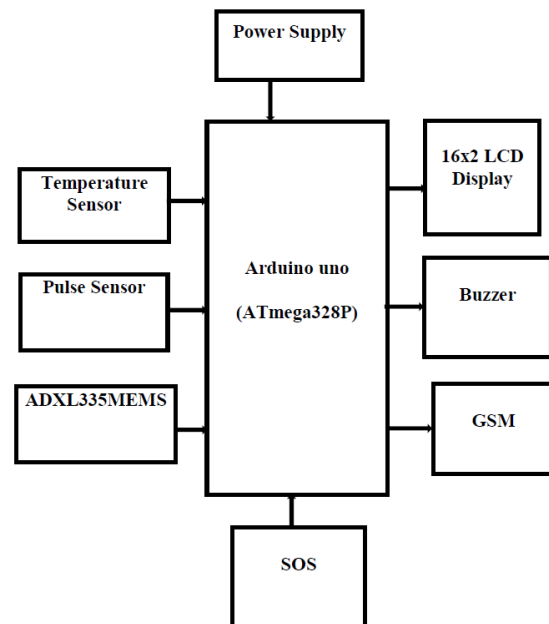
There are mainly two parts of the system, one transmitter and the other one is receiver. In the transmitter, we have heart beat sensor and the other temperature sensor. All the sensor are

connected to the patient. The microcontroller monitors all the system in the transmitter if any abnormality in the patient's condition, then it sends the signal so that the receiver will capture the signal and will work according to that.

5. RESULTS

Here in this project, we will make a virtual care taker-online patient monitoring system
which records the patient heart beat rate and body temperature. And also send an SMS alert to the caretaker and doctor whenever those readings go beyond critical values.

Fig. 5.1 System Stable

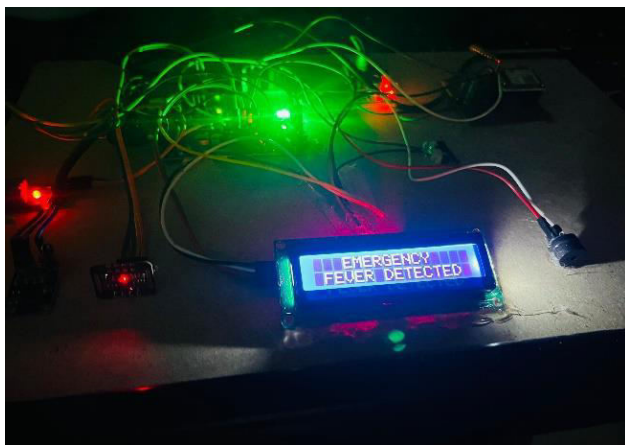If the system is stable it displays "SYSTEM STABLE".

Fig. 5.2 Fever Detected

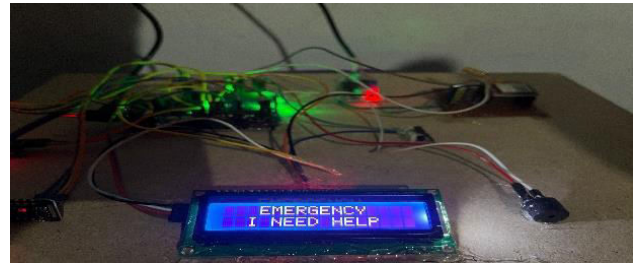If the temperature is high, it gives message "FEVER DETECTED".

Fig. 5.3 I Need Help

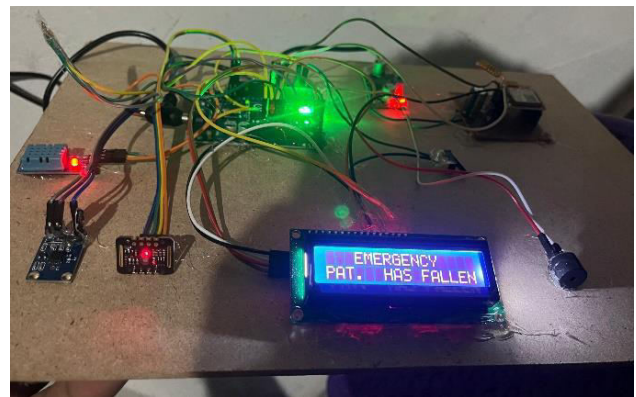If the patient press SOS button it gives message "I NEED HELP".

Fig. 5.4 Patient has Fallen

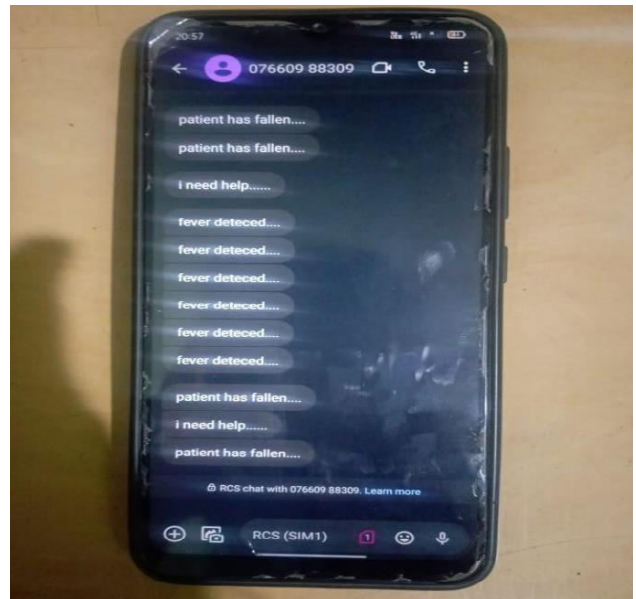If the patient is moving it gives message "PATIENT HAS FALLEN".

Fig. 5.5 SMS alert

It also sends an SMS alert to the caretaker and doctor whenever those readings go beyond critical values.

6. CONCLUSION

This project designed and implemented a virtual caretaker-online patient monitoring system using sensors and Arduino board. The system monitored body temperature, pulse rate and room humidity and temperature using sensors, which are also displayed on an LCD. These sensor values are then sent to a medical server using wireless communication. With the values received the doctor then diagnose the disease and the state of health of the patient. During extreme conditions to alert the doctor warning message is sent to the doctor's cell phone through GSM modem connected and at the same time the buzzer turns to alert the caretaker.

All the individual modules like Heartbeat detection module, fall detection module etc. and remote viewing module gave out the intended results. The designed system modules can further be optimized and produced to a final single circuit. More important fact that came up during project design is that all the circuit components used in the remote health detection system are available easily.

The Future work of the project is very essential in order to make the design system more advanced. In the designed system the enhancement would be connecting more sensors to internet which measures various other health parameters and would be beneficial for patient monitoring i.e. connecting all the objects to internet for quick and easy access.

REFERENCES

[1]   Tae-Yoon Kim, Sungkwan Youm, Jai-Jin Jung, Eui-Jik Kim Multi-hop BAN Construction for Healthcare IoT" 2015 International Conference on Platform Technology and Service, P.P 978-1-4799-1888-1/15

[2]   Boyi Xu, Li Da Xu, Senior Member, IEEE, Hongming Cai, Cheng Xie, Jingyuan Hu, and Fenglin Bu "Ubiquitous Data Accessing Method in IoT-Based Information System for Emergency Medical Services" IEEE TRANSACTIONS ON INDUSTRIAL INFORMATICS, VOL. 10, NO. 2, MAY 2014, P.P 1551-3203.

[3]   Debiao He and Sherali Zeadally "An Analysis of RFID Authentication Schemes for Internet of Things in Healthcare Environment Using Elliptic Curve Cryptography" IEEE INTERNET OF THINGS JOURNAL, VOL. 2, NO. 1, FEBRUARY 2015, P.P 2327-4662.

[4]   Vandana Milind Rohokale, Neeli Rashmi Prasad, Ramjee Prasad "A Cooperative Internet of Things (IoT) for Rural Healthcare Monitoring and Control" 2011 Center for TeleInFrastuktur, Aalborg University, Denmark, P.P 978-1-4577-0787-2/11.

[5]   Charalampos Doukas, Ilias Maglogiannis "Bringing IoT and Cloud Computing towards Pervasive Healthcare" 2012 Sixth International Conference on Innovative.

[6]   All the base stations of a cellular network are connected to a base station controller (BSC) which is responsible for managing distribution of the resources. The system consisting of the base station controller and its connected base stations is called the Base Station Subsystem (BSS).

[7]   Koji Takahashi, Hirofumi Sakai, Kunihito Nagayama, Akihito Baba, Kenji Makihara, Tanemesa Asano, Vaporization and nucleation on microheater in microchannel with nozzle, AIAA Thermophysics Conference, 35th, Anaheim, CA, June 11-14, 2001, AIAA Paper 2001-3075).

[8]   http://microcontrollershop.com/product_info.php?products_id=1078

[9]   http://ieeexplore.ieee.org/Xplore/login.jsp?url=http%3A%2F%2Fieeexplore.ieee.org%2Fiel5%2F30%2F4560070%2F04560131.pdf%3Farnumber%3D4560131&authDecision=-203