Journal of The Gujarat Research Society
ISSN: 0374-8588
Volume 21 Issue 13, December 2019

Monitoring of Smart Hospital via IoT

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ABSTRACT: ***The Internet of Things (IoT) has large applications in the healthcare field. Increasing concern of public health day to day there is a need to monitor various health parameters on a daily basis, maintaining good health is very important for every human being. This research paper discusses Smart hospitals based on IoT for monitoring various health parameters such as body temperature, level of oxygen in blood, pulse rate and many more important health parameters on a daily basis as well as hospital management. The proposed device is designed with the help of various sensors to measure these parameters remotely with the help of GSM module. These sensors are connected to a microcontroller which transmits data wirelessly via GSM module on the doctor or medical staff smartphone or IP address to which devices are assigned. The output obtained from various sensors are stored in the database to which device is assigned, over a period of time. After successful completion of various parameter measurements, the output results are compared with the threshold for each parameter. If the compared results are not as satisfactory, then a summary with confirmed symptoms is displayed on user mobile. This summary can be uploaded on the cloud for consulting a remote doctor.***

KEYWORDS: ***Arduino, Hospital, Sensor, IoT, GSM module, Smart Operation, Patient Convenience.***

INTRODUCTION

Information and Communication Technologies (ICT) solutions for modern healthcare systems are continuously growing worldwide. Recent years have seen a growing interest in wearable sensors and today many devices are commercially available for personal health care and fitness. In addition to existing smart medical devices, researchers have also considered applications of such technologies for long-term tracking, management and therapeutic access to physiological information for patients in remote health monitoring systems. Based on current technological trends, one can readily imagine a time in the future when your routine physical examination is preceded by a two–three day period of continuous physiological monitoring using less expensive wearable sensors. The work developed in this paper focuses on the study and the development of an intelligent patient monitoring system in the medical environment. Indeed, one of the specialized sections of a hospital that are Intensive Care Units (ICU) are of great importance because of the seriousness of the health status of patients staying and therefore need special attention.

The medical field is the backbone of any country. When it comes to health care, medical science plays a significant role. When it comes to providing the patient the best form of quality treatment when they are in the hospital, technology is fantastic. In the old days, physicians or nurses can only manually interact with patients, creating errors[1]. These errors are now dramatically decreasing with electronic health systems. Statistics have shown that

both nursing errors and improved patient care have been minimized with the use of electronic health systems. Developing an advanced healthcare monitoring system based on IoT shown in figure 1, various parameters need to be considered, such as availability of data, reliability, consistency & cost effectiveness. The most important parameter is real time data which needs to be well supported during working hours by the healthcare monitoring systems which monitor the health of people. More important, when authorized medical staff observes symptoms of patients, at that particular time the health parameter of the patients have to be refreshed with high frequency which helps the doctor's platform update continuously. Microcontrollers collect the data from various sensors and then transfer the data wirelessly with the help of a GSM module[2].

Proposed health Monitoring System Based on IoT using microcontroller used to collects information of patients with the help of various sensors. The proposed system uses GSM modules to transfer these collected information to the internet [6].

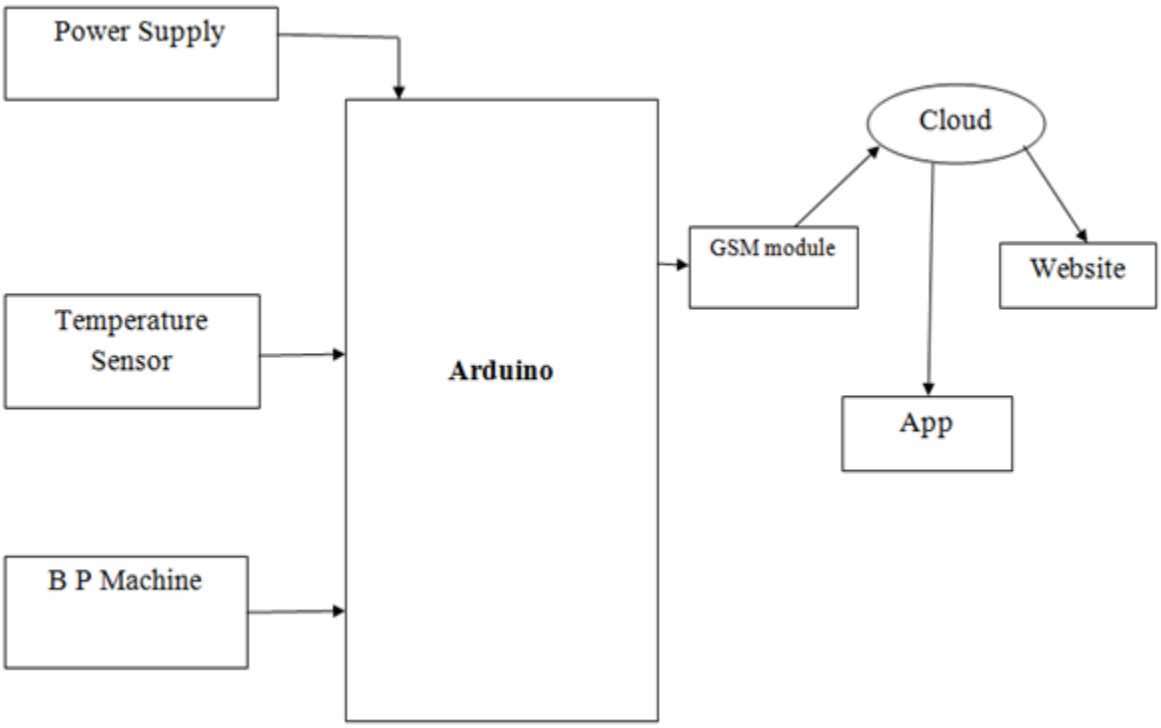

Fig 1:Block diagram of ICU Monitoring System

LITERATURE REVIEW

Technology based on IoT is important when it comes to giving the patient the best type of medical facility care when patients are in the hospital. Previous days authorized doctors or nurses used to communicate with patients manually which causes mistakes. Now with the help of electronic health monitoring systems these manual mistakes can be overcome. Statistics surveys have shown that using electronic health monitoring systems has lowered manual mistakes made by medical staff such as nurses, doctors or patient care persons.

Electronic healthcare monitoring systems are changing rapidly in the global market. Many Societies are concerned with medical issues, missing patient data from records & many more.

There are various ways to apply IoT in healthcare industry:

Out-patient Monitoring

Out patient monitoring allows doctors to observe various health parameters and suggest the patients remotely, which limits the visit of patients in hospital, patients should need to visit after a long interval? This proposed system helps hospitals to manage resources efficiently & subsequently at the same time provide increase in revenues by providing excellent treatment to patients. An advanced healthcare monitoring system helps the doctor to regularly monitor the patient and provide guidance at regular intervals.

Clinical Care

Patients who are hospitalized require intensive observation & can be monitored regularly with the help of IoT. Various Sensors are used to collect various parameters related to health care & use GSM technology to examine various parameters.

Monitoring of Patient Remotely

Monitoring of Patient Remotely technique uses digital technologies to collect medical information & other parameters related to health from individual patients & electronically transfer this information to the particular hospital to which the system is connected. Monitoring of patients remotely can help to bring down the number of hospital return time and long queues to meet the doctor in the hospitals.

Device Monitoring

Healthcare monitoring systems linked with IoT can generate notification when there is any problem with the proposed system functioning which will prevent the system from executing its functions not properly and avoid wastage of patient time[2].

One more problem is that hospital caretakers or nurses need to visit patient’s rooms continuously to check patient conditions. This affects patients' sleep. In critical condition maximum sleep and rest is necessary for the patients. Also, frequently visiting patients' rooms by nurses and caretakers is disturbing their own health by increasing workload. The main benefit of remote health monitoring systems is to lead a normal life even though the patients are under continuous health monitoring. Generally, the remote health monitoring system is used to monitor the fall detection of elderly people, heart diseases patients, neurological diseases and diabetic patients. The sensors or devices such as accelerometer, respiration rate sensors, t-shirt with embedded sensors and camera, wireless body sensors, AMPED sensors, defibrillator device, pulsometer and pedometer, textile based autonomous nervous system are attached to the patient’s body to acquire vital signals and the acquired signals are being processed (amplification, filtering, marketization) according to the communication network.

Then the processed data is transmitted to the central server for storage and analysis. The doctors are able to check patient's health condition by using graphical user interface.

CONCLUSION & DISCUSSION

An overview of some significant IoT applications has been studied in the fields of military, solid waste management, smart metering, healthcare, transport, vehicular systems, precision farming, pilgrimage monitoring, customer asset tracking, home automation, disaster monitoring, environmental monitoring, smart grid monitoring and surveillance. IoT may be used eminently in other areas, aside from these applications. Smart hospitals based on IoT have been designed successfully. This project is energy efficient as in this project the arduino board is being used having a microcontroller which has low power consumption. Users do not need to manually turn ON or turn OFF the switch of electrical equipment. It is possible to control the switch remotely with the help of the mobile application. This proposed system is also not time consuming. Status of a patient's health can be monitored remotely from location. It is a user -friendly system as well as maintenance of this project is cost efficient.

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