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Patient Centric Wireless Health Monitoring System

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Abstract

The system proposed here contains a variety of medical tools such as sensors and web-based applications or applications that connect to network devices and help monitor and record patient health data and medical information. Remote health caring of patient reception is increasing with the recognition of assorted nature of mobile devices that has developed to enable remotely caring. The cloud also as IoT (Internet of Things) and therefore the mobile technologies make it easier to observe the patient health conditions by sharing the health information to health care teams like doctors, nurses and specialists.

However, the guardians of the patients are often anxious about their patients after they are in work. By ensuring guidance awareness about the patients, it can bring more liability of the hospital management. We've got demonstrated a health care system for hospital management to permit guardians together with doctors to remotely monitor health conditions of patients via internet. Remote monitoring and guidance awareness by sharing information in a much authenticated manner are the most focus.

Keywords: *Internet of Things, IoT in Healthcare, Patient Monitoring, Arduino uno, Smart Health Monitoring.*

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INTRODUCTION

Recent years have seen a rising interest in wearable sensors and today several devices are commercially available for personal health care, fitness, and activity awareness. In addition to the niche recreational fitness arena catered to by current devices, researchers have also considered applications of such technologies in clinical applications in remote health monitoring systems for future recording, management and clinical access to patient's physiological information. Based on current technological trends, one can readily imagine a time within the near future when your routine physical examination is preceded by a two–three day period of continuous physiological monitoring using inexpensive wearable sensors. Over this interval, the sensors would continuously record signals correlated along with your key physiological parameters and relay the resulting data to a database linked along with your health records. After you show up for your physical examination, the doctor has available not only conventional clinic/lab-test based static measurements of your physiological and metabolic state, but also the much richer longitudinal record provided by the sensors.

Using the available data, and aided by decision support systems that even have access to an oversized corpus of observation data for other individuals, the doctor can make a much better prognosis for your health and recommend treatment, early intervention, and life-style choices that are particularly effective in improving the quality of your health. Such a disruptive technology could have a transformative impact on global healthcare systems and drastically reduce healthcare costs and improve speed and accuracy for diagnoses.

Technologically, the vision presented within the preceding paragraph has been feasible for a few years now. Yet, wearable sensors have, thus far, had little influence on this clinical practice of medication. During this paper, we focus particularly on the clinical arena and examine the opportunities afforded by available and upcoming technologies and so the challenges that must be addressed so on permit integration of these into the practice of medication.

The major aim of the paper can be summarized as following:

- To obtain the real-time medical information about a patient via IoT.

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- Processing and classification of information gathered about the patient.

- To provide Internet of Things based healthcare solutions at anytime and anywhere.

- This system is to be available at reasonable prices.

BACKGROUND STUDY

Remote health monitoring system is an extension of the medical system in a hospital where the patient's vital physical condition can be monitored remotely. Traditionally screening programs were available only in hospitals and were characterized by a large and complex cycle that required the use of high power. Continued advances in the semiconductor technology industry have led to small, medium-sized sensors and controls, low power consumption and cost-effectiveness. This also saw improvements in the remoteness of the vital signs of the health of patients, especially the elderly.

Remote health monitoring system can be used in the following situations:

1. The patient is known to have a health condition with an unstable immune system. This occurs in cases where a new drug is introduced to the patient.
2. The patient is more likely to have a heart attack or may have had a previous attack. Significance can be observed in order to predict and warn in advance of any physical symptoms.
3. Critical condition of the body
4. The condition leading to the development of a life- threatening condition. This is for older people and perhaps those with poor health conditions.
5. Athletes during training. Knowing which training rules will produce the best results.

In recent times, a number of systems have been set up to address the issue of remote health monitoring. Systems have a wireless detection system that sends wireless information to a remote server. Some even adopt a service model that requires a subscription fee. In developing countries, this is a barrier as some people are unable to afford it because of the cost involved. There is also the problem of connecting to the Internet where other systems will work, good quality internet for remote real- time communication is required. Internet access is still a problem in developing countries.

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Many of the programs are being introduced in developed countries where the infrastructure is working properly. In many cases, systems were changed to operate in developing countries. To alleviate some of these problems it is necessary to address the remote acquisition from the top road to adapt to the basic conditions found in developing countries.

The design of a simple patient monitoring system can be rounded by the number of parameters I can get. In some cases, by obtaining one parameter several readings can be calculated.

To facilitate the consideration of obtaining the parameter are:

1. One parameter monitoring system:

In this example, one parameter is monitored e.g., Electrocardiogram (ECG) study. From an ECG or heart rate detection, several readings can be obtained depending on the algorithm used. ECG studies can provide heart rate and oxygen saturation.

2. Multi-parameter monitoring system:

This has many parameters monitored at once. An example of such a system can be found in the High Depression (HDU), in intensive care unit (ICU), during surgery in a hospital theatre or in a hospital rescue centre. Several monitored parameters include ECG, blood pressure, respiratory rate. The Multi parameter monitoring system is basically proof that a patient is alive or well. In developing countries, soon after abandoning their daily routine, many older ones move to rural areas. In developed countries, they may even be able to move to relief centers. This is where a remote health monitoring system can come in handy.

LITERATURE SURVEY

The Internet of Things (IoT) plays an important role in today's Tele surveillance health system. The "IoT" study was complete and related to montage and issues. The main goal of "IoT" is to ensure that, in conjunction with the "electronic sensor" device, Internet-based communication and sending and receiving information are normally accessible.

Some research work is given below:

1. Prasad et al. uses a patient monitoring system, which aims to collect medical research data and educational studies. PHS will enable faster and safer preventive care, lower overall costs, improved patient practice and improved stability. Guk et al.

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2. The author introduced the “Io-based Smart Health Care System using Arduino. Use a special sensor to monitor the patient's health limits. Here the author has focused on the concept of separating the wireless network and the cloud computing. Once nerves are connected to patients' bodies, they begin to receive and transmit data to sensory centers such as temperature sensors (DS18B20), heart rate, blood pressure, cloud-based ECG (AD8232) services are responsible for receiving, storing, and distributing patient data.

3. Aretha et al. an electronic device is described to monitor the health of the elderly in their home with the help of wireless sensor technology. Renija et al.

4. The author provided a "Remote Health Monitoring System using Arduino Board over Distributed Area". Here the author focuses on the IoT based Smart Healthcare System. The main purpose of this program is designed to transcend patient health limits. Kaur et al.

5. The author presented the "IoT-Based Patient Health Monitoring System Survey". Here the author proposes a smart health care system that includes a smart identification marker, server and internet.

6. Awasthi et al. has developed a system for measuring physical activity signals in the environment such as the ECG and BCG using a smart chair that is compliant with non-compliant biological signals and can be monitored using a monitoring system similar to their model that provides an ancient example of IOT use in health care.

7. Rajkumar et al. has proposed a m-health system that uses mobile devices to collect real-time data from patients and stored on online network servers that allow access only to specific clients. This data can be used for medical diagnoses of patients and is accessed through a number of wearable devices and a sensory network.

8. Kabir et al. explored the role of IoT in health care and studied its technical features to make it more realistic and identified opportunities for them to propose a cloud-based concept in which patient medical data could be safely transmitted, with patient consent

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and knowledge. Family by building a network between patient, hospital, doctors, labs etc. The main reason for this is to free the patient from expensive clinical care, to overcome the shortage of doctors and therefore to provide improved care and assistance to patients.

9. Biradar et al. introduced a data model to record and use IoT data. They have designed and developed a Ubiquitous Data based approach to collecting and publishing IoT data worldwide so that it can be accessed anywhere, anytime. They also introduce IoT-based emergency medical service and how to collect and use IoT data across different platforms.
10. Gupta et al. has proposed a new way to predict the risk of illness from a patient's medical record using a mine-based statistical method that they say is the highest probability of disease. And in order to meet their goal they have updated the 0 algorithm that is most needed to determine the link weight of websites.

SYSTEM ARCHITECTURE

In this article, we describe about sensors which are essential, easy to use and have proper effectiveness. Here we considered three sensors, three for monitoring the vital signs of pulse, oxygen level, body temperature all are recorded in a hospital environment.

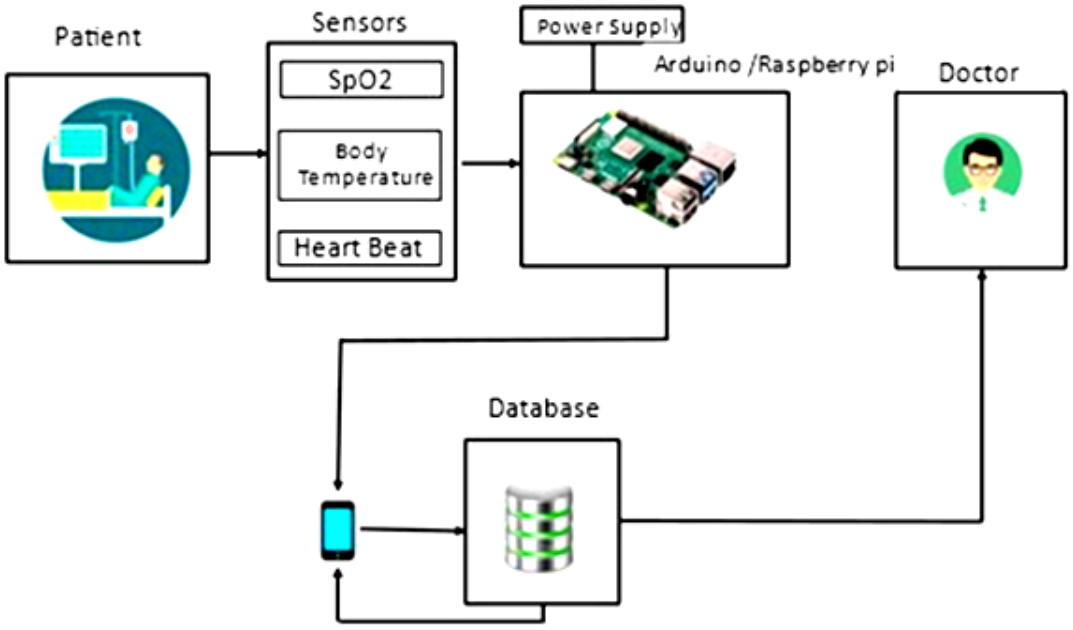


Fig. 1 Architecture diagram of health monitoring system

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METHODOLOGY

In this paper, we propose a system to monitor patient's body temperature, heart rate, and oxygen level (SPO2). Further we extend the existing system to combine all parameters which shows readings in real time which helps to predict health disorders more efficiently.

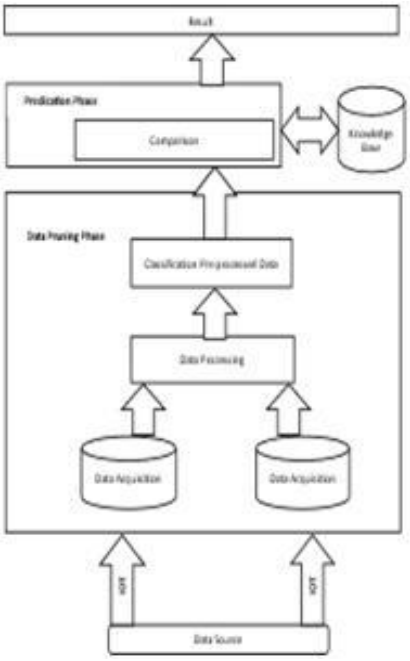


Fig. 2 Proposed Methodology

The figure above shows how to obtain information about a patient's condition by monitoring various parameters and using the same information to predict whether a patient has a disease or does not need treatment or not.

In level-1, unprocessed data from various IoT devices are available and stored on the server. These devices include various sensors such as temperature sensor, oxygen sensor and pulse sensor. Since some of the sensors give analog output which cannot be used by Arduino nano, we first convert the analog values into digital form and using convertor IC. Then using the Arduino nano on which Window OS is installed, we write the code in python that reads the values from the sensors and update them into the database at regular intervals.

In Level 2, relevant information is obtained from the information stored by filtering, sorting and classification. This information is nothing but real-time patient health data. This information will also be used at the next level to predict that the patient is suffering from any type of disease. This helps to make the system smarter and more efficient.

In Level 3, hence we can infer the disease or disorder by using the existing knowledge base and categorize the result in various categories such as Ideal, Normal, and With Symptoms etc.

CONCLUSION

In this paper we have presented IOT Based Patient Centric Health Monitoring system a Remote monitoring system, which is able to continuously monitor the patient

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hospital. We proposed a continuous monitoring and control mechanism to monitor the patient condition and store the patient data in server using Wi-Fi Module based wireless communication, we also proposed remote health care data acquisition and smart storage system connecting all the objects to internet for internet for quick and easy access.

The proposed system can be set-up in the hospitals and massive amount of data can be obtained and stored in the online database. Even the results can be made to be accessed from mobile through an application. The data, consisting medical history of many patients' parameters and corresponding results, can be explored using data mining, in search of consistent patterns and systematic relationships in the disease. For instance, if a patient's health parameters are changing in the same pattern as those of a previous patient in the database, the consequences can also be estimated. If the similar patterns are found repeatedly, it would be easier for the doctors and medical researchers to find a remedy for the problem.

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