IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
Volume 2, Issue 1, May 2022
Impact Factor: 6.252

Health Care Monitoring System

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Abstract: *In nowadays patient monitoring system is more critical to constantly monitor a patient's physical parameters from sensors on the patient's body. This system can monitor physical parameters periodically. Sensor nodes can sense the heart rate, body temperature, ECG signal, Pulse rate, etc. This sensor data is transferred to mobile phones using Bluetooth communication. All these sensors and Bluetooth are connected to Arduino. Then Doctors can monitor/her physical condition on a mobile application using flutter. In this paper we also included RFID sensors, RFID sensors are used to open and close the door automatically. These RFID sensors are used to open and close the gate of the hospital. The offered outcome of this research is to give suitable and effective health facilities to patients.*

Keywords: Patient Monitor, Internet of Things (IoT), Bluetooth Module, Arduino, Pulse Rate Sensor, Temperature Sensor, ECG sensor, RFID Sensor

I. INTRODUCTION

1.1 What is a Patient Health Monitoring System?

A remote health monitoring system is an addition to a hospital medical system where a patient's vital body state can be monitored remotely. The detection systems only appeared in hospitals and were characterized by vast and complicated circuitry that needed high power consumption. Continuous advances in the semiconductor technology industry gave rise to sensors and microcontrollers that are smaller in size, faster in operation, low in power consumption, and inexpensive.

This has further seen development in the remote monitoring of vital life signs of patients, mostly the elderly. The patient health monitoring system can be applied in the following situations:

1. A patient is known to have a medical condition with an unsteady regulatory body system. This is in cases where a new medicine is being introduced to a patient.
2. A patient is possible to have heart attacks or may have suffered one before. The vitals may be monitored to predict and alert any sign of the body status in advance.
3. Critical body organ situation
4. The situation leading to the development of a dangerous life-threatening condition. This is for people at aging and maybe having failing health conditions.
5. Athletes in the course training. To know which training authorities will produce better results.

Recently, several systems have come up to address the issue of patient health monitoring. The systems have a wireless detection system that sends the sensor details wirelessly to a remote server. Some even adopted a service model that requires one to pay a subscription payment. In developing nations, this is a barrier as some people cannot use them due to the cost issues involved. There is also the issue of internet connectivity where some systems operate, good quality internet for a real-time remote connection is required. Internet penetration is still a difficulty in developing nations.

NESGI FOE, Department of Computer Engineering 2021-22 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 nations. To reduce some of these problems there is a need to approach patient detection from a ground-up approach to suit the basic minimal conditions presently available in developing nations.

A simple patient monitoring system design can be approached by the number of parameters it can identify. In some incidents, by detecting one parameter several readings can be calculated. For simplicity considerations parameter detection are:

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1. **Single Parameter Monitoring System:** In this example, a single parameter is monitored e.g., Electrocardiogram (ECG) reading. Several readings can be obtained from the ECG or heartbeat detection based on the algorithm used. An ECG scan can give the heart rate and oxygen saturation.
2. **Multi-Parameter Monitoring System:** This has many parameters being monitored at the same time. An example of such a system can be established in High Dependency Units (HDU), Intensive Care Units (ICU), during the surgery at a hospital theatre, or post-surgery recovery units in Hospitals. Some parameters that are monitored include the ECG, blood pressure, and respiration rate. The Multi-parameter monitoring system proves that a patient I recovering. In developing nations, just after retiring from their daily career routine majority of the elderly age group, move to the rural areas. In developed countries, they may move to helped living group homes. This is where a remote health monitoring system can come inconveniently.

II. LITERATURE OVERVIEW

2.1 Development and Clinical Estimation of a Home Health care System Measuring in Toilet, Bathtub, and Bed Without an Extension of Any Biological Sensors

Day-to-day monitoring of health conditions at home is important for an effective plan for early diagnosis, treatment, and prevention of lifestyle-related diseases such as adiposis, diabetes, and cardiovascular diseases. While numerous commercially available devices for home health care monitoring are widely used, those are unwieldy in terms of self-attachment of biological sensors and self-operation of them. From this viewpoint, we have been expanding a non-conscious physiological monitoring system without the attachment of any sensors to the human body as well as any operations for the measurement. We expanded some devices installed in a toilet, a bath, and a bed and showed their high measurement accuracy by comparison with simultaneous recordings of ordinary biological sensors directly attached to the body. To investigate that applicability to the health condition monitoring, we developed a monitoring system in combination with all the monitoring devices in hospital rooms and previously carried out the measurements of patients' health conditions. Additionally, in this study, the health conditions were measured in 10 patients with cardiovascular disease or sleep disorder. From these results, the patients' health conditions such as the body and excretion weight in the toilet, the ECG 33

2.2 Intelligent Wireless Remote Patient Monitoring System

Nowadays, Heart-related diseases are rising in power. Cardiac arrest is stated as the major contributor to the immediate and unexpected death rate in the modern disturbing lifestyle around the world. A system that notifies the person about the onset of the disease earlier automatically will be a blessing to society. This is achievable by deploying advances in wireless technology to the living patient monitoring system. This paper presents the development of a module that provides mobility to the doctor and the patient, by acquiring a simple and popular technique, detecting the abnormalities in the biosignal of the patient in advance, and sending an SMS alert to the doctor through the Global System for Mobile(GSM) thereby taking suitable precautionary measures thus decreasing the critical level of the patient. Worldwide surveys conducted by World Health Organization (WHO) have confirmed that heart-related diseases are on the rise. Many of the cardiac-related issues are assigned to modern lifestyles, food habits, obesity, smoking, tobacco chewing, lack of physical exercise, etc. Postoperative patients can develop problems once they are discharged from the hospital. In some patients, the cardiac issues may reappear, when they start doing their routine work. Hence the ECG of such patients needs to be kept watch for some time after their treatment. This helps in diagnosing the inappropriate functioning of the heart and taking precautions. A few of these lives can often be saved if acute care and cardiac surgery are offered within the so-called golden hour. So, the need for advice on first-hand medical attention and promotion of good health by patient monitoring and follow-up becomes unavoidable. Hence, patients who are at risk require that their cardiac health be monitored frequently whether they are indoors or outdoors so that emergency care is possible. Telemedicine is mostly considered to be part of the unavoidable future of the modern practice of medicine.

2.3 The Real-Time Monitoring System for in-Patients based on ZigBee

The system consists of two sub-systems: patient physical states data acquisition and communication system depending on ZigBee technology, and hospital monitoring and control center. The patient physical states data acquisition and communication system monitors the main physical parameters and movement status constantly. The information from the

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data acquisition system is sent to the hospital monitoring center by ZigBee wireless communication module. The monitoring center receives the information from each patient and saves them to the database, and then judges the state of the patient by fuzzy reasoning. The data from the patient can be shown as a graph or numeric on the monitor if it is necessary, and then the doctor can diagnose the patient according to the recorded continuous data. The wireless sensor network is made up of a lot of wireless sensors based on ZigBee technology. The ZigBee technology gives a resolution for transmitting sensors' data by wireless communication. ZigBee technology can transmit data at a rate of 250kbps, and then it is sufficient for the physical parameters of the patient. The communication distance of the ZigBee node can be over 200 meters and can be spread by addinga route node, and then ZigBee technology is suited to a short-distance wireless sensors network. ZigBee technology owns many goddesses, such as low power consumption, low cost, small size, free frequency, etc. To know the physical states of in-patients, the physical properties need to be monitored in real-time. The traditional medical test instrument is extensivein size and connected by wire often, and the patient is required to be quiet during the test. In most hospitals, the medical instruments need to be read by the doctor or nurse, and the physical parameters are tested and recorded one or two times each day, real-time monitoring is expensive for most patients, and can be only acquirable for ICU by a nurse. For this reason, the worsening of the patient can't be found in time, and then the patient can't be helped in time. For most the patients can be monitored in real-time in hospitals, we should find a new method. Considering that the movement of the patient is limited in the hospital, we adopted the ZigBee and wireless sensors network to obtain the physical parameters of the patient.

III. System Methodology

Here, we have used three types of sensors one is a Heartbeat sensor (ECG) another one is a body temperature sensor(LM35) and the Last one is a pulse rate sensor. These sensors' signal is sent to the microcontroller. Arduino Uno is the main framework, which was connected by Bluetooth Module.

3.1 System Architecture

In this article, we describe sensors which are effectiveness. Here we considered three basic sensors, three for monitoring the vital signs of ECG sensor, pulse, and body temperature, all set down in a hospital environment.

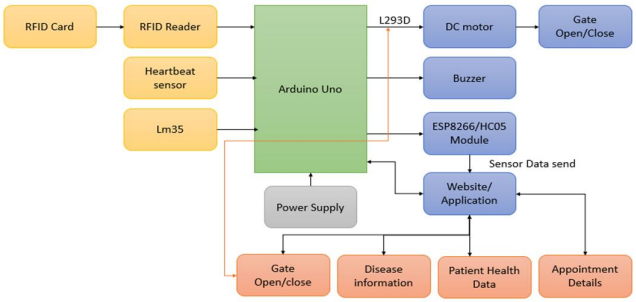

Figure 1: System Architecture

Fig. 1 Shows the architecture of the suggested system for remote patient health monitoring where sensors are connected to a person whose health readings are to be monitored.

3.2 Hardware Architecture

A. Arduino Microcontroller

Arduino Uno is a microcontroller board that is dependent on the ATmega328P. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, a USB (Universal Serial Bus) connection, a power jack,a reset button, andan ICSP (Circuit Serial Programming) header. It involves every single thingrequired to support the microcontroller; simply connect it to a computer with a USB cable or power it with an AC-to-DC adapter or battery to get activated.

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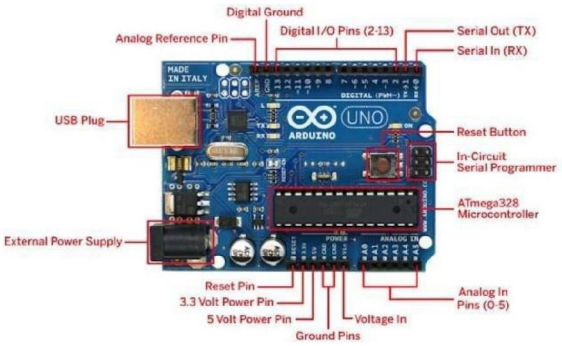

Figure 2: Arduino UNO

B. ECG Sensor

ECG records the electrical activity caused by heart muscle depolarizations, which propagate in pulsating electrical waves regarding the skin. Although the electricity amount is very small, it can be picked up easily with ECG electrodes attached to the skin. The full ECG setup contains at least four electrodes which are placed on the chest or at the four extremities according to standard nomenclature. Of course, variations of this setup exist to permit more flexible and less intrusive recordings,

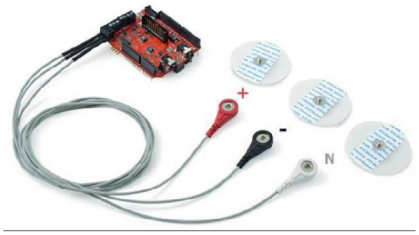

Figure 3: ECG module

C. Temperature Sensor (LM 35)

The temperature sensor is a device that is designed specifically to measure the hotness or coldness of an object. LM35 is a precision IC temperature sensor with its output proportional to the temperature (in °C). With LM35, the temperature can be calculated more accurately than with a thermistor. It also possesses low self-heating and does not cause more than a 0.1 °C temperature rise in still air. The operating temperature range is -55°C to 150°C.The LM35's low output impedance, a linear output, and precise inherent calibration make interfacing to readout or control circuitry especially easy.

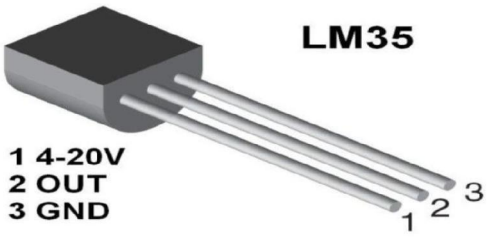

Figure 5: LM 35

D. Heartbeat Sensor

A heartbeat sensor provides a simple way to study the heart's function, which can be measured based on the principle of psycho-physiological signal used as a stimulus for the virtual-reality system. The amount of blood in the finger changes over time. The sensor shines a light lobe (a small very bright LED) through the ear and measures the light that gets transmitted to the Light Dependent Resistor. The amplified signal gets reversed and filtered, in the Circuit. To calculate the

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heart rate based on the blood flow to the fingertip, a heart-rate sensor is assembled with the help of LM358 OP-AMP for monitoring the heartbeat pulses.

Figure 6: Pulse Rate Module

E. EM 18

- Radiofrequency Identification (RFID) is a wireless identification technology that uses radio waves to identify the presence of RFID tags.
- Just like a Bar code reader, RFID technology is used for the identification of people, object, etc. presence.
- In barcode technology, we need to optically scan the barcode by keeping it in front of the reader, whereas in RFID technology we just need to bring RFID tags in the range of readers. Also, barcodes can get damaged or unreadable, which is not the case for most RFID.
- RFID is used in many applications like attendance systems in which every person will have their separate RFID tag which will help identify the person and their attendance.
- RFID is used in numerous companies to provide access to their authorized employees.
- It is also helpful to keep track of goods in an automated toll collection system on the highway by embedding Tag (having unique ID) on them.

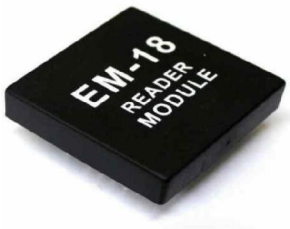

Figure 7: EM 18 module

IV. Future Development

Progressively, the health sector has been enhanced by using the advancement of technology. Researchers have been rapidly working on developing medical appliances. In a further development, many sensors can be added to measure the more physical parameter of the patient's body such as respiratory sensors, BP sensors, and glucose sensors. Also, GSM may be introduced to give the patient details to the patient's guardian. After adding on this sensor, this device will be worked as an absolute package of the healthcare monitoring system.

V. Conclusion

The main goal of the experiment was successfully achieved. All the individual modules like the Heartbeat detection module, and remote viewing module gave out the expected outcome. The designed system modules can further be increased and produced to a final single circuit. A more important fact during project design is that all the circuit components used in the remote health detection system are easily available.

With the integrated circuit industry development, Micro Electro Mechanical Systems (MEMs) and microcontrollers have become in, have increased processing speeds, are miniaturized, and are power efficient. This has led to the increased development of embedded systems that healthcare specialists are adopting. These embedded systems have also been adopted in Smartphone technology. And with increased internet penetration in most developing countries through mobile phones,

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and with use of the Internet of things (IoT) will become adopted at a faster rate. The Remote Health Care system utilizes these concepts to come up with a system for abetter quality of life for people in society. From an engineering point of view, the project has seen concepts acquired through the computer science and embedded study period being practically applied. The Electric circuit analysis knowledge was used during the design and creation of the individual modules. Electromagnetic fields analysis used in the wireless transmission between microcontrollers and Software programming is used during the programming of the microcontrollers to come up with a final finished circuit system.

REFERENCES

[1]. "Arduino Architecture" https://www.engineersgarage.com/what-is-gsm-gprs-module [Oct. 1, 2017]
[2]. "Systems design" https://en.wikipedia.org/wiki/Systems_design [Oct. 15, 2017]
[3]. "UML - Standard Diagrams" https://www.tutorialspoint.com/uml/uml_standard_diagrams.htm [Oct. 18, 2017]
[4]. "The Internet of Things in healthcare: an overview" ttps://scholar.google.com/citations?user=Y4opL B8AAAA J&hl=en [Sept. 7, 2017]
[5]. "Envisioning inclusive futures: technology-based assistive sensory and action substitution" https://www.infona.pl /resource/bwmeta1.element.elsevier-3d45bfdd-fe55-359f-84e4- 674a21cae024 [Sept 4, 2017]
[6]. "A multiple communication standards compatible IoT system for medical usage" http://ieeexplore.ieee.org/ document/6577775/?reload=true [Sept 5, 2017]
[7]. "Ubiquitous data accessing method in IoT-based information system for emergency medical services" https://www.deepdyve.com/lp/institute-of-electrical-and-electronics-engineers/ubiquitous-data-accessing-method-in-iot-based-information-system-for- YCZzyY5W9g [Sept 6, 2017]
[8]. "Implementation of a medical support system considering P2P and IoT technologies" https://www.compu ter .org/csdl/proceedings/cisis/2014/4325/00/4325a101-abs.html [Sept 7, 2017]
[9]. "Acquisition and management of biomedical data using Internet of Things concepts" http://ieeexplore.i eee .org/document/7050625/ [Sept 10, 2017]
[10]. "Real-time internet application with distributed flow environment for medical IoT" https://csdl.computer.org/ csdl/proceedings/icgciot/2015/7910/00/07380578-abs.html [Sept 11, 2017]
[11]. "Secure end-to-end communication for constrained devices in IoT-enabled ambient assisted living systems"
[12]. https://www.computer.org/csdl/proceedings/wf-iot/2015/0366/00/07389141-abs.html [Sept 11, 2017]
[13]. "Software Testing" https://en.wikipedia.org/wiki/Software_testing [Oct 20, 2017]
[14]. "Sensors" https://tkkrlab.nl/wiki/Arduino_37_sensors [Oct 20, 2017]