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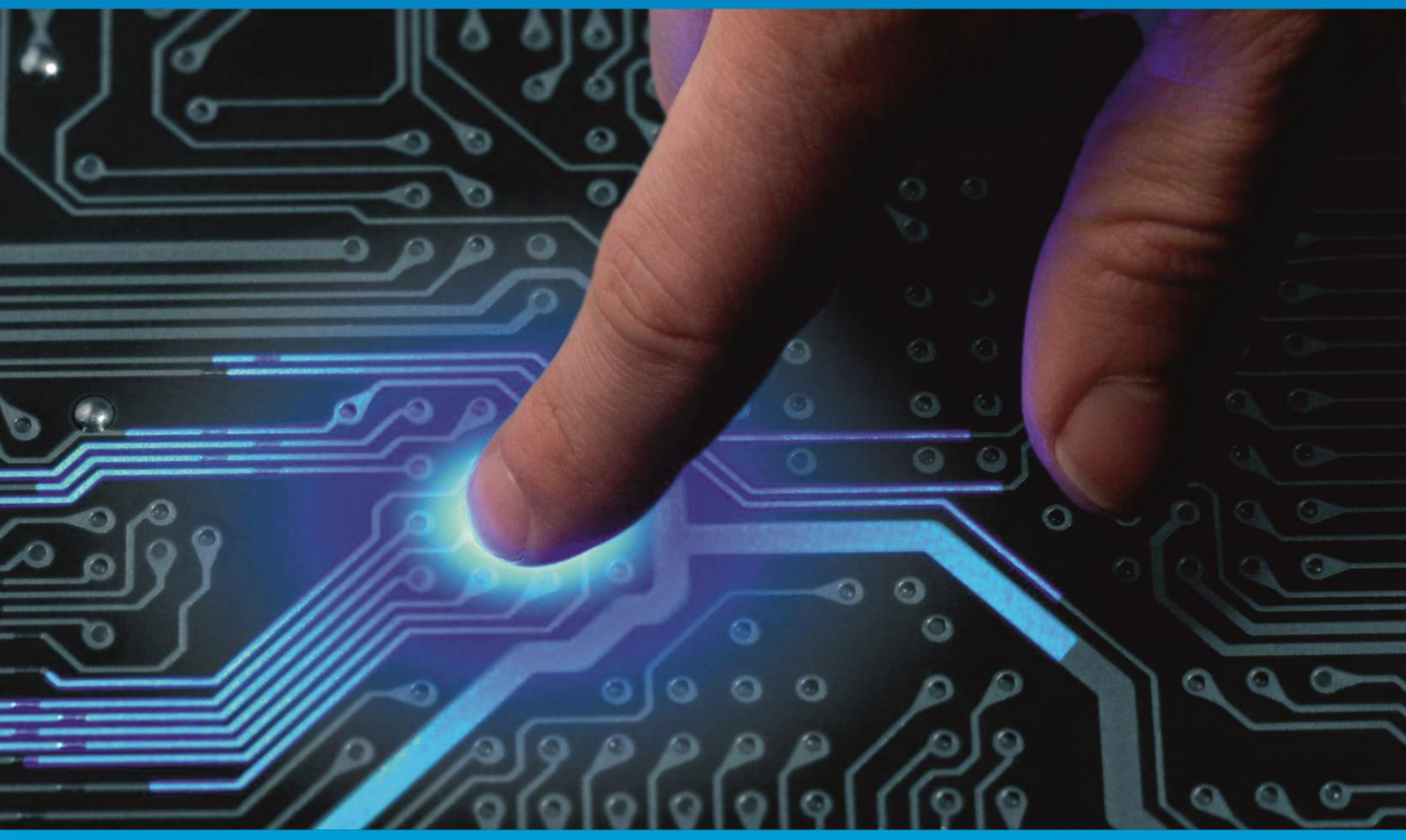
e-ISSN: 2320-9801 | p-ISSN: 2320-9798



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN COMPUTER & COMMUNICATION ENGINEERING

Volume 9, Issue 5, May 2021

INTERNATIONAL STANDARD SERIAL NUMBER INDIA

Impact Factor: 7.488

International Journal of Innovative Research in Computer and Communication Engineering

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 7.488 |

|| Volume 9, Issue 5, May 2021 ||

| DOI: 10.15680/IJIRCCE.2021.0905119 |

Smart Human Health Monitoring System

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ABSTRACT: This project is significant in various ways because in today's world, everyday many lives are affected because the patients are not timely and properly operated. Also for real time parameter values are not efficiently measured in clinic as well as in hospitals. Sometimes it becomes difficult for hospitals to frequently check patient's conditions. Also continuous monitoring of ICU patients is very difficult. To deal with these types of situations, our system is beneficial. Our system is designed to be used in hospitals and homes also for measuring and monitoring various parameters like temperature, ECG, heart rate, pulse rate. The results can be recorded using Arduino. Also the doctors can see those results on android app. The system will also generate an alert notification which will be sent to doctor. Our system is useful for monitoring health system of every person through easily attach the device and record it. In which we can analysis patient's condition through their past data, we will recommend medicines if any emergency occurred through symbolic A.I.

KEYWORDS: ECG, Heart rate, Temperature, Pulse rate.

I. INTRODUCTION

Health is characterized as a full state of physical, mental, and social well-being and not merely a lack of illness. Health is a fundamental element of people's need for a better life. Unfortunately, the global health problem has created a dilemma because of certain factors, such as poor health services, the presence of large gaps between rural and urban areas, physicians, and nurses unavailability during the hardest time.IoT is making any objects internally connected in the recent decade and it has been considered as the next technological revolution. Smart health monitoring mechanism, smart parking, smart home, smart city, smart climate, industrial sites, and agricultural fields are some of the applications of IoT.

The most tremendous use of IoT is in healthcare management which provides health and environment condition tracking facilities. IoT is nothing but linking computers to the internet utilizing sensors and networks. These connected components can be used on devices for health monitoring. The used sensors then forward the information to distant locations like M2M, which are machinery for computers, machines for people, handheld devices, or smartphones. It is a simple, energy-efficient, much smarter, scalable, and interoperable way of tracking and optimizing care to any health problem.

Heart rate and body temperature are the two most significant indicators for human health. Heart rate is the per-minute amount of heartbeats, commonly known as the pulse rate. To measure the pulse rate, an increase in the blood flow volume can be used by calculating the pulses. Normal heart rate ranges between 60 and 100 beats per minute for healthy people. The typical restful heart for adult males is roughly 70 bpm and for adult females 75 bpm. Female with 12 years of age and above, typically have higher rates of heart in contrast with males. The temperature of human body is simply the heat of body and the sum of heat radiated by the body is scientifically determined. In healthy adults, it is likely to range between 97.8 °F (36.5 °C) and 99 °F (37.2 °C). Different factors such as flu, low-temperature hypothermia, or any other illness may lead to a change in body temperature. In almost all illnesses, fever is a typical indicator.

There are several fatal diseases like heart disease, diabetes, breast cancer, liver disorder, etc. in medical sector but the main concern of our developed system is to monitor the fundamental signs of all types of patients. This paper proposes a customized healthcare system that monitors the pulse and body temperature of patients via sensors and transmits the data through Wi-Fi that enables the medical staffs to get data from the server. The developed system also provides a

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solution for the problem of maintaining a single database of patients in hospitals using a web server, apart from the personalization of critical health-related criteria.

A. General Objective

To layout and obtain a project on "Smart Human Health Monitoring System."

B. Specific Objective

To layout and obtain a project that will perceive patient's temperature, ECG, pulse rate, oxygen level.

To layout and obtain a project that will determine patient's health like ECG, temperature, pulse rate, oxygen level.

C. Problem Statement

1. Patients can check themselves without having any physical contact with the doctor.
2. If the Pulse rate is good it appears "good" in the application known as Bluetooth terminal.

The paper consists of different sections, in which each section defines differently about the project. So, (section II.) includes the proposed methodology in which the design of the project is discussed, the (section III.) includes the system requirements, in which the component names are described, the (section IV.) includes the hardware requirements, in which there in information about each component used in the project, the (section V.) includes the software requirements, the (section VI.) includes the comparative study, which specifies the comparison in between the reference papers and the project, the (section VII.) includes the results, the (section VIII.) includes the discussion and future scope of the project, the (section IX.) includes the conclusion of the project and the (section X.) includes the references.

II. PROPOSED METHODOLOGY

The main objective is to design a Patient Monitoring System with two-way communication i.e. not only the patient's data will be sent to the doctor through SMS and email on emergencies, but also the doctor can send required suggestions to the patient or guardians through SMS or Call or Emails. And Patient or guardian can able to track patient's location at any point in time through Google Maps which would enable to send medical services in case of an emergency for non-bed ridden patients.

Internet of Things (IoT) based smart health monitoring system is a patient monitoring system in which a patient can be monitored 24 hours. In the present world, IoT is changing the infrastructure of technologies. By facilitating effortless interaction among various modules, IoT has enabled us to implement various complex systems such as smart home appliances, smart traffic control systems, smart office systems, smart environment, smart vehicles and smart temperature control systems and so on in very little space.

Health monitoring systems are one of the most notable applications of IoT. Many types of designs and patterns have already been implemented to monitor a patient's health condition through IoT.

System Design for Smart Human Health Monitoring System using IOT

This proposed project consists of temperature checking, ECG checking, Pulse rate checking and oxygen level checking of specific person without coming in contact with the doctor.

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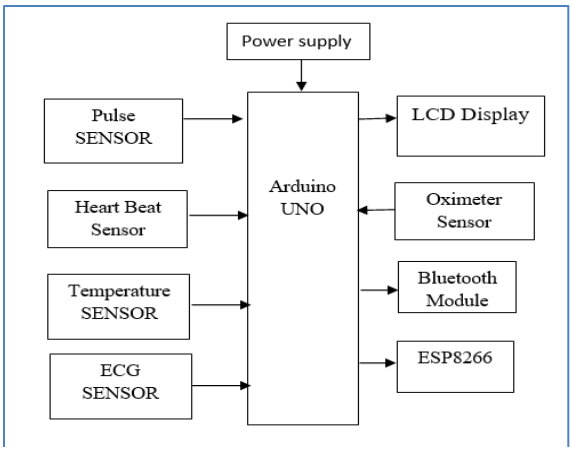


(Fig. 1: Block Diagram of circuit)

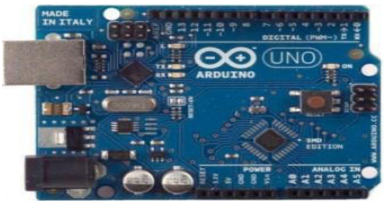
III. SYSTEM REQUIREMENTS

(Hardware and Software)
ARDUINO UNO, Bluetooth Module (HC-05), Spark fun Single Lead Heart Rate Monitor (AD8232), Temperature Sensor (DFrobotGravity: AnalogLM35), Protocentral Electronics Protocentral Pulse Oximeter and Heart Rate Sensor based on MAX30100, Breadboard, 10 pieces of Jumper wire kit (5cms long).

IV. HARDWARE DESCRIPTION

1) Arduino UNO (Microcontroller)

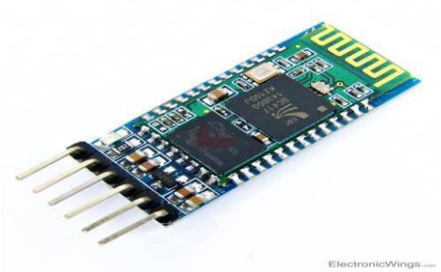
The Arduino Uno is a microcontroller board based on a removable, dual-inline-package (DIP) ATmega328 AVR microcontroller. It has 20 digital input/output pins (of which 6 can be used as PWM outputs and 6 can be used as analog inputs). Programs can be loaded on to it from the easy-to-use Arduino computer program.



(Fig.2: Arduino UNO)

2) Bluetooth Module (HC-05)

HC-05 is a Bluetooth module which is designed for wireless communication. This module can be used in a master or slave configuration. Bluetooth serial modules allow all serial enabled devices to communicate with each other using Bluetooth.



(Fig. 3: Bluetooth Module [HC-05])

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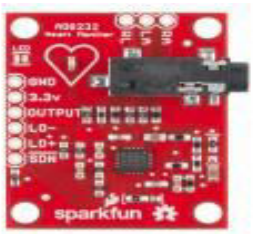
3) Spark fun Single Lead Heart Rate Monitor (AD8232)

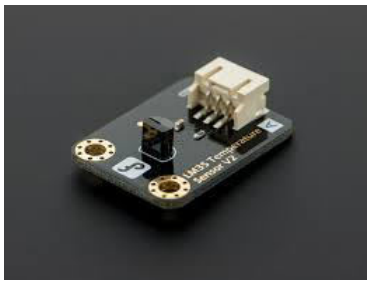
The AD8232 SparkFun Single Lead Heart Rate Monitor is a cost-effective board used to measure the electrical activity of the heart. This electrical activity can be charted as an ECG or Electrocardiogram and output as an analog reading. ECGs can be extremely noisy, the AD8232 Single Lead Heart Rate Monitor acts as an op amp to help obtain a clear signal from the PR and QT Intervals easily.



(Fig.4: Sparkfun Single Lead Heart Rate Monitor[AD8232])

4) Temperature Sensor (DFrobotGravity: AnalogLM35)

The DFRobot LM35 Linear Temperature Sensor is based on the semiconductor LM35 temperature sensor. It can be used to detect ambient temperature. This sensor is produced by National Semiconductor Corporation and offers a functional range between 0 to 150°C. The sensitivity is 10mV/°C.



(Fig.5: Temperature Sensor (DF Robot Gravity LM35)

5) Protocentral Electronics Protocentral Pulse Oximeter and Heart Rate Sensor based on MAX30100

MAX30100 is an integrated pulse oximeter and heart-rate monitor sensor solution. It's an optical sensor that derives its readings from emitting two wavelengths of light from two LEDs – a red and an infrared one – then measuring the absorbance of pulsing blood through a photodetector. This particular LED colour combination is optimized for reading the data through the tip of one's finger. It is fully configurable through software registers and the digital output data is stored in a 16-deep FIFO within the device. It has an I2C digital interface to communicate with a host microcontroller.

(Fig.6: Pulse Oximeter and Heart Rate Sensor based on MAX30100)

V. SOFTWARE DESCRIPTION

1. The Arduino IDE

The Arduino IDE is a cross-program application created in Java and is originate from IDE for the deal with a programming language and the wiring project. It is proposedto establish programming to a performer and other new usersunfamiliar with software enhancement. It includes code editor with features such us syntax importance, automatic

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indentation, brace matching, and is also qualified of compiling and uploading a package to the board with a specific click.

VI. COMPARATIVE STUDY

The paper (1) proposes a smart healthcare system in IoT environment that can monitor a patient's basic health signs as well as the room condition where the patients are now in real-time. In this system, five sensors are used to capture the data from hospital environment named heart beat sensor, body temperature sensor, room temperature sensor, CO sensor, and CO2 sensor. The error percentage of the developed scheme is within a certain limit (<5%) for each case. The condition of the patients is conveyed via a portal to medical staff, where they can process and analyse the current situation of the patients. The developed prototype is well suited for healthcare monitoring that is proved by the effectiveness of the system.

The paper (2) proposes Body Area Network (BAN) is a sensor network technology for monitoring and logging vital signs of a person, such as cardiac frequency and blood pressure. The main goal of BAN is to make remote monitoring possible. In this paper a group monitoring approach is presented. The work differs from others because the idea is to monitor a group of patients in a hospital or clinic at the same time while having only one receiver for up to 32 people. There is no need to have a transmitter/receiver pair for each patient, making the system affordable. The solution presented also involves wireless transmission, i.e., the captured signs are transferred from the patient device to a host in a wireless fashion. Practical experiments are presented to demonstrate the feasibility of the system.

The paper (3) proposes even if the elderly and disabled need the assistance of their families, parents, and healthcare providers, they prefer to live in their homes instead of assisted-living centers. Therefore, their health and activities must be remotely monitored so that in case of an urgent unexpected situation, immediate help can be provided. In this respect, this paper proposes a wireless sensor network-based health monitoring system for the elderly and disabled, and focuses on its development steps. The proposed system is composed of low-cost off-the-shelf components and enables the monitoring of important health parameters of the elderly and disabled.

The paper (4) proposes a mobile device based wireless healthcare monitoring system that can provide real time online information about physiological conditions of a patient. Our proposed system is designed to measure and monitor important physiological data of a patient in order to accurately describe the status of her/his health and fitness. In addition, the proposed system is able to send alarming message about the patient's critical health data by text messages or by email reports. By using the information contained in the text or e-mail message the healthcare professional can provide necessary medical advising. The system mainly consists of sensors, the data acquisition unit, microcontroller (i.e., Arduino), and software (i.e., LabVIEW). The patient's temperature, heart beat rate, muscles, blood pressure, blood glucose level, and ECG data are monitored, displayed, and stored by our system. To ensure reliability and accuracy the proposed system has been field tested.

The paper (5) presents the design and prototype of a wireless health monitoring system using mobile phone accessories. We focus on measuring real time Electrocardiogram (ECG) and Heart rate monitoring using a smart phone case. With the increasing number of cardiac patients worldwide, this design can be used for early detection of heart diseases. Unlike most of the existing methods that use an optical sensor to monitor heart rate, our approach is to measure real time ECG with dry electrodes placed on smart phone case. The collected ECG signal can be stored and analyzed in real time through a smart phone application for prognosis and diagnosis. The proposed hardware system consists of a single chip microcontroller (RFduino) embedded with Bluetooth low energy (BLE), hence miniaturizing the size and prolonging battery life.

The paper (6) proposes IoT in healthcare is the key player in providing better medical facilities to the patients and facilitates the doctors and hospitals as well. The proposed system here consists of various medical devices such as sensors and web based or mobile based applications which communicate via network connected devices and helps to monitor and record patients' health data and medical information. The proposed outcome of the paper is to build a system to provide world-class medical aid to the patients even in the remotest areas with no hospitals in their areas by connecting over the internet and grasping information through about their health status via the wearable devices provided in the kit using a raspberry pi microcontroller which would be able to record the patient's heart rate, blood pressure. The system would be smart to intimate the patient's family members and their doctor about the patient's current health status and full medical information in case any medical emergency arises.

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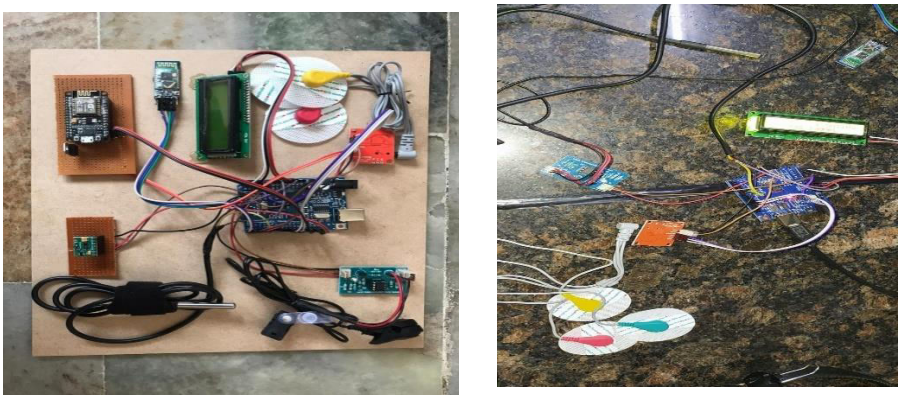
VII. RESULT AND ANALYSIS



(Fig.7: Main Circuit of Smart Health Monitoring System)

VIII. DISCUSSION AND FUTURE SCOPE

The summary of this review is done based on some criteria such as feedback devices, major hardware components, uses, and cost-effectiveness. Different frameworks employ different feedback systems. The summary of the reviewed system is depicted in Table I with the aforementioned criteria.

The system designed used a Arduino and MCU ESP8266 module for data transmission and detection of hearing problems, headache, and rapid pulse rate, BLYNK for data transmission. It detects heart problems and body temperature. Some scholars discussed that an accelerometer, a voice sensor, and a microphone have been used for detecting the hyper-functional disorder and the system detected cardiovascular disease through ECG and heart rate sensor.

The system discussed used a pulse oximeter, blood glucometer, and accelerometer for detecting chronic disease progression and used a Wi-Fi module for data transmitting. It detected various chronic diseases. Electrode pads were used for detecting cardiovascular disease in the system. The Arduino Uno based system has been used to detect hypothermia. The system introduced used a mobile app and glucometer for detecting diabetes mellitus. The high-cost device detected heart diseases. Smartphone, laptop, VGA display have been used as a feedback device. The system detects abnormalities in the heart. The respiration rate was monitored by using a respirator and accelerometer. The system used various gas sensors to provide the health monitoring facility.

Though extensive works have been done to implement smart healthcare systems that are summarized in this paper, various sensors can be employed for health system monitoring for further development. The future developed systems can employ Wi-Fi and the range limitations of Bluetooth devices. Smartphones can be used as a health monitoring system as it makes the interaction between multiple sensors very easy. Various machine learning algorithms can be used to make the systems more accurate. In microcontroller-based systems, can be used for easy presentation of the monitoring data on mobile applications.

IX. CONCLUSION

In this project, the use of IoT in health monitoring systems has been summarized. Although IoT is being used in all sectors of medical science, there is room for further improvement and research. The early identification of any health problem can help the patient to take necessary emergency measures, which can potentially save the patient's life.

IoT can help in this regard. IoT based health monitoring systems can monitor the patients in real-time and warn the patient of any abnormalities. However, the IoT architecture must have the facilities to ensure the proper security of sensitive data. Also, the used sensors must be small in size so that they can be easily incorporated into various systems. Finally, the use of various machine learning and deep learning algorithms might make the systems more accurate and robust. The idea of a smart health monitoring system using the IoT architectures is a novel contribution in the field of medical science and it will reduce health issues and unwanted deaths.

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REFERENCES

[1] Md. Milon Islam Received: 13 May 2020 / Accepted: 14 May 2020 / Published online: 26 May 2020 © Springer Nature Singapore Pte Ltd 2020
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[7] Rahaman A, Islam M, Islam M, Sadi M, Nooruddin S. Developing IoT based smart health monitoring systems: a review. Rev Intell Artif. 2019;33:435–40.
[8] Riazul Islam SM, Kwak Daehan, Humaun Kabir M, Hossain M, Kwak Kyung-Sup. The Internet of Things for health care: a comprehensive survey. IEEE Access. 2015;3:678–708.

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