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Heart Attack Detection and Heart Rate Monitoring using IoT

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ABSTRACT- These days we have an increased number of heart diseases including increased risk of heart attacks. Our proposed system uses sensors that allow to detect heart rate of a person using heartbeat sensing even if the person is at home. The sensor is then interfaced to a microcontroller that allows checking heart rate readings and transmitting them over internet. The user may set the high as well as low levels of heart beat limit. After setting these limits, the system starts monitoring and as soon as patient heart beat goes above a certain limit, the system sends an alert to the controller which then transmits this over the internet and alerts the doctors as well as concerned users. Also the system alerts for lower heartbeats. Whenever the user logs on for monitoring, the system also displays the live heart rate of the patient. To smooth this challenge, IoT emerges as an encouraging paradigm because it provides the scalability required for this purpose, supporting continuous and reliable health monitoring on a global scale. The IoT-based health system provides patients and doctors lots of conveniences. This has led to high demands for a more robust healthcare monitoring and treatments facilities. Patient tracking structures is the time period for all the numerous gadgets that are used to supervise sufferers. The purpose of this study is to suggest an IoT design for smart monitoring and emergency alert system for patients. This proposed system can be utilized efficiently in homes as well as hospitals. Thus concerned ones may monitor heart rate as well get an alert of heart attack to the patient immediately from anywhere and the person can be saved on time.

KEYWORDS: IoT, Heartbeat sensing, Health system, Arduino Uno.

I. INTRODUCTION

Monitoring the condition of a patient remotely is a serious concern which must be tackled. Remote health management systems refer to tools, procedures, techniques, and facilities that allow patients to be consulted, diagnosed and treated remotely by physicians or other medical professionals. Health monitoring, rehabilitation, and assisted living for the elderly and medically challenged humans is an emerging challenge because they require seamless networking between people, medical instruments, and medical and social service providers. This motivates the need for affordable, low-power, reliable, and wearable devices that will improve the quality of life of many elderly and physically challenged people.

II. RELATED WORK

SRavikumar, VARulMurugan, MBoopalan, KHariPrasanth, B Karthikeyan developed a model which will track, trace, monitor patients and facilitate taking care of their health, so efficient medical services might be provided at appropriate time. In case of an emergency a SMS will be sent to the Doctors mobile, nearest neighbors and relatives containing measured values and patient's location. P.SaleemAkram; MRamesha, SaiAamaniSindhu Valiveti insisted that Having good health is something everyone wants. It is equally important to monitor a person's health on a regular basis to avoid any kind of abrupt changes in the future. Nowadays, IOT plays a vital role in capturing data and monitoring, analyzing a series of data, recording storage, and display. We analyze parameters such as body temperature, blood pressure, pulse sensor, and GPS to track the patient's current location. B.Sridhara Murthy and SureshK.Peddoju Identified that health monitoring is one of the rising fields that is rapidly creating and gaining quick progress in its advancements. Normally, IoT is utilized to interconnect distinctive accessible resources of medical and related devices. We provided an overview on best in class research and improvements in patient health monitoring systems.



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Modupe Odusami, Sanjay Misra, Olusola Abayomi-Alli, Shobayo Olamilekan, Chukwuebuka Moses proposed a system which developed an enhanced Internet of Things-based patients' health monitoring system consisting of four vital sensors: temperature sensor, heart rate sensor, pulse sensor, and a UV sensor. These sensory units are attached to the Arduino nano board, and the data gotten from these sensors are stored in a ThingSpeak cloud with the ESP8266-01 wi-fi Access Module communication. Ashikur Rahaman, Md. Milon Islam, Md. Rashedul Islam, Muhammad Sheikh Sadi, Sheikh Nooruddin Proposed a review of IoT based smart health monitoring systems is presented. The latest innovative technologies developed for IoT based smart health monitoring system with their merits and demerits have been discussed.

This review aims to highlight the common design and implementation patterns of intelligent IoT based smart health monitoring devices for patients. Anand Nayyar, Vikram Puri and Nhu Gia Nguyen proposed a model of Intelligent IoT-based health monitoring system, i.e., BioSenHealth 1.0. BioSenHealth 1.0 is working prototype for monitoring real-time vital statistics of patients in terms of body oxygen level, pulse rate/heart rate, and body temperature and sends the live data to doctors via thingspeak.com. The device is fully tested on 50+ live patients in various nursing homes-cum-hospitals, and the accuracy measured is more than 90% as compared to existing health monitoring systems. Honey Pandey

S. Prabh proposed a model which uses IFTTT the readings of sensors are reperused into google sheet which is then changed over into csv go looking like data. The datasets utilized are grouped as far as therapeutic parameters which are additionally utilized for preparing and testing the information. V. Tamil selvi, S. Sri balaji, P. Vigneshwaran, P. Vinu The device is specially designed for actual time monitoring of the health parameters of the coma sufferers. It has more suitable by means of the use of GSM and IoT. Hamim, Sumit Paul, Syed Iqramul Hoque proposed a model that led to a prototype of IoT Based Remote Health Monitoring System for Patients. This prototype consists of three health sensors: heart pulse sensor, body temperature sensor and galvanic skin response sensor IoT integrated with the health wearables can overcome the need of visiting hospitals for primary health issues. This also reduces the medical expenses for patients significantly.

A. Rahimoon, Mohd Noor Abdullah, Ishkrizat Taib developed a monitoring system uses an internet network via wireless fieldity (wifi) connection to be linked with online portal on smart phone or computer. The proposed system is comprised of an Arduino controller, LM-35(S1), MLX-90614(S2) temperature sensors and ESP-wifi shield module. The obtained result has shown that real time temperature monitoring data can be transferred to authentic observer by utilizing internet of things (IoT) applications.

III .PROPOSED SYSTEM

In this proposed system heart rate monitoring , heart attack detection and abnormality detection system is made using IoT. Nowadays treatment of most of the heart-related diseases requires continuous as well as long term monitoring. IoT is very useful in this aspect as it replaces the conventional monitoring systems with a more efficient scheme, by providing critical information regarding the condition of the patient accessible by the doctor in any remote place, at any time through the internet.

Thenurses or the duty doctor available at the hospital can monitor the heart rate of the patient in the serial monitor through the real time monitoring system. A warning system is incorporated in which if the patient's heartbeat goes below or exceeds a particular value the doctor receives an alert message through a mobile application. Here heart rate sensor, temperature sensor and gyro sensor are interfaced with controller in order to detect the body temperature, pulse and body movement. In any case of emergency buzzer will turn on for the purpose of alerting. Furthermore, the monitored parameters are updated to the IoT. This system uses LCD for displaying monitored parameters. Here uses the arduino controller for controlling overall system.

IV .HARDWARE AND SOFTWARE USED

NodeMCU is a powerful and affordable open-sourced development board for the Internet of Things (IoT) applications. It is based on the popular ESP8266 Wi-Fi module and is designed to provide easy wireless communication and control of devices. The board is equipped with a microcontroller and Wi-Fi capabilities, which make

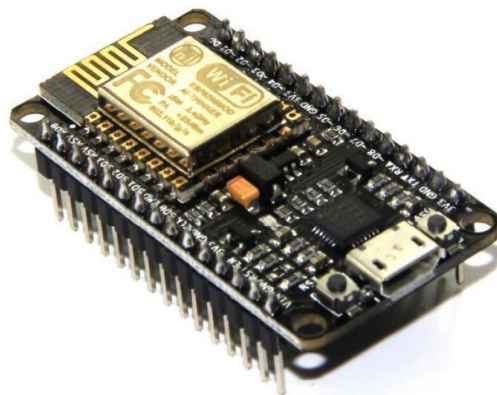


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it ideal for various IoT applications. NodeMCU uses Lua scripting language, which is a simple and easy-to-learn programming language. It is designed to simplify the programming process for developers and allow them to focus on creating innovative IoT applications.

The use of Lua also enables it to be easily integrated with other programming languages and tools, such as C and Python. The NodeMCU board has several GPIO (General Purpose Input/Output) pins, which are used to interface with sensors, actuators, and other devices. The board also has an on-board regulator that allows it to be powered directly from a USB port or a battery, making it easy to deploy in a wide range of IoT projects. The main advantage of NodeMCU is its on-board flash memory, which allows developers to store data and program code without the need for an external memory module. The board has 4MB of flash memory, which is more than enough for most IoT applications. The on-board flash memory also allows developers to



Arduino UNO

Arduino UNO is a conveniently programmable flexible board and an open-source microcontroller. The board is equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards (shields) and other circuits. It consists of an ATmega328P microcontroller. It contains 14 digital pins, 6 analog I/O pins, a USB Port and a power jack. It operates at 5V. It is recommended that the input voltage can be between 7V to 12V. The board has a built-in UART (Universal Asynchronous Receiver/Transmitter) module, which allows it to communicate with other devices using serial communication protocols such as UART, SPI, and I2C. The board also has a USB interface, which can be used for programming and debugging. The board can be programmed by an IDE called Arduino IDE. The program that is written on the IDE can be exported to the Arduino board through a USB cable. The Arduino board contains 3 types of memories inside the ATMEGA328P microcontroller.

SRAM – Static Random Access Memory. It is of 2KB and stores the data which are temporary.

Flash MEMORY – It is of 32KB and stores the program. EEPROM – Electrically Erasable and Programmable Read Only Memory. It is of 1KB and contains the data either the power is on or off.

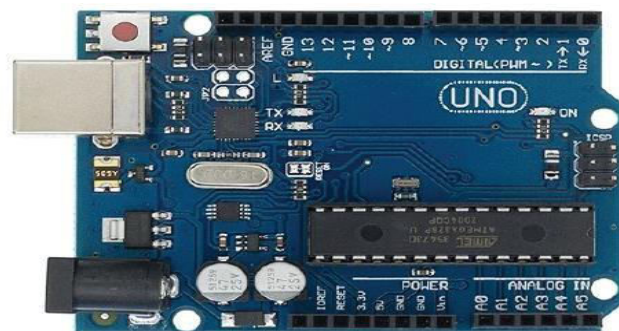


Fig.2. Arduino UNO

HeartbeatSensor

MAX30100 is an integrated pulse oximeter and heart-rate monitors 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. The pulse oximetry subsystem in MAX30100 consists of ambient light cancellation (ALC), 16-bit sigma delta ADC, and proprietary discrete time filter. It has an ultra-low-power operation which makes it ideal for battery operated systems.

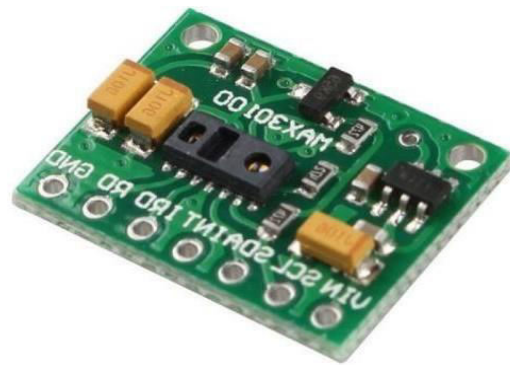


Fig.3. Max30100 Heartbeat Sensor

Temperature Sensor

DHT11 sensor is used to measure the temperature as well as humidity. The DHT11 sensor can measure temperature in the range of 0°C to 50°C (32°F to 122°F) with an accuracy of $\pm 2^\circ\text{C}$ ($\pm 3.6^\circ\text{F}$). It can also measure relative humidity in the range of 20% to 90% with an accuracy of $\pm 5\%$. The sensing element of the DHT11 sensor is a capacitive humidity sensor and a thermistor. The humidity sensor measures the relative humidity of the air by measuring the change in capacitance of a polymer film that is sensitive to moisture. The thermistor measures the temperature of the air by measuring the resistance of a thermally sensitive resistor. It has a fast response time of less than 2 seconds. This means that it can provide accurate temperature and humidity readings quickly, making it ideal for real-time applications. It can be easily interfaced with any microcontroller like Arduino. It provides a digital output that can be easily interfaced with microcontrollers or other digital circuits. The output is a 40-bit data stream that includes the temperature and humidity readings. The data is transmitted using a single-wire communication protocol.



Fig.4. DHT11 Sensor



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PARAMETERS	VALUES
Operatingvoltage	3 to5V
TemperatureRange	0-50°C/±2°C
HumidityRange	20-80%/5%
MaxOperatingCurrent	2.5mAmax

Oxygen levelSensor

Oxygenlevelsensorsarecommonlyusedinmedicalsettingstomeasuretheamountfoxygeninapatient'sblood,which is an important indicator of respiratory function. Thesensors work by detecting the presence of oxygen moleculesinthebloodandconvertingthisinformationintoanelectricalsignal that can be read by medical equipment. These sensorshelphhealthcareadvisorstoprovidecriticalinformationaboutapatient'srespiratoryfunction.Itcanbeusedtodiagnoseand monitor a variety of respiratory conditions, such as asthma,chronicobstructivepulmonarydisease(COPD),andpneumonia.Theyareimportanttoolsformonitoringrespiratoryfun ctioninpatientsandcanhelphhealthcareprovidersmakeinformed decisionsaboutpatientcare.

LiquidCrystalDisplay

OxygenlevelSensor A liquid crystal display (LCD) is a flat panel display,electronic visual display, or video display that uses the lightmodulating properties of liquid crystals. Liquid crystals donotemitlightdirectly.LCDsareavailabletodisplayarbitrary images (as in a general-purpose computer display)or fixed images which can be displayed or hidden, such aspreset words, digits, and 7-segment displays as in a digitalclock.TheliquidcrystallayerinanLCDismadeupofrod-shaped molecules that can align themselves in a particulardirection in response to an electric field. When a voltage isappliedtotheelectrodes,theelectricfieldchangestheorientationoftheliquidcrystalmolecules.Theorientationofthe molecules affects the way that light passes through theliquid crystal layer, creating the image on the display. Therefresh rate of an LCD refers to the number of times persecondthatthedisplayisupdated.



Fig.5.LiquidCrystalDisplay

Buzzer

Abuzzerorbeeperisasignallingdevice,usuallyelectronic,typicallyusedinautomobiles,householdapplianceessuchasami crowaveoven,orgameshows.Itmostcommonlyconsistsofanumberofswitchesorsensorsconnectedtoacontrolunitthatdetermi nesifandwhich button was pushed or a preset time has lapsed, and usuallyilluminatesalightontheappropriatebuttonorcontrolpanel,andsoundsawarningintheformofacontinuousorintermitten tbuzzingorbeeping sound.



Fig.6.Buzzer

Software used Arduino IDE

The Arduino integrated development environment (IDE) is a cross-platform application (for Windows, macOS, Linux) is written in the programming language Java. It is used to write and upload programs to Arduino board. The source code for the IDE is released under the GNU General Public License, version 2. The Arduino IDE supports the languages C and C++ using special rules of code structuring. The Arduino IDE supplies a software library from the Wiring project, which provides many common input and output procedures. The Arduino IDE includes a code library that contains pre-written code snippets and libraries for common tasks. The code library allows users to easily add functionality to their projects without having to write code from scratch. It includes a board manager that allows users to easily add support for new Arduino boards. The board manager provides an easy-to-use interface for selecting the appropriate board, selecting the correct firmware, and configuring the board for use with the IDE. It also includes a serial monitor that allows users to communicate with their Arduino board via a serial connection. The serial monitor displays data sent from the board and allows users to send data back to the board for testing and debugging. The serial monitor can also be used to view debugging messages sent from the board.

Proteus Design Suite

The Proteus Design Suite is a proprietary software tool suite used primarily for electronic design automation. The software is used mainly by electronic design engineers and technicians to create schematics and electronic prints for manufacturing printed circuit boards. It is a design software developed by Labcenter Electronics for electronic circuits simulation, schematic capture and PCB design. It is commonly used for digital simulations such as microcontrollers and microprocessors. It can simulate LED, LDR, USB Communication. It is a simulation and design software tool developed by Labcenter Electronics for Electrical and Electronic circuit design. It also possesses 2D CAD drawing feature. It includes a library of virtual components that can be used in circuit simulation. These virtual components are designed to replicate the behavior of real-world components, such as sensors, actuators, and microcontrollers. They can be used to test and simulate the behavior of complete systems, such as motor control, communication protocols, and control systems.

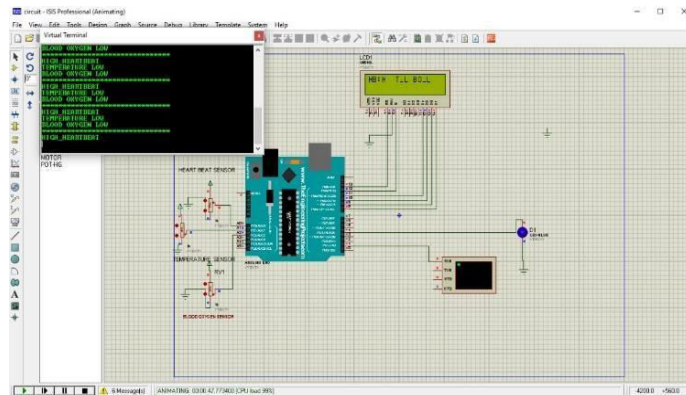


Fig.7.SimulationinProteus

ResultsandDiscussions

This technology's spectrum of impact is wide; it can be used to help identify a person under home quarantine who needs a higher level of treatment or a community where an emerging outbreak could be imminent and requires early intervention.

Conclusion

The heart rate sensor which is interfaced with microcontroller senses the heartbeat of person and transmits the data over internet using Wi-Fi module. System allows setting limits of heart beat. After setting these limits person can start monitoring the heart beat and whenever the person's heart beat goes above certain set point they can get an alert on high heart beat and also about chances of heart attack. Also the system alerts for lower heart beat the system can also be designed to efficiently track the location of the patients and elderly to provide timely medical services in an emergency. The advancement of integrated sensor technology has allowed many physiological parameters to be accurately.

REFERENCES

- [1] AASM Task Force, "Sleep-related breathing disorders in adults: recommendations for syndrome definition and measurement techniques in clinical research," *Sleep*, vol. 22, no. 5, pp. 667–689, 1999.
- [2] M. T. Young et al, "Epidemiology of obstructive sleep apnea: a population health perspective," *American journal of respiratory and critical care medicine*, vol. 165, no. 9, pp. 1217–1239, 2002.
- [3] T. D. Bradley and J. S. Floras, "Obstructive sleep apnoea and its cardiovascular consequences," *The Lancet*, vol. 373, no. 9657, pp. 82–93, 2009.
- [4] J. M. Marin et al, "Long-term cardiovascular outcomes in men with obstructive sleep apnoea-hypopnoea with or without treatment with continuous positive airway pressure: an observational study," *The Lancet*, vol. 365, no. 9464, pp. 1046–1053, 2005.
- [5] C. Iber et al, "The aasm manual for the scoring of sleep and associated events: rules, terminology and technical specifications," *American Academy of Sleep Medicine*, 2007.
- [6] R. B. Berry et al, "Rules for scoring respiratory events in sleep: update of the 2007 aasm manual for the scoring of sleep and associated events," *J Clin Sleep Med*, vol. 8, no. 5, pp. 597–619, 2012.
- [7] P. E. Peppard et al, "Increased prevalence of sleep-disordered breathing in adults," *American journal of epidemiology*, vol. 177, no. 9, pp. 1006–1014, 2011.



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