WWW.IJRPR.COM

International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

ICU Patient Monitoring System Based On IOT

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ABSTRACT-

Technology is essential to healthcare, not just for sensory equipment but also for recording and communication. It is essential to follow different medical guidelines and recovery periods after surgery. IoT is thus a customized version of the most recent advancement in healthcare communication methodology. IoT is a major factor in many applications and acts as a catalyst for the healthcare industry. In this project, a microcontroller serves as a communication gateway. This system offers a smart patient health monitoring system that tracks a patient's health using sensors and uses the internet to notify worried doctors or family members in the event of an emergency. A buzzer is also linked to the controller to notify the caregiver of any variations in the detector's output. The sensors are linked to a microcontroller to monitor the patient's condition. The microcontroller is then interfaced with an LCD display and a wireless local area network association to provide alarms. The system not only displays the patient's temperature, blood pressure, and pulse rate in real time over the cloud, but it also automatically notifies the doctor about the patient's condition over the Internet of Things if it notices any changes in these parameters. In order to efficiently monitor patient health status and save lives on time, IoT-based patient health monitoring systems leverage the internet. This makes it possible to easily provide quick conditional medication using this method. This system can operate at a high level and takes little time to set up.

Keywords—Raspberry-pi, pulse sensor, Accelerometer and buzzer.

I. INTRODUCTION

The term "patient monitoring system" refers to a system that is used to monitor physiological signs, which include parameters such as the electrocardiogram (ECG), respiratory signs, blood pressure, body temperature, and metrics related to gases, among others. One aspect of M-health innovation is the comprehension and verification of monitoring systems. It may be referred to as mobile health or m-health. With the aid of cell phones, these systems are used for the practice of general and medical health. One can use these frameworks for observation up close or far away.

By enabling patient observation outside of traditional clinical settings (such as at home), remote patient monitoring arrangements enable human services offices to serve a larger population at a lower cost. The main goal of this project is to create and implement a smart patient health tracking system that tracks patients' health using sensors and notifies loved ones of any problems via the internet. Creating monitoring systems with an SMS-based patient flourishing viewing and an IOT-based patient checking framework was the goal. distinct clients can view distinct aspects of a patient's blossoming within an IOT-based framework. The rationale for this is that the data ought to be verified by visiting a website or URL. While, in GSM based patient viewing, the flourishing parameters are sent utilizing GSM by strategies for SMS. In most of the rural areas, the medical facility would not be in a hand reach distance for the natives.

BACKGROUND OF THE STUDY

In the modern social protection system, an administrator or medical guardian checks on patients who stay at home during the post- operative phase. Since anything can modify the prosperity parameterin a matter of seconds and more significant damage can occur if a professional is not present, this system may not be expected to be used for endless watching. Thus, the notion to add more doctors from a group of expert doctors present all over the world where periodically consistent patient checking is enhanced is made possible by this improvement in the period where the web guides the world.

EXISTING SYSTEM

It is challenging to maintain a constant watch on patients conditions when a nurse or doctor has to physically move from one hospital to another to check on their well-being. Thus, it is challenging to recognize any dangerous situations unless the nurse or physician evaluates the patient's health at that same

time. It can be exhausting for the doctors to care for so many patients in the hospital. Furthermore, in medical emergencies, patients are often rendered unconscious, rendering them incapable of pressing an emergency alarm button.

• These monitoring systems confine patients to their beds and only allow them to move a certain distance from the bedside.

• The current approaches in patient monitoring systems concentrate on offering improved healthcare facilities to a number of patients with limited medicinal resources.

•Patient data collection is not possible outside of this range.

OBJECTIVE OF THE STUDY

Here, the primary goal is to develop a remote patient health monitoring system that will enable patients' conditions to be diagnosed. In the busy modern world, providing vital care and medical help to bedridden patients at key phases with state-of-the-art medical facilities has become a huge challenge. An affordable and quick-response warning system is a necessary in hospitals with large patient populations whose physical states must be checked frequently as part of a diagnostic process. When these technologies are implemented correctly, doctors and medical workers can receive timely warnings and be notified when an emergency arises. The sensors used in modern systems are hardwired to a PC that is placed next to the bed.

NEED OF IOT

We may connect commonplace devices to each other via the internet thanks to the IOT idea. The gadgets linked by the Internet of Things idea can be remotely analyzed. The IoT idea offers the means and means of establishing a connection between computer- based systems and the real world. The idea has been becoming more and more relevant since the number of wireless gadgets on the market is rising quickly. Hardware gadgets are linked to one another over the internet.

The system's link to internet is provided via ESP 8266 Wi-Fi module.

INTERNET OF THINGS (IOT)

IoT refers to a system in which physical objects and sensors periodically attached to or within those objects are connected to the internet through wired and wireless networks. Numerous native space connection types, including RFID, NFC, Wi-Fi, and Bluetooth, will be used by these sensors. Additionally, sensors may have wide- area capabilities like 3G, LTE, GPRS, and GSM. Link all living and inanimate objects together. Industrial instrumentation connections were the first things made possible by early net of things trials and installations.

II. LITERATURE SURVEY

1] Lutfun Nahar, Syeda Samiha Zahar, Faria Binta Rafiq, IOT based ICU Patient Health Monitoring System 2021, Internet of Things empowers people to get more significant level of mechanization by creating framework, utilizing sensor and interconnecting gadgets and Internet. ICU, silent checking is basic and the most significant action, as little delay in choice identified with patient's treatment may cause perpetual inability or even passing. Arranged sensors, allow to acquire rich information collectively for our physical and mental prosperity. Here an IoT based framework have been proposed in the health care system, which can assist with fast correspondence, recognize crisis and start to communicate with human services staff. Furthermore, it can assist with starting proactive and speedy treatment. This medicinal services framework will lessen the plausibility of human mistakes, delays in correspondence and encourage specialist to save additional time in choice with precise perceptions.

2] C.senthamilarasi, j.jansi rani, b.vidhya , h.aritha a smart patient health monitoring system using iot volume 119 no. 16 2018, 59-70. Over the past ten years, healthcare monitoring systems have become increasingly important and focused on technology. Humans are dealing with the issue of unexpected deaths from a variety of illnesses, which is caused by patients not receiving timely medical attention.

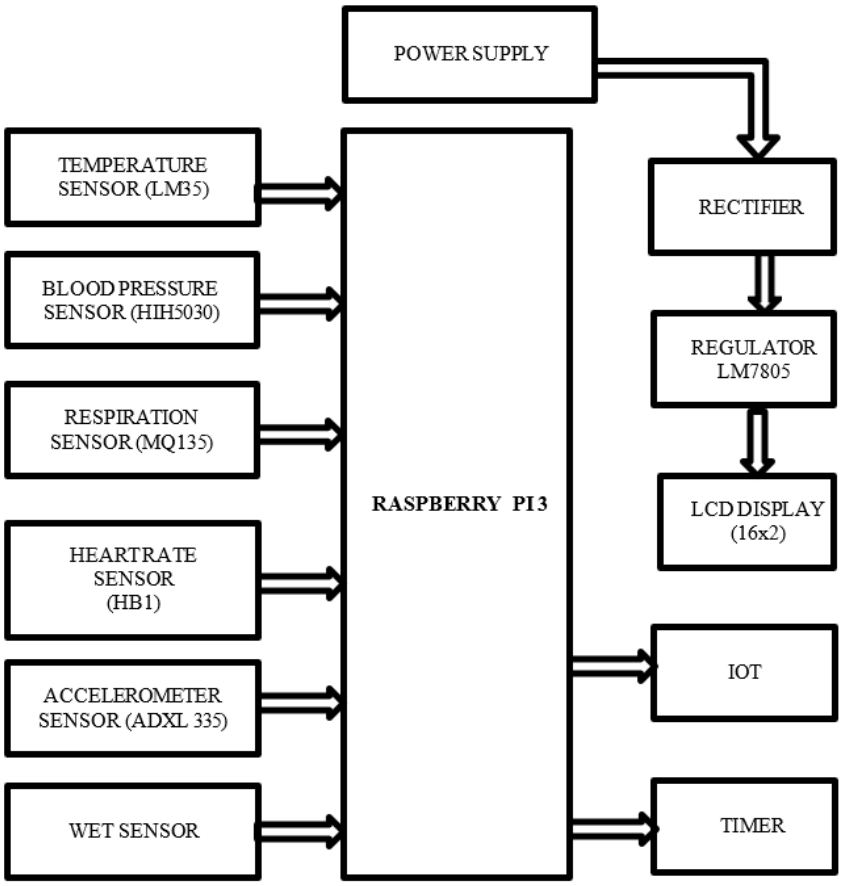
3] Shola Usha Rani1, Antony Ignatious2, Bhava Vyasa Hari2, Balavishnu V Iot Patient Health Monitoring System Indian Journal of Public Health Research and Development • October 2017. The world's critical care has been profoundly impacted by the growing usage of mobile and smart devices in the health sector. These technologies are being used by medical professionals to drastically alter the way that medications are administered in clinical settings. Similar to this, a large number of users benefit from the advantages of E-Health (social insurance supported by ICT) and M- Health (mobile health) applications to improve, aid, and support their well-being.

4] Narasimha Rao Jasti Madhu IoT based Remote Patient Health Monitoring System Narasimha Rao Jasti Madhu 2017. There have been attempts to apply the new technology in numerous areas to enhance the quality of human existence as a result of technological advancements and the shrinking of sensors. The healthcare industry is one major research field where the technology has been adopted. The cost of healthcare services is prohibitive for those in need of them; this is especially true in developing nations. Therefore, this project is an attempt to address a healthcare issue that society is currently facing.

5] Arnaud S.R.M.Ahouandjinou, Kokou Assogba, Cina Motamed, Smart And Pervasive ICU Based-IoT for Improving Intensive Health Care 2016. Setting up a smart and pervasive environment is one of the current challenges being investigated in several research topics. Among the panoply of

applications enabled by the IoT, smart and connected health care is a particularly important one. Networked sensors, either worm on the body or embedded in our living environments, make possible the gathering of rich information indicative of our physical and mental health. In this project offer through this work, an hybrid architecture over a single platform for a visual patient monitoring system for Automatic Detection of risk Situation and Alert using a multi camera system and collaborative medical sensor network.

BLOCK DIAGRAM



2.1 METHODOLOGY

IoT has an incredibly broad range of applications, including industrial instrumentation, military services, healthcare, and pollution monitoring. In an extremely detailed project, we've imposed hardware wherever it's functioning to detect mechanical device defects through Internet of Things (IoT) victimization of an interface. The project's primary focus is on creating a suitable energy meter that combines hardware and software to achieve desired practicality by utilizing embedded systems capabilities.

2.1 RASPBERRY PI

The Raspberry Pi Foundation created the Raspberry Pi line of inexpensive single-board computers in the UK with the goal of advancing the teaching of fundamental computer science in educational institutions and underdeveloped nations. The initial model sold outside of its designated market for applications like robotics and became significantly more popular than expected. Its portability and inexpensive cost have made it popular even for scientific endeavors, such weather monitoring. Peripherals are excluded from this. However, a number of official and unofficial packages have included certain accessories.

2.2 PULSE SENSOR

A pulse sensor that measures a person's heart rate is simple to operate. Your heart rate is vital to assess and to keep track of while you exercise or run. This operates on the basis of a principle known as photoplethysmography, which states that variations in the intensity of light flowing through an organ can be used to measure variations in blood volume in that organ. As a result, the light emitted by the LED will only be detected by the photo sensor when there is blood in the vein, thereby detecting the pulse. The final output is obtained by further conditioning and filtering the output signal.

2.3 TEMPERATURE SENSOR & RESPIRATION SENSOR

The combination DHT11 digital temperature and humidity sensor A calibrated digital signal output of the temperature and humidity is contained in the sensor. Utilizing specialized digital module collecting technology along with temperature and humidity sensing technology, to guarantee great dependability and superior long-term stability of the product.

This sensor is connected to an alarm circuit so that it can sound a buzzer in the vicinity of the gas leak to notify the operators. In addition, the MQ2 gas sensor is utilized to detect hazardous gases, LNG, propane, iso-butane, and cigarette smoke.

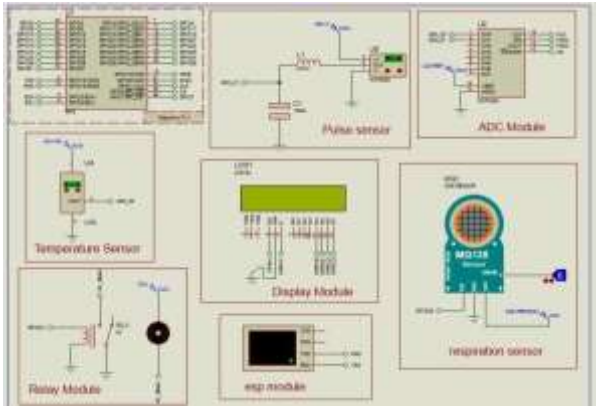
2.4 ACCELEROMETER

A device that monitors appropriate acceleration is an accelerometer. Different from coordinate acceleration, which is acceleration in a fixed coordinate system, proper acceleration is the acceleration (the rate of change of velocity) of a body in its own instantaneous rest frame. For instance, an accelerometer at rest on Earth's surface will register.

2.5 LCD DISPLAY & BUZZER

A liquid crystal display (LCD) is a flat, thin electronic visual display that makes advantage of liquid crystals' ability to modulate light. LCDs don't directly emit light. One type of passive display technology is liquid crystal displays, or LCDs. An audio signaling device, often known as a buzzer or beeper, can be piezoelectric, electromechanical, or mechanical (piezo for short). Buzzers and beepers are commonly used in alarm systems, timers, and to confirm user input, such as mouse clicks and keystrokes. The buzzer is made out of an external casing that has two pins to connect it to ground and power.

III CIRCUIT DIAGRAM



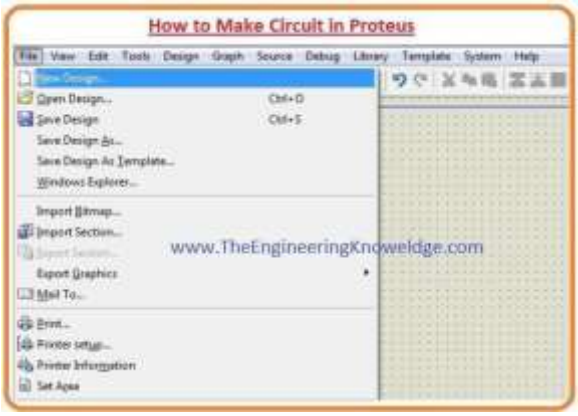
IV SOFTWARE REQUIREMENTS

4.1 PROTUES SOFTWARE

A proprietary software tool package called Proteus Design package is mostly used for electronic design automation. Electronic design experts and technicians use the program primarily to develop electronic prints and schematics for printed circuit board manufacture. It was created by Lab center Electronics Ltd. in Yorkshire, England, and is accessible in Chinese, English, French, and Spanish. A Windows program for schematic capture, simulation, and PCB (Printed Circuit Board) layout design is called Proteus Design Suite. Depending on the scale of designs being created and the needs for microcontroller simulation, it is available in a variety of configurations. Basic mixed mode SPICE simulation capabilities and an auto router are included with every PCB Design product.

4.2 EXPERIMENTAL WORK

Friends, let's now talk about how to create any kind of electric circuit in Proteus. We'll follow a few procedures to build a circuit.



Step 1: Click the Proteus icon on your computer first, then select the “New file” option, as indicated in the figure below.

Step 2: Following that, the drawing sheet will appear, as seen in the figure below. Keep it in line with your Project.

Step 3: Next, select the components for your projects by moving to the component option, as indicated in the image below.

Step 4: Two buttons, P and L, will appear once you click on components mode. You can view the picture from library by moving the P button. It is employed in the selection of various circuit assembly components.

V.RESULT

By this resulting this graph shows,

Field chart-1 is shows the temperature value presented. This Value is reading by temperature sensor and updating every second by using Nodemcu. This graph shows the temperature present in the room in Degree Centigrade by time periods. Maximum value is 33oC acquire at 4-Dec and minimum value is 27oC acquire 4-Dec.

Field chart-2 is shows the pulse value presented in patient heart rate. This Value is reading by pulse sensor and updating every second by using Nodemcu. This graph shows the pulse of patient by time periods. Maximum value is 160 acquire at 4-Dec and minimum value is 100 acquire at 4-Dec.

Field chart-3 is shows the gas value presented room. This Value is reading by MQ2 sensor and updating every second by using Nodemcu. This graph shows the gas present in the patient room in ppm by time periods. Maximum value is 900 ppm acquire at 4-Dec and minimum value is 20 ppm acquire at 4-Dec.

VI CONCLUSION

Therefore, the suggested system might collect and read a variety of significant patient indicators, evaluate them on the cloud, and alert the physician or other concerned parties to the patient's health situation. It keeps an eye on vital indicators and detects anomalies. These anomalies lessen the need for manual monitoring by alerting the medical team. The data is sent to the cloud platform by the system using MQTT communication. This communication protocol helps a web interface provide a graphical representation of information by transmitting the readings of critical patient senses. The experiment's primary goal was effectively accomplished. Each individual module, such as the remote viewing module, heartbeat detection module, fall detection module, etc., produced the desired outcomes.

The system modules that have been designed can be further refined and manufactured into a single circuit. The fact that all of the circuit components needed for the remote health detection system are readily available is a more significant revelation that emerged during project design.

Micro Electro Mechanical Systems (MEMs) and microcontrollers have improved in price, processing speed, miniaturization, and power efficiency as a result of advancements in the integrated circuit industry. The development of embedded systems has expanded as a result, and healthcare professionals are implementing them. The technology of smartphones has also incorporated these embedded systems.

VII FUTURE WORKS

To further develop the design system, more work must be done on the project in the future. Adding more sensors to the system would improve its ability to measure different health markers. We can also use an Arduino and Wi-Fi module to add a GPS module to an Internet of Things-based health monitoring system. Using the received longitude and latitude, the GPS module will determine the patient's position or location. Next, it will use the Internet of Things to send the patient's location to the cloud, where doctors may access it to determine whether to take preventive measures or to automatically notify the closest hospital so that an ambulance can be dispatched to the patient.

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