International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 09 Issue: 04 | Apr 2022 www.irjet.net p-ISSN: 2395-0072

IOT BASED ICU MONITORING SYSTEM

Khilari Varsha Bhagwan[1], Tambe Rupali kerbhau[2], Morade Snehal[3], Andre Suvarna[4]

[1,2,3]Student, Dept. of Electronic and Telecommunication Engineering, Jaihind College of Engineering, Kuran
[4]Professor, Dept. of Electronics and Telecommunications, Jaihind College of Engineering, Kuran

---

Abstract- In hospitals, critical patient are treating in ICU Due to critical patients health doctors needs to continuously monitor the patient. Doctor use this system to monitor for observing the patient. This system continuously transmitting patient data i.e. Heart Rate, Blood Pressure, Oxygen Level, body temperature etc. to server for the future purpose. A real time monitor system analyze the human body parameters.

To design a system to remotely monitor a patients vital parameters which are measured by an Ventilator and to upload this data on cloud so that it can be used for future purpose in analysing a patients health over a certain period of time. Who are admit in ICU room whose body temperature and blood pressure measurement reading is so much necessary in every single moment is also a big problem. On concentrating this problem here we have proposed a system that is called ICU Monitoring System. One main area of research that has seen an adoption of the technology is the healthcare sector. The people in need of healthcare services find it very expensive this is particularly true in developing countries.

Key Words: Arduino Uno, Pressure Sensor, Air flow Sensor, Temperature Sensor, SPO2 Sensor, LCD Display.

1. INTRODUCTION

Intensive care units (ICU) are vital for enhancing the survival of critically ill patients through the continuous monitoring of their vital functions.

The Parameters which are continuously monitored are:-
PIP(Peak Inspiratory Pressure)

Inspiratory airflow monitoringOxygen Saturation

Heart Rate

Body temperature

The Vital functions Displayed on the Ventilator are only for that particular instance of time and this patients data cannot be stored for future analysis of patients health.[1]

So, there is a need of a system which can store the patients measured Vital Parameters and remotely display them on the Screen in doctors cabin. And this is where our project comes in.[2] 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 patients parameter values are not efficiently measured in clinic as well as in hospitals. Sometimes it becomes difficult for doctors to all time check patient's conditions.

Also continuous monitoring and also check ICU patients is very difficult.[3] To deal with these types of situations, our system is beneficial. Our system is designed to be used in hospitals for measuring and monitoring various patients parameters like temperature, ECG, heart rate, blood pressure, oxygen.[4] The results can be recorded using Arduino. Also the doctors can see patients report on android app. The system will also generate an alert notification which will besent to the consult doctor.[5]

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.[6]

1.1 OBJECTIVES

Objective of the study a database for all the vital data to be accessed remotely through internet,the main objective is to design a ICU Monitoring System to diagnose the health condition of the patients.

Giving care to the bedridden patients at critical stages. In hospitals where every patients whose physical conditions, must be monitored frequently as a part of a diagnostic procedure.

To display the measured parameters on to a different display Screen apart from the ventilator Screen Present in the ICU room also in doctors cabin.

The data measured from the patient every day will be saved on cloud to use it for future diagnosis and analysing the Improvement in Patients Health.

2. Block Diagram

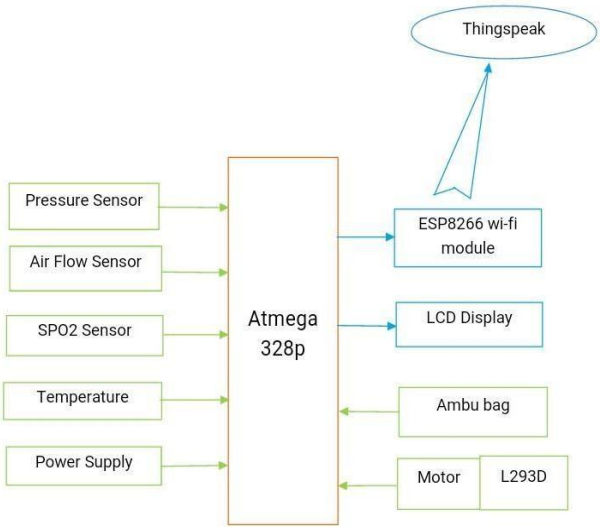

Fig 1: Block Diagram

3. Block diagram description

First the motor driver pumps the Ambu bag which pumps the air forwards to the patient where the Pressure sensor and the Airflow sensor measures the pressure and the amount of air flowing inside which can be controlled.

The LM35 Temperature Sensor and the SpO2 sensor are connected the patients body which take continuous input. All the this data is given as an input to the Microcontroller.

This data is then processed and Patients Health is determined and it is Displayed on the Screen at the doctors cabin and a notification is sent to the consult doctor if the patients Vital Functions fall below the Threshold or if any critical condition occur.

All this data of the patient is uploaded on to the cloud storage so that it will be saved and can be reviewed for future references.

This is a simple block diagram that explains the IoT Based ICU Monitoring System using ESP8266 & Arduino. Pulse Sensor and LM35 Temperature Sensors measure BPM & patients pulse and temperature. The Arduino processes the code and displays it to 16*2 LCD Display and also store on cloud. ESP8266 Wi-Fi module connects to Wi-Fi and sends the data to thingspeak server. The IoT server we used here is Thingspeak. Finally, the data can be monitored from any part of the world by logging into the Thingspeak channel on your device. The module can work on both side as an Receive point and as a station, hence it can easily fetch data and also upload it to the internet. Another exciting feature of this module is that it can be programmed using the Arduino IDE which makes it a lot more user-friendly.

3.1. Hardware Components

A. ArduinoUno

The Arduino is a group of smaller scale controller sheets to hardware plan, testing and prototyping, programmers, and numerous experts. It can be used it as brain for robots, to assemble new advanced music instruments, or to manufacture a framework that lets home plants tweet once there dry.

Arduinos are worked around an ATMEGA microcontroller-basically a total PC with all the components on a solitary chip. Figure (A) demonstrates the Arduino Uno board. Using USB, the Arduino board is connect with the PC. The program is written in a basic language like C, C++, or Java on Arduino IDE by transferring data, code to the board.[1]

Fig (A): Arduino Uno Board

The Arduino Uno can be powered through the USB connection or with an external power supply. The board operates on an external supply in between 6 volts to 20 volts. If supplied with less than 7V, 5V pin may supply less than five volts and the board may be unstable. If using more than 12Volts the voltage regulator may overheat and damage the circuit. The recommended range in between 7 to 12 volts. Arduino Uno is a microcontroller based on the ATmega328P, it has 14 digital input and output pins, 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, and a reset button. Arduino uno contains all thing to support the microcontroller simply connect it to a computer with a USB cable , power it with a AC-to-DC adapter and battery to get started it.

B. Pressure Sensor.

Fig (B): Pressure sensor

A pressure sensor, as the name suggests, is a device that senses and measures pressure. The pressure sensor in electronic circuits is in the form of an integrated circuitand

that acts as a transducer, it replicates in the form of an electrical signal. A pressure sensor is also called as a pressure transducer, pressure transmitter, pressure sender, pressure indicator, manometer and piezometer.

C. SPO2 Sensor

Fig (c): SPO2 sensor

Display & indications for SpO2:- 3-digit LED (light-emitting diodes) display, 10.9mm high. Pulse rate: 3-digit Display LED, 10.9mm high, Sensors:- all reusable LED flashes to alert the operator to check the sensor placement. SpO2: Range 0-100% Accuracy: ±2% at 70-100%, ±3% at 50-69%

Averaging: 4.8- or 16-pulse beat average. Pulse oximeters, also called SpO2 sensors, are used to measure blood oxygen levels or oxygen saturation in your blood. In the medical field, pulse oximeters are usually small devices that resemble a clip.

D. LM35 sensor

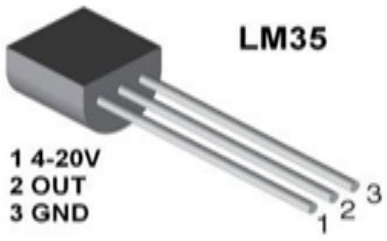

Fig (D): LM35 sensor

Temperature sensor is a device which is designed specifically to measure the hotness or coldness or temperature of an object. LM35 is a precision IC temperature sensor with its output proportional to the temperature °C . With LM35 sensor the temperature can be measured more accurately than with a thermistor.

The operating temperature range in between -55°C to 150°C.

LM35 is a temperature measuring device having an analog output voltage proportional to the temperature. This sensor provides output voltage in Celsius. It doesn't required any external calibration circuitry. The sensitivity of LM35 temperature sensor is 10 mV/°C. As temperature will increases then output voltage also increases.

LM35 is used for the measure precise centigrade temperature. The output voltage range of this sensor in between -55˚ to +150˚C.

LM35 Temperature sensor Features Calibrated Directly in Celsius Linear + 10-mV/°C Scale Factor.

0.5°C Ensured Accuracy Rated range for Full −55°C to 150°C . Operates from 4 Volts to 30 Volts. below than 60-µA Current Drain. Low Self-Heating 0.08°C in Still Air.0.5°C Ensured Accuracy Rated range for Full −55°C to 150°C . Operates from 4 Volts to 30 Volts. below than 60-µA Current Drain. Low Self-Heating 0.08°C in Still Air.

E. LED Display

Liquid crystal displays (LCD) have materials which combination of the properties of both liquids and crystals. Also having a melting point, they have a temperature range within which the molecules are almost as mobile as they would be in a liquid, but they are grouped together in an ordered a similar to a crystal. An LCD consists of two glass panel and The inner surface of the glass plates are coated with transparent electrodes which define the character, symbols to be displayed polymeric layers are present in between the electrodes and the lCD, which makes the liquid crystal molecules to maintain a orientation angle.

This 16 × 2 LCD packs 32 characters into an two-line displays. An LED backlight enables optimal viewing in all lighting conditions. This unit uses the HD44780 interface found on most parallel character displays.

Size:- 85.0 x 29.5 x 13.5 mm , Viewing area is :- 64.5 x 16.4 mm in size, Dot size:- 0.56 x 0.61 mm Dimensions

Character size:- 3.00 x 5.23 mm,

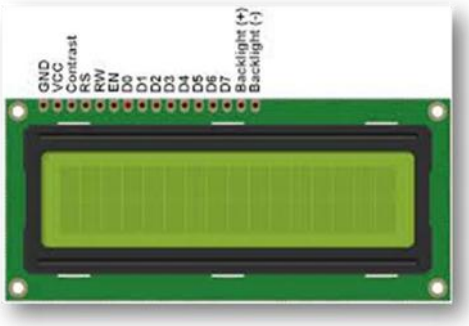

Fig (E): LCD Display

FUTURE SCOPE:

In hospital who is critical patient are admitted in ICU room. Due to critical condition health doctors needs to

continuously monitor the patient. Doctor use this monitoring system for ill patient those admitted in ICU room and his condition is very serious so monitors for that patient. This monitor system continuously transmitting patient data to the doctor that is Heart Rate, Blood Pressure, Oxygen Level, body temperature etc. to local server for the future purpose. An Intelligent real time monitor system analyze and also store the human body parameters.

The proposed system gives better and effective in way caring of patients and the information collected is networked worldwide through internet and communication devices in turn connected to cloud services through internet and doctors can use this data and provide a quick and effective solution.

7 . CONCLUSION

In this way ICU Patient Monitoring System is an enhanced system that helps in monitoring ICU Patients without any manual intervention.

By using this system, the man power in hospitals can be reduced. Doctors can check the patients anytime from anywhere.

This system is less costly, more compact as compared to other systems.

The proposed system gives better and effective health care services to the ill patients and the information collected is through network.

Emergency alert e-mail is sent to the consult doctor if the threshold value is reached. This system is helpful for patients who has advised for the complete rest.

The goal of the proposed system is to adopt a new production of medical systems that can provide health caring service for high quality and low-cost in patients using this combination of large data analysis, cloud computing.

ACKNOWLWDGEMENT:

We would like to sincerely thank you our project guide Prof. Andre S.B. for guiding this project work also would like to thank our other faculty members from the electronic and telecommunication engineering department at Jaihind College of Engineering, Kuran for allowing us to perform our project work.

REFERENCES:

[1] Ranney, M.L: Griffeth, V: Jha, A.K. "Critical Supply Shortages- The Need of Ventilators For Personal Protective pandemic." N. Engl. J. Med. 2020, 382, e41.

[2] M; Valls, A.; Grifols, J.: Farré, R.: Cambra Lasosa, F.J; Rubin, B.K. "COVID-19 and respiratory support devices.Respir. Rev. 2020, 35, 61–63.

[3] S.B. Baker, W. Xiang, and I. Atkinson:- "Internet Of Things For Smart Healthcare are ; Technologies, Challenges, and Opportunities," IEEE Access, vol. 5, no. c, pp. 26521-26544, 2017.

[4] Ferrante, L.; Fearnside, P.M. "Protect Indigenous peoples from COVID-19." Science2020, 368, 251.

[5] Taylor, L. "The pandemic new centre." New Sci.- 2020, 246, 12–13.