IJEAST

INTERNATIONAL JOURNAL
OF ENGINEERING APPLIED SCIENCE
AND TECHNOLOGY

VOLUME : 6 ISSUE : 1 Print / Issue Publication Date: 08-Aug-2021

ISSN : 2455-2143

DOI : 10.33564/IJEAST.2021.v06i01.064

Indexed In

Google SCHOLAR OPEN ACCESS doi Crossref

WWW.IJEAST.COM

editor@ijeast.com

International Journal of Engineering Applied Sciences and Technology, 2021
Vol. 6, Issue 1, ISSN No. 2455-2143, Pages 406-414
Published Online May 2021 in IJEAST (http://www.ijeast.com)

EFFECTIVE MEDICAL TREATMENT AND MONITORING SYSTEM FOR BLOOD PRESSURE AND SATURATION OF OXYGEN LEVEL WITH TELEGRAM MESSAGE SERVICE

[1]M. Sri Vally Radha, [2]S. Pavan Kumar, [3]P. Appalanaidu, [4]C. Sri Ramu
[1,2,3,4] IV/II B.Tech.
[1,2,3,4] Department Of Electronics & Communication Engineering,
Godavari Institute Of Engineering And Technology (Autonomous Institution),
Nh-16, Chaitanya Knowledge City, Rajahmahendravaram, A.P, India-533294.

ABSTRACT - A lot of period, due to negligence of hospital staff, or insensitivity of relatives it may happen that medication is not observed correctly, and it may go ahead to cause heart attack or other life-threatening situations. Thus, this research study presents proposed systems which include arrangement of sensor tools and Internet of Things (IoT). Using this structure one can manage electrical energy equipment's and monitor level of the medicine from a distant place and keep an eye on entire development. In this structure using IoT, one can normalize electrical appliances and constantly supervised patients from remote location. The internet of things technology is a innovative change maker for the health care engineering. It is changing healthcare field by dropping functioning costs and serving caretakers centre of attention on treating patients in a better mode. This method consists of a number of sensors. Controlling and data processing is done through the ESP8266, all the sensors are connected to Arduino Uno. Through this system, we can measure Temperature, heartbeat, and BP. Through sensors, it is possible to measure all these values. These values are then used for detecting any situation. In case of a critical situation, an alert can be given as a telegram message it is possible to monitor the person's health from any location in the world through the mosquito server cloud. The project uses a MQTT protocol for monitoring patients.

Condition through the mobile Application. The data from sensors is uploaded to the cloud server, periodically without any interruption if the internet is available. Through this system one can efficiently monitor patient's condition.

Keywords: Medication, Internet of Things, ESP8266, telegram, and MQTT protocol.

I. INTRODUCTION

Patient monitoring is the observation of a disease, medical state, and other vital parameters and of a patient over a period. It is regularly performed by constantly calibrating certain medical parameters with the use of a device called as medical monitor. The presentation of medical tests like blood tests and urine tests. A medical monitor usually consists of one or more sensors, processing components, display devices and communication links for displaying or recording the results through a monitoring network [1].

The patient monitoring system is a mainly used in Intensive Care Unit (ICU). The similar name of intensive care unit is critical care unit (CCU). ICU is a distinct sector of a hospital that delivers precise treatment. Not all persons need intensive care unit, but some critical persons need personal treatment [2, 3].

In the present scenario the normal hospital systems are not capable to monitor the patient health conditions always. Hence there is a need for patient monitoring system for monitoring the patient health conditions constantly, and our project will be the solution for that.

This project, we have projected a clever patient monitoring system for monitoring the patient health conditions automatically through sensors based

connected networks. Several sensors are used for gathering the biological behaviours of a patient. The biological information is then forwarded to the IOT cloud. The system is more intelligent that can be able to detect the critical condition of a patient by processing sensors data and instantly provides push notifications to doctors as well as hospital in-charge personal. The doctors and nurses get benefit from this system by observing their consequent patients distantly without visiting in person [4, 5].

II. LITERATURE SURVEY

Various researchers had worn diverse methods and technologies to carry out the process of heart rate monitoring. Some of the important research works were reviewed in this paper.

In this project heart-rate signals were collected from finger or ears using IR TX-RX (Infrared Transmitter and Receiver pair) module which was amplified in order to convert them to a noticeable scale. A low pass filter was used to filter natural noise. These signals were counted by a microcontroller module (ATmega8L) and displayed on the LCD. Microcontroller is programmed with an algorithm to run the proposed heart rate counting system. The results obtained using this process when compared to those obtained from the manual test concerning counting of heart rate was found acceptable. The proposed system is applicable for family, hospital, community medical treatment, sports healthcare and other medical purposes. Also, fit for the adults and the paediatrics. However, this method in the developed system needs further investigation and need more functionality, which may b**e** useful to consider advance in future investigation [1, 2, and 3].

This project includes working on a wirelessly display of Heart beat and temperature based on a microcontroller ATmega328 (Arduino Uno). Most monitoring systems that are used in today's world works in offline mode but our system has been designed in such a way that a patient can be monitored remotely in real time. This system consists of sensors which measures heart beat and body temperature of a patient which is controlled by the micro controller. Both the parameters are displayed in LCD monitor. The transmitted data is wireless and is send through microcontroller. Heartbeat is counted through pulse sensor in Beats per Minute while the temperature sensor measures the temperature and both the data are sent to the microcontroller for transmission to receiving end. Finally, the data are displayed at the receiving end. This system could be made available at a reasonable cost with great effect and accuracy [4, 5, and 6].

This shows GSM enabled real time heart rate monitoring system. GSM system is used for communicating the abnormalities in heat rate values. Abnormal change in the values of any of these parameters from their set point values will be instantaneously sensed and local help is sought from the nearby people. If any help is not available, this system sends SMS directly to home, doctor or care taker's mobile phone. Heart rate is the number of heat-beats per unit of time, simply expressed as beats per minute (bpm). An attempt is made to design and develop a system that uses a simulator circuit to diagnose abnormalities in the heart rate which includes Tachycardia and Bradycardia conditions. It is a two- directional communication system in which he care taker or Doctor, can also send SMS to know the present parameter status of the person or patient [7, 8, and 9].

Implementation of heartbeat monitoring and heart attack detection system using Internet of things is shown. These days we saw an increased number of heart diseases and heart attacks. The sensor is interfaced to a microcontroller that allows checking heart rate readings and transmitting them over internet. The user may set the 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 regulator which then transmit 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. Thus, concerned patients may monitor heart rate as well get an alert of heart attack to the patient without delay from anywhere and the person can be saved on time.

The plan and development of a microcontroller based heartbeat and body temperature monitor using fingertip and temperature sensor is shown. The device involves use of optical technology to detect the flow of blood through the finger and offers the advantage of portability over conventional recording systems. Wireless body area network based remote patient monitoring systems have been presented with numerous problems including efficient data extraction and dynamic tuning of data to preserve the quality of data communication. Assessment of the device on real signals shows accuracy in heartbeat measurement, even under extreme physical activity. This paper presents these challenges as well as solution to these problems by proposing an architecture which allows a network to be formed between the patient and doctor in order to enable remote monitoring of patient by analysing the data of patient. The device consists of sensors which are

International Journal of Engineering Applied Sciences and Technology, 2021
Vol. 6, Issue 1, ISSN No. 2455-2143, Pages 406-414
Published Online May 2021 in IJEAST (http://www.ijeast.com)

used to measure heartbeat as well as body temperature of a patient and it is controlled by a central unit. The readings from these sensors are further processed and sent via GSM module to a remote location where it is displayed on cell phone. The optical heartbeat sensor counts the heart beat per minute and temperature sensor measures the temperature from the body and both the measured data are sent to a receiving end utilizing wireless technology where the data is displayed in a cell phone for further processing and patient care. This device is shown superior in comparison to conventional systems [10].

The heart rate can be measured by monitoring one's pulse using dedicated medical devices such as a temperature, portable wrist strap watch, or any other commercial heart rate monitors. In spite of its accuracy, some way it is costly, involve many clinical settings and patient must be attended by medical experts for uninterrupted monitoring. For a patient whom before now diagnosed with fatal heart disease, their heart rate condition has to be monitored always. This paper proposed an alert system that able to monitor the heart beat rate condition of patient. The heart beat rate is detected using photo plethysmograph (PPG) technique. This signal is processed using PIC16F87 microcontroller to determine the heart beat rate per minute. Then, it sends SMS alert to the mobile phone of medical experts or patient's family members, or their relations via SMS. This will also alert the family members to swiftly attend the patients.

III. SYSTEM SETUP

A. Hardware Components:

- Heart beat Sensor
- Pulse Sensor
- LCD Display
- Mems Sensor
- Arduino Uno
- ESP8266 Module

B.HEART BEAT SENSOR

Monitoring heart rate is very significant for athletes, patients as it determines the situation of the heart (just heart rate). There are many ways to compute heart rate and the most precise one is using an Electrocardiography.

But the more easy way to monitor the heart rate is to use a Heart beat Sensor. It comes in different shapes and sizes and allows an instant way to measure the heartbeat.

Heart beat Sensors are available in Wrist Watches (Smart Watches), Smart Phones, chest straps, etc. The heartbeat is measured in beats per minute or bpm, which indicates the number of times the heart is contracting or expanding in a minute.

The basic heart beat sensor consists of a light-emitting diode and a detector like a light detecting resistor or a photodiode. The heartbeat pulses cause a variation in the flow of blood to dissimilar regions of the body. When tissue is illuminated with the light source, i.e., light emitted by the led, it either reflects (a finger tissue) or transmits the light (earlobe). Some of the light is absorbed by the blood and the transmitted or the reflected light is received by the light detector. The amount of light absorbed depends on the blood volume in that tissue. The detector output is in the form of the electrical signal and is comparative to the heartbeat rate.

This signal is a DC signal relating to the tissues and the blood volume and the AC component synchronous with the heart beat and caused by pulsatile changes in arterial blood volume is superimposed on the DC signal. Thus the major requirement is to isolate that AC component as it is of prime importance.

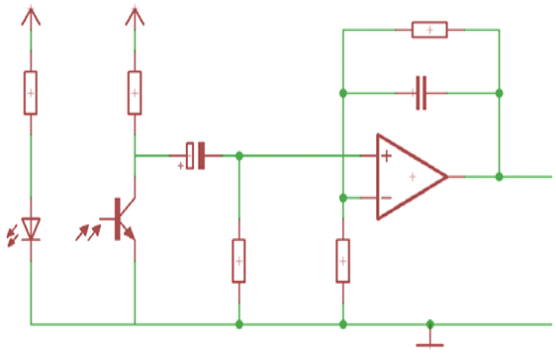

Figure 1 HP-LP Circuit Diagram

C.MEMS SENSOR

Acceleration is a process in which velocity is changed with respect to time and it is a vector quantity. Similarly, velocity is a speed and direction. There are two ways for elucidation acceleration of anything first one is change in speed and second one is change in direction. Sometimes both are changed concurrently. If we talk about ADXL 335 accelerometer, then this accelerometer is a device that is used for measuring acceleration of any object. It measures the acceleration in the form of analog inputs, in three-dimension direction such as X, Y and Z. It is low noise and less power consume device. When it is used for acceleration measure purposes then it is interfaced with any type of controller such as microcontroller or Arduino etc. It is mostly used in construction operational equipments such as drilling, driving

International Journal of Engineering Applied Sciences and Technology, 2021
Vol. 6, Issue 1, ISSN No. 2455-2143, Pages 406-414
Published Online May 2021 in IJEAST (http://www.ijeast.com)

piles and demolition etc., human activities machines such running, walking, dancing and skipping etc. It is easily available in market or online shop. A simple ADXL 335 accelerometer is shown in

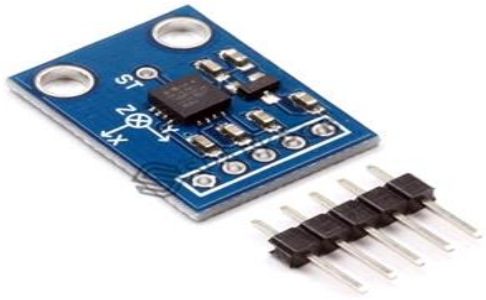

Figure 2 ADXL 335 Accelerometer

Every ADXL 335 accelerometer consists of five pins which are used for different purposes. At present different types of accelerometers are available in market which is used for different purposes. Some works on the principle of MEMS (micro electro mechanical sensor) working. It consists of a small mass which is etched into silicon surface and then integrated into a small circuit. When force is applied on this mass then it covers some displacement, so acceleration is produced in this mass according to newton second law of motion F = ma which is sensed by its sensor. Similarly, if we talk about analog accelerometers then they work on two principles such as capacitive sensing and piezo electric sensing. Both have different advantages and disadvantages. Similarly, ADXL335 accelerometer is an analog accelerometer therefore it works on the principle of capacitive sensing. In capacitive sensing accelerometer when it is moved in any direction then its capacitance is changed

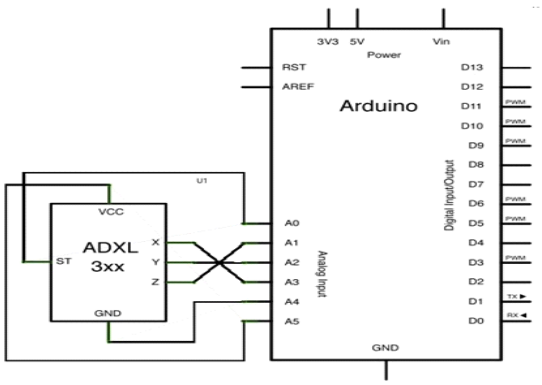

Figure 3Interfacing ADXL with Arduino

According to schematic figure 2 x, y and z pins of accelerometer are connected to A1, A2 and A3 pins of Arduino board. These are analog input pins, which gives the analog input signal to Arduino board. Similarly, Vcc and ground pins of accelerometer are connected to A5 and A4 pins of Arduino board. So, after making all connections, a logic program is written in Arduino library then this program is upload in Arduino board with the help of Arduino IDE software. Then triple axis reading is attained through Arduino board.

D.PULSE SENSOR

A person's heartbeat is the sound of the valves in his/her heart contracting or expanding as they force blood from one region to another. The number of times the heart beats per minute (BPM), is the heartbeat rate and the beat of the heart that can be felt in any artery that lies close to the skin is the pulse.

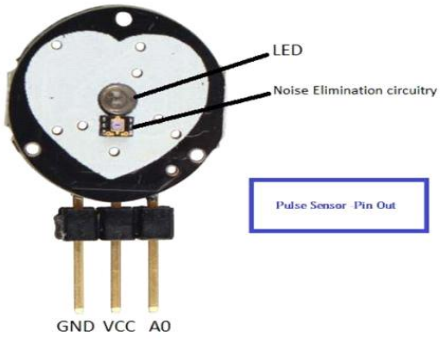

Figure 4 Pulse Sensor

E.AURDUINO UNO

The Arduino UNO is an open-source microcontroller board based on the Microchip ATmega3285 microcontroller and developed by arduino. 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. The board has 14 Digital pins, 6 Analog pins, and programmable with the Arduino IDE (Integrated Development Environment) via a type B USB cable. It can be powered by a USB cable or by an external 9-volt battery, though it accepts voltages between 7 and 20 volts. It is also like the Arduino Nano and Leonardo. The hardware reference design is distributed under a Creative common Attribution Share-Alike 2.5 license and is available on the Arduino website. Layout and production files for some versions of the hardware are also available.

International Journal of Engineering Applied Sciences and Technology, 2021
Vol. 6, Issue 1, ISSN No. 2455-2143, Pages 406-414
Published Online May 2021 in IJEAST (http://www.ijeast.com)

Figure 5 Arduino Uno

F.ESP8266 MODULE

The ESP8266 arduino well-suited module is a low-cost Wi-Fi chip with full TCP/IP capability, and the incredible thing is that this little board has a MCU (Micro Controller Unit) integrated which gives the prospect to control I/O digital pins via effortless and almost pseudo-code like programming language. This device is produced by Shanghai-based Chinese manufacturer, Express if Systems.

ESP8266 Arduino module comes with PCB trace antenna which seems to have a very good coverage. Other version can have on-board ceramic antenna or an external connector which allows you to attach external Wi-Fi antennas modules. ESP-01 has only 6 active pins, although the MCU can support up to 16 I/O. Board dimensions are 14.3 x 24.8 mm.

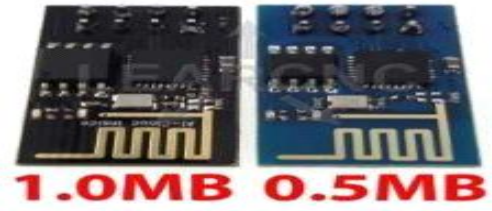

Figure 6 : ESP8266 Module

Over the internet it found that ESP8266 arduino module, version 01, is sold in two or more versions, which at first glance seem quite the same. After buying both of them I saw that there is a difference in size of the flash memory. You may encounter issues while flashing if you don't make the proper settings according to board specifications. Although the board default has 2 available GPIOs, you can do some workarounds and use other MCU available pins if you have the proper soldering tools. I managed to use GPIO 16 to wake up the device after DEEP SLEEP mode.

G.PIN DESCRIPTION

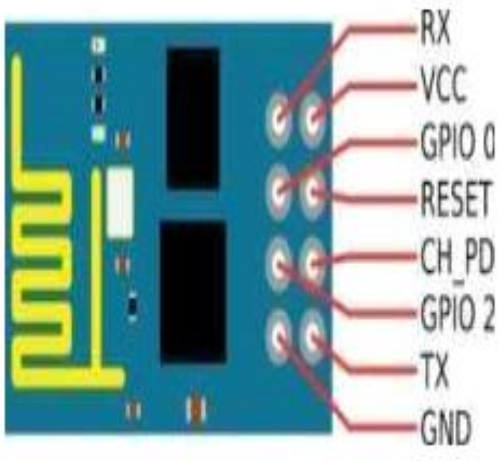

Figure 7 ESP2866 Module

Pins are arranged in two rows, having 4 on each row. Some models have pin description on the PCB, which make it simple.

H.LCD DISPLAY:

A liquid-crystal display (LCD) is a flat-panel display or other electronically modulated optical device that uses the light-modulating properties of liquid crystals. Liquid crystals do not emit light directly, instead using a backlight or reflector to produce images in colour or monochrome. LCDs are available to display arbitrary images (as in a general-purpose computer display) or fixed images with low information content, which can be displayed or hidden such as present words, digits, and seven-segment displays, as in a digital clock. They use the same basic technology, except that arbitrary images are made up of a large number of small pixels, while other displays have larger elements.

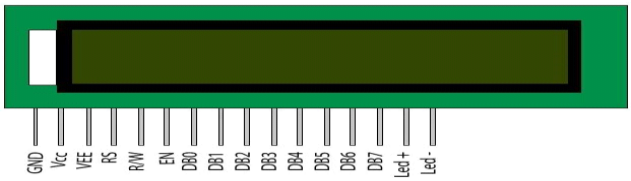

Figure 8 LCD Display

IV. MQTT APPLICATION:

In the simplest terms, MQTT is a messaging protocol that was designed to create a reliable standard for machine-to-machine (m2m) communication. MQTT is a publish-and-subscribe protocol, meaning that as an alternative of communicating with a server, client devices and

International Journal of Engineering Applied Sciences and Technology, 2021
Vol. 6, Issue 1, ISSN No. 2455-2143, Pages 406-414
Published Online May 2021 in IJEAST (http://www.ijeast.com)

applications publish and subscribe to topics handled by a broker.

MQTT typically uses IP (Internet Protocol) as its transport but can also use other bi-directional transports.

Figure 9 MQTT App

A.MQTT CLIENT AND BROKER:

Any Thing (from a microcontroller to a massive server) that runs an MQTT library and connects to a broker over a network can efficiently become an MQTT client.

Clients don't send messages directly to and from each other but instead communicate to topics managed by the MQTT broker. These topics work a little like email inboxes. Messages are published by Things to topics; messages are then picked up when a Thing subscribes to those topics.

The MQTT broker handles authentication of Things on the network as well as managing connections, sessions, and subscriptions. Its main responsibility is to receive all published messages and then send them subscribed clients. The MQTT broker also queues messages for subscribed clients, delivering them according to the agreed QoS level.

V. BLOCK DIAGRAM

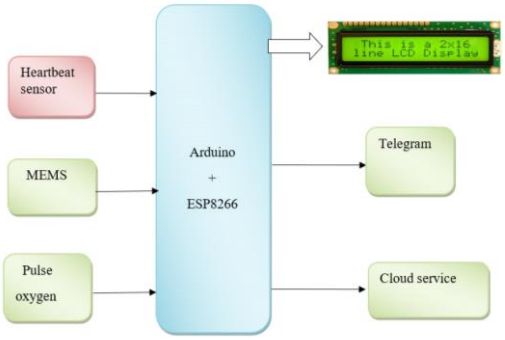

Figure 10 Block Diagram

A.HEARTBEAT SENSOR:

The heartbeat sensor is based on the principle of photoplethysmography. It measures the change in volume of blood through any organ of the body which causes a change in the light intensity through that organ (avascular region).

B.MEMS SENSOR:

Acceleration is a process in which velocity is changed with respect to time and it is a vector quantity. Similarly, velocity is a speed and direction. There are two ways for explaining acceleration of anything first one is change in speed and second one is change in direction. Sometimes both are changed at once.

C.PULSE SENSOR:

The number of times the heart beats per minute (BPM), is the heartbeat rate and the beat of the heart that can be felt in any artery that lies close to the skin is the pulse.

D.ARDUINO UNO:

The Arduino UNO is an open-source microcontroller board based on the Microchip ATmega3285 microcontroller and developed by arduino. 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. The board has 14 Digital pins, 6 Analog pins, and programmable with the Arduino IDE (Integrated Development Environment) via a type B USB cable.

E.LCD DISPLAY:

A liquid-crystal display (LCD) is a flat-panel display or other electronically modulated optical device that uses the light-modulating properties of liquid crystals.

International Journal of Engineering Applied Sciences and Technology, 2021
Vol. 6, Issue 1, ISSN No. 2455-2143, Pages 406-414
Published Online May 2021 in IJEAST (http://www.ijeast.com)

VI. RESULTS

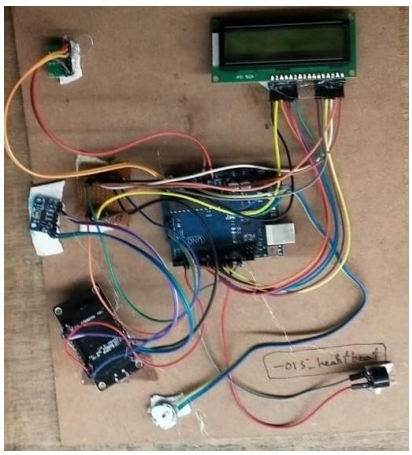

Figure 11 Health Monitoring System Kit

From figure, we can observe the health monitoring system without the input and output.

Figure 12 LCD Display with No Input

From figure,we can observe the LCD display connected to Arduino uno board responding to the supply while there is no input from any sensor i.e., the sensors are not connected to patient or person.

Figure 13 : Pulse Sensor Output

From figure, we observe that Pulse Sensor is responding to the supply, so we can say that pulse sensor is ready to take the input.

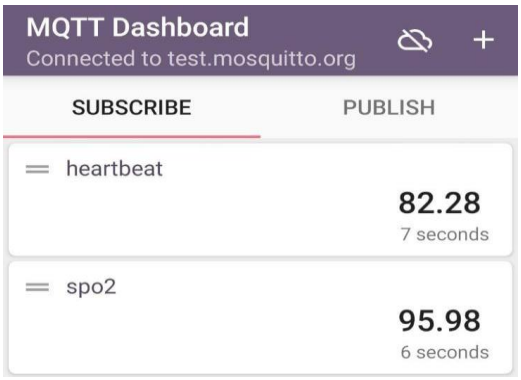

Figure 14 Output of Health Monitoring System in MQTT APK

From figure, we can observe the output of health monitoring system through MQTT application via cloud.

Figure 15 : Output of Health Monitoring System in LCD Display

From figure, we can observe the heartbeat and oxygen (SPO2) of the patient or a person in LCD display of health monitoring system.

International Journal of Engineering Applied Sciences and Technology, 2021
Vol. 6, Issue 1, ISSN No. 2455-2143, Pages 406-414
Published Online May 2021 in IJEAST (http://www.ijeast.com)

Figure 16 Response from the TELEGRAM BOT

From figure, we can observe the response in Telegram while taking input from arduino via cloud.

VII. CONCLUSION

The project has been successfully designed and tested. Integrating features of all the hardware components used have developed it. Presence of every module has been reasoned out and placed carefully thus contributing to the best working of the unit. Secondly, using sensors and with the help of growing technology the project has been successfully implemented.We conclude that our project will be used as an patient monitoring system in the hospital environment. Our project has the system is more intelligent that can able to detect the critical condition of a patient by processing sensors data and instantly provides push notification to doctors / nurses as well as hospital in-charge personal and this type of implementation is a major advantage because even a common man can able to understand the system output parameters data.

VIII. FUTURE SCOPE

The project can be further extended to measure the patient parameters like ECG, Body movements, ERG etc. It can implement by using Raspberry pi for better results to monitor the patient conditions.It is extended to display the medicine description according to the patient ‘s condition at the time of monitoring.

IX. ACKNOWLEDGEMENT

We are grateful to **Mr. J. MAHESH KUMAR,** Assistant Professor(E.C.E),for having allowed carrying out this paper work. We take this opportunity to express my profound and whole heartful thanks to our guide, who with his patience support and sincere guidance helped us in the successful completion of the paper.

We would like to thank **Dr. B. Srinivasa Raja, Professor and Head of Department (ECE),** for valuable suggestions throughout our paper which have helped in giving define shape to this work. We are particularly indebted to him for his innovative ideas, valuable suggestions and guidance during the entire period of work and without his unfathomable energy and enthusiasm, this paper would not have been completed.

We like to express my deep sense of gratitude to **Dr. P.M.M.S. Sarma, Principal of GODAVARI INSTITUTE OF ENGINEERING AND TECHNOLOGY (A),** for providing us a chance to undergo this paper in a prestigious institute.

X. REFERENCES

[1] K. M. Kumar and R. S. Venkatesan, “A Design Approach To Smart Health Monitoring Using Android Mobile Devices,” 2014 IEEE International Conference on Advanced Communications, Control and Computing Technologies.

[2] S. Roy and R. Gupta, “Short range centralized cardiac health monitoring system based on zig bee communication,” 2014 IEEE Global Humanitarian Technology Conference - South Asia Satellite (GHTCSAS).

[3] https://circuitdigest.com/microcontroller-projects/iot-based-patient-monitoring-system-using-esp8266-and-arduino

[4] Xiaoxin Xu Mingguang Wu, Cheng Ding and Bin Sun Jiangwei Zhang, “Outdoor Wireless Healthcare Monitoring System for Hospital Patients based on Zigbee” publish from Department of Control Science & Engineering, Zhejiang University Hangzhou, CHINA.

[5]https://www.sciencedirect.com/science/article/pii/S1877050916301260

[6] Hassinen Marko, Marttila-Kontio Maija “Wireless System for Patient Home Monitoring”, Department of Computer Science University of Kuipio, Kuipio, Finland.

[7]http://www.microcontrollerboard.com/pic_memory_org anization.html, “PIC 16F87XA Memory Organization Tutorial”

[8]ww1.microchip.com/downloads/en/DeviceDoc/39582b. Pdf, “MICROCHIP PIC16F87XA Data Sheet, 28/40/44- Pin Enhanced Flash Microcontrollers”, 2008

[9] N. M. Z. Hashim, A. S. Jaafar, N. A. Ali, L. Salahuddin, N. R. Mohamad, “Traffic Light Control System for Emergency Vehicles Using Radio Frequency”, IOSR Journal of Engineering (IOSRJEN) Vol. 3, Issue 7, pp 43-52, 2013.

[10]N. M. Z. Hashim, N. A. Ali, A. S. Jaafar , N. R. Mohamad, L. Salahuddin, N. A. Ishak, "Smart Ordering System via Bluetooth", International Journal of Computer Trends and Technology (IJCTT) – volume 4 Issue 7, pp. 2253-2256, 2013.

IJEAST

INTERNATIONAL JOURNAL
OF ENGINEERING APPLIED SCIENCE
AND TECHNOLOGY

ABOUT IJEAST

International Journal of Engineering Applied Science and Technology (IJEAST) is a peer-reviewed, open access journal that publishes high-quality research papers in the field of Engineering, Applied Science and Technology.

IJEAST aims to provide a platform for researchers, academicians, and professionals to share their innovative ideas, research findings, and practical experiences with the global scientific community.

FOCUS AREAS

- Engineering
- Applied Science
- Technology
- Innovation & Development
- Interdisciplinary Studies

PEER REVIEWED
All submissions are rigorously peer reviewed to ensure quality.

OPEN ACCESS
Free and unrestricted access to research for all.

GLOBAL REACH
Connecting researchers and professionals worldwide.

TIMELY PUBLICATION
We ensure a swift and efficient publication process.

For more information, visit our website
www.ijeast.com

INTERNATIONAL JOURNAL
OF ENGINEERING APPLIED SCIENCE
AND TECHNOLOGY

editor@ijeast.com
www.ijeast.com
India

2455-2143