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IOT BASED MONITORING SYSTEM FOR COMATOSE PATIENTS

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Abstract— *Coma is a state of unconsciousness where the patient fails to respond. These patients need utmost care and 24*7 observations. This paper presents a continuous monitoring and recording of patient data without human intervention. If there is any sudden changes occur in the normal range of body parameters such as body temp falls or rise, blood pressure (B. P.) increases or decreases causing high or low B.P. where both are not stable conditions for better health, then it has facility to automatically alert the medical person. The development sensor identifies the patient development and furthermore produces an alarm message to the clinical individual. As torpid misfortunes their sensation for urine, clinical individual necessities to persistently screen urine yield, hence we are utilizing ultrasonic sensor to beware of urine level. Clinical individual can monitor patient utilizing login to the framework.The software IoT API we are using is ThingSpeak*

Key Words: Comatose, IoMT, healthcare monitoring, ThingSpeak, B.P

1. INTRODUCTION

In last decades health issues are raising day to day life at very high speed every day. One of the major health issues is a coma. Coma is a deep state of persistent sleep Unconsciousness is a covert government of persevering rest where an individual can't be stirred; he neglects to react regularly to excruciating upgrades, light, or sound; comes up short on a typical wake-rest cycle; and doesn't start intentional activities. Sluggish can't purposely feel, talk or move. Trance states can be brought about by different things, for example, an extreme physical issue to the head that harms the cerebrum, diseases in the mind, mind harm because of absence of oxygen for a really long time, taking a lot medication (glut) or different medications, might be because of compound irregular characteristics in the body from different ailments. Now and then the individual in a state of extreme lethargy state can react to the outside climate by deliberate developments, for example, he may open his eyes in light of outer drive. Despite the fact that a person in a state of extreme lethargy state seems ordinary however they couldn't react to the outer orders. Since the actual movement of tenacious vegetative state individual are uncommon, there is a requirement for customary consideration and care. Innovation will consistently makes things more straightforward and the human existence a lot simpler to endure. It influences the a large number of life; one of the significant districts is clinical field. Internet of Medical Things (IoMT) is an extension of the internet of things into the healthcare domain. Then IoMT is an ecosystem of interconnected sensors, wearable devices, medical devices, and clinical systems and applications that can connect to health care information technology systems using networking technologies.

2. RELATED WORK

In this section, we surveyed existing systems and their research work dealing with analysis and monitoring of health parameters of coma patient. There are numerous uninterrupted monitoring systems available in the medical field one of them is life scope VISMOPVM-2703.
This device empowers to monitor ECG, pulse respiration, NIBP (non - invasive blood pressure amplifier), temperature. A large touch screen enables quick and intuitive operation. But, it is very expensive. Also, the medical staff needs to manually record the parameters for every ten minutes which can cause human errors while recording [1]. Author [2], monitors different parameters of coma patient using PIC µc 8051. A zigbee [RF4CE] has been proposed and implemented to support the remote patient monitoring. The different sensors collect the medical data of patient and it gives feedback to the doctors. Zigbee module is connected to the µc. Zigbee is used for transfer values to the receiver side. The main drawback of this technique is, it sends data to the nearest place. In [3], author proposes a health parameter monitoring system by using Raspberry-Pi. It mainly focuses on ECG only. It also uses zigbee, which sends data only to the nearest place. In [4], author presents a health parameter analysis and monitoring of coma patients using wearable motion sensor technique. It uses LPC2148 ARM controller which needs extra hardware for connection to the internet, while this facility is inbuilt available in the raspberry-pi. In [5], author describes model driven technology for automatic and cognitive IoT based system

in the field of healthcare. Drawback of this technique is insufficient analysis and may be expensive due to prototype implementation.

3. METHODOLOGY

The proposed health monitoring system consists of different sensors which are divided into two categories. One is used for monitoring vitals of the comatose and second is used for detecting any physical changes occur in the comatose. Here, temperature and blood pressure are the two vitals recorded and monitored to understand health status of a comatose. The other two sensors are MEMS accelerometer sensor and Eye blink sensor which are used for detecting any physical changes that occurring comatose. These sign switch gives data are recorded and checked consistently to comprehend the body working. In the event that the arrangements of these detected signs which are outside ordinary ranges normally suggest the requirement for some consideration or conceivable departure to a more elevated level of treatment during which we alert the doctor.

4. PROPOSED SYSTEM

A health observing system comprises of variety of sensors connected to the patient and they communicate that data via the processing Thinkspeak. In this project, Node MCU is acts as a data junction node as well as a processor. The patient and doctor smart phone or computers are used as a monitoring device. The sensors are used to measure the health parameters of patient after these parameters are acts as readings and finally converted into signals. These signals are provided for processing to Node MCU. Then Node MCU displays the information on a monitor and also stores the information over the cloud with the help of IoT. This information can be accessed by the doctor on his phone/computer and get the notification. Also there is facility provided to send an alert message to the doctor or patient care giver if any abnormal data is detected. The workflow of the project is as- the sensors value are read and displayed on the monitor and stored in the cloud for future use.

5. BLOCK DIAGRAM

First of all Power supply is connected to the Voltage Regulator. And the Voltage regulator is connected in Node MCU. Temperature and Humidity sensor, Heart beat sensor and Ultrasonic sensor and PIR sensor are connected to the Node MCU. Make sure all the components are works with the Node MCU through the serial communication. Default pins are connected in serial communication on the Node MCU. Then connect the 16*2 LCD display module and IOT is connected through the Node MCU. All components have VCC and ground pins that pins are connected in Node MCU Vin and ground pin.

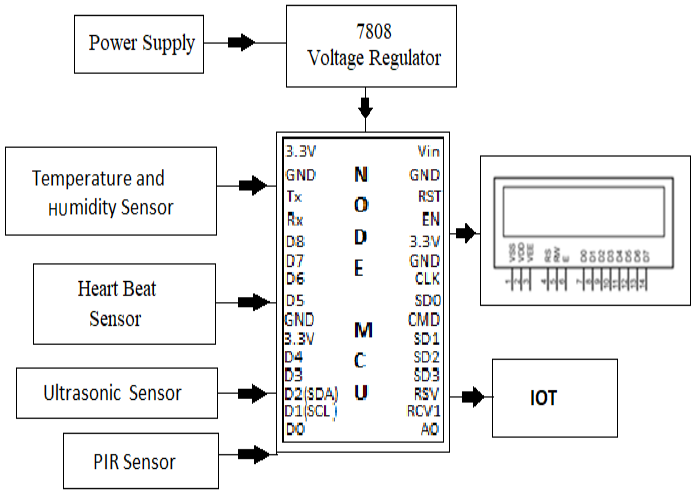

Fig-1: BLOCK DIAGRAM

5.1 NODE MCU

The NodeMCU (Node MicroController Unit) is open source software and hardware development environment that is built around a very inexpensive System-on-a-Chip (SoC) called the ESP8266. The ESP8266 planned and fabricated by Express if Frameworks, contains all vital components of the cutting edge PC: computer processor, Slam, organizing (Wi-Fi), and surprisingly an advanced working framework and SDK. That settles on it an incredible decision for IoT ventures, all things considered. In any case, as a chip, the ESP8266 is additionally difficult to access and utilize. You need to bind wires, with the fitting simple voltage, to its PINs for the easiest undertakings, for example, fueling it on or sending a keystroke to the "PC" on the chip. Also, you need to program it in low-level machine guidelines that can be deciphered by the chip equipment. While this degree of combination isn't an issue when the ESP8266 is utilized as an inserted regulator chip in mass-created hardware, it is a tremendous weight for specialists, programmers, or understudies who need to explore different avenues regarding it in their own IoT projects. Acquiring a page from the fruitful playbooks of Arduino or a Raspberry Pi, the NodeMCU project means to improve on ESP8266 advancement.

It has two key segments. An open source ESP8266 firmware that is based on top of the chip producer's restrictive SDK. The firmware gives a straightforward programming climate dependent on eLua (implanted Lua), which is an extremely basic and quick scripting language with a set up engineer local area. For new comers, the Lua scripting language is not difficult to learn.

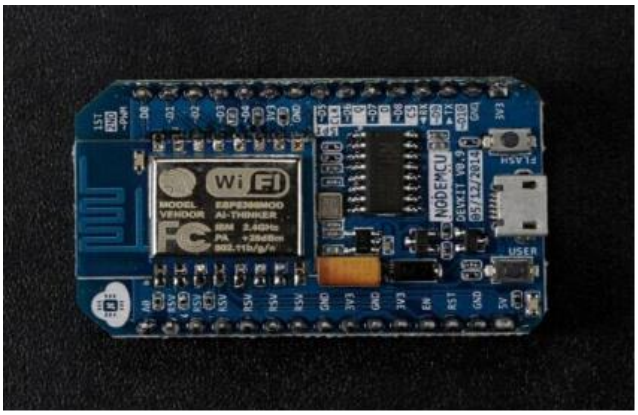

Fig -2: Node MCU

5.2 DHT11

Humidity Sensors are very important devices that help in measuring the environmental humidity. A humidity sensor is an electronic device that measures the humidity in its environment and converts its findings into a corresponding electrical signal. Humidity sensors vary widely in size and functionality; some humidity sensors can be found in handheld devices (such as smartphones), while others are integrated into larger embedded systems (such as air quality monitoring systems). Humidity sensors are commonly used in the meteorology, medical, automobile, HVAC and manufacturing industries.

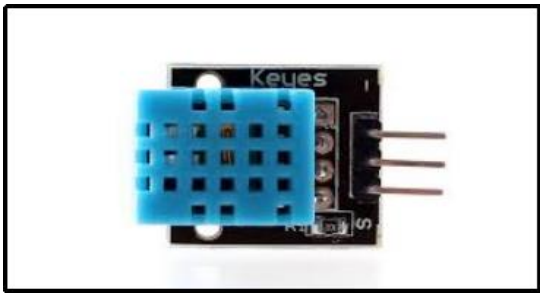

Fig -3: DHT11

5.3 PULSE SENSOR

The Pulse Sensor is a plug-and-play heart-rate sensor for Arduino. It can be used by students, artists, athletes, makers, and game & mobile developers who want to easily incorporate live heart-rate data into their projects. The essence is an integrated optical amplifying circuit and noise eliminating circuit sensor. Clip the Pulse Sensor to your earlobe or fingertip and plug it into your Arduino, you can ready to read heart rate. Also, it has an Arduino demo code that makes it easy to use.

Fig -4: Pulse Sensor

5.4 ULTRASONIC SENSOR

This is a contactless measurement sensor. It can measure distance up to 2cm – 400cmIts exactness is around three millimeters which is productive top to bottom estimation applications. Another approach to utilize the capacitive RH sensors is to notice the progressions in the recurrence of the oscillator developed utilizing a capacitor with RH touchy guinea pig as dielectric. This arrangement is regularly utilized in drug items.

5.5 PIR

A passive infrared sensor is an electronic sensor that measures infrared light radiating from objects. PIR sensors mostly used in PIR-based motion detectors. Also, it used in security alarms and automatic lighting applications. The below image shows a typical pin configuration of the PIR sensor, which is quite simple to understand the pin outs.

6.EXPERIMENTAL RESULT

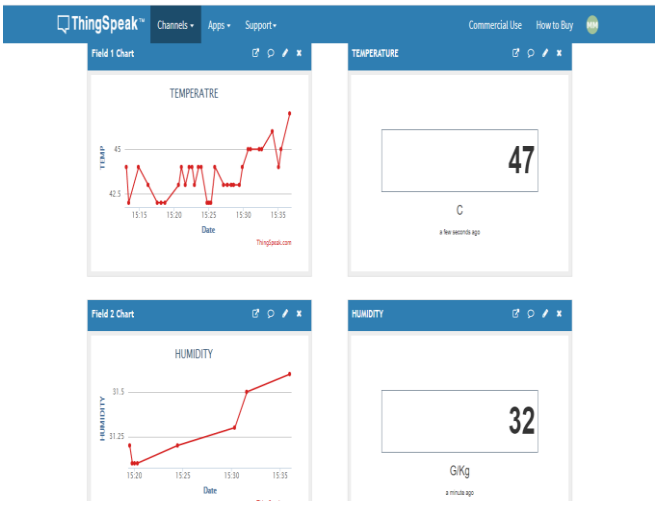

Fig -7: Humidity and temperature

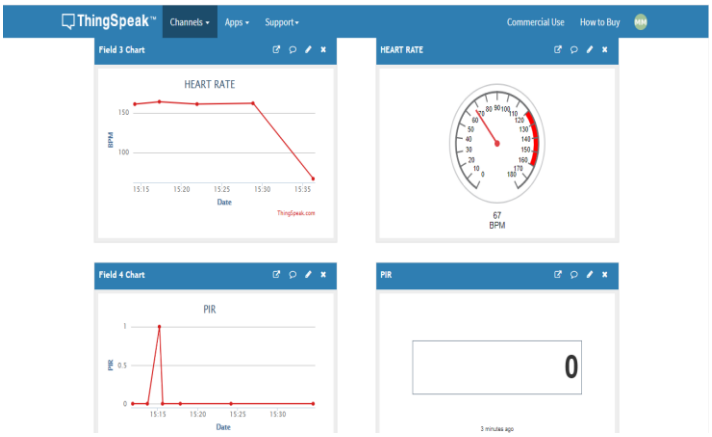

Fig -8: Heart rate

Fig -9: Ultrasonic range

6. CONCLUSION

The aim of our proposed system is to build easily accessible design that the patient's critical information is conveyed quickly to the doctor is achieved. The designed model leads to the better and effective health care service to comatose and the collected data is networked worldwide with the help of internet and communication which provide a quick response. The IoMT market involves variety of smart devices, such as wearable and medical/vital monitors, in the home, or hospital; and associated real-time location, tele health and other services. So with the help of these devices doctor can easily examine his patient at anytime, anyplace. In this proposed system vital parameters such as B. P., temperature are monitored. Movement sensor and eye blink sensor is used to detect motion of body parts of comatose. Ultrasonic sensor is used for urine level monitoring. Also the designed system is affordable to the patients.

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