HEALTH CARE SYSTEM FOR COMA PATIENTS

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Abstract : **Finding and checking of wellbeing is a vital errand in the medical services industry. Extreme lethargies is a condition of obviousness where a patient neglects to react. These patients need most extreme consideration and 24*7 perceptions. This paper demonstrates a nonstop checking and recording of insensible subject's information without human involvement. Utilizing the framework design, the extreme lethargies patient's body boundaries can be estimated continuously. Sensors gather patients body boundaries like temperature, heart rhythm, movement, eye blink and the dampness which moves the information to Node MCU which further exchanges that information to the Cloud worker. We have planned a framework that utilizes the IoT stage "ThingSpeak" to screen the unconscious patient on the web. There is no requirement for the clinical staff or going with people to be genuinely present to deal with the patient on the ground. The framework utilizes Twilio to send SMS to specialist and overseers. Clinical individual can monitor patients utilizing login to the framework So, this task assists with observing the trance-like state patient truly for each second.**

Keywords - **Comatose, Sensors, IoT, ThingSpeak, Twilio .**

I. INTRODUCTION

In present-day world, the quantum of mishap happening is extremely high. If there is a mishap, the patients are conceded in ICU (Intensive Care Unit), In such condition, the patient may go into a state of insensibility. Extreme lethargy is a condition of obviousness where an individual can't be stirred; neglects to react regularly to agonizing improvements, light, or sound; comes up short on an ordinary wake rest cycle, and doesn't start willful activities. Trance like state may happen for different reasons, like inebriation, an illness or disease that influences the focal sensory system (CNS), a genuine physical issue, and hypoxia, or oxygen deprivation. Specialists will check the influenced individual's developments and reflexes, reaction to difficult improvements, and understudy size. Specialists will notice breathing examples to assist with diagnosing the reason for the unconsciousness. They likewise check the skin for indications of any wounds because of injury. Specialists will look for indications of excitement, like vocal commotions, eyes opening or development. And furthermore, will test reflexive eye developments. These tests can assist with deciding the reason for the extreme lethargies and the area of cerebrum harm.

Wellbeing checking for trance like state patients offers certain advantages like giving treatment at a beginning stage, diminishing holding up time, quick finding, coordinate arising advancements with IT frameworks and EMR. The utilization of Node MCU and IoT is sufficient in well-being perception. Hub MCU is an open-source based firmware and improvement board uniquely focused on for IoT based Applications. By utilizing this blend, the developed framework is much powerful, solid, and adaptable too.

An IoT is a method which associates the gadgets and offers human cooperation to a superior life. This framework, helps specialists for taking the accurate estimations of patient's wellbeing boundaries and to give legitimate treatment to him at the fitting time. The framework is created dependent on Flex sensor, Eye flicker sensor, Gyroscopic sensor, Heartbeat sensor, Ultrasonic sensor, Moisture sensor and Temperature sensor which is utilized to plan a framework which screens the development of the individual at extreme lethargies stage and alarms consequently by making an impression on the concerned individual utilizing IOT.

II. LITERATURE SURVEY

Patient development and checking framework for extreme lethargies patients is a framework that is utilized to identify development changes in the trance state patient. Those progressions might be either strange conduct or surprising changes made by the patient without a specialist. [1] presents the technique for patient development checking framework for those patients that are taking clinical treatment in both nearby and unfamiliar medical clinics with the assistance of edges examination approach. On to the patient's hand, flex sensors are placed , and if there is any development on hands , the sensor sends data to the specialists by remote correspondence. Glass arrangement with eyeball sensor is fixed onto the patient's eye wear. When any movements in the eye the sensor sense the esteem and send data to the specialist. MEMS is utilized to track down the patient's leg development and all the data is remotely moved through IOT module and checked. Heartbeat and the temperature sensors are utilized to discover the pulse and the temperature of the patient.

In [2] another framework is proposed where it gathers information of different wellbeing boundaries like heartbeat rate, internal heat level, development, eye squint, and so forth They have utilized the IoT stage "ThingSpeak" to screen the trance like state patient on the web. The outcomes incorporate persistent observing of the patient by the watchman by continually signing into the framework. Due to this there is no requirement for clinical staff or going with people to be genuinely present to deal with the patient in light of the fact that there is a GSM module to send SMS to specialist and overseer. As comatose loses their sensation for

urination, clinical individual necessities to persistently screen urine output, hence in [3] ultrasonic sensor is utilized to beware of urine level.

[7] explores about the impacts found in the patient utilizing "image processing-based coma patient monitoring system with feedback" which is identified with actual changes in body development of the patient. It facilitates a framework for checking patient heartbeat rate and gives cautioning in type of alert and LCD Display. It facilitates a SMS to an individual sitting at the far off place if there exists any development in any body part of the patient.
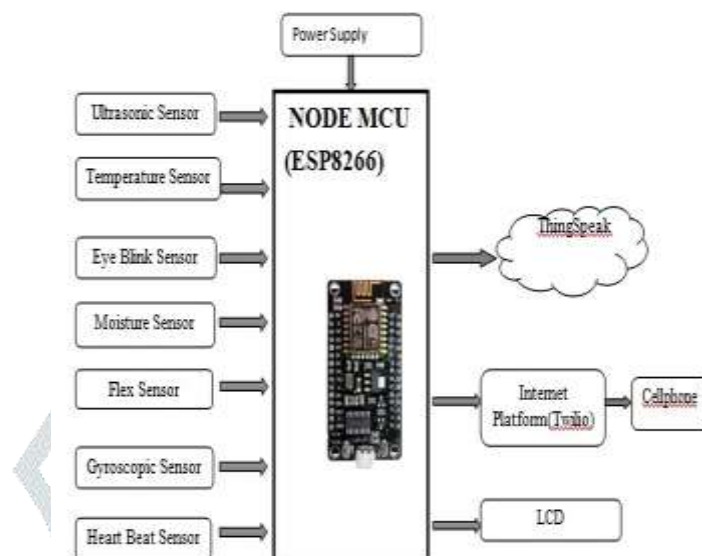
III. SYSTEM ARCHITECTURE

Figure 1: System design

The proposed wellbeing observing framework for trance like state patients comprises of various sensors which are divided into two parts. One, utilized for checking vitals of the comatose and two, is utilized for identifying any actual physical changes happening. Here, temperature, pulse and circulatory strain are the various parameters recorded and checked to comprehend wellbeing condition of an incapacitated. Different sensors are Gyroscopic sensor, Ultrasonic sensor, Flex sensor, Moisture sensor, and Eyeblink sensor which are utilized for distinguishing any actual changes that happen in a senseless.

IV. METHODOLOGY

The signs which gives data are recorded and checked consistently to comprehend the body working. On the off chance that the arrangements of these detected signs which are outside ordinary ranges normally infer the requirement for some consideration or conceivable clearing to a more significant level of treatment during which we alert the specialist.

Each sensor is interconnected with the Node MCU and that framework is connected to the IoT ThingSpeak server. It provides services and controls over the network. The data from the sensor is transmitted to the Node MCU. Later it is communicated to IoT ThingSpeak server. All the data on ThingSpeak server is updated periodically and the same will be displayed using health monitoring system . Simultaneously it will process the data, accordingly if the measured factor is out of range, a warning SMS is sent to the patient's caregiver or doctor or any specified physician.
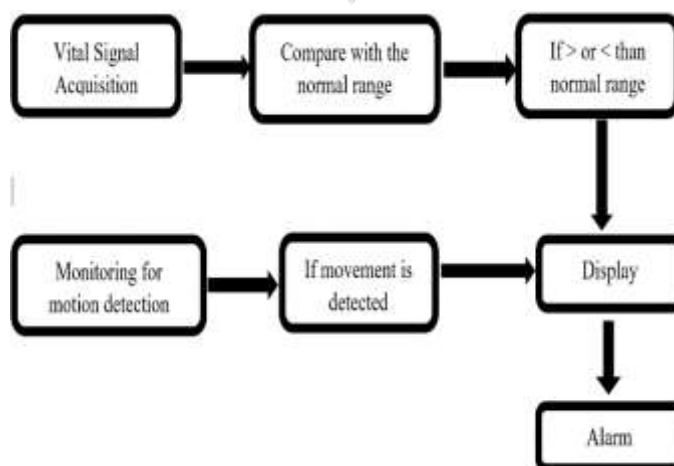

Figure 2: Methodology that is used in the proposed system

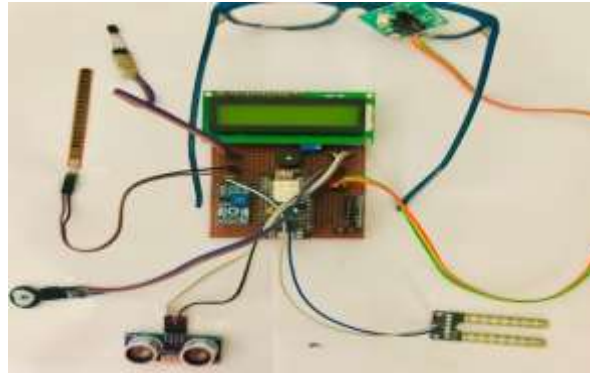**IV. HARDWARE AND SOFTWARE DESCRIPTION**

Figure 3: Hardware setup

The system consist of all the multiple sensors such as ultrasonic sensor, moisture sensor, temperature sensor, heart beat sensor, flex sensor, gyroscopic sensor, eye blink sensor that are connected to NodeMCU board. Theses sensors collect different body parameters and display them on LCD board.

A. Node MCU :

Figure 4: Node MCU

NodeMCU is an open-source based firmware and improvement board uniquely focused on for IoT based Applications. It incorporates firmware that runs on ESP8266 Wi-Fi SoC from Espressif Systems, and equipment which depends on the ESP-12 module.

B. Flex Sensor:

Figure 5: Flex Sensor

A simple flex sensor is about 2.2" long. As it bends, the resistance across the sensor increases. Connector is 0.1" spaced and breadboard amicable. Protect from stressing this sensor at the base. For best outcomes, safely mount the base and base segment and permit just the real flexing part to flex.

C. *Eye Blink Sensor:*

Figure 6:Eye Blink Sensor

The reflected IR rays from the eyes are received by IR receiver. When the eye is closed, the output of IR receiver is high otherwise the it is low. This information helps to know if the eye is in closing or opening position.

D. Moisture Sensor:

Figure7: Moisture Sensor

The moisture sensor is a self-developed sensor that recognizes the patient's wet condition and alerts the medical attendant through the buzzer. The immediate action helps to decrease the risk of danger and cold.

E. Ultrasonic Sensor:

Figure 8: Ultrasonic Sensor

Ultrasonic sensor is used to keep check on urine level of coma patients as they lose their sensation for urination. It works by emitting sound waves at a very high frequency. They then wait for the sound to be reflected back, calculating distance based on the time required.

F. Buzzer:

Figure 9: Buzzer

A buzzer is a signalling device, basically used in automobiles, home applications. It gives a warning sound if any values from the sensors goes beyond the threshold level thereby alerting the nearby caretakers to give immediate help to the patient.

G. Temperature Sensor:
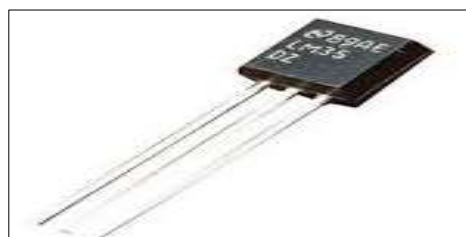
Figure 10: Temperature Sensor

LM35 is an analog type semiconductor based sensor that has three terminals. They are V_{cc}, ground and V_{out}. The electrical output from the sensor is proportional to the degree centigrade.

H. Heart Beat Sensor:

Figure 11: Heart Beat Sensor

This sensor is used to measure the speed of the heartbeat. The heartbeat is measured in beats per minute. It indicates the number of times heart is contacting or expanding in a minute. The principle of heartbeat sensor is that the varying volume in an organ is measured by varying intensity of light passing through the organ.

I. Gyroscopic Sensor:

Figure 12: Gyroscopic sensor

Gyroscope sensor is a device that measure and maintain the orientation and angular velocity of an object. It measures the tilt and lateral orientation of the object. They are also called as Angular Rate Sensor or Angular Velocity Sensors. These sensors are installed in the applications where the orientation of the object is difficult to sense by humans. Angular velocity is the change in the rotational angle of the object per unit of time.

J. LCD Display:

Figure 13: LCD Display

LCD stands for Liquid crystal display. A 16*2 alpha numeric display is used to display the measured data .

K. ThingSpeak

ThingSpeak is an open source cloud based IoT analytics tool that allows to aggregate, visualize, and analyse real information streams. ThingSpeak is concerned with the real-time display of information provided to it by devices. We use ThingSpeak to analyse and process data as it comes in real-time. It is a cloud interface in and of itself. It offers a number of capabilities , including private channel information collecting an public channel information sharing.

Figure 14: Representation of ThingSpeak API

The output from the sensors is processed by the microcontrollers and are sent to cloud via WiFi module. The doctor can check the current status of a patient simply by logging. It saves time and cost. And also remote monitoring is done easily.

L. Twilio

        Twilio is a cloud communications platform as a service provider company. It uses web service API's and allows software developers to programmatically make and receive phone calls, send and receive text messages, and perform other communication functions. Twilio is responsible for connecting internet to the global telecommunications network. It is called as Super Network as it allows consumers to connect with one another anytime, anywhere in the globe, without fail.

V. RESULTS

Figure 15: Graph of heartbeat sensor
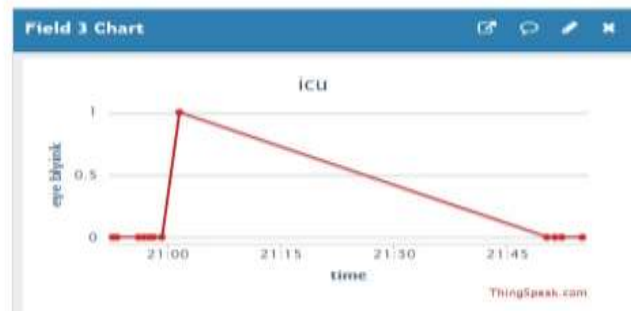

Figure 16: Graph of temperature sensor

Figure 17: Graph of Eye blink sensor

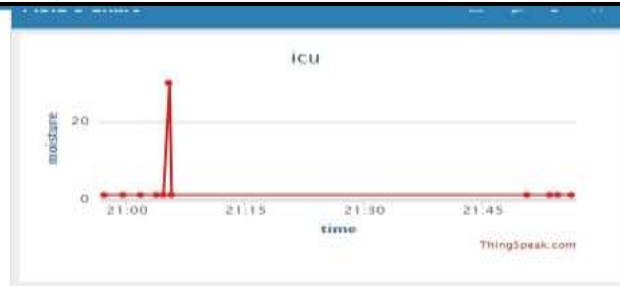*Figure 18: Graph of Flex sensor*

Figure 19: Graph of moisture sensor

Figure 20: Graph of Gyroscopic sensor
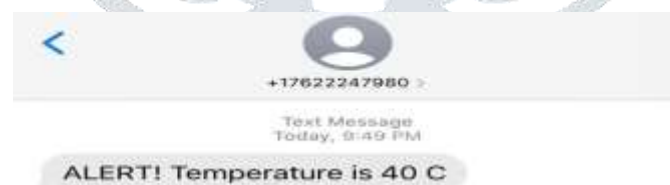

Figure 21: Graph of Ultrasonic sensor

Figure 22: Screenshot of alert SMS

i.   Continuous checking vand recording of comatose patient body boundaries, for example, eye blink, internal heat level, finger development, pulse, dampness level, body development.

ii.   In crisis circumstances, this framework naturally sent a ready SMS to the patient's parental figures, specialists if any peculiar information recognized and if any development is detected in any body part of the patient.

iii.   The senseless wellbeing history will be seen and learned whenever at any spot and by specialist with the assistance of remote innovation.

iv.   This framework is principally being utilized in clinic's ICU consequently diminishing the work for attendants who in any case need to constantly screen the patient.

v.   It will likewise limit patient's standard visit to clinic for registration.

VI. CONCLUSION

To conclude that our project is used for monitoring all the health-related parameters of comatose patient such as eye movement, heart rate, moisture level, temperature, finger and leg movements. This system is developed for patients who are unconscious and need continuous care.

Comparison with other board Node MCU is more advanced in terms of cost, speed, complexity etc. The proposed system, switch to wireless technology to have a better estimation of health monitoring system. Health monitoring system for coma patients offers certain benefits like providing treatment at an early phase, reducing waiting time, fast diagnosis, integrate emerging technologies. Patient's data is saved on the server, and hence it benefits the follow-ups. Human errors are minimised as it uses information technology for assessment and hence it gives better performance.

REFERENCES

[1] Dr.R. Josphine Leela (M.E,PhD) , K.Hamsageetha , P.Monisha , S.Yuvarani, "Body Movement and Heart Beat Monitoring for Coma Patient Using IoT", International Journal of Innovative Research in Science, Engineering and Technology Vol. 7, Special Issue 2, March 2018.

[2] Manjunath R Kounte, Lavanya, Mamatha C, Megana A and Meghana MB , "Design and Implementation of IOT based Health Monitoring System for Comatose Patients", International Journal of Advance Science and Technology Vol. 29, No. 10S, (2020).

[3] SamPeter.S, Padmavathi.S, "An Improved Health Monitoring System for Coma Patients Using Internet of Things", International Journal of Emerging Technology and Innovative Engineering Volume 5, Issue 6, June 2019.

[4] Ankita Ramtirthkar, JyothiDigge, V.R.Koli, "IoT Based Healthcare System for Coma Patient", International Journal of Engineering and Advanced Technology (IJEAT) ISSN: 2249 – 8958, Volume-9 Issue-3, February 2020.

[5] Dr.P.Kannan (M.E, PhD), Nandhini.S, NasrineJaheer, Naveena.R, Rajeshwari.V, "Implementation Of Cloud Based Health Care Monitoring System Using IoT" International Research Journal of Engineering and Technology (IRJET), e-ISSN: 2395-0056 Volume: 06 Issue: 03 | Mar 2019.

[6] Lokesh B, A Angulakshmi, Ashwini Kumari P, ManojkumarSinde , Lokesh M , "IoT based Coma Patient Monitoring System using wearable sensors", International Journal of Advance Science and Technology Vol. 29, No. 10S, (2020).

[7] Jay Patel, RamsinhChavda, Megha Christian, Shweta Patel and Ramanuj Gupta, "Image Processing Based Coma Patient Monitoring System with Feedback", International Journal of Recent Scientific Research Research Vol. 7, Issue, 2, pp. 8885-8888, February, 2016.

[8] Nakul S. Palkhede, Sachin D. Mali, Prof. Manisha S Shelar, "IoT Based Patient Monitoring", International Journal of Trend in Scientific Research and Development (IJTSRD) Vol.2, May-June 2018.