International Journal of Electronics Engineering (ISSN: 0973-7383)
Volume 11 • Issue 1 pp. 607-613 Jan 2019-June 2019 www.csjournals.com

Coma Patient Monitoring System using IOT

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Abstract: Coma is a trance like state caused by severe injury or illness. It is a state where one cannot respond to painful stimuli, light, sound etc.., Medicinal services industry has interminably been on the cutting edge in the appropriation and use of data and correspondence advancements Information and Communication Technologies (ICT) for best services for nursing and treatment. Late improvements in ICT and the development of the Internet of Things (IOT) have encouraged for new research and investigation in every field including the medical and social insurance industry. Medical clinics have always encouraged utilizing the modern electronic instruments for better results and to achieve it IOT is used together with wi-fi connectivity and sensor hub reminiscent and little sensor hubs. This paper introduces a way of continuous monitoring of patient's parameters and providing the monitored details to his/her guardian through secure website.
Keywords: Coma, Health, IOT, Monitoring, Patient, System.

Introduction

Coma or state of mind may be a state of an individual wherever a private cannot reply to the interior and external stimulation [1]. Coma may be a deep state of state of mind. A coma patient may be a person whose heart continues to be beating but he/she is unaware of his/her close setting and has no physical management over his/her entire body. Such cases need serious attention and continuous observance to avoid wasting patients' lives. Nowadays, having somebody to look at critically sick person is extremely overpriced and takes a great deal of work force. Besides, such continuous management by a paramedical assistant is fallible and will cause difficulties because of human error like negligence. Within the case of critically sick patients, it needs to live the very important parameters a minimum of for each fifteen seconds until the patient's condition stabilizes. What is more, [2] state that observance of coma patients is very different from observance the traditional patients. It is a tedious job for the paramedical workers to unceasingly monitor every patient's twenty-four x seven since the proportion of workers to patient is extremely low. In step with statistics provided by World Health Organization (WHO), 2015 regarding half-dozen [8]. 9 million kids below five die from treatable and preventable diseases annually because of lack of variety of physicians also as regarding fifty fifth of fifty-seven very different countries face health hands crisis [8]. Therefore, it is imperative and necessary to propose prosperity checking systems for a trance like tolerant state. Such human services frameworks are expected to ceaselessly measure and provide all the imperative data of a specific person by keeping up every one of the records of that incapacitated physically. Understanding Monitoring Systems will be crucial as they help to monitor multiple parameters and helps the doctor in providing accurate information. The specialized brightness and improvement of various fields have prompted an intense change in way of living, one that have major role is installed frameworks and broadcast communications. The advances in data and correspondence innovations empower in fact, the persistent observing of wellbeing related parameters with remote sensors, wherever the client happens to be. They give important ongoing data empowering the doctors to screen and break down a patient's present and past condition of wellbeing. Notwithstanding, the present frameworks for this observing are restrictively costly and can be just found at specific emergency clinics just as the frameworks utilized in medical clinics are perplexing and just certain individuals can utilize them. Moreover, in the current medicinal services frameworks, the therapeutic present reality faces two essential issues about understanding observing, right off, the bat the need of human services suppliers' present bedside the patient and besides the patient is confined to bed and wired to huge machines. To accomplish better quality patient consideration, the above referred to issues must be settled. As the innovations are propelling it has turned out to be attainable to propose a wellbeing-observing framework dependent on GSM. With this, we can propose a system that satisfies all necessary challenges. With associate improvement in technology and shrinking of sensors, there are tries to utilize the new technology in varied areas to boost the standard of human life. One main space of analysis that has seen associate adoption of the technology is that the health care sector. The individuals in want of health care services realize it terribly dearly won this is often significantly true in developing countries. As a result, this project is an effort to unravel a health care downside presently society is facing. The most objective of the project was to style a Coma patient monitoring system using IOT. It is comprised of three main elements. The primary half being, detection of patient's vital organ exploitation sensors, second for causation knowledge to cloud storage and the last half was providing the holding of patient's parameters record.

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Literature Survey

Sneha et. al [3] has built up a analysis and monitoring of a coma patient using MEMS sensor, heartbeat sensor, Eyeball sensor. It alerts the doctors if the values of sensors are more than threshold values.

Malika et. al [4] has planned a distant ZigBee based mostly patient checking framework. This framework includes a PIR sensing element, Temperature sensing element, wetness sensing element, smoke sensing element associated are related to the patient's body remotely and the specialist is afraid at no matter purpose there's therapeutic crisis.

Murthy et. al [5] has built up a Zigbee based remote sensor based system for patient wellbeing observing. This framework has a heartbeat sensor, MEMS sensor, body temperature sensor; saline dimension sensor and the outcomes are transmitted by means of ZigBee, which is utilized to screen the old individuals.

Chen [6] has built up a wearable inertial sensor for human movement examination to consistent track movements and places of maturing individuals. This system is contained inertial estimating unit, for example, MEMS sensor for movement following analysis.

Khalifa et. al [7] has built up a framework for checking the wellbeing state of older individuals. Reports are transmitted by ZigBee to the specialist. This framework comprises of pulse sensor, beat sensor, ECG sensor and Muscle sensor and a neighborhood observing pc and ZigBee transmitter and beneficiary.

Existing System

The existing systems are of two types of namely manual and automated system.

a) Manual system: Nurses are appointed to take patient's readings on regular basis and should inform the duty doctor in case of emergency. The responsible doctor visits his patient one time in a day and nurse provides the noted readings.

b) Automated systems: These systems monitors the patient's parameters and when the doctor visits the patients, he just watches the parameters from the system. There are also systems using ZigBee technology for transmission of the monitored parameters.

Proposed System

The proposed system helps the doctors to monitor patient's details 24x7. It helps the doctor to look at the measured parameters along with date and accurate time details of the monitored results. This system is based on IOT, which helps the doctors to view the patient's monitored results anywhere from the world. This helps the doctors to give instructions to nurses at critical times like when they are away. The details about the patient's parameters are kept confidential through a secure login to view patient's details. The secure login details are only provided only to trustworthy persons and protects patient's privacy. So the proposed system provides continuous monitoring of the patient and holds the records of monitored parameters with dates and monitored time, provides access anywhere from the world to trustworthy persons.

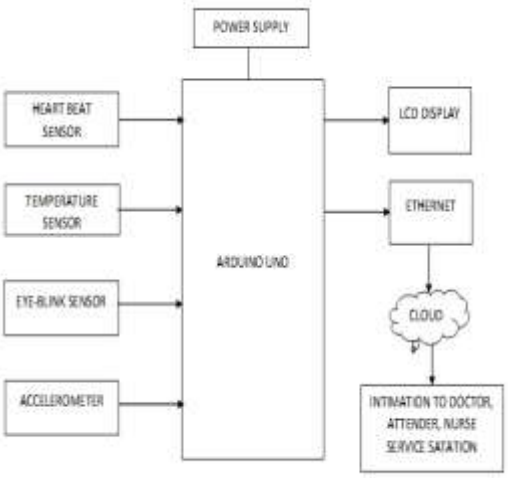

Figure 6. Block Representation of prototype

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Methodology

The proposed framework comprises four sensors in which two sensors are utilized for observing the vitals of patients. Temperature and heartbeat rate are the two vitals recorded and observed to comprehend wellbeing status of the patients. The other two sensors are Micro-Electro-Mechanical Systems (MEMS) accelerometer sensor and Eye squint sensor, which are utilized; chronicle any physical changes that happen in a lethargic. These signs, which give data, are recorded and checked constantly to comprehend the body working.

Eye Blink Sensor

This sensor is utilized to recognize any squints in an out cold. This sensor takes a shot at the IR standard. This sensor works by enlightening an eye region utilizing an infrared light. It has a transmitter and a beneficiary. The transmitter is utilized to transmit an infrared light that is utilized for enlightening the eye territory. The reflected light is gotten at the beneficiary. At the point when there is an eye flicker, there will be no infrared light gotten at the collector end

MEMS Sensor

This sensor is utilized to detect the speeding up changes in the individual this sensor is set on the fingers of the patient. At whatever point there are speeding up changes in the patient i.e. at whatever point there is any development it will be recorded and a stage demodulation standard is utilized to decide the esteem and course. This sensor is comprised of a polysilicon surface smaller scale machined structure, which is based on the highest point of a silicon wafer. The opposition against the speeding up powers is given by suspending the spring over the outside of the wafer. It takes a shot at a rule of estimating the avoidance utilizing a differential capacitor, which has free fixed plates that are joined to the moving mass. These plates are at 180 degrees out of a stage. At the point when there is a quickening, there will be a diversion in the moving mass which unbalances the differential capacitor, which results in a yield plentifulness, is corresponding to increasing speed, then a Phase touchy demodulation process is utilized to evaluate the esteem and bearing of speeding up. This sensor can be utilized as a single structure for a total 3-hub detecting.

Heart Pulse Sensor

This sensor is utilized to screen the beat rate of the individual. This sensing element deals with a customary of sunshine balance by blood movement in finger at every heartbeat. The beat rate sensor bargain of a very splendid red Light Emitting Diode (LED) for brightening andLight Dependent Resistor(LDR) is utilized as an identifier. The finger, when put inside the sensor, is enlightened with a bright red LED. This LED should be overly splendid with the goal that the light should probably go through the finger and could be recognized at the locator side. At the point when heart siphons blood through the veins the finger gets increasingly misty which brings about engrossing of certain measures of light and less measure of light will be gotten by a finder. The finger is set between LED and LDR. The measure of light consumed by the blood relies upon the blood volume around there. The flag got at the indicator end will be as an electrical flag, which is corresponding to beat rate. LDR takes a shot at a rule of its adjustment in resistivity when light is an occurrence on it. The light force is conversely corresponding to obstruction change, which results in voltage drop. The identifier flag shifts with each heartbeat

Temperature Sensor

The body temperature is estimated utilizing the LM35 sensor. Temperature guideline is a principal part that keeps the body at the right working temperature because of its effect on the rate of compound procedures. In typical individuals, the temperature is around 30 ℃ to 38 ℃. In the LM35 detector, the yield voltage is in a very direct extent with the body of the patient. The operating scope of the lumen thirty-five detector is from - fifty-five to +150°C. The top of this detector is that it does not need any outer alignment. The sensor is fixed to maintain a strategic distance from oxidation impacts. This sensor creates more prominent yield voltages contrasted with that of thermocouples.

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Program Flow

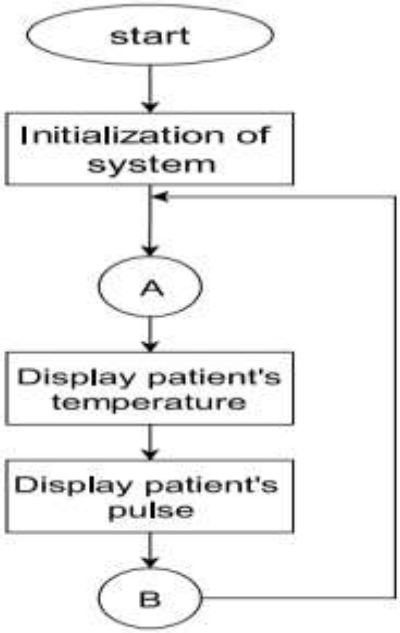

Figure 2. Flowchart of the Program

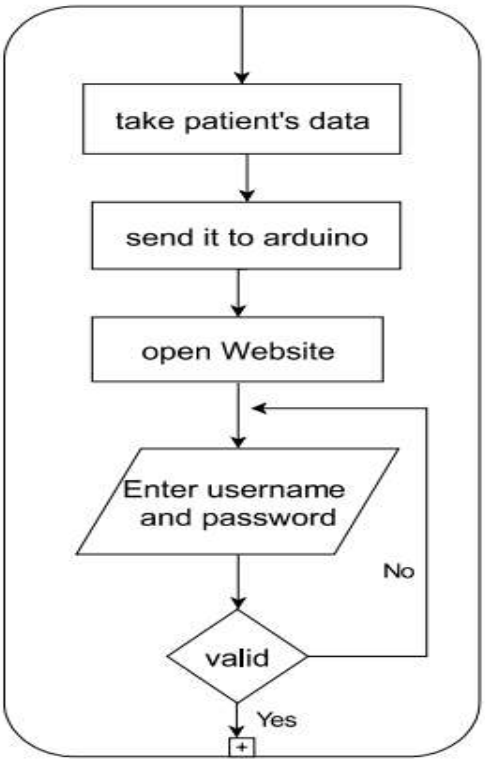

Figure 3. Flowchart a

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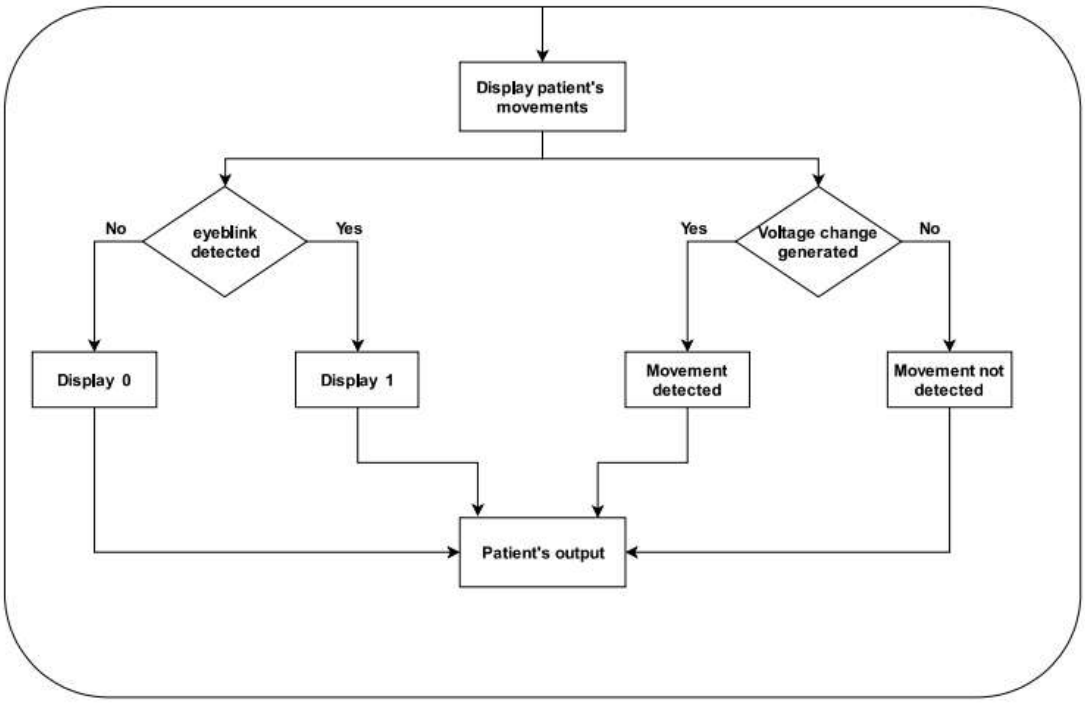

Figure 4.Flowchart B

Results and Discussions

This framework will be useful in helping specialists about the patient's wellbeing condition. The outcomes got in the proposed framework will have the data about Eye flickers and hand developments, beat rate, and body temperature. It is ease and low power framework. With slight changes, this framework can be utilized to analyze movement related disarranges, for example, epilepsy and Parkinson's malady. A framework contemplating development issue highlighting tremor can likewise be created.

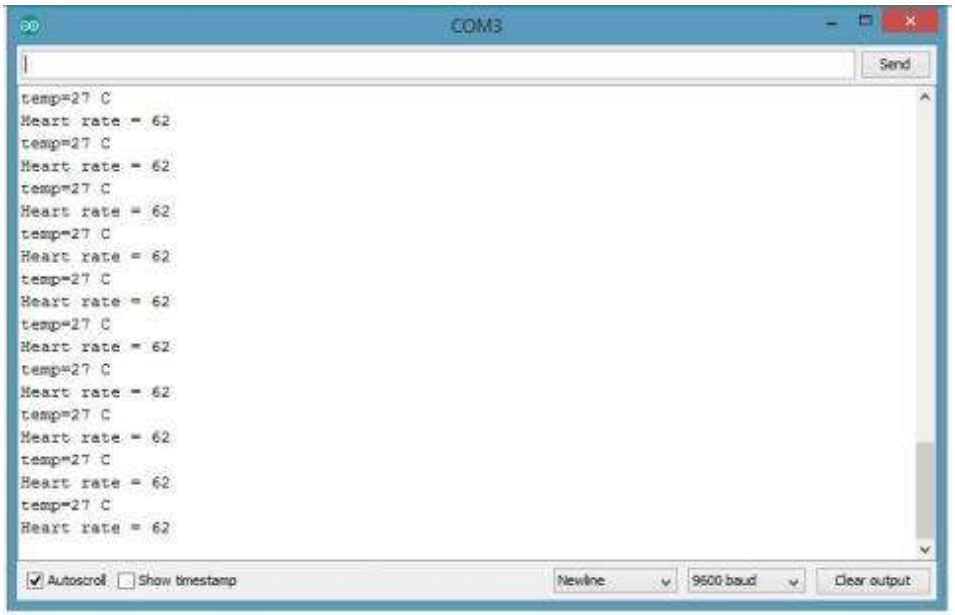

Figure 5. Initial Output of unit testing

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Figure 6. Screenshot of Cloud Login

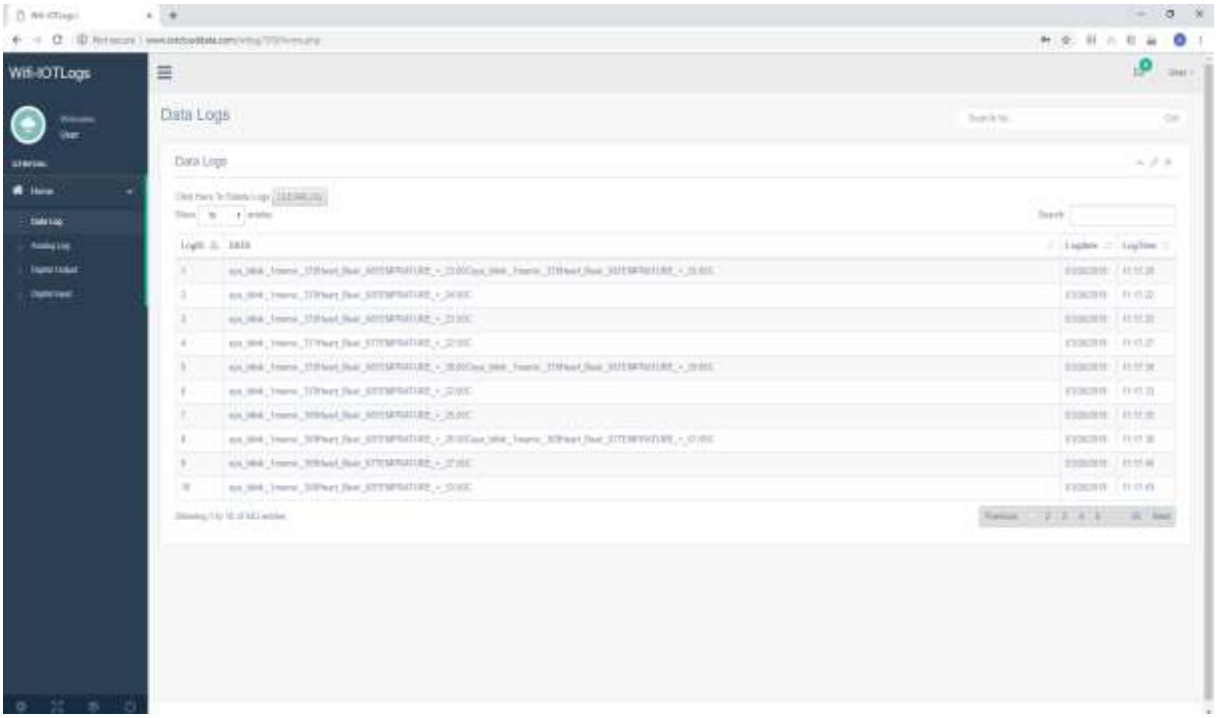

Figure 7. Screenshot of Cloud Storage

Conclusion

In this proposed system, the vital parameters such as temperature and pulse rate are monitored. The system is designed for unconscious patients who need continuous care. Sometimes due to the critical condition of the patient, there will be a difficulty in measuring the pulse at the finger, therefore the pulse sensor can be developed which can be placed on the neck for the pulse measurement. The patient is continuously monitored 24x7 without affecting his/her privacy with a secure login system with this project.

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