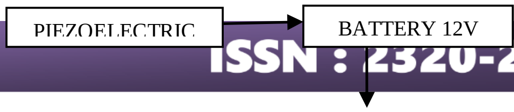

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E-PATIENT MONITORING SYSTEM USING ARDUINO

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***Abstract*-**Health monitoring is a major problem in today's world. Due to a lack of proper health monitoring, patients suffer from serious health issues. Health experts are also taking advantage of these smart devices to keep an eye on their patients. We will make an IOT-based Health Monitoring System that records the patient's heart beat rate and body temperature and send an email/SMS alert whenever those readings go beyond critical values. Pulse rate and body temperature readings are recorded over the Ubibot system and Google Sheets so that patient health can be monitored from anywhere in the world over the internet. A panic will also be attached so that patients can press it on emergency to send Email/SMS to their relatives

Index Terms - Arduino, Node MCU, Temperature sensor, Heartbeat sensor, Respiratory sensor, MEMS sensor, E-Patient, IOT

I. INTRODUCTION

Recently health issues have been increasing in our day-to-day life, as people are subjected to heavy workloads. All this cause various disorder such as high BP, low BP, and heart attacks which require daily visits to doctors and hospitals to be treated and improve. These visits consume a lot of time as well as money and it is difficult for people who stay in rural and remote areas to access these facilities with ease and on time. Some of these medical facilities even involve diagnosis using equipment such as temperature, heartbeat, respiratory sensors, and MEMS accelerometers.

II. PROPOSED FRAMEWORK

We have proposed a robust health monitoring system that is intelligent enough to monitor the patient automatically using iot. It collects the status information through to systems which would include the patient's temperature, body movement, heart rate, blood pressure, and ecg, and sends an emergency alert to the patient's doctor as well as to the caretaker with his current status. We connected respiratory sensors, temperature sensors, mems sensors, and heartbeat sensors to the node mcu to monitor our home through iot technology and the figure 1 is given below. This would help the doctor and caretaker to monitor his patient from anywhere in the world. The system uses smart sensors that generate raw data information collected from each sensor and sends it to a cloud server where the data can be further analyzed and statistically maintained to be used.

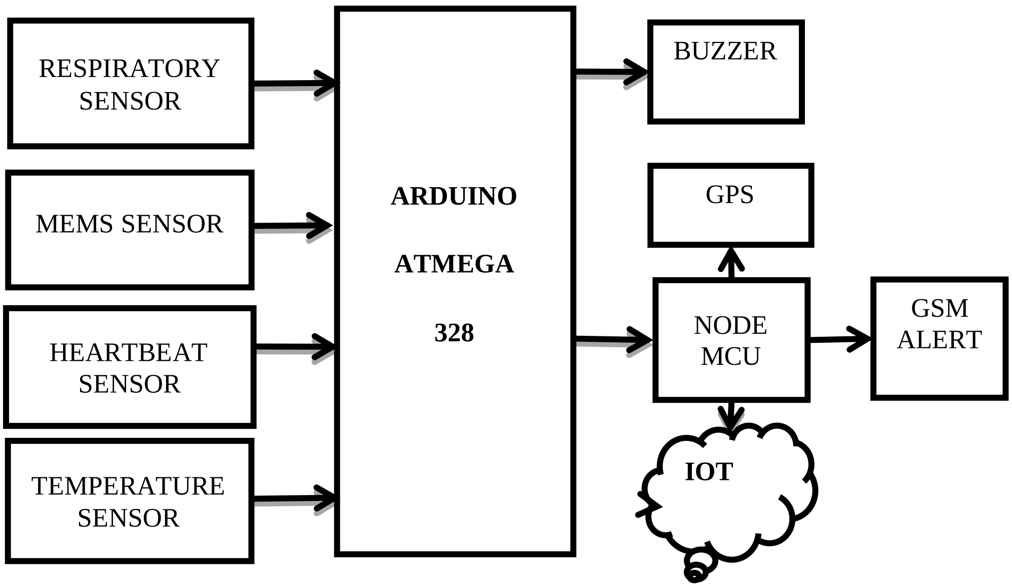

Figure 1. Proposed System

A) Arduino ATMEGA 328:- The Arduino is an easy-to-use yet powerful single-board computer.The Arduino is open-source figure 2 shows ATMEGA 328 Arduino Board. Which means the hardware is reasonably priced and the development software is free.

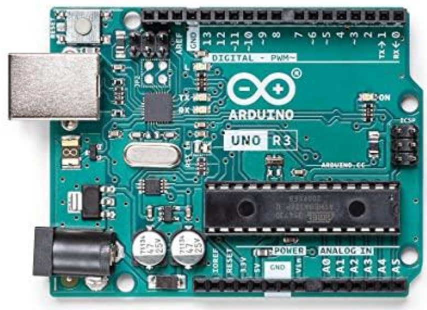

Figure 2: Arduino Board

B) MEMS SENSOR:- Micro-electromechanical systems (MEMS) are a technology that combines computers with tiny mechanical devices such as sensors, valves, mirrors, and actuators embedded in semiconductor chips. When figure4 shows MEMS Accelerometer given below. MEMS is also sometimes called smart matter.

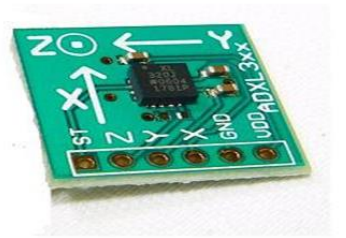

Figure 3: MEMS Accelerometer

C) NODE MCU:- Node MCU is an open-source LUA-based firmware developed for the ESP82666 WiFi chip. The Node MCU Development Board can be easily programmed with Arduino IDE since it is easy to use. All you need is the Arduino IDE, a USB cable, and the Node Board itself now figure4 Node MCU is given below.

Figure 4: Node MCU Board

D) RESPIRATORY SENSOR:- The ECG works mostly by detecting and amplifying the tiny electrical changes on the skin that are caused when the heart muscle "depolarizes" during each heartbeat. The electrical activity of the heart over time is captured and externally recorded by skin electrodes. When the figure5 shows the respiratory sensor given below us.

Figure 5: Respiratory Sensor

E) TEMPERATURE SENSOR:- The different parts of the body have different temperatures. It indicates if the body is unable to maintain a normal temperature and it increases significantly above normal, a condition known as hypothermia occurs. When the figure6 shows the temperature sensor given below. The opposite condition, when body temperature decreases below normal levels, is known as hypothermia.

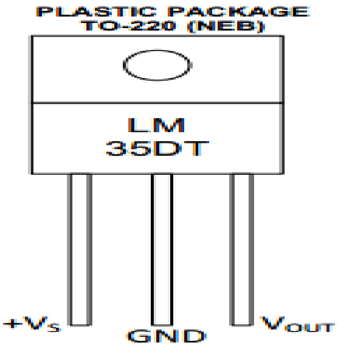

Figure 6: View of Temperature Sensor

F) HEARTBEAT SENSOR:- A person’s heartbeat is the sound of the valves in his/her’s heart contracting or expanding as they force blood from one region to another. The number of times the heart beats per minute(BPM0, is the heartbeat rate and the beat of the heart that can be felt in any artery that lies close to skin is the pulse. When the figure7 shows the Wrist Watch heartbeat sensor given below.

Figure 7: Wrist Watch heartbeat sensor.

G) ARDUINO SOFTWARE IDE:- Arduino is a tool for making computers that can sense and control more of the physical world than your desktop computer. It’s an open-source physical computing platform based on a simple micro-controller board and a development environment for writing software for the board.

H) PROTEUS:- This is very useful to protect critical processes in industrial environments (data collection, device monitoring), or to avoid the operator inadvertently closing a utility (keyboard emulation). The ISAPI version of Proteus can be used to create scripts run through Internet Information Services and is equipped with specific functions to cooperate with the web server.

III. RESULT AND DISCUSSION

With the usage of DSP and DIP, it will also be possible to transmit higher quality data such as videos and sound apart from just text or simple bits. This type of communication will also reduce the risks of radiation hazards and can be used almost anywhere even in places where electronic devices are banned due to the fear of radiation. The principle of operation is quite simple. Two dry sensors are used to detect and filter the EEG signals. The sensor tip detects electrical signals from the forehead of the brain. At the same time, the sensor picks up ambient noise generated by human muscles, computers, light bulbs, electrical sockets, and other electrical devices. When figure 8&9 shows Health Monitoring Kit and output given below.

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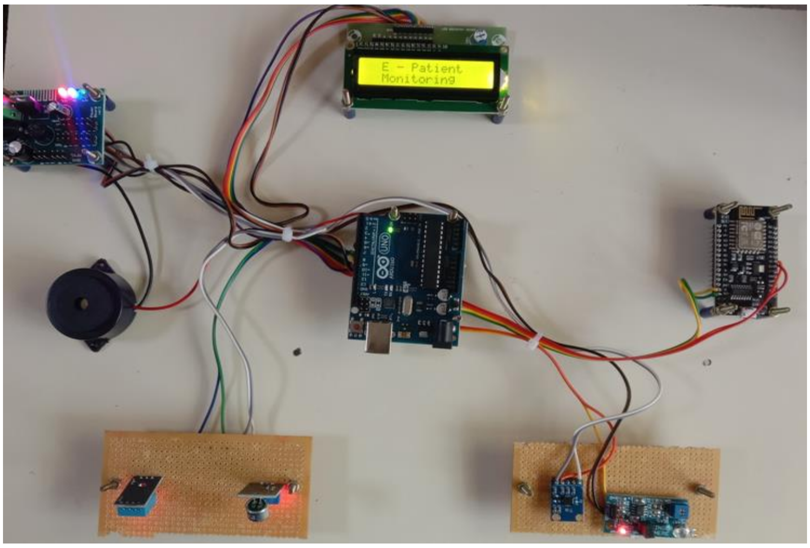

Figure 8: E-Patient Monitoring Kit.

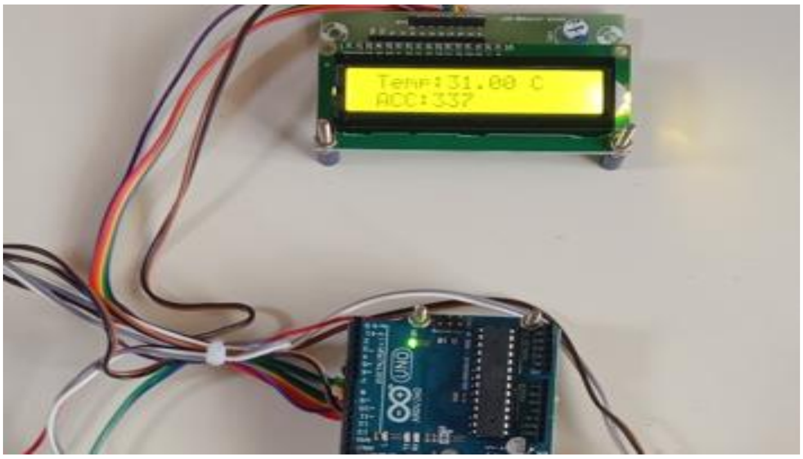

Figure 9: Project output for body temperature.

The value of the signal and time are written to the array data. The data which are stored in the array will be compared with the threshold points given by the user. In this project, the MATLAB section waits for three consecutive blinks to send the Robot activation signal. Then based on the attention level value Robot Move Forward Command will be sent to the Robot module through Zigbee transmission. After three consecutive blinks, the program will scan for a left blink and a right blink to turn the Robot right and left respectively.

IV. CONCLUSION

The principle of operation is quite simple. Two dry sensors are used to detect and filter the EEG signals. The sensor tip detects electrical signals from the forehead of the brain. The device measures the raw signal, power spectrum (alpha, beta, delta, gamma, theta), attention level, mediation level, and blink detection. When figure 10 shows the Output in the graphs given below. With the usage of DSP and DIP, it will also be possible to transmit higher quality data such as videos and sound apart from just text or simple bits. This type of communication will also reduce the risks of radiation hazards and can be used almost anywhere even in places where electronic devices are banned due to the fear of radiation. When it crosses the critical level it gives an alert message to the caretaker and doctor as well as through the buzzer by using the embedded C programming language.

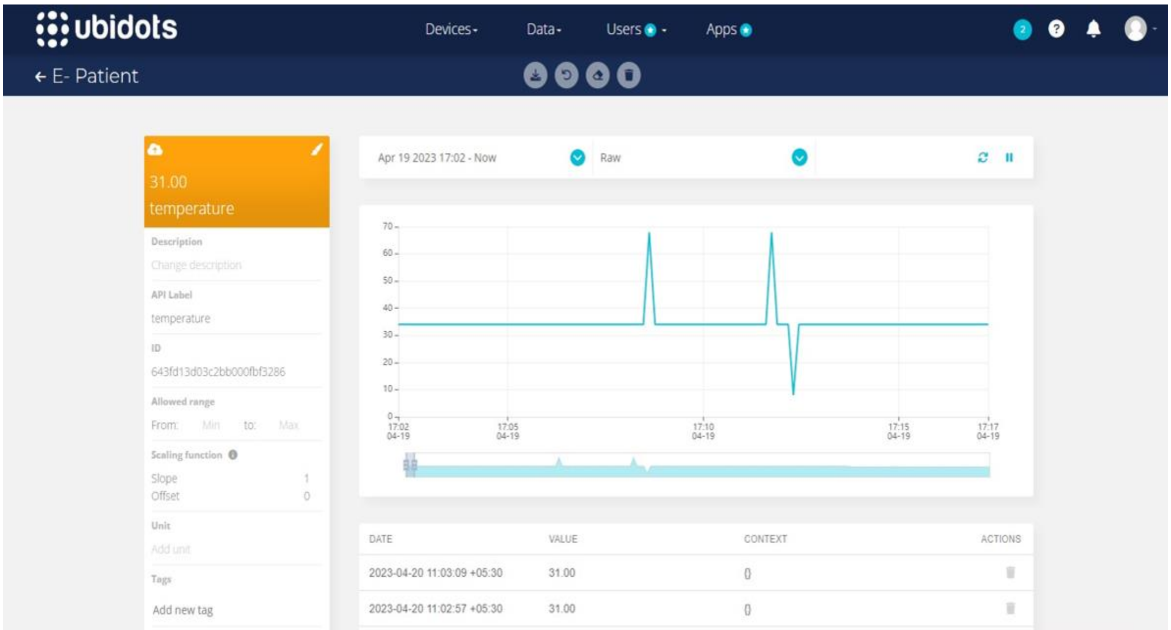

Figure 10: Project output for body temperature in Graph

V. FURTUE SCOPE

The brain-controlled mobile robots have a great deal of attention because they can help bring mobility back to people with devastating neuro-muscular disorders and thus improve their quality of life. A comprehensive brain-controlled mobile robot uses a brain wave sensor that can collect EEG-based brain signals of different frequencies and amplitude and it will convert these signals into packets and transmit through a Wireless medium into the level splitter section to check the attention level. The Level splitter section (LSS) analyses the level and gives the robot movement for the person who is sitting in the wheelchair. The major difference between brain-controlled mobile robots and other brain-controlled devices is that these mobile robots require higher safety because they are used to transport disabled people. The brain-controlled mobile robots can be applied in practice, including finding ways to improve the performance (especially robustness) of BCI systems, to improve the overall driving performance given the constraints of the BCI system.

VI. ADVANTAGES & APPLICATIONS

- High data transmission rates of up to 10Gbps can be achieved.
- Since light cannot penetrate walls, it provides privacy and security that Wi-Fi cannot.
- IOT has low implementation and maintenance costs.
- It is safe for humans since light, unlike radio frequencies, cannot penetrate the human body.
- Hence, concerns about cell mutation are mitigated.
- Indoor wireless open optical communication.
- Indoor navigation.
- Underwater visible light communication.
- Smart indoor blind assistive application.
- Vehicle-to-vehicle communication.

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