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An IOT based approach in paralysis patient healthcare system

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Abstract
In today's world many people are suffering from physical disabilities due to paralysis or some accidental problem. Most of these patients are dependent on care taker. Paralysis is a condition in which there is impairment of one or more muscles in body. In order to assist these patients' hands, play major role in system. The system ensures the patients to express his requirements by hand motion. Sometime appliances are also controlled by patient's hand motion. This system also monitors patient's heartbeat, if it exceeds normal value then buzzer will be activated and message will be shown on LCD to doctors and caretakers to attend patient.

Keywords: IOT, embedded system, cloud, healthcare automation, home automation, web application

1. Introduction
Paralytic patient healthcare system is a system designed to help patient convey various messages to other people like doctor, nurse or family member or caretaker, the system makes use of micro controller based circulate to achieve this functionality.

Physically disabled people many of the times rely on others, even to perform simple action like switching on/off lights, turning on/off fan etc. In order to provide solutions to these activities the system use hand motion-controlled device when even there is motion the rely circuit will be activated which time on/off lights and fan.

Patient healthcare system is method in which the doctor or care taker will monitor patient's health from any location any time. There are cases when there is no one hereby him/her to overcome such situation is system continuously monitors health records of patients such as heartbeat and body temperature

2. Proposed Methodology
The proposed system is divided into three parts, Patient Data Acquisition & Device Control (Input, Output & Processing System), Doctor's Panel, Patient Panel (Self-Monitoring & Device Control). Patient data acquisition and device control, Whole hardware setup forms first module. This is the main & primary module of presented system. It collects the sensor's data and feeds to the IoT enabled microcontroller which acts as a brain of this system. This brain sends all data to web application where doctor & patient can login to monitor health. Microcontroller has Wi-Fi chipset to perform the connectivity with webserver via Wi-Fi network present at patient's place. This module also performs the task of appliance control in patient's room on his requests being generated from web application itself.

Doctor's Panel, this is the part of web application where only doctor can login to view all the data of all his/her patients. This data includes the threshold values of patient's health parameters being sensed by sensors, alert limits, reminders etc. All the critical data records of patient will be stored here & are accessible only by doctor.

Patient Panel, this is the part of web application where only patient can login to monitor his routine health check records and the threshold values as well as reminders set by his doctor. This panel also gives functionality to patient to control devices in his room which are connected to this system.
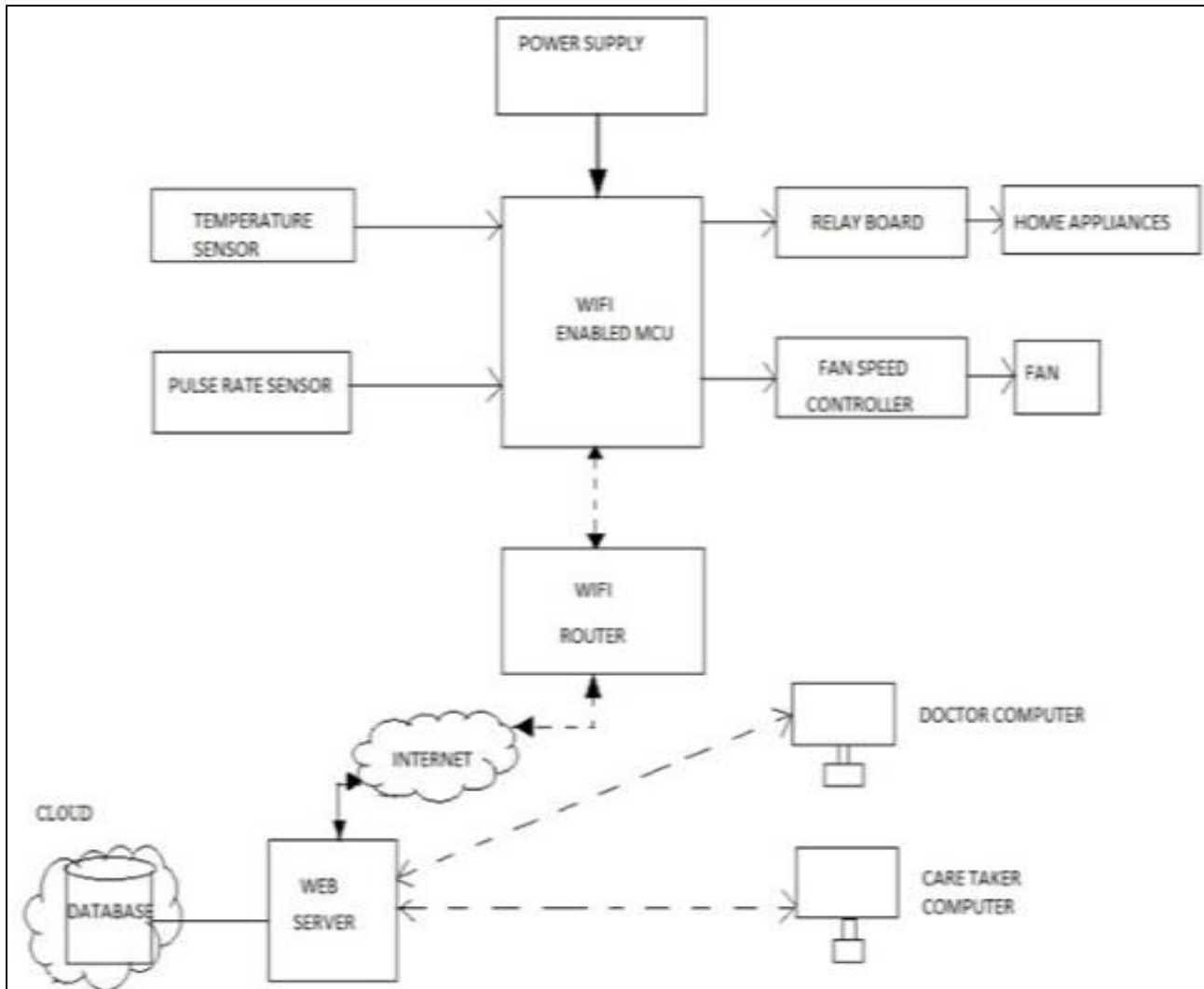
Fig 1: Block Diagram

3. System Implementation
3.1 Sensors
3.1.1 LM35 sensor
LM35 is a precision integrated-circuit temperature sensor. The output voltage of this temperature sensor is linearly proportional to the Celsius temperature. It produces an increase in 10mV for every 10- degree Celsius rise in temperature.

3.1.2 Pulse sensor
When a heartbeat occurs, blood is pumped through the human body and gets squeezed into the capillary tissues. The volume of these capillary tissues increases as a result of the heartbeat. But in between the heartbeats (the time between two consecutive heartbeats,) this volume inside capillary tissues decreases. This change in volume between the heartbeats affects the amount of light that will transmit through these tissues. This change is very small but we can measure it with the help of Arduino.

The pulse sensor module has a light which helps in measuring the pulse rate. When we place the finger on the pulse sensor, the light reflected will change based on the volume of blood inside the capillary blood vessels. During a heartbeat, the volume inside the capillary blood vessels will be high. This affects the reflection of light and the light reflected at the time of a heartbeat will be less compared to that of the time during which there is no heartbeat (during the period of time when there is no heartbeat or the time period in between heartbeats, the volume inside the capillary vessels will be lesser. This will lead higher reflection of light). This variation in light transmission and reflection can be obtained as a pulse from the output of pulse sensor. This pulse can be then conditioned to measure heartbeat and then programmed accordingly to read as heartbeat count.
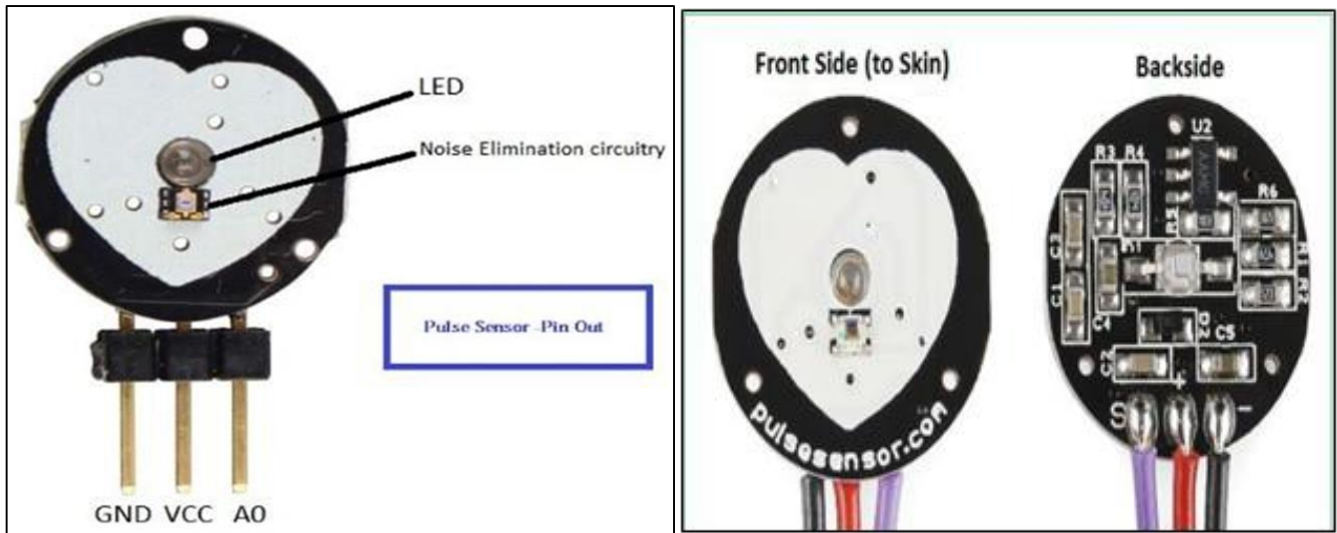
Fig 2: Pulse Rate Sensor

4. Observation

The proposed system is not only helpful for the paralytic patients but also for old age peoples and temporarily disabled people. The results of temperature sensor and pulse sensor are shown figure:
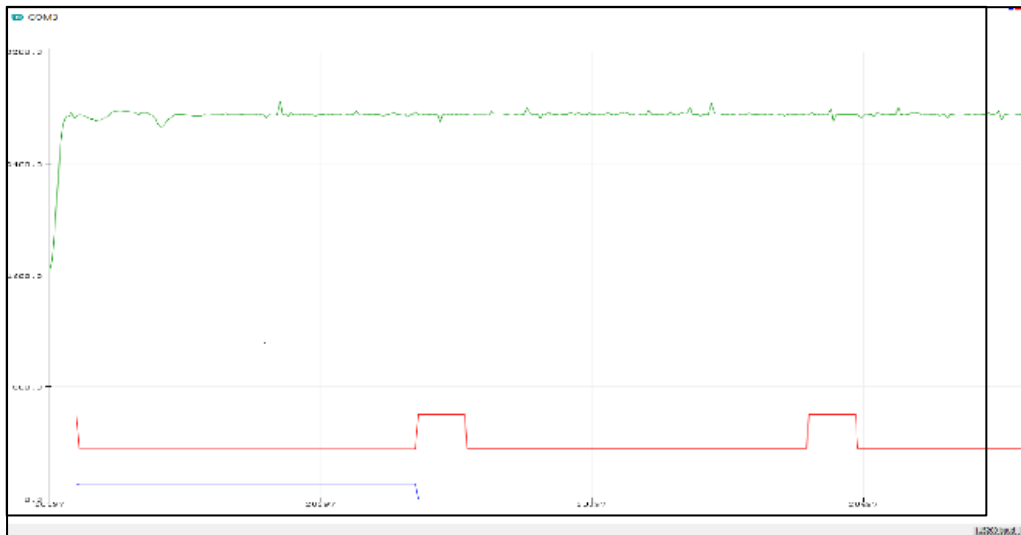

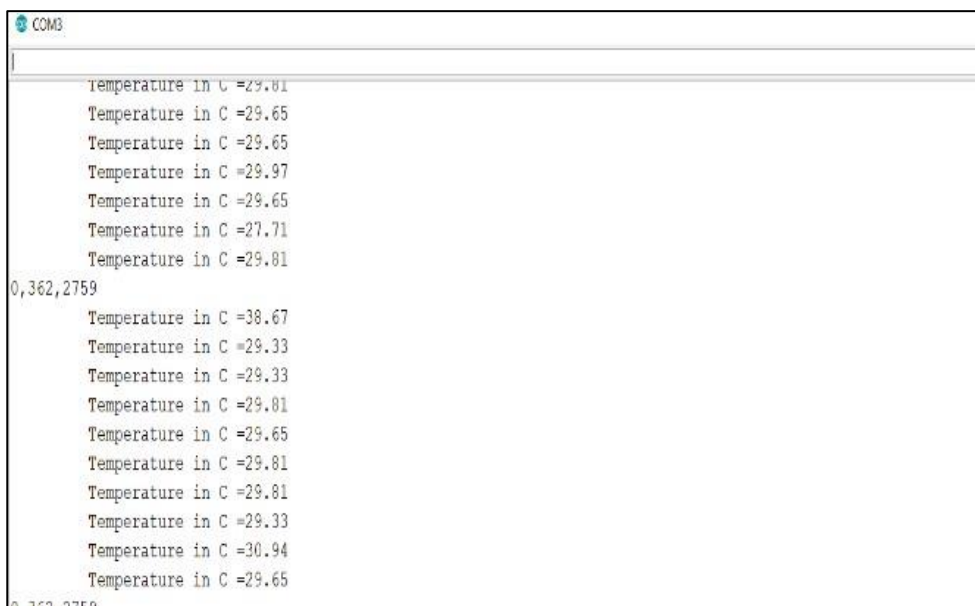**Fig 3:** Graphical Representation of Pulse Rate

Fig 4: Result of temperature sensor

5. Conclusion and Future Scope

The proposed system will be helping hand for paralytic patient, old age and temporarily disabled people. The patients can convey his/her needs through the designed system. Home automation is also included in proposed system so that patient can control different home appliances without help of care taker. Health monitoring is the major issues, this system will continuously monitor patients body temperature and pulse rate. If the temperature or pulse rate exceeds normal range then the messages will be quickly notified to the care taker and doctor. In future, considering the COVID-19 pandemic more health parameters can be added like oxygen level.

7. References

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