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IoT Based Paralysis Patient Health Monitoring System

[1]Dr. Devasena A, [2]Nagam Pragathi, [3]Neelam Sireesha, [4]Tavva Sujini, [5]Yuvashree M
Professor, Department of Electronics and Communication Engineering[1]
Students, Department of Electronics and Communication Engineering[2,3,4,5]
Dhanalakshmi College of Engineering, Chennai, India
Corresponding Authors: tavvasujini.ece2019@dce.edu.in

Abstract: *In the medication process, it is a common practice to treat patients with saline solution for dehydration and other health problems to improve the health status of patients. During saline feeding, continuous monitoring by nurses is mandatory when monitoring the saline level. There are many cases where patients are harmed due to the inattention of the staff because their absence does not register the refilling of the saline level in the container. This creates the problem of backflow of blood immediately after the completion of the physiological solution in the container. Therefore, an IoT-based saline level monitoring system was developed to protect the patient from harm. The proposed model contains a sensor that continuously detects drops of physiological solution. Whenever the sensor does not detect drops for a certain interval, it alerts hospital staff with a buzzer, helping to monitor patient safety.*

Keywords: IoT, WSN, MEMS, PWM, IDE, BPM

I. INTRODUCTION

A patient monitoring system is a process of continuous monitoring of the vital parameters of the patient, designed by the doctor, which must be constantly monitored. Patient monitoring is usually done by connecting sensors such as temperature sensor, temperature sensor, etc. The components of a conventional patient monitoring system usually include sensor network, imaging device, wireless communication nodes and other supporting components. Sensors are nothing more than transducers that are used to capture all physical quantities of the patient and convert them into an equivalent electrical signal for data processing. Display devices are devices that are used to accumulate the desired received signal and display the relevant content on LCD or HMI displays. Communication devices are usually short-range communication devices that are used to transmit captured sensor data to the nearest sensor nodes where imaging devices have been connected. Usually, the other supporting components involved in the patient monitoring system are microcontroller units which are used to decode the received signal, in addition, the microcontroller is used to make relevant decisions when needed.

II.EXISTING SYSTEM

In the current methodology system, there is only the technology to monitor the patient's heart rate in the near display unit of the terminal, and remote monitoring is only possible if there is a WIFI connection.
In this monitoring system, the implementation of the module is for the paralyzed patients.

1. This module comprises of parameters include heart rate, respiration rate, temperature. \
2. The primary function of this system is to monitor the heart rate, breathing rate, temperature of the paralyzed and the datacollected by the sensors are sent to the cloud from there we can get alerts.

III.PROPOSED SYSTEM

With an automatic saline monitoring system, the manual effort of continuously monitoring patients to whom nurses apply saline will be reduced. As the entire proposed framework is automated, it requires very less human intervention and effort at the center. At night, this will be more invaluable because the nurses will not have the presumption to check

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the saline level in the saline container every now and then, which is a daunting task. This also saves patients from harming them by back flowing blood into the saline container, which can sometimes have the most lethal impact. This will reduce the worry of continuous observation by the attending physician at a reasonable cost.

IV.HARDWARE IMPLEMENTATION

A. Block Diagram

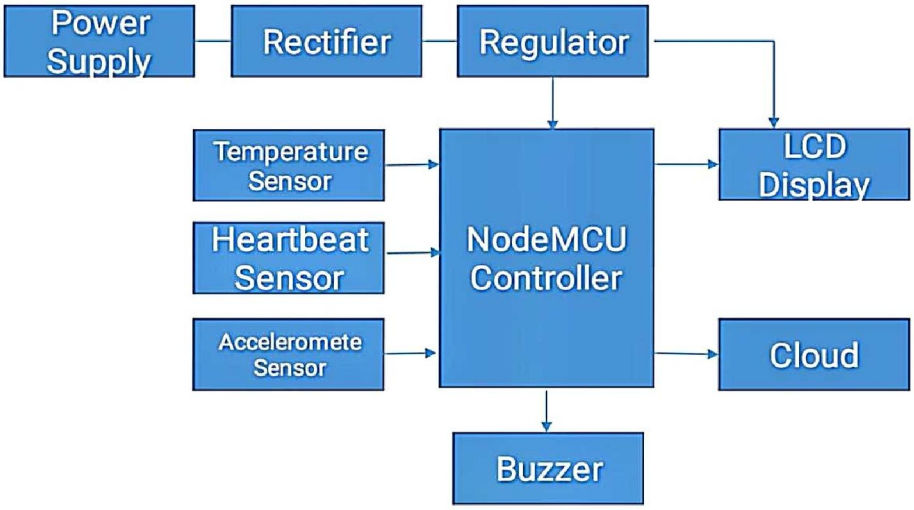

Fig-4.1 : Node MCU Controller

The above figure represents the systematic block diagram of the project "IoT Based Paralysis Patient Health Monitoring System ". As shown in the block diagram, there are five sensors Temperature Sensor, Heartbeat Sensor, Buzzer , LCD Display ,and Accelerometer Sensor.

IoT (Internet of Things)

IoT stands for Internet of Things, which means accessing and controlling everyday devices and equipment using the Internet. Our IoT tutorial covers all IoT topics like introduction, features, pros and cons, ecosystem, decision framework, architecture and domains, biometrics, security camera and door unlock system, devices,etc ,.

Let's take a closer look at our mobile devices, which includes GPS tracking, mobile gyroscope, adaptive brightness, voice detection, face detection, etc. These components have their own individual functions, but what if they all communicate with each other to providea better experience? For example, the brightness of the phone is adjusted according to the GPS position or direction. The term "things" in the Internet of Things refers to anything and everything in everyday life that is accessed or connected via the Internet.

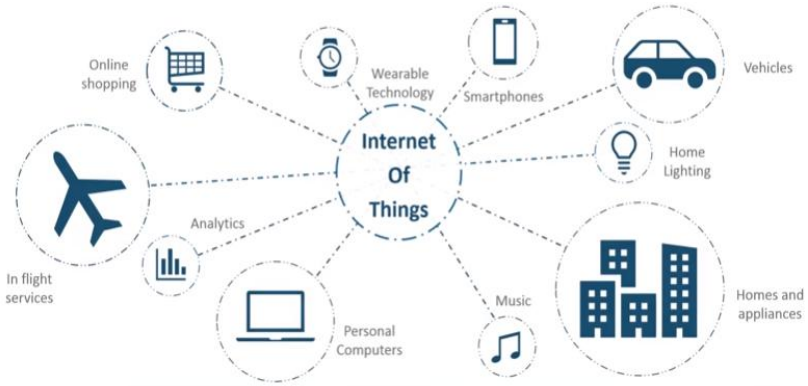

Fig-4.2 : IoT

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B.NODE MCU

Node MCU is an open source IoT platform.It includes firmware that runs on the ESP8266 Wi-Fi Sock from Expressive Systems and hardware that is based on the ESP-12 module. By default, the term "Node MCU" refers to firmware rather than development kits. The firmware uses the Lau scripting language. It is based on the Eula project and built on the Expressive Non-OS SDK for ESP8266. It uses many open source projects such as lua-cjson and SPIFFS.

C.ESP8266 Arduino Core

When Arduino.cc started developing new MCU boards based on non-AVR processors, such as the ARM/SAM MCUs used in the Audrina Due, they needed to modify the Arduino IDE so that it was relatively easy to change the IDE to support alternative tool chains. To be able to compile Arduino C/C++ for these new processors. They did this with the introduction of Board Manager and SAM Core. A "core" is a collection of software components required by the Board Manager and the Arduino IDE to compile an Arduino C/C++ source file for the machine language of the target MCU. Some ESP8266 enthusiasts have developed an Arduino core for the ESP8266 Wi-Fi Sock, popularly called "ESP8266 Core for the Arduino IDE". It has become the leading software development platform for various ESP8266-based modules and development boards, including Node MCU.

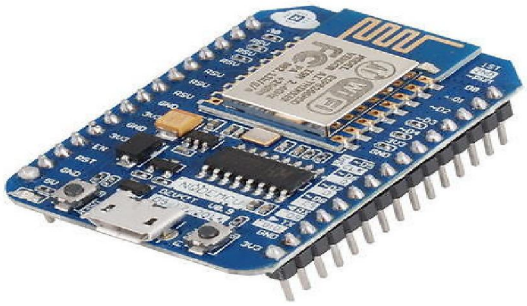

Fig-4.3: ESP8266 Arduino Core

D. Node MCU Development Board/kit v0.9 (Version1)

Since Node MCU is open source platform, their hardware design is open for edit/modify/build. Node MCU DEV Kit/board consist of ESP8266 Wi-Fi enabled chip. The ESP8266 is a low-cost Wi-Fi chip developed by Expressive Systems with TCP/IP protocol. For more information about ESP8266, you can refer ESP8266 Wi-Fi Module.

Fig-4.4: Node MCU Kit

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E. TEMPERATURE SENSOR

Temperature is the most frequently measured environmental variable. This is to be expected since most physical, electronic, chemical, mechanical and biological systems are affected by temperature. Some chemical reactions, biological processes, and even electronic circuits work best within a limited temperature range. Temperature is one of the most commonly measured quantities, so it is not surprising that there are many ways to measure it. Temperature sensing can be done either by direct contact with the heating source, or remotely, without direct contact with the source using radiated energy. There is a wide variety of temperature sensors on the market today, including thermocouples, resistance temperature detectors (RTDs), and thermistors, infrared and solid state sensors

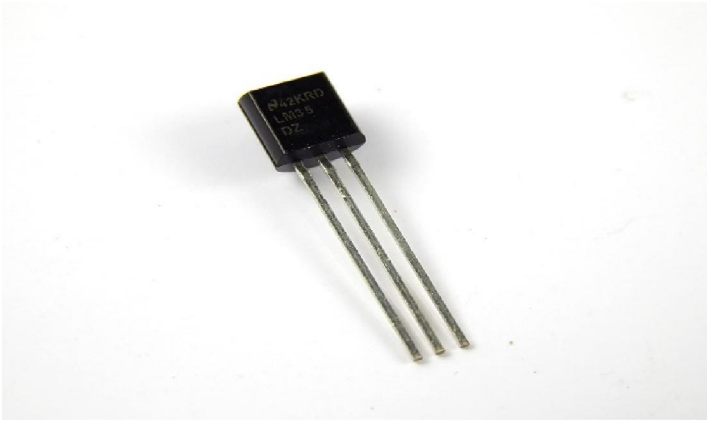

Fig-4.5: Temperature Sensor

E. Semiconductor sensors

They are classified into different types such as voltage output, current output, digital output, silicon resistive output and diode temperature sensors. Modern semiconductor temperature sensors offer high accuracy and high linearity in the operating range of about 55 °C to +150 °C. Internal amplifiers can scale the output to suitable values such as 10 mV/°C. They are also useful in cold end compensation circuits for wide temperature range thermocouples.

F. HEARTBEAT SENSOR

Fig-4.6 : Heartbeat Sensor

A person's heartbeat is the sound of the valves in the heart contracting or expanding as they push blood from one area to another. The number of heart beats per minute (BPM) is the pulse rate, and the heartbeat that can be felt in any artery that lies close to the skin is the pulse.

G.Buzzer

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An audible signalling device such as a buzzer or buzzer may be of the electromechanical or piezoelectric or mechanical type. The main function is to convert the signal from sound to sound. It is generally powered by DC voltage and is used in timers, alarm devices, printers, alarms, computers, etc. Based on different designs, it can generate different sounds such as alarm, music, bell and siren.

Fig-4.7: Buzzer

H.POWER SUPPLY

All electronic circuits only work at low DC voltage, so for their proper operation we need a power supply that will provide an adequate voltage supply. This unit consists of a transformer, rectifier, filter and regulator. An AC voltage typically 230 volts rms is connected to the transformer voltage up to the desired AC voltage level. A diode rectifier that provides a full wave rectified voltage that is initially filtered by a simple capacitor filter to produce a DC voltage. This resulting DC voltage usually has some AC voltage ripple or fluctuation. The regulator circuit can use this DC input to provide a DC voltage that not only has much less voltage ripple, but also stays at the same DC current value even if the DC voltage changes somewhat or the load connected to the DC output voltage changes.

Fig-4.8 : General Block of Power Supply Unit

I.RECTIFIER

The DC level obtained from a sinusoidal input can be improved by 100% using a process called full-wave rectification. Here in our full wave rectifier project we are using bridge rectifier. From the basic bridge configuration, we see that two diodes (say D2 and D3) are on while the other two diodes (D1 and D4) are off for t = 0 to T/2. At the input are conductive diodes D1 & D4. So the polarity across the load is the same.

Diode of variable types like 1N4001, 1N4003, 1N4004, 1N4005, IN4007 etc. can be used in bridge rectifier. But here we use 1N4007 because it can withstand up to 1000v.

J. REGULATORS

The output voltage from the capacitor is more filtered and finally regulated. A voltage regulator is a device that maintains a constant output voltage regardless of changes in power supplies, loads, and temperature changes. Here we use a fixed voltage regulator, the LM7805. IC LM7805 is +5V regulator which is used for microcontroller.

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V. SOFTWARE REQUIREMENTS

A.ARDUINO

Arduino is a tool for building computers that can perceive and control more of the physical world than your desktop computer. It is an open-source physical computing platform based on a simple microcontroller board and a development environment for writing software for that board.

Fig-5.1 :Arduino

VI.RESULTS

The IoT based paralysis patient health monitoring system is designed as per block diagram given in figure ,the developed version of kit is given below.

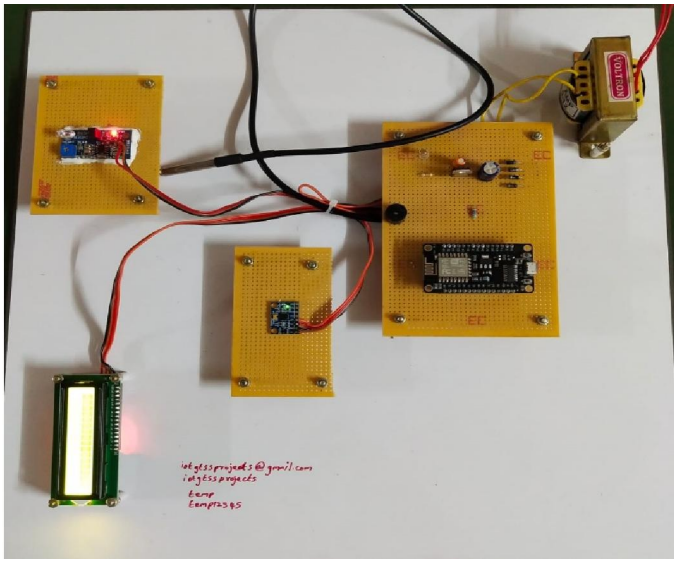

Fig-6.1 : IoT based paralysis patient health monitoring system

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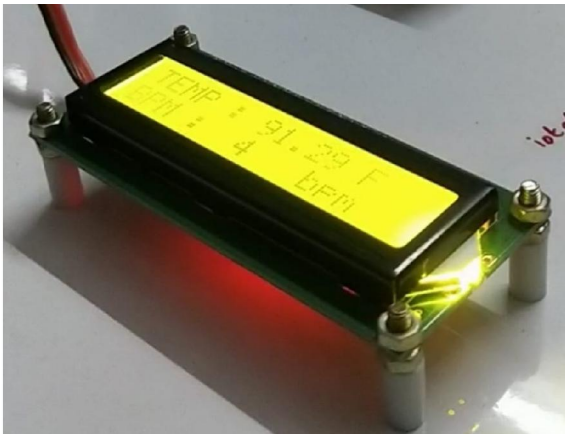

Fig-6.2 :LCD Display of Body temperature and BPM

VII. CONCLUSION

This paper proposes the automated approach to monitoring the Saline Fluid in the bottle and furthermore to stop the flow of saline using solenoid valve. The proposed system is suitable for use in hospitals via a computer or smartphone, doctors or nurses can screen the Saline level, temperature, and any patient's heart rate can be accessed at any time and from any place. As the entire proposed framework is automated, it requires exceptionally less human intervention. It is particularly useful for the nurses especially at the hospitals where numerous patients are alloted to 2-3 nurses. Consequently, this system is user friendly and any naive user with a little training can easily utilize this system. It can be reused for the next saline bottle.

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