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Alzheimer's Assistant Using Arduino

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Abstract: The increasing prevalence of Alzheimer's disease among the elderly has spurred efforts to develop innovative solutions for patient care and monitoring. This project proposes a comprehensive system, embodied in a wearable device, designed to monitor the health status of Alzheimer's patients. The device integrates sensors such as GPS for location tracking, a gyroscope for detecting sudden movements, and sensors for measuring vital signs including body temperature, heart rate, and blood oxygen saturation (SpO2). Data collected by the sensors is transmitted in real time to caregivers or healthcare professionals using IoT and the Blynk platform, ensuring prompt responses to emergencies or irregularities. The system aims to enhance patient safety by providing continuous updates on their health and location, reducing risks associated with wandering or sudden health declines. The sensors are seamlessly connected to microcontrollers, including Arduino Nano and NodeMCU ESP8266, which facilitate data processing and communication. The project's results demonstrate accurate performance, offering a scalable solution for managing Alzheimer's patients. The use of low-power sensors ensures energy efficiency, making the device practical for prolonged use. This innovative system highlights the potential of integrating IoT and wearable technologies to improve the quality of life for patients and their families.

Keywords: Alzheimer's disease. Arduino. Personal assistant for Alzheimer's Patients. Medical application of Arduino.

1.1 Introduction:

We have recently noticed an increase in Alzheimer's disease in the elderly, especially the elderly. This has led to companies competing to help people afflicted with this disease.So in this project a system was designed to help patients with Alzheimer's disease. The project has been completed, tested and the results are shown accurately. Where the project was linked by way with the application by the Blynk platform The temperature is sent instantaneously. Gyroscope sensor is used to monitor the velocity of the Zuhaimer patient. GPS sensor is connect continues to limit the location of the patient . Temperature sensor is connected to V1 in IoT Blynk platform. In the event that the temperature rises more than the specified value, a warning message is sent to the monitored person informing him that the temperature has risen in order to take the necessary action. Heart rate sensor is connected to V2 in IoT Blynk platform read the patient heart rate countinously.Spo2 sensor is connected to V3 in IoT Blynk platform read the patient heart rate continuously**.**

1.2 The Aim of Project :

- This project aims to design a watch that contains some sensors to monitor the patient's status
- send it continuously or in an emergency situation to the person observing the patient's status.

1.3 Propose of Project :

- The purpose of is to design a watch that contains some sensors to measure patiets behavior such as body head, SPO2, Heart rate.
- Display the patient's behavior on screen
- In the same time send it continuously a copy of these information on nurse or doctor phone by using IoT
- Using Blynk cloud for sending the data through the internet

2. Project Components:

2.1 Arduino Nano:

It is an open-source electronic board consisting of several digital and analog ports. It uses Arduino boards of microprocessors and control units to perform a set of tasks. The Arduino is programmed using a programming code.

2.2 gyroscope sensor

Vibration gyro sensors detect angular velocity through the Coriolis force acting on a vibrating component. Consequently, the precision of angular velocity measurements varies considerably based on the material and structural characteristics of the element.

A gyroscope sensor is an instrument capable of measuring and maintaining the orientation and angular velocity of an object. It offers greater sophistication compared to accelerometers, as it can assess both the tilt and lateral orientation of the object, while accelerometers are limited to measuring linear motion.

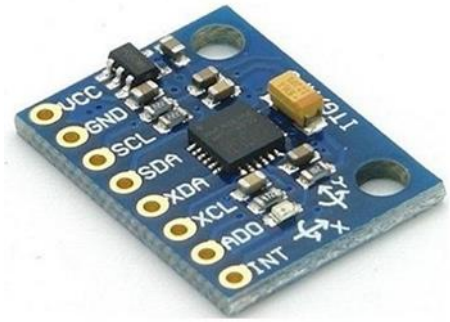

Fig: Gyroscope sensor

2.3 The Global Positioning System (GPS) :

The UBLOX NEO-6M GPS Module, accompanied by its antenna, is entirely compatible with the Arduino development platform. Utilizing the UBLOX NEO-6M-0001 architecture chip, it can be seamlessly integrated into various devices and receivers, including Personal Navigation Devices (PNDs), GPS mice, auto trackers, speed detectors, and numerous other applications.

Fig: The Global Positioning System (GPS)

2.4 Contactless Temperature Sensor Module GY-906 MLX90614 :

The MLX90614 is a non-contact infrared thermometer designed for temperature measurements. It features an infrared-sensitive thermopile detector chip and a signal conditioning ASSP, both housed within the same TO-39 package. This thermometer is compatible with Arduino and any microcontroller that can interface with it via the I2C protocol. The sensor is provided with a breakout board that includes all necessary components for operation, along with two types of unsoldered pins. Please specify your preference for soldering one type or the other. Additionally, there are two solder jumpers for the I2C interface, which may require soldering based on your specific application, although most applications will not necessitate this. The MLX90614 is constructed from two chips developed and produced by Melexis.

Fig.: MLX90614 Sensors

2.5 MAX30102 Pulse Oximeter SPO2 & Heart-Rate Module:

The MAX30102 is a biosensor module that combines pulse oximetry and heart rate monitoring capabilities. It features integrated internal LEDs, photodetectors, optical components, and low-noise electronics designed to reject ambient light. This oximeter sensor, known as the MAX30102, measures the percentage of oxygen saturation in the blood via the fingertip, while also tracking heart rate, thus functioning as an SpO2 sensor. The device can be interfaced with any microcontroller using the I2C protocol and operates within a voltage range of 1.8 to 5 volts. Its low energy consumption makes it suitable for various medical applications, allowing it to be powered by simple batteries for extended periods, making it ideal for portable monitoring solutions.

Fig.: MAX30102 Sensors

2.6 Node MCU ESP 8266:

NodeMCU is an open-source platform built on the ESP8266, enabling the connection of devices and facilitating data transfer through the Wi-Fi protocol. It incorporates essential microcontroller features such as GPIO, PWM, and ADC, among others. The accompanying diagram illustrates the pinout configuration of the NodeMCU. This controller is widely recognized in the realm of IoT applications due to its wireless connectivity capabilities. It can be programmed independently using the Arduino IDE or integrated with Arduino to function as a communication module, making it suitable for various applications requiring Internet connectivity.

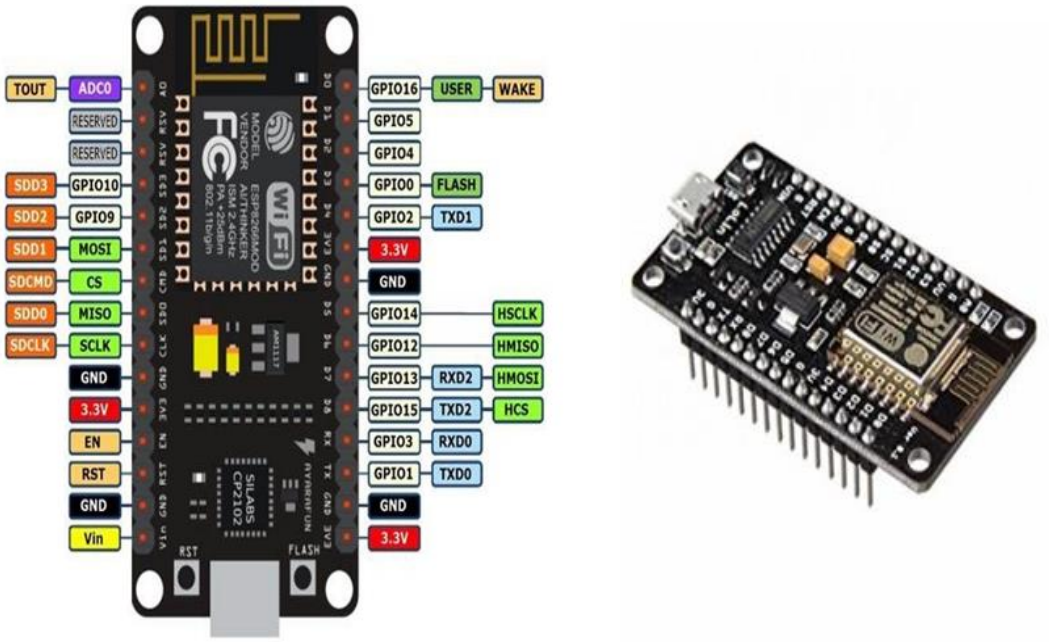

Fig.: Node MCU ESP8266 Wi-Fi

2.6.1 non-contact infrared thermometer interface with Node MCU:

The following circuit explain the connection non-contact infrared thermometer with Node MCU ESP 8266

- ✓ Connect SCL of sensor to D1 in Node MCU
- ✓ Connect SDA of sensor to D2 in Node MCU
- ✓ Connect GND of sensor to GND in Node MCU
- ✓ Connect VCC of sensor to 3.3 volt Node MCU

2.7 MAX30102 Pulse Oximeter SPO2 & Heart-Rate Module:

The MAX30102 is a biosensor module that combines pulse oximetry and heart rate monitoring capabilities. It features built-in LEDs, photodetectors, optical components, and low-noise electronics designed to reject ambient light. This oximeter sensor, known as the MAX30102, measures the percentage of oxygen saturation in the blood via the fingertip and also tracks heart rate, functioning as an SpO2 sensor while counting heartbeats. The sensor can be interfaced with any microcontroller using the I2C protocol and operates within a voltage range of 1.8 to 5 volts. It is utilized in various medical applications and is characterized by its low energy consumption, making it suitable for use with basic batteries over extended periods, such as in portable monitoring devices.

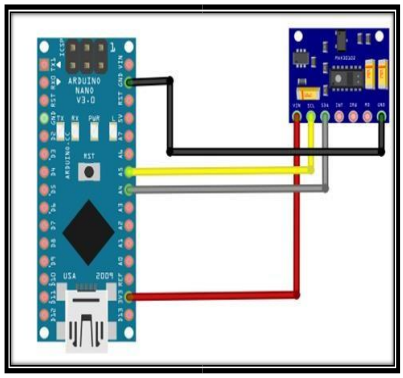

Fig: Connect Arduino nano with MAX30102

3.1 System Connection:

The circuit below shows the connection of our system,

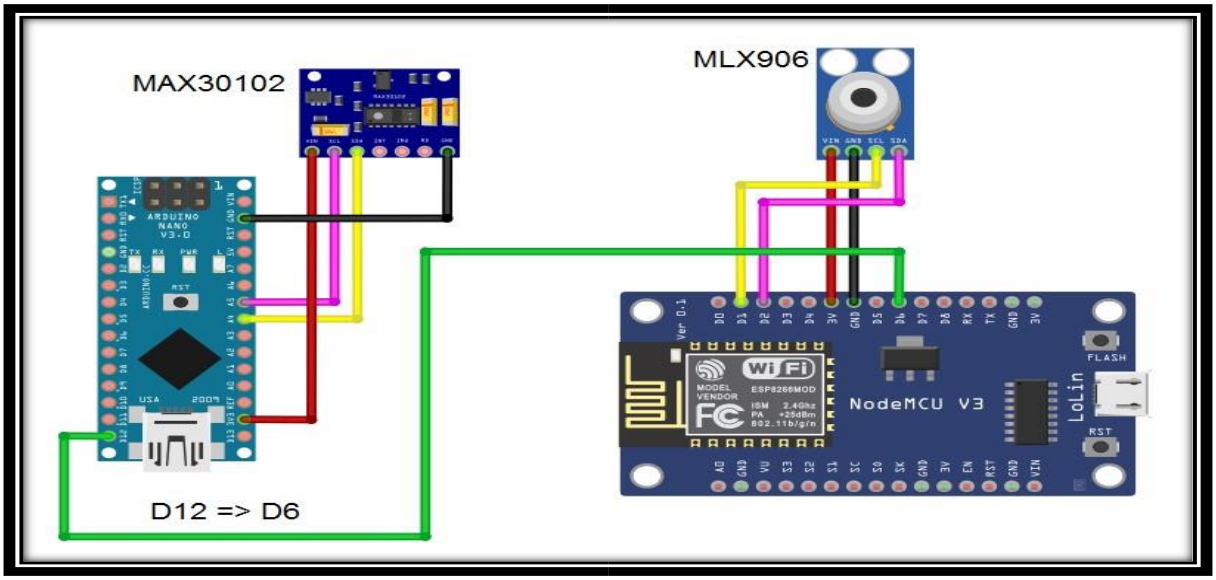

Fig: Connect Sensors with Node MCU, Arduino Nano

1. Connect SCL of MLX906 sensor to D1 in Node MCU
2. Connect SDA of MLX906 sensor to D2 in Node MCU
3. Connect GND of MLX906 sensor to GND in Node MCU
4. Connect VCC of MLX906 sensor to 3.3 volt Node MCU
5. Connect SCL of MAX30102 sensor to D1 in Arduino Nano
6. Connect SDA of sensor to D2 in Node Arduino Nano
7. Connect GND of sensor to GND in Node Arduino Nano
8. Connect VCC of sensor to 3.3 volt Node Arduino Nano
9. Connect D12 of Arduino Nano to D6 of Node MCU Nano

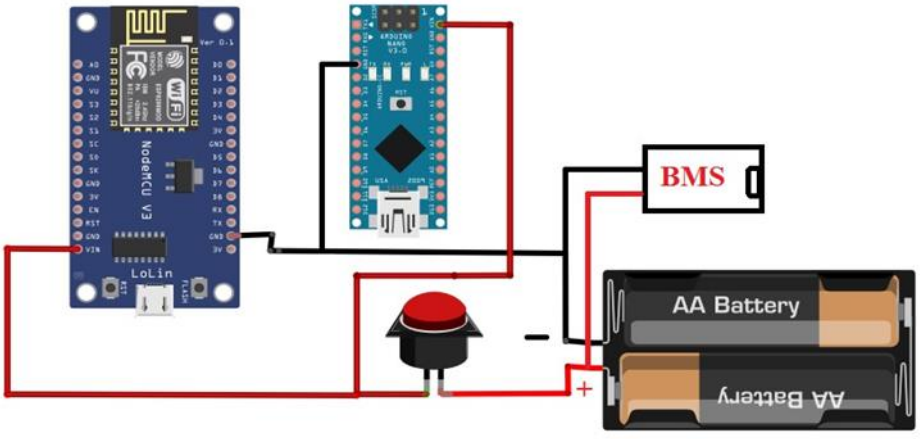

Fig: Arduino Nano power Connect with Battery

3.2 Physical connection of project diagram:

The pictures below show the physical connection of the project

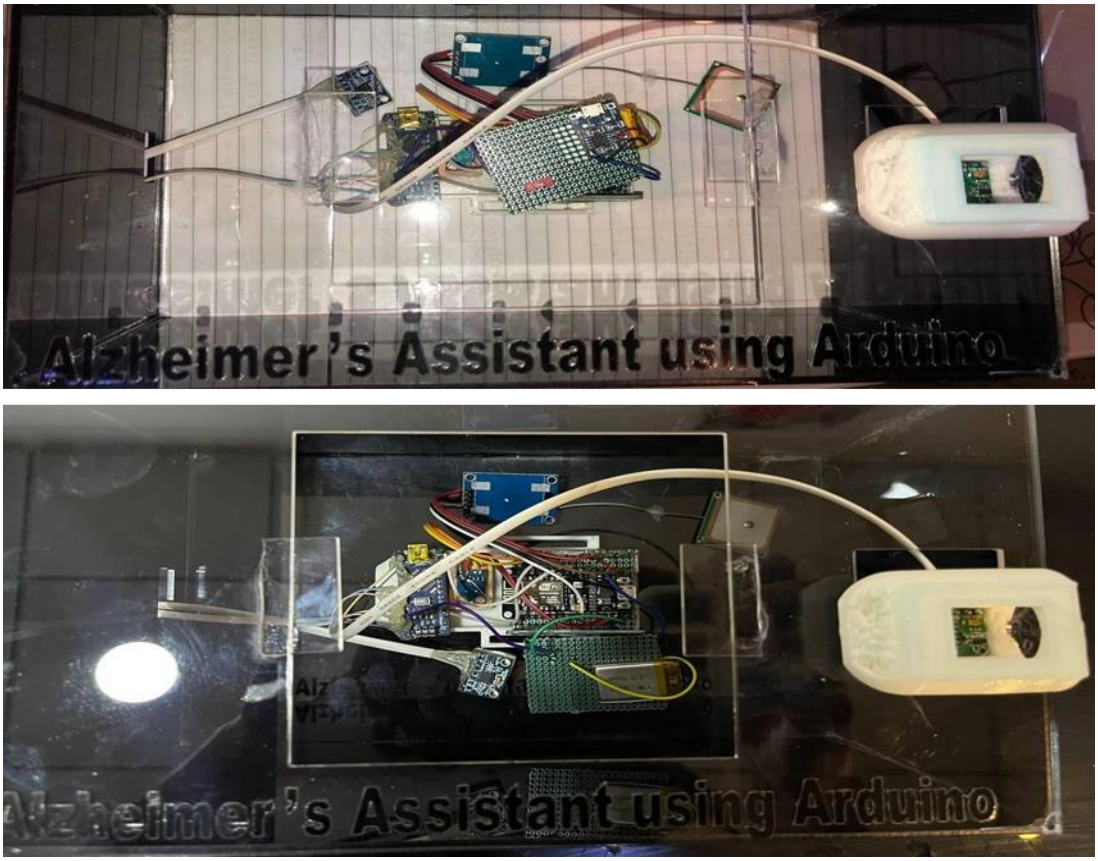

Fig: physical diagram of project

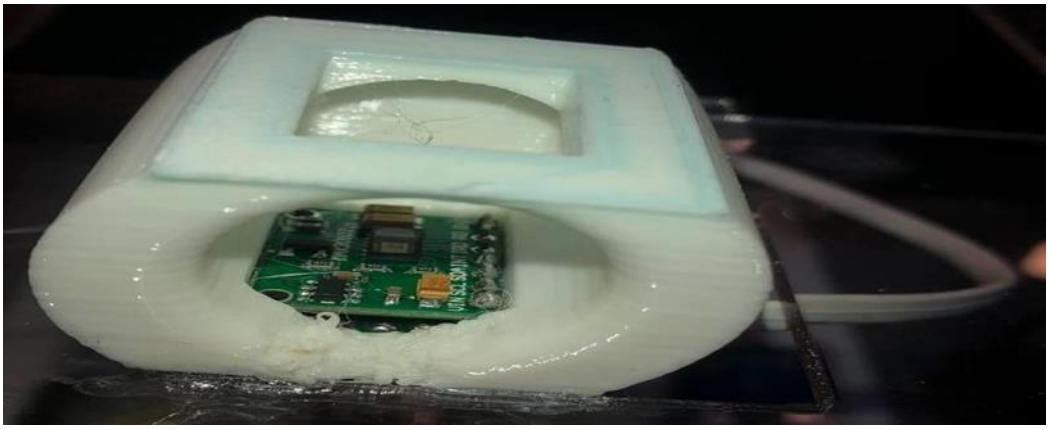

Fig: Max30102 sensor cover

4. Conclusion:

In conclusion,

1. The project has been completed, tested and the results are shown accurately. Where the project was linked by way with the application by the Blynk platform The temperature is sent instantaneously
2. Gyroscope sensor is used to monitor the velocity of the Zuhaimer patient
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4. Temperature sensor is connected to V1 in IoT Blynk platform

In the event that the temperature rises more than the specified value, a warning message is sent to the monitored person informing him that the temperature has risen in order to take the necessary action

5. Heart rate sensor is connected to V2 in IoT Blynk platform read the patient heart rate countinously.
6. Spo2 sensor is connected to V3 in IoT Blynk platform read the patient heart rate countinously.

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