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Smart Watch for Elderly Person

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Abstract: ***In India ,the current senior citizen population of 130 million is expected to grow more than double to 300 million to constitute 20 percent of the population[1].With a rapidly growing 60-plus population, India is faced with herculean task of providing senior-friendly urban infrastructure. Around 64% of adult fall prey to depression and loneliness in urban area. There is also been a significant increase in crime rate against senior citizens being left at home alone.Also,the senior population is most exposed and vulnerable to Covid-19 infections and fall ill often. This paper aims to develop a smartwatch equipped with health monitoring and fall detection techniques for elderly population using a microcontroller's main component in used in this is an Arduino which is a microcontroller equipped/connected with sensors which can detect the health parameters such as pulse rate, body temperature etc. It also been equipped with fall detection technique which can detect the fall of user wearing the smartwatch and can send SOS to the caretakers concerned with that user.All the previous smartwatches are developed keeping in mind the general population, however this device is solely dedicated to the senior population and act as a health monitoring device.***

Keyword: CoVID-19, Smartwatch, Microcontroller, Arduino, SOS

I. INTRODUCTION

According to Mordor intelligence article on Global smartwatch market, 68.59 millions of smartwatches were produced in year 2020 which is expected to grow to 230 million unit by 2026[2].Now,this clearly speaks about the potential of smartwatches in today's world. Since the reach of smartwatches are going to be increased, it becomes absolutely necessary to have smartwatches in market which caters to the need of different group of people. In our research paper we have discussed about developing a smartwatch that looks and fulfill the need and attention of senior population of this planet. Since most of the smartwatches are equipped with a microcontroller combined with sensors to detect various parameters, a screen with which user interacts, which can be either a push button or touch screen, and this smartwatch in turn is connected to a smartphone, which is usually carried by the same user via Bluetooth or wi-fi[3]. The current smartwatches in market tracks various amounts of activities ,manage calls and notification and many more things. Our proposed model is solely dedicated and designed for the purpose of monitoring and tracking the health activity and related complications in case of emergency. It uses an Arduino based microcontroller which is incorporated with Temperature sensor(LM 35),pulse rate sensor, ultrasonic sensor, accelerometer and gyroscope module which are used to record the body parameters. It can also detect the fall of user to the ground can send SOS in case of emergency to caretakers.

The L298 is known as a dual H-bridge is a coordinated circuit in 15-lead Multi watt and PowerSO20 bundles. Polarity of the motors can we reversed using this motor driver. This circuit has a high voltage and high current double extension driver which can acknowledge TTL rationale levels took care of by Arduino. By utilizing this component our robot can undoubtedly pause and run according to the instructions provided.

II. ARCHITECTURE AND DESIGN

A. Design

Our proposed design has multiple sensors which include: temperature sensor (LM 35),pulse rate sensor, ultrasonic sensor, MPU6050 accelerometer and gyroscope module. A basic block diagram of our smart watch o is shown in Fig.

These sensors will collect the data and pass it through the Arduino and the Arduino will later send it to the Thing Speak server, and these data will be display through Liquid Crystal Display(LCD).



Fig -1: Design Architecture

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B. Sensor and Hardware

1) Pulse Rate Sensor: This sensor works smoothly with Arduino, as the sensor clips on to the finger to measure heart rate[4]. The Heart shaped branding covers the front of the sensor. This is the side of your body that contacts your skin. On the front, there is a little round hole through which the LED shines from the back, as well as a small square slightly beneath the LED. Signal(S), Vcc(3 – 5 V), and GND are the three wires that come out of the sensor.

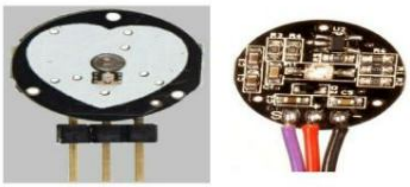


Fig -2: Pulse Rate Sensor

2) LM35 Temperature Sensor: The LM35 is a linear analogue temperature sensor. The output of this device is proportional to the temperature (in degree Celsius). The operating temperature ranges from -55°C to 150°C[5]. Every oC rise or fall in temperature causes a 10mV change in the output voltage. It can be powered by either a 5V or a 3.3V supply, and its standby current is less than 60uA.

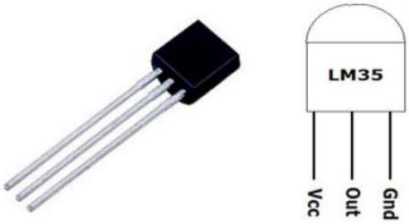


Fig -2: LM35 sensor

3) Ultrasonic Sensor: An ultrasonic sensor functions in the same way that sonar does. It uses sound waves to determine the distance between objects [6]. Sound waves are sent out at a given frequency and in a specific direction, and the receiver waits for the sound waves to return. The time it takes for a sound wave to return lets us figure out how far away an object is.



Fig -3: Ultrasonic Sensor

4) ESP8266-01: The ESP8266 microcontroller is equipped with a Tensilica L106 32-bit RISC processor, which consumes very little power and runs at a maximum clock speed of 160 MHz[7]. The processing power is available for user application programming and development thanks to the Real-Time Operating System (RTOS) and Wi-Fi stack. A Tensilica 32-bit processor, standard digital peripheral interfaces, antenna switches, power amplifier, low noise receive amplifier, filters, and power management modules are all included. All of them are included in a single little packet. The ESP8266 uses a variety of unique technologies to achieve low power consumption. There are three modes of operation in the power-saving architecture: active mode, sleep mode, and deep sleep mode. This enables battery-powered designs to run for longer periods of time. Because of its wide operational temperature range, the ESP8266 can perform reliably in industrial situations. The chip provides dependability, compactness, and robustness because to highly integrated on-chip functionalities and a low number of external discrete components.

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5) *Arduino UNO:* The Arduino Uno is an ATmega328-based microcontroller board. There are 14 digital input/output pins (six of which can be used as PWM outputs), six analogue inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button on the board. It comes with everything you need to get started with the microcontroller; simply plug it into a computer with a USB wire or power it with an AC-to-DC adapter or battery. The Uno is unique in that it does not employ the FTDI USB-to-serial driver chip found on previous boards[8]. Instead, it uses an Atmega16U2 that has been coded as a USB-to-serial converter. It is possible to communicate with the PC or computer using this method. The name "Uno" comes from the Italian word "uno," which means "one." It was chosen to commemorate the imminent release of Arduino 1.0. Because most sensors deliver their output in analogue form, there is no need to interface an external ADC with the Arduino board to communicate with the sensor. This board is very simple to programme because no external programmer or burner is required to burn the programme into the microcontroller. Because it includes 32KB of flash memory, the user's software can be saved and customised to meet their needs.



Fig -4: Arduino UNO

III. OUTPUT



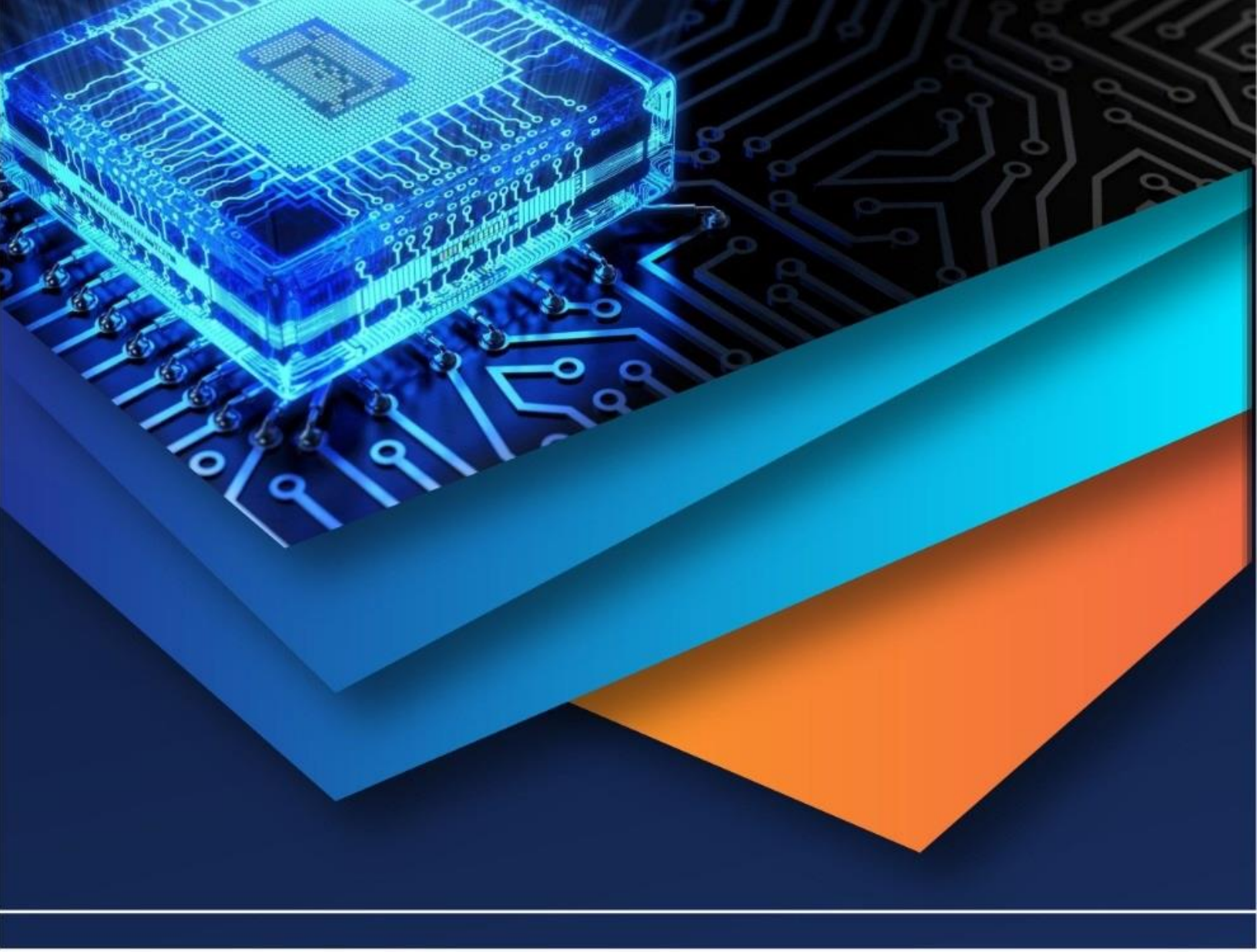
Fig -5: Output from the proteus simulation

IV. CONCLUSION

In our Project, we aimed at making a smart watch which is focused on Senior/ Elderly Person who are facing daily life challenges in order to maintain their proper routine and to be safe and secure from the unconscious conditions which can occur suddenly , therefore we have made this feature which enables real time monitoring of the person and current health condition

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