**Project Proposal**

**CSEL-3208: Computer Peripheral & Interfacing Project (IOT)**

Presented by- **“Team Prefetch”**

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**Project title**: Portable Ultrasonic Range Meter for Non-Contact Distance Measurement.

**Problem statement**: Accurate and portable distance measurement is essential in various applications, such as robotics, industrial automation, and environmental monitoring. This project addresses the need for a cost-effective and portable solution for non-contact distance measurement.

**Objective**: The objective of this project is to design and implement a Portable Ultrasonic Range Meter based on Arduino and an Ultrasonic Sensor (HC-SR04). The system should be capable of accurately measuring distances in a non-contact fashion and displaying the results on a 16x2 LCD display. The primary goals include:

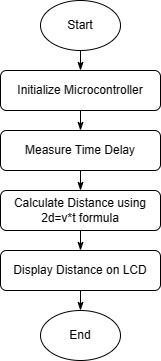
• Develop a compact and portable distance measurement device.

* Implement a user-friendly interface for real-time distance display.
* Achieve precise distance measurements with a range of 2cm to 400cm.
* Ensure low power consumption for extended battery life.
* Utilize the Arduino platform for ease of development and versatility.

**Features**: The Portable Ultrasonic Range Meter project offers the following key features:

* Non-contact distance measurement using ultrasonic technology.
* Accurate measurements within the range of 2cm to 400cm.
* Real-time distance display on a 16x2 LCD screen.
* Compact and portable design, suitable for various applications.
* Low power consumption, allowing the use of a 9V battery.
* Continuous distance measurement without delays.

**Workflow diagram**:



**Fig:2 Flow Chart of Portable Ultrasonic Range Meter for Non-Contact Distance Measurement.**

**Tools and devices**:

* Arduino Nano microcontroller.
* Ultrasonic Sensor HC-SR04.
* 16x2 LCD Display.
* 9V battery or external power source.
* Connecting Wires

**References**:

* ["Ultrasonic sensor based distance measurement"](https://create.arduino.cc/projecthub/UnO/ultrasonic-sensor-based-distance-measurement-using-arduino-701947) - Arduino Project Hub
* ["HC-SR04 Ultrasonic Sensor User Guide"](https://www.electroschematics.com/hc-sr04-datasheet/) – ElectroSchematics
* ["Arduino Official Website"](https://www.arduino.cc/) – Arduino
* ["Introduction to SONAR Technology"](https://www.britannica.com/technology/sonar) – Britannica

**Arduino Code:**

// Define the pin connections for the ultrasonic sensor

const int trigPin = 2; // Trigger pin

const int echoPin = 3; // Echo pin

void setup() {

Serial.begin(9600); // Initialize serial communication

pinMode(trigPin, OUTPUT); // Set the trigger pin as an output

pinMode(echoPin, INPUT); // Set the echo pin as an input

}

void loop() {

// Trigger the ultrasonic sensor

digitalWrite(trigPin, LOW);

delayMicroseconds(2);

digitalWrite(trigPin, HIGH);

delayMicroseconds(10);

digitalWrite(trigPin, LOW);

// Measure the time it takes for the pulse to return

long duration = pulseIn(echoPin, HIGH);

// Calculate the distance in centimeters

float distance\_cm = duration \* 0.034 / 2;

// Print the distance to the Serial Monitor

Serial.print("Distance: ");

Serial.print(distance\_cm);

Serial.println(" cm");

// Wait for a short delay before taking the next measurement

delay(500);

}