**Project Report: Ultrasonic Distance Measurement System with LCD Display and Buzzer Alarm**

*Introduction:*

The Ultrasonic Distance Measurement System is designed to measure distances using an ultrasonic sensor and display the results on an LCD screen. Additionally, the system includes a buzzer alarm that activates when the measured distance is less than 5 inches. This project combines hardware components with programming to create a simple and effective distance measurement and alarm system.

**Components Used:**

1. Arduino Board

2. Ultrasonic Sensor (HC-SR04)

3. LCD Display (16x2)

4. Buzzer

5. Jumper Wires

6. Arduino Kit

**Working Principle:**

The ultrasonic sensor emits ultrasonic waves, and when these waves encounter an obstacle, they bounce back to the sensor. The Arduino calculates the distance based on the time taken for the ultrasonic waves to travel to the obstacle and back. The distance is then displayed on the LCD. If the calculated distance is less than 5 inches, a buzzer alarm is activated.

**Wiring Diagram:**

Arduino Ultrasonic Sensor LCD Display Buzzer

+5V -------------- VCC VCC + (Positive)

GND -------------- GND GND - (Negative)

D13 -------------- Trig

D12 -------------- Echo

D4 ------------------------------------- (Control Pin)

**Arduino Code:**

#include "myLCD.h"

#define trigPin 13

#define echoPin 12

#define buzzerPin 4 // Assuming the buzzer is connected to digital pin D4

long duration;

int distance\_cm, distance\_inch;

void setup() {

lcd.begin(16, 2);

lcd.setCursor(0, 0);

lcd.print("BestinAutomation");

lcd.setCursor(0, 1);

lcd.print("UltrasonicSensor");

pinMode(trigPin, OUTPUT);

pinMode(echoPin, INPUT);

pinMode(buzzerPin, OUTPUT); // Set the buzzer pin as OUTPUT

delay(4000);

}

void loop() {

lcd.clear();

digitalWrite(trigPin, LOW);

delayMicroseconds(2);

digitalWrite(trigPin, HIGH);

delayMicroseconds(10);

digitalWrite(trigPin, LOW);

duration = pulseIn(echoPin, HIGH);

distance\_cm = duration \* 0.034 / 2;

distance\_inch = duration \* 0.0133 / 2;

lcd.setCursor(0, 0);

lcd.print("Distance: ");

lcd.print(distance\_cm);

lcd.print(" cm");

delay(20);

lcd.setCursor(0, 1);

lcd.print("Distance: ");

lcd.print(distance\_inch);

lcd.print(" inch");

// Check if the distance is less than 5 inches

if (distance\_inch < 5) {

digitalWrite(buzzerPin, HIGH); // Turn on the buzzer

} else {

digitalWrite(buzzerPin, LOW); // Turn off the buzzer

}

delay(500);

}

**Conclusion:**

This Ultrasonic Distance Measurement System provides a practical and interactive solution for measuring distances. The LCD display offers a clear and user-friendly interface, while the buzzer alarm enhances the system's utility by alerting users when an object is detected within a critical range. This project demonstrates the integration of hardware components with Arduino programming to create a functional and versatile system for distance measurement and monitoring.