



**KIIT, Deemed to be University
School of Computer Engineering
Sensors And Automation [EC28005]**

EXPERIMENT -7

Aim:

Interfacing HCSR04 Digital Sensor for Distance Measurement.

Component/Software Used:

Component/Software	Specification
Arduino Uno	-
Bread Board, Cables, Connecting Wires, Laptop/Computer, 7 Segment Display, Digital sensor (HCSR04)	-
Software(s) Used	Arduino IDE 2.2.1

Theory:

- 1. Ultrasonic Pulse Generation:** The sensor generates an ultrasonic pulse directed towards the target object. This pulse is then reflected off the object and received back by the sensor.
- 2. Time-of-Flight Calculation:** By measuring the time taken for the ultrasonic pulse to travel to the object and return, the sensor can calculate the distance based on the speed of sound in the air and the total time taken.

3. Analog-to-Digital Conversion: The analog signal representing the time-of-flight measurement is converted into a digital format for processing and analysis. This conversion is crucial for interfacing the sensor with digital systems effectively.

4. Interfacing Circuitry: The interfacing circuitry includes components for signal conditioning, amplification, and conversion. This circuitry ensures that the digital output of the sensor is compatible with microcontrollers or other digital devices.

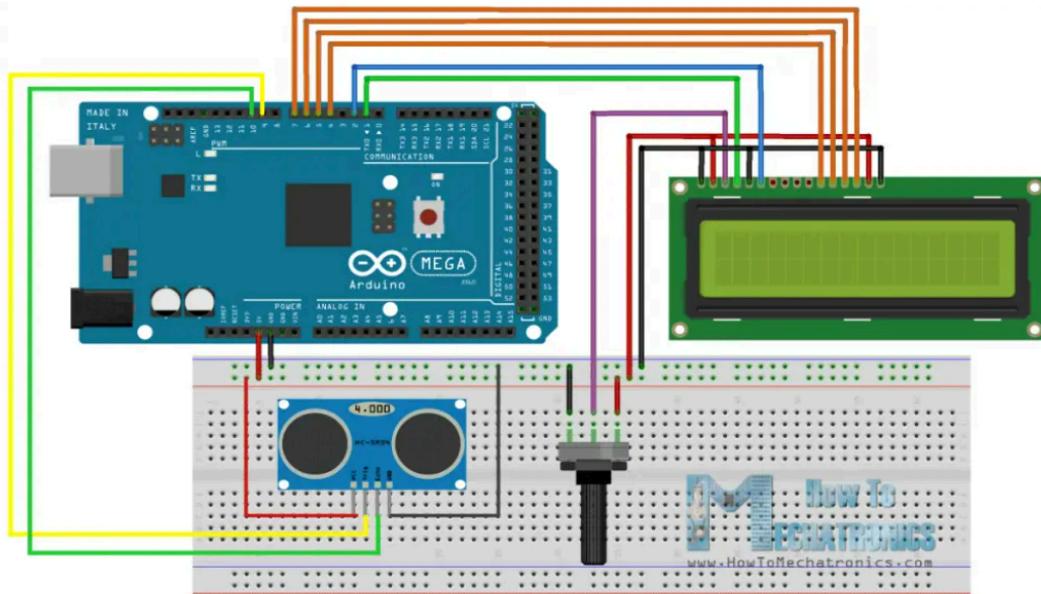
Principle of Working:

The HCSR04 sensor works by emitting ultrasonic pulses and measuring the time taken for the pulses to travel to an object and back. Using the speed of sound, it calculates the distance to the object. This process involves converting the analog distance measurement into a digital format for integration into digital systems, enabling precise distance monitoring and control.

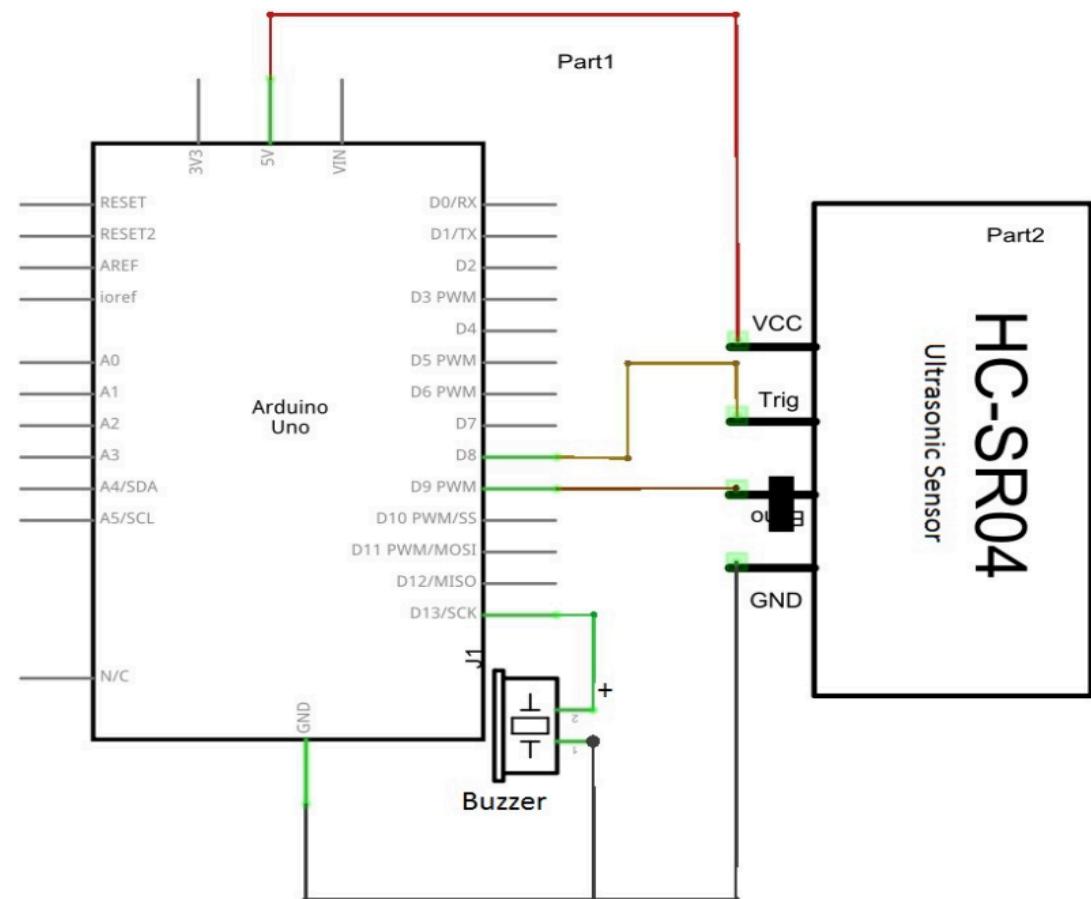
Ultrasonic Sensor HC-SR04



Circuit:



Schematic:



Program:

```
#include <afstandssensor.h> // AfstandsSensor(triggerPin, echoPin);

AfstandsSensor afstandssensor(9, 10); // Starter afstandssensoren

ben 13 og 12.

void setup () {

    Serial.begin(9600); // Opsætter serial kommunikation tilbage til

    computeren

}

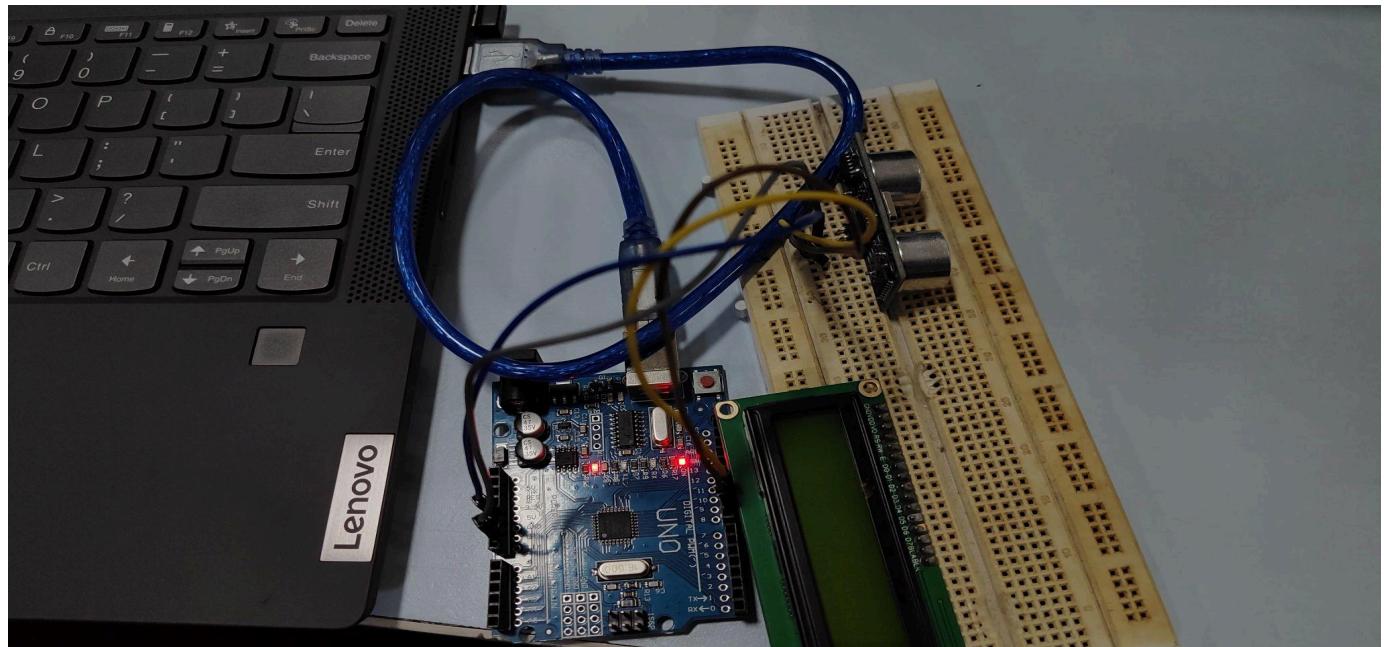
void loop () {           // Måler afstanden for hver 500ms

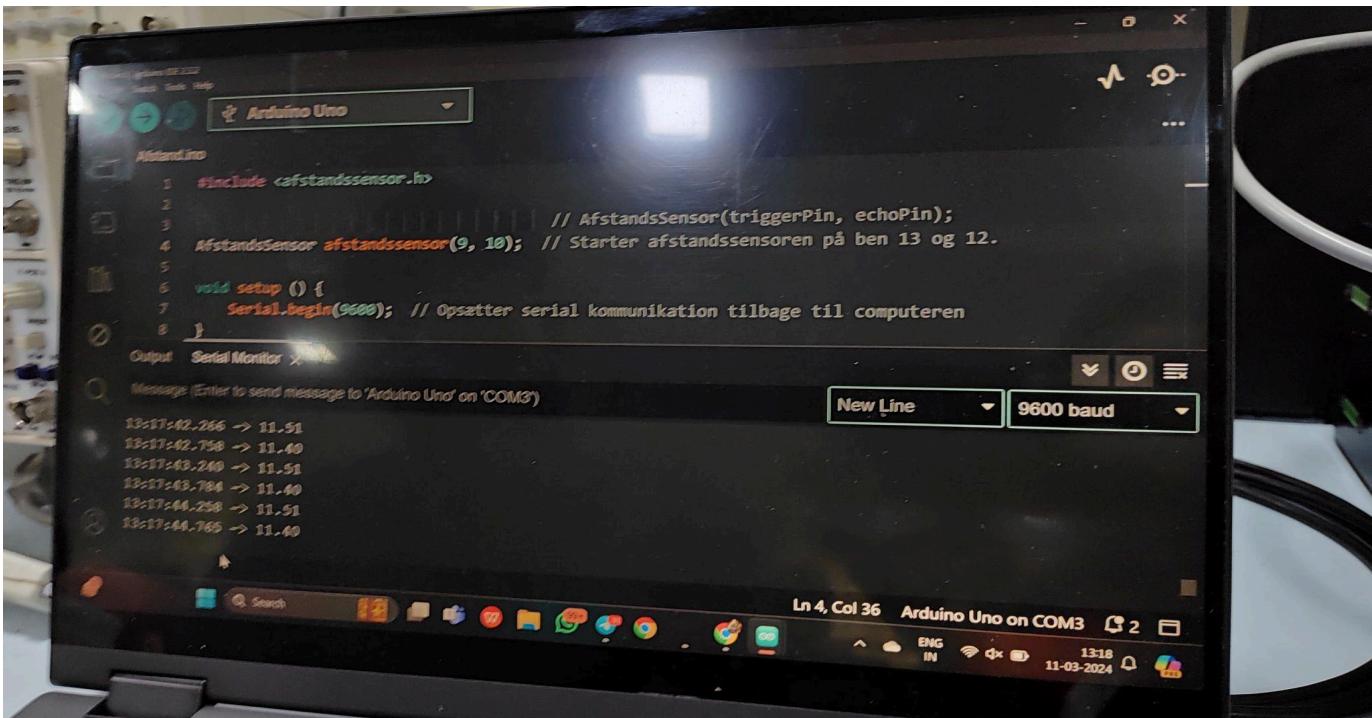
    Serial.println(afstandssensor.afstandCM());

    delay(500);

}
```

Result picture:





Conclusion:

The successful interfacing of the LM35 analog sensor with a microcontroller enables accurate and reliable temperature measurements. The conversion of the analog output to digital values, along with data acquisition and processing, demonstrates the feasibility of utilizing the LM35 sensor for temperature monitoring and control applications. The experiment provides valuable insights into the practical implementation of analog sensors for precise environmental measurements and highlights the potential for integrating such sensors into various smart systems and data logging applications. Overall, the experiment underscores the significance of effective sensor interfacing for real-time monitoring and control of environmental parameters.

Name: Aditya Bahadur
Roll No: 2205787
Class: CSE 38
Group No: 04