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Integrating HC-SR04 Sensor with Arduino for Distance Measurement

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Contents

1 INTRODUCTION

This documentation outlines the integration of the HC-SR04 ultrasonic sensor with an Arduino board for accurate distance measurement. The HC-SR04 sensor utilizes ultrasonic waves to determine the distance to an object by measuring the time taken for the sound waves to bounce back. By interfacing the HC-SR04 sensor with the Arduino and using appropriate programming, we can display the measured distance in the Arduino's serial monitor. This setup provides a simple and effective way to monitor distances in various applications.

2 COMPONENTS USED

2.1 Hardware Components:

2.1.1 Arduino Uno:

- Includes 14 digital pins and 6 analog pins.
- Operates at a voltage of 5V.
- Microcontroller: ATmega328P
- Uses the ATmega328P microcontroller.
- Runs at a clock speed of 16MHz.

2.1.2 HC-SR04 Ultrasonic Sensor:

- Operating Voltage: 5V DC.
- Non-contact Distance Measurement: The HC-SR04 sensor utilizes ultrasonic waves to measure distance without physical contact with the object.
- High Accuracy: Capable of providing precise distance measurements with an accuracy of up to 3mm.
- Number of Pins: 4 (VCC, Trig, Echo, GND).

2.2 Software Components:

2.2.1 Arduino IDE:

- Integrated Development Environment (IDE) for Arduino boards.
- Provides a user-friendly interface for writing, compiling, and uploading code to the Arduino Uno.
- Offers a wide range of built-in functions and libraries for interfacing with hardware components.

2.2.2 HC-SR04 Library:

- Source: Installed from Arduino Library Manager, developed by Dharun Saha.
- Purpose: Facilitates easy interfacing and communication with the HC-SR04 Ultrasonic Sensor.
- Functionality: Provides convenient functions for triggering the sensor, capturing echo signals, and calculating distances accurately.

3 HARDWARE CONNECTIONS SETUP

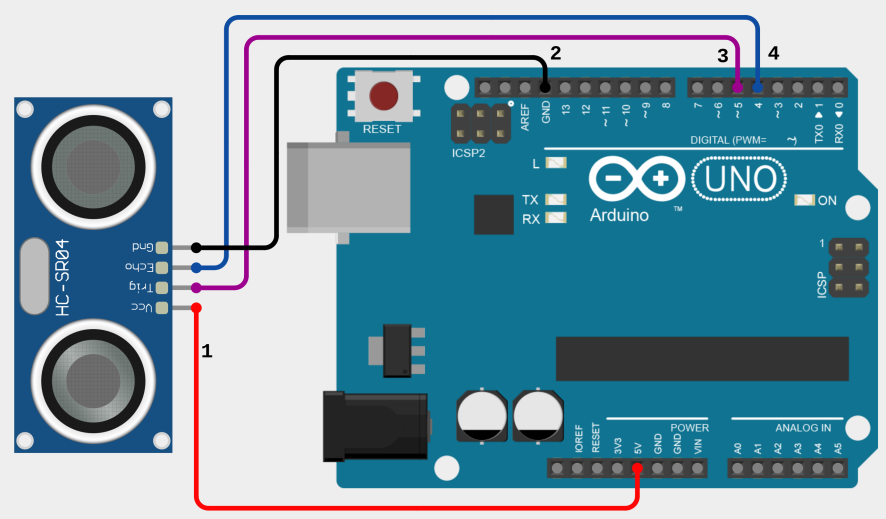

Figure 2: Hardware Connections Setup Circuit Diagram

1. Connect the VCC pin of the HC-SR04 sensor to the 5V pin of the Arduino Uno.
2. Connect the GND pin of the HC-SR04 sensor to the GND pin of the Arduino Uno.
3. Connect the TRIG pin of the HC-SR04 sensor to digital pin 5 of the Arduino Uno.
4. Connect the ECHO pin of the HC-SR04 sensor to digital pin 4 of the Arduino Uno.

4 RESULT

The HC-SR04 sensor successfully measures the distance to an object and displays the results on the Serial Monitor of the Arduino IDE. The distance measurements are accurate and displayed in real-time, allowing for precise distance monitoring in various applications.