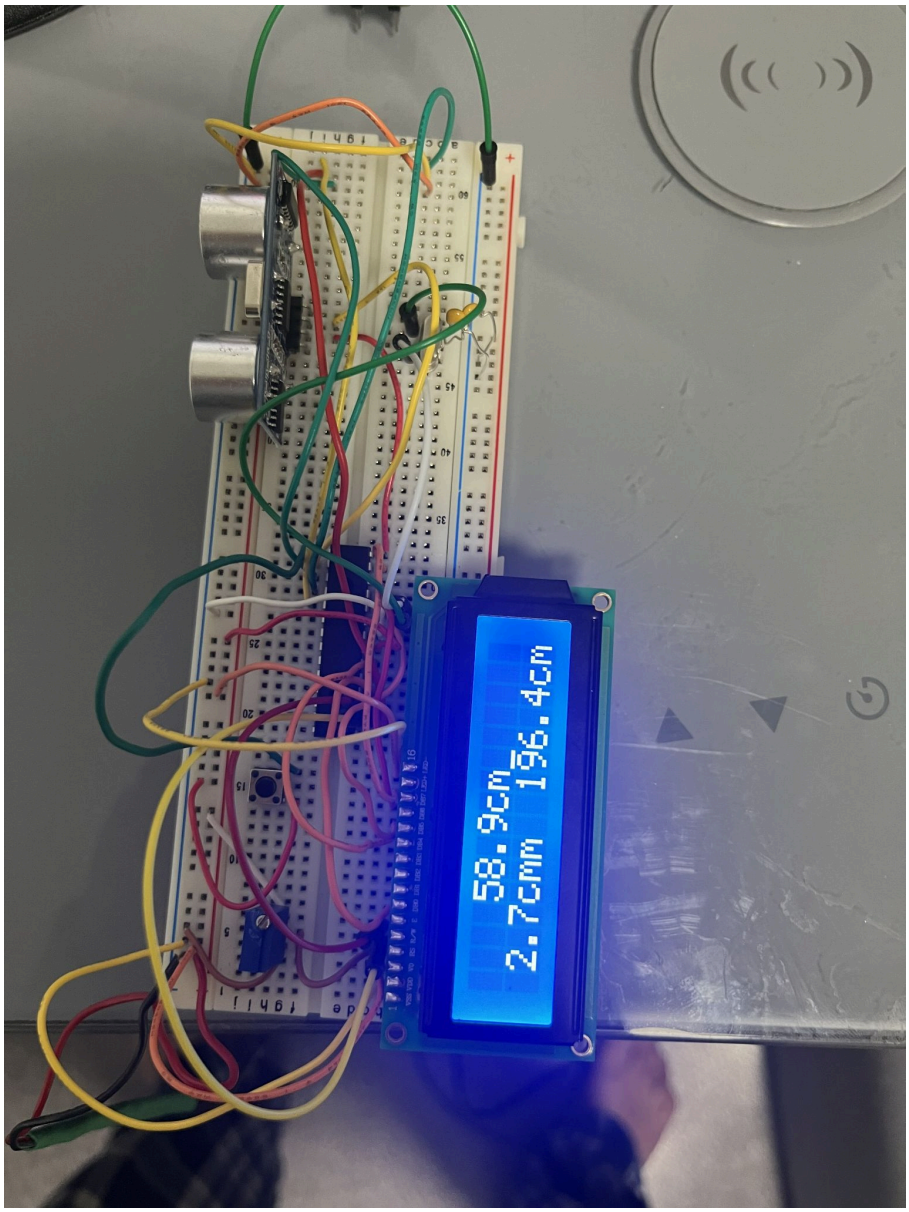
Digital Tape Measure



Description

The digital tape measure device is used to measure the distance of nearby objects using an ultrasonic sensor (HC-SR04). This device calculates the time between emitted ultrasonic waves and received waves by the sensor to determine a distance. The device also consists of a 16x2 LCD, which is used to show minimum, maximum and measured distance. The top half of the screen displays the nearest object detected and the second half of the screen displays the minimum and maximum distance since the last reset. If no objects are detected within the sensor range, the LCD displays “Out of Range” on the top half of the screen.

Operating Conditions

Power Supply: 5V DC

Microcontroller: ATmega328P with an external 14.7456 MHz crystal

- Temperature Range: -40°C to 50°C

Ultrasonic Sensor: HC-SR04

- Operating Voltage: 5V
- Range: 2 cm to 400 cm
- Resolution: 0.3 cm

Distance Range: 2 cm to 90 cm

LCD Module: HD44780

- Operating Voltage: 4.5V to 5.5V

Operating Instruction

1. Assemble the circuit by connecting the ATmega328P to the HC-SR04 ultrasonic sensor, LCD and a pushbutton.
2. Make sure the circuit is connected to a 5V power supply. Deploy the code onto the microcontroller using a programmer.
3. Hold a solid object at different distances in front of the ultrasonic sensor and watch the distance change.
4. Use the pushbutton to reset minimum and maximum values on the bottom left and bottom right side of the LCD respectively.

Test Results

Distaplay Functionality: The values in the LCD updates without any flickering
Range Detection: When there are no objects within 2 cm to 90 cm the LCD shows “Out of Range” message.
Minimum and Maximum Distance Tracking: The button successfully resets the Min and Max values.

I/O

Input: Push button to reset min/max distance tracking.
Output: LCD display to show minimum, maximum and current distance.