ECE 303 – ECE Laboratory

Week 8: Displays

Zachary Minter
Electrical and Computer Engineering Department
Drexel University

DREXEL UNIVERSITY
Electrical and Computer Engineering
College of Engineering

Outline

- Week 8 Deliverables
- LCD Display
- Water Level Sensor
- Temperature and Humidity Sensor, Thermistor

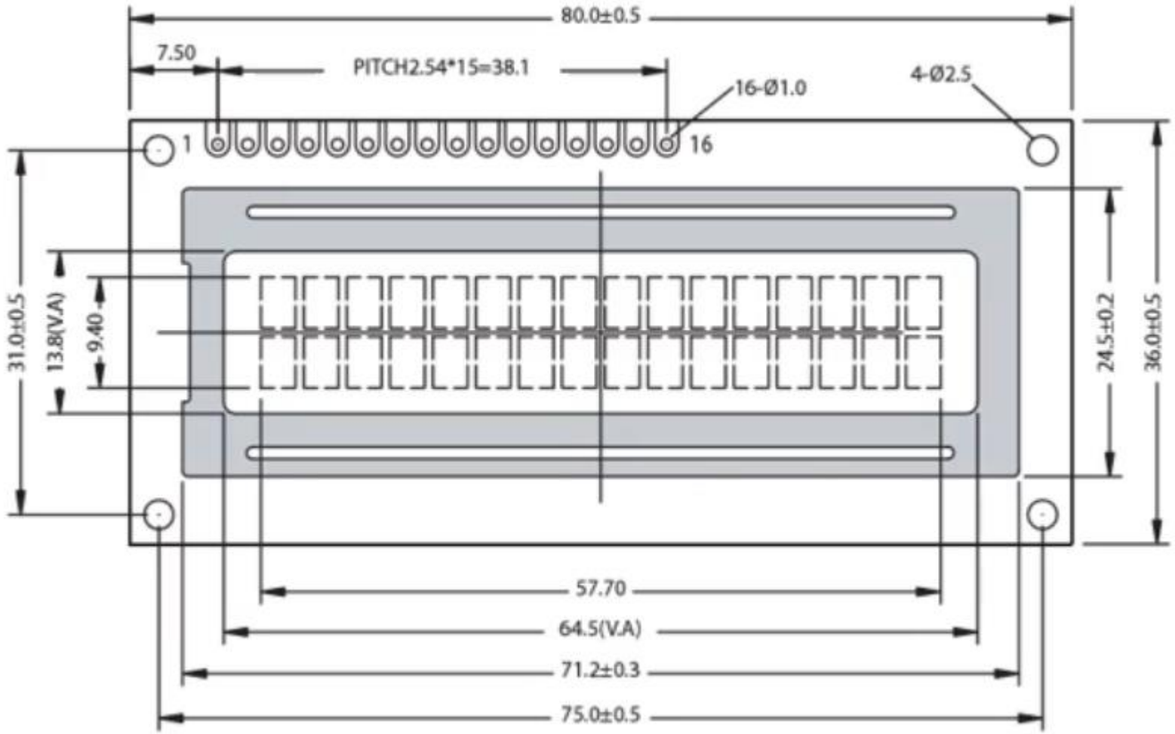
Week 8 Deliverables

- Week 8 Lab Objective:
  - Use the LCD screen to display motor speed, coolant level, and battery temperature
  - ‘Displays’ portion of Online Project

- Deliverables (in single ZIP folder):
  - Technical lab memo for this week’s assignment
  - Video demonstrating functionality of various displayed data

- Reminder: The end of the term is quickly approaching. All lab deliverables and the final report/video for the Online Project should be submitted by next Friday.

LCD Display



Pin connections

PIN NO	Symbol	
1	VSS	---Ground
2	VDD	---Logic supply voltage (5V)
3	V0	---LCD drive voltage: for contrast adjustment
4	RS	---Register Select: 0 for Command Register, 1 for Data Register
5	R/W	---Read/Write: 0 for Data Write, 1 for Data Read
6	E	---Enable signal-Active High
7	DB0	Bi-directional data bus lines
8	DB1	
9	DB2	
10	DB3	
11	DB4	
12	DB5	
13	DB6	
14	DB7	
15	A	---Power supply for BKL (Backlight) – 5V
16	K	---Power supply for BKL (Backlight) - Ground

Figure 1. LCD Display. Note, it has 2 rows, allowing up to 16 characters per row

LCD Display

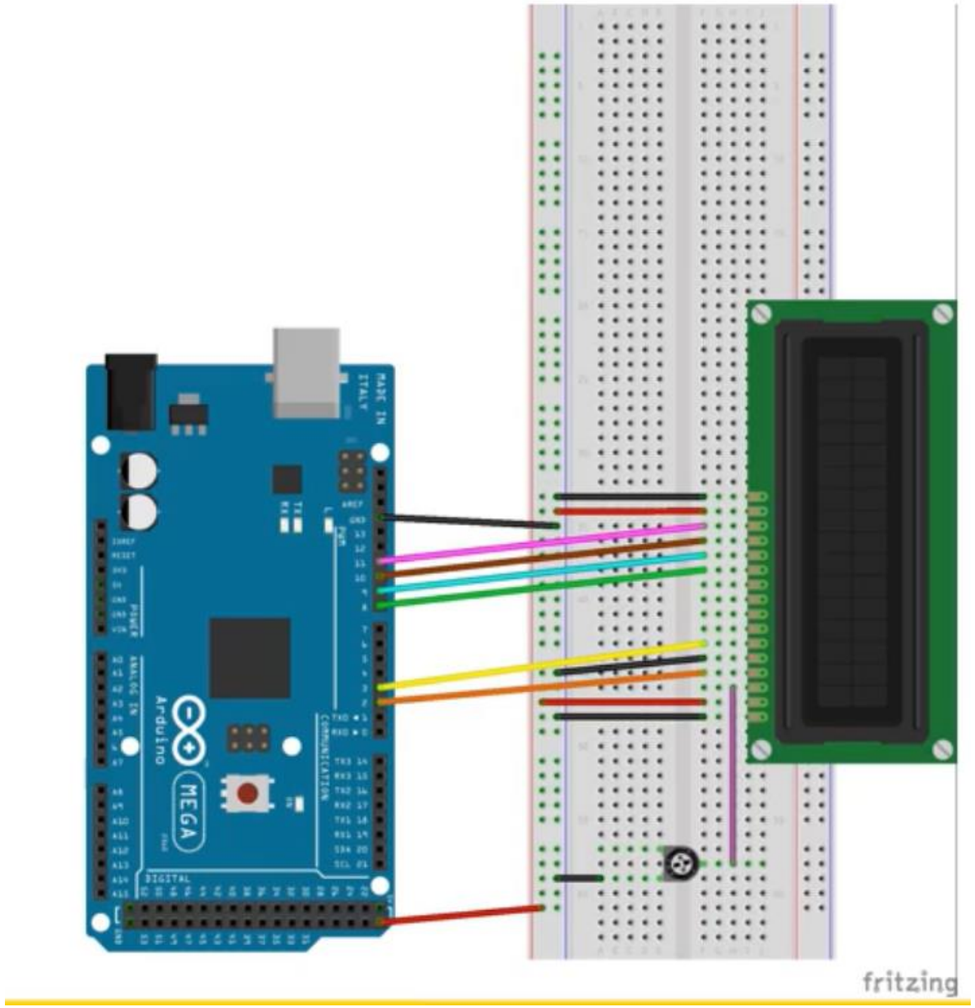


Figure 2. LCD Display Schematic

Water Level Sensor

- Consists of a series of bare conducting wires
- Delivers an output value by detecting the amount of water induced contact between the grounded and sensor traces

Figure 3. Water Level Sensor

- Pins
  - VCC (+) (Working Voltage: 5V)
  - GND (-)
  - Signal Output (S)

Water Level Sensor

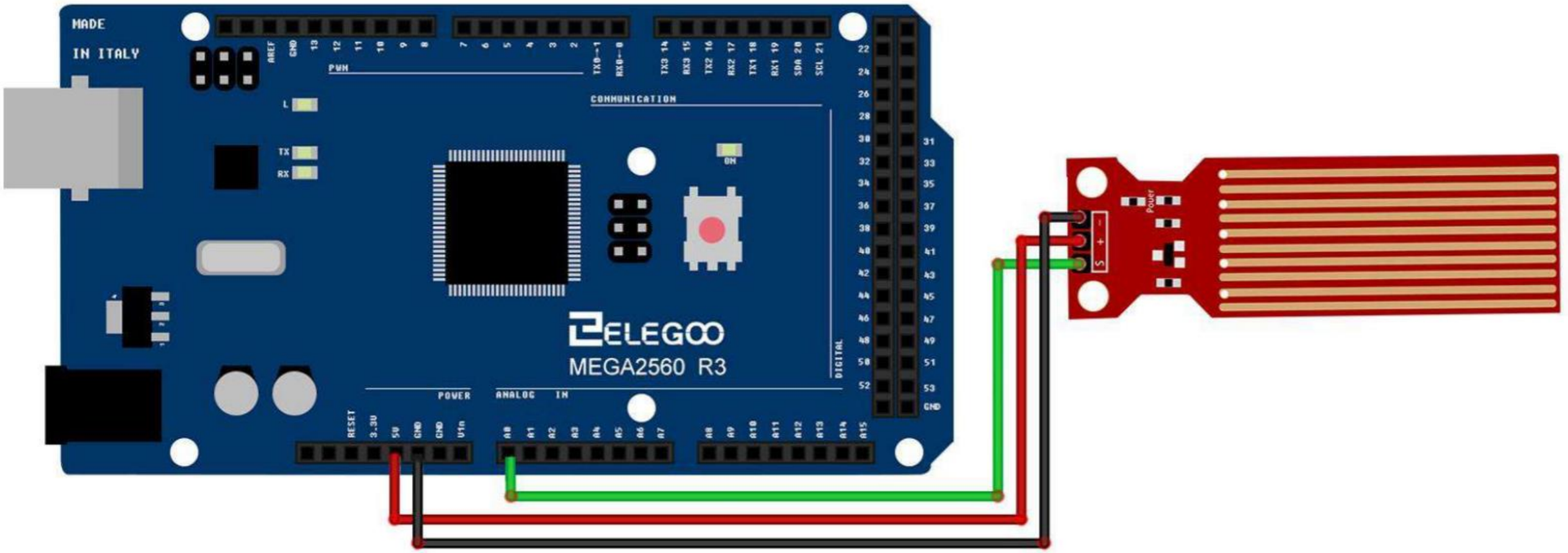


Figure 4. Basic connection schematic for water level sensor

Source: “Elegoo: The Most Complete Starter Kit Tutorial for MEGA2560”

Temperature and Humidity Sensor

- Pins
  - VCC (power supply, Working Voltage: 3.5~5.5V)
  - DATA (serial data)
  - NC (empty pin)
  - GND

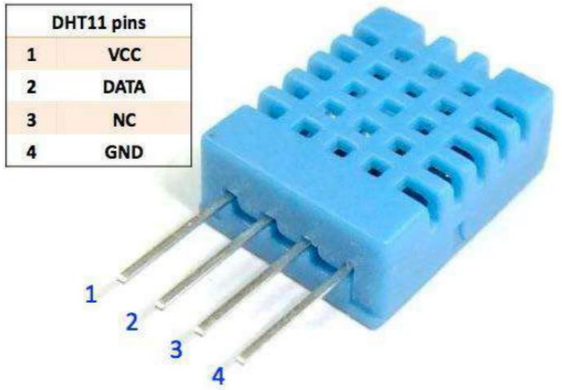


Figure 5. DHT11 Temperature and Humidity Sensor

Temperature and Humidity Sensor

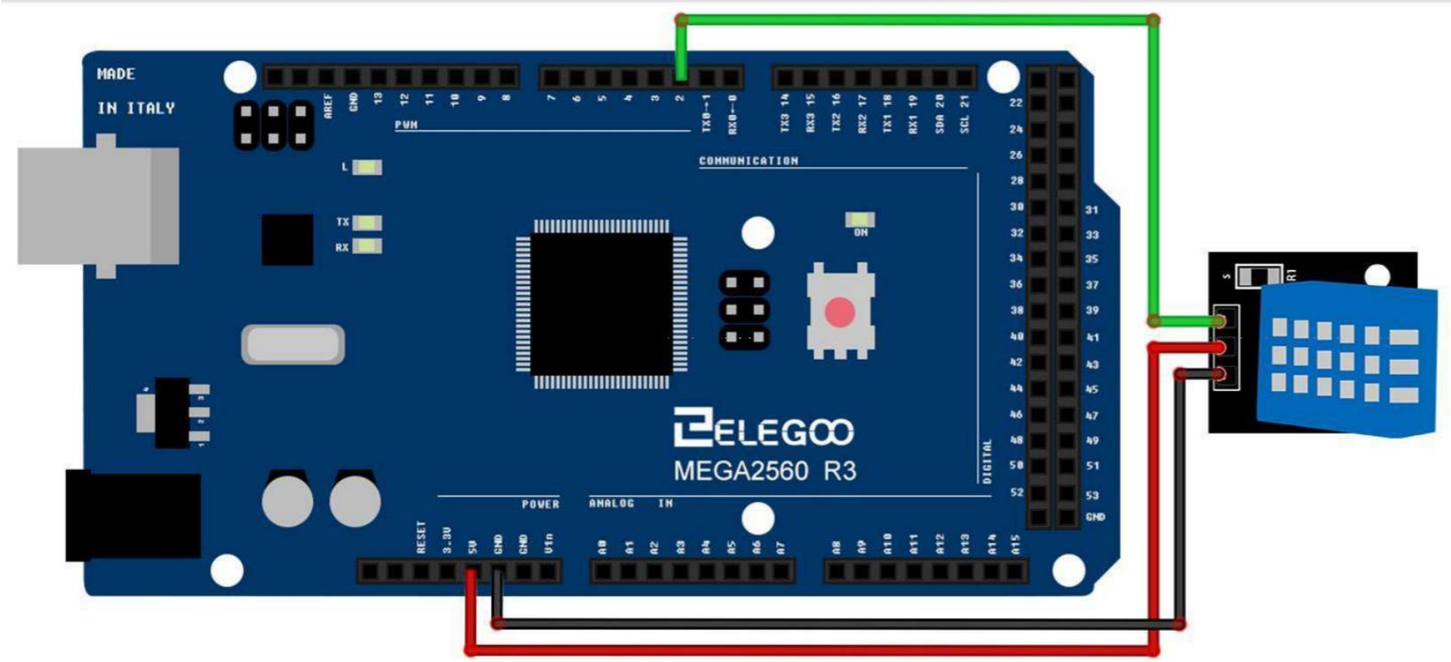


Figure 6. Basic connection schematic for DHT11 temp and humidity sensor module

Thermistor

- Thermal resistor
  - Resistor that drastically changes resistance with temperature
- Two types of thermistors
  - Negative Temp Coefficient (NTC): R decreases as Temp increases
  - Positive Temp Coefficient (PTC): R increases as Temp increases
- Should connect as a voltage divider with known resistor (ex. 10k resistor) to measure thermistor output voltage

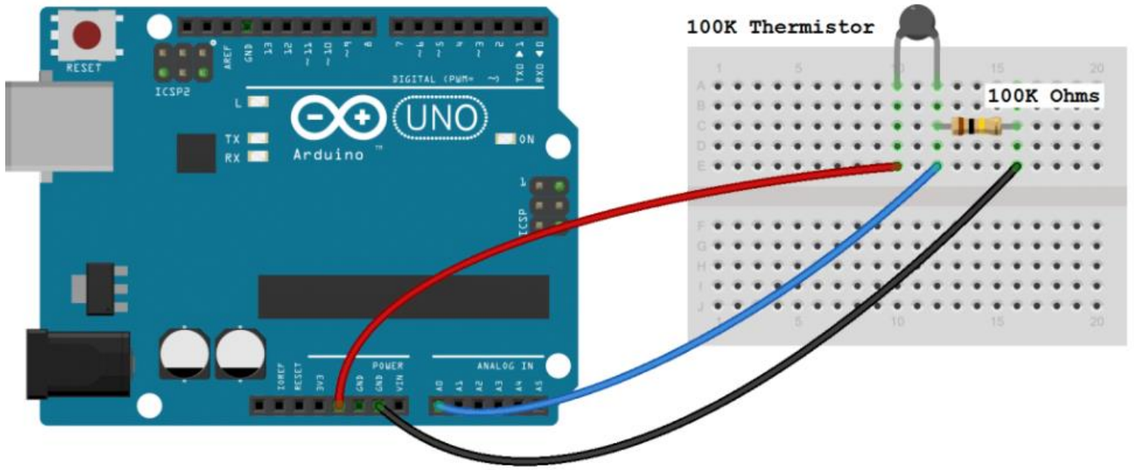


Figure 7. Basic connection schematic for thermistor

Source: “Make an Arduino Temperature Sensor (Thermistor Tutorial),” CircuitBasics.