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Sensors and Actuators

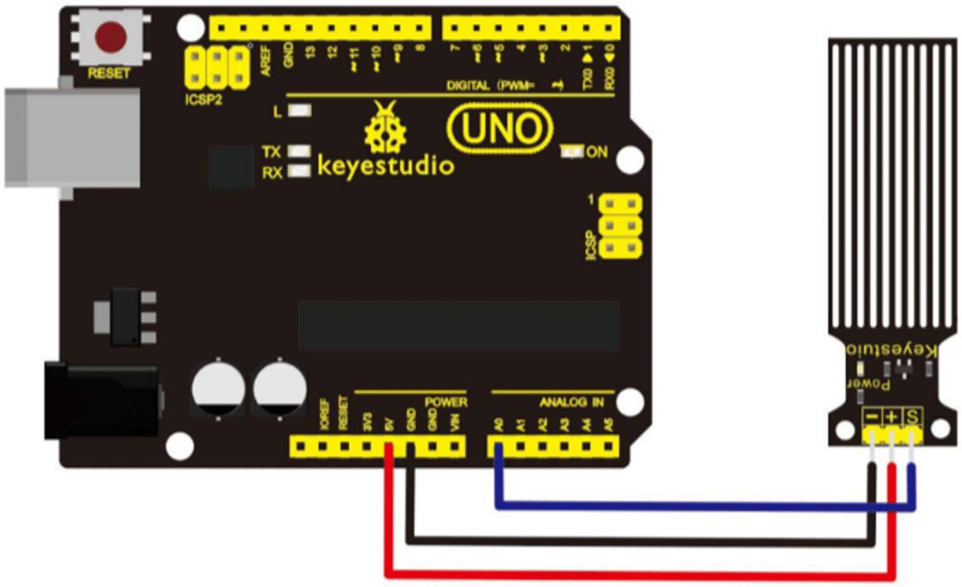
Individual Project: Milestone 1

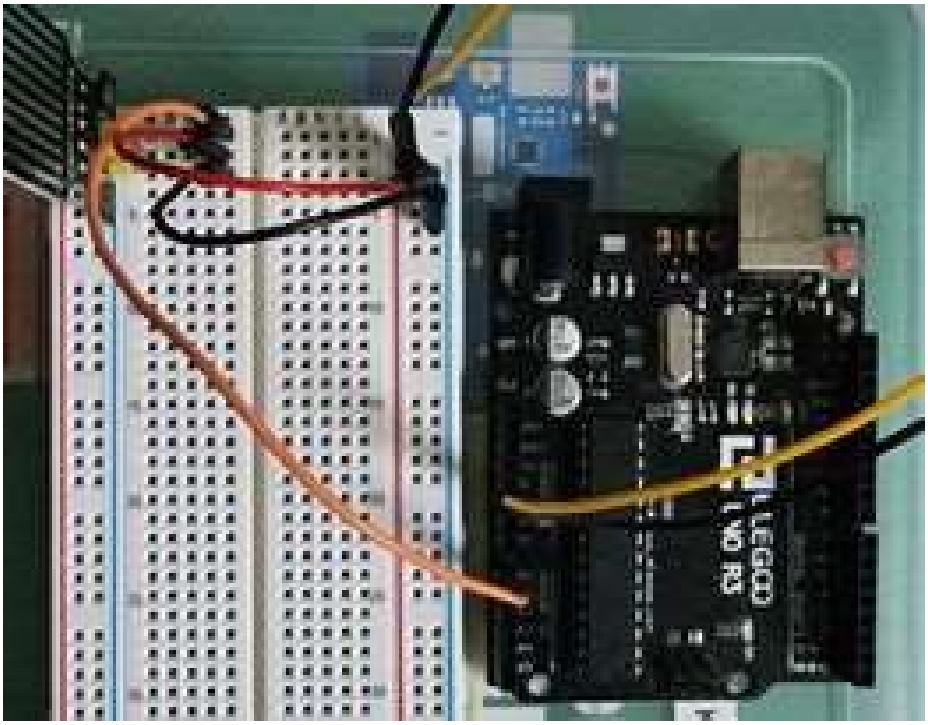
9/26/2022

Sensor Operation:

- Measures volume of water it's immersed in, or the presence of water by measuring the resistance of the traces of exposed parallel wires on the sensor. The sensor is designed to measure if water is present or if the water level in a container is increasing or decreasing.

Wiring Diagram and System Picture:





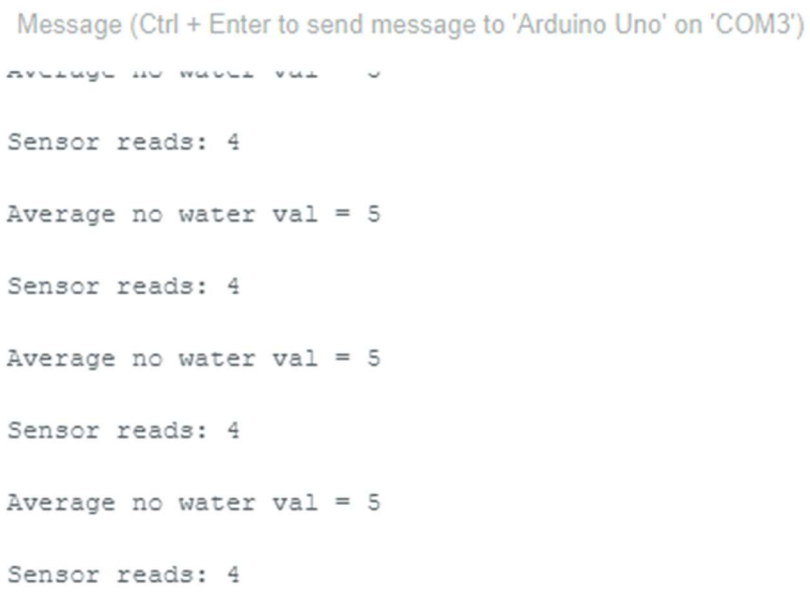
Arduino Code:

Sens and Act project.ino

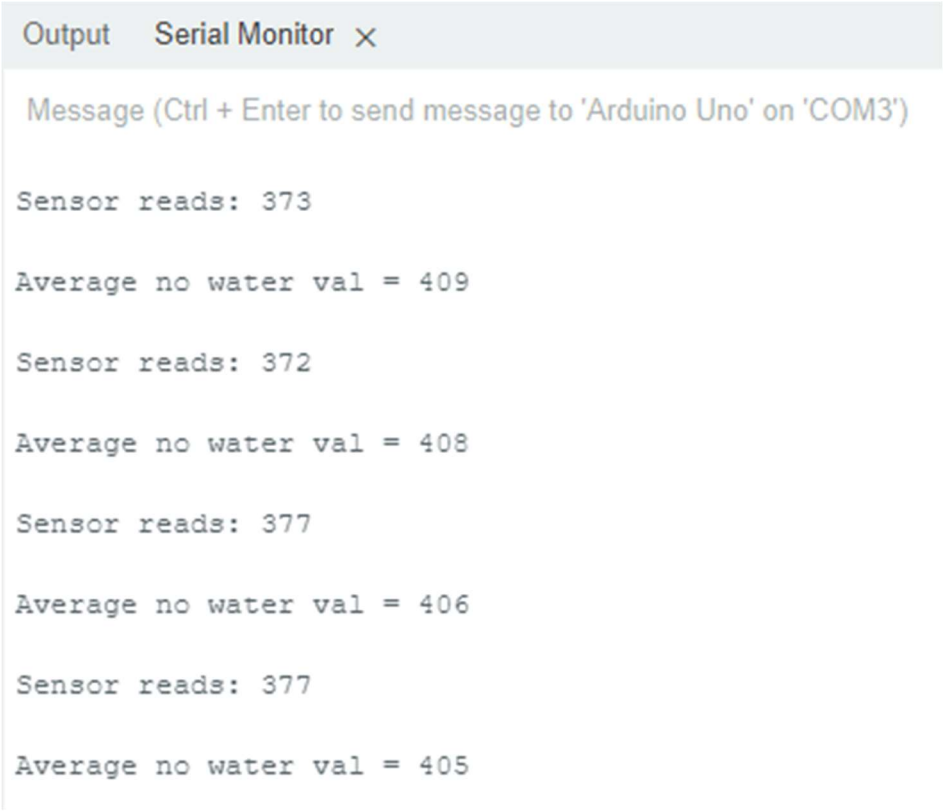
```
// const int max = NA;
// const int min = NA;
int sensVal = 0; // pin A[0]
int lastVal = 0;
int count = 0;
int countVal = 0;
int NW = 0; //used to calculate avgNW
int avgNW = 0; //avg when no water
char printBuff[120];

void setup() {
  // put your setup code here, to run once:
  Serial.begin(9600);
}

void loop() {
  // put your main code here, to run repeatedly:
  int val = analogRead(sensVal); // Sensor read
  ++count;
  NW += val;
  delay(1000);
  sprintf(printBuff,"Sensor reads: %d\n", val);
  Serial.println(printBuff);
  lastVal = val;
  avgNW = (double) NW/count;
  sprintf(printBuff, "Average no water val = %d\n", avgNW);
  Serial.println(printBuff);
}
```

Sensor Readings:

- Readings when the sensor is not in contact with water



- Readings when the sensor is in contact with water



Focused Study of Static Characteristics:

- Repeatability
    - I plant to measure the same quantity of water in a container several times. From this I can see if the measurements stay roughly the same and derive the standard deviation of the sensor.
- Linearity
    - By measuring the voltage at the input of the sensor and the voltage at the output of the sensor I will be able to create a curve plot. I will repeat this with the sensor in the water.
- Drift
    - Once set of data will be collected for when the sensor is out of the water and another set when the sensor is in the water. Left to collect data for an extended period of time I can monitor if the sensor's output deviates over a prolonged period of time.

Datasheet Specifications:

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controller, single-chip microcomputer, etc.

Specification

- Operating voltage: DC5V
- Operating current: < 20mA
- Sensor type: Analog
- Detection area: 40mm x16mm
- Production process: FR4 double-side tinned
- Humanized design: Anti-slippery semi-lunar recess
- Working Temperature: 10°C-30°C
- Working Humidity: 10%-90% without condensation