

Individual Lab Report (ILR01)

Mechatronics Sensors Lab

Name: Hongru Liu

Team: Team 2

Andrew ID: [hongrul]

Teammates: Hongru; Yechen; Hongfei; Dan; Bi

Submission Date: [2025-01-30]

1. Individual Progress

For the Sensors Lab, Hongfei and I worked on interfacing a potentiometer as one of our required sensors (and the required analog sensor). We connected the potentiometer to the Arduino with the outer pins tied to 5V and GND, and the center wiper pin connected to A0. We verified correct operation by rotating the knob and observing the output on the Serial Monitor.

On the software side, we implemented a minimal, reliable readout loop. The program initializes serial communication in `setup()` and repeatedly reads the analog input in `loop()`. The potentiometer output is read using `analogRead(A0)`, which returns a value from 0–1023 (10-bit ADC). The value is printed continuously to the Serial Monitor. It allowed us to confirm that the sensor responds smoothly and consistently across its range as the knob is turned. This completed a working sensor-to-UI pipeline: analog sensor → microcontroller ADC → serial display.

Code:

```
void setup() {  
    // put your setup code here, to run once:  
    Serial.begin(9600);  
  
}  
  
void loop() {  
    // put your main code here, to run repeatedly:  
    int sensorValue = analogRead(A0);  
    Serial.println(sensorValue);  
    delay(1);  
  
}
```

2. Challenges

The main challenge during testing was an initial wiring and breadboard placement issue. At first, the potentiometer pins were not inserted correctly into separate breadboard rows, which caused unstable values and saturation. After re-checking the pin placement and ensuring the two outer pins were connected to 5V and GND while the center pin was connected to A0, the readings became stable and changed monotonically with knob rotation.

A second minor challenge was that the Serial Monitor output updates very quickly because the loop runs continuously with only a delay(1). This makes the values scroll rapidly, so we relied on real-time observation while rotating the knob to verify correct behavior.

3. Teamwork

Hongfei and I collaborated closely on the potentiometer task: we split responsibilities between wiring verification, running the program, and validating the sensor response range on the Serial Monitor. Other teammates worked on additional sensors, Yechen worked on the ultrasonic sensor and, Dan and Bi worked on IMU. We shared our results so each sensor could be validated individually before moving toward combining the team's work into a single integrated program.

Figure(s)

Figure 1. Potentiometer wiring photo/diagram.

