Mechatronic Design – Individual Lab Report (ILR01)
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Team Letter and Name: Team 2: Dancing Hexapod
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1. Individual Progress

For this lab, Hongru and I worked on the potentiometer, which is a knob that can give different values depending on how it is turned. I connected it to the Arduino and wrote code to read its values. The code works by reading the voltage from the potentiometer and converting it into a number between 0 and 1023. This number is then shown on the Serial Monitor so I can see how the value changes when the knob is turned. By observing the output, I verified that the potentiometer is working correctly and provides a reliable input signal. This step is important because the potentiometer can later be used to control the hexapod's speed, gait amplitude, or other motion parameters. Completing this lab gave me a better understanding of how analog sensors interface with microcontrollers and how their values can be used in robot control.

2. Challenges

One challenge I faced was incorrectly inserting the potentiometer on the breadboard at first. Because of this, the Arduino was reading fluctuating or wrong values when I turned the knob, that the both end of the potentiometer is reading the maximum the value. After realizing the mistake, I reconnected the potentiometer correctly, making sure the pins were in the right rows for 5V, GND, and the analog input pin. Once the wiring was correct, the readings became stable. I also added a small delay of 200 milliseconds in the code to make the Serial Monitor output easier to read. This experience helped me understand the importance of careful hardware setup when working with sensors.

3. Teamwork

I not only focused on the potentiometer, but also tested the IMU with Dan and Zhengya, Yechen worked on the ultrasonic sensor, and we all helped organize the breadboard connections and power supply. We shared our results with each other and discussed how the different sensors could work together in the hexapod. By working together, we ensured that each sensor was tested individually before integrating them

into the full system.

4. Figure

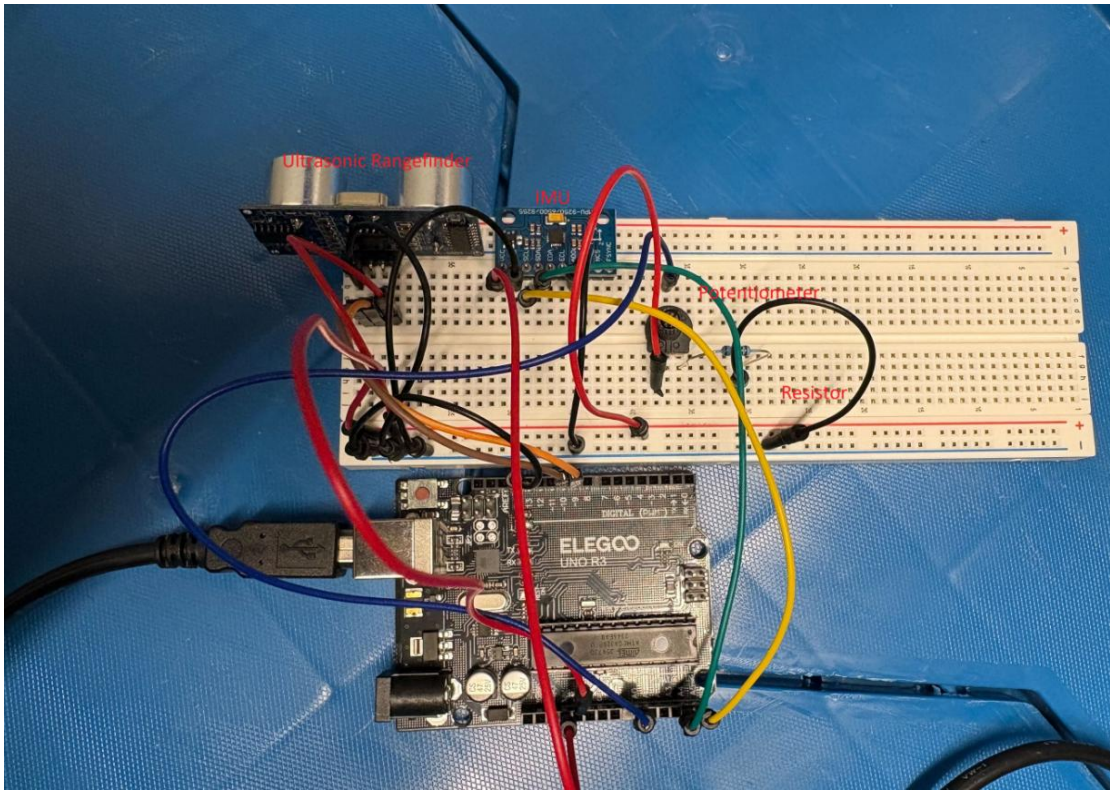

Figure 1. Potentiometer setup on Arduino breadboard

The potentiometer's three pins are connected to 5V, GND, and the Arduino analog input A0. Turning the knob changes the voltage at the signal pin, which is read by the Arduino.

```
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);
}
```

This code reads the value from the potentiometer and prints it to the Serial Monitor. In the setup() function, serial communication is started so the Arduino can send data to the computer. In the loop() function, the Arduino reads the analog value from pin A0, which is connected to the potentiometer. This value changes when the knob is turned. The value is printed to the screen every 300 milliseconds, allowing us to easily see how the potentiometer responds to movement.

5. Plans

Before the next lab demo, I plan to focus on the motor lab. Integrating motor control with the existing sensor inputs and understand how motor speed and direction are controlled using the microcontroller. In particular, the potentiometer input can later be used to adjust motor speed or motion intensity during testing. In addition to hardware work, I have started working on the project website, which will document our design concept, system components, and progress.