

Homework 1 (IROS)

Conditions:

- Worth 25% of the final grade.
- Work in groups (up to 6 members recommended) or individually.
- Deadline: Friday 28/07/2024 – 23:45.
- For assistance, you can ask me or your friends.
- Choose one of the two available tasks.
- Use TinkerCad (<https://www.tinkercad.com/dashboard>) for simulation and testing.
- Submit your code on Moodle. Include the names of all group members in a comment at the beginning of the code.

Task A: Stepper Motor and Potentiometer Control

Objective:

Control the direction and speed of a stepper motor using a potentiometer.

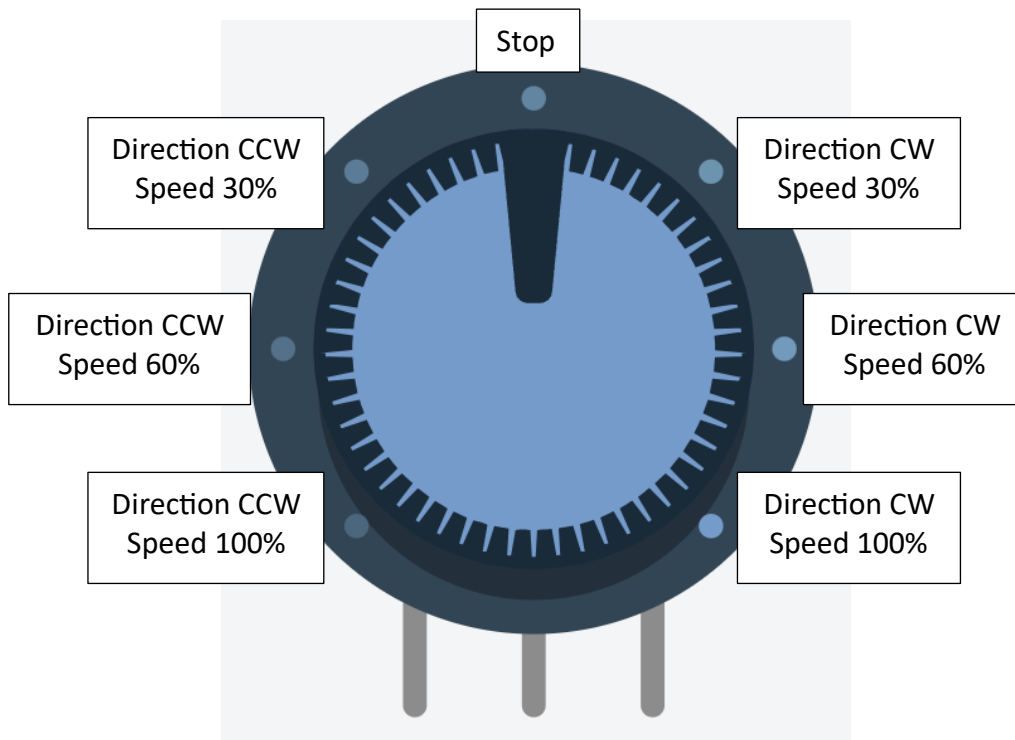
Instructions:

1. Potentiometer Position and Motor Behavior:

- **Center Position:** When the potentiometer is in the middle position, the stepper motor should stop.
- **Right Movement:**
 - Rotating the potentiometer to the right should make the motor rotate in one direction (either clockwise (CW) or counterclockwise (CCW)).
 - The speed of rotation should be proportional to how far the potentiometer is from the center.
- **Left Movement:**
 - Rotating the potentiometer to the left should make the motor rotate in the opposite direction to the previous movement.
 - The speed should still be proportional to the distance from the center.

2. Simulation:

- Use four LEDs to simulate the stepper motor.
- Ensure to connect a 470-ohm resistor in series with each LED to limit the current.



Task B: Temperature Sensor, LCD, and Servo Motor Control

Objective:

Integrate a temperature sensor, an LCD display, and a servo motor with an Arduino to create a ventilation control system.

Instructions:

1. Setup:

- Connect the temperature sensor to the Arduino to read ambient temperature.
- Connect the LCD display to the Arduino to show temperature readings and ventilation status.
- Connect the servo motor to the Arduino, representing the ventilation system.

2. Temperature Reading:

- Continuously read the temperature from the sensor and convert it to Celsius.

3. Servo Motor Control:

- **Temperature Below 25°C:** Set the servo motor to 0 degrees (ventilation system is closed).
- **Temperature Between 25°C and 40°C:**
 - Adjust the servo motor position proportionally to the temperature.
 - At 25°C, the servo should be at 0 degrees.
 - At 40°C, the servo should be at 90 degrees.
 - For temperatures between 25°C and 40°C, the servo angle should increase linearly from 0 to 90 degrees.

4. Display Information on LCD:

- Show the current temperature in Celsius.
- Display the ventilation status as a percentage, where 0% corresponds to the servo at 0 degrees and 100% corresponds to the servo at 90 degrees.