Lab 8. Engine speed control

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1. Introduction

In this experiment, we control a vibration motor using a potentiometer. The vibration motor is powered by a PWM signal generated by the Arduino, and the vibration intensity is adjusted according to the position of the potentiometer. This project is ideal for understanding PWM control and interaction with simple electronic components.

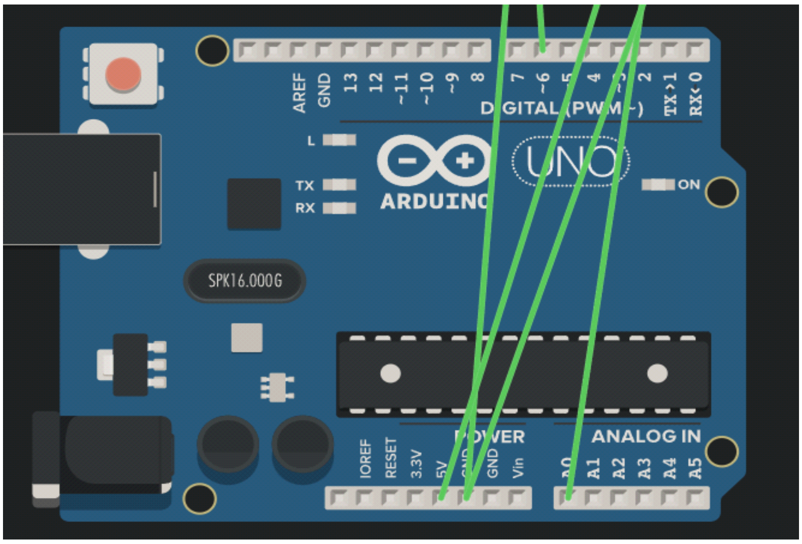
Objectives of the experiment:

- Understanding how PWM signals work.
- Using a potentiometer to control the speed of a motor.
- Implementing speed control in a simple circuit.

2. Required components

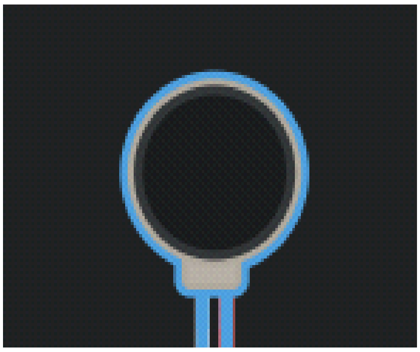
Arduino Uno R3

- **Description:** Microcontroller used to control the motor and read the potentiometer value.



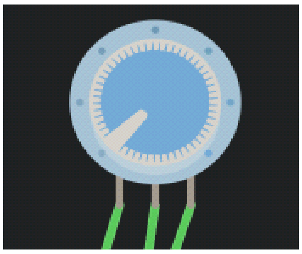
Vibration Motor

- **Description:** Small motor that vibrates when powered. Used to simulate vibration.



Potentiometer

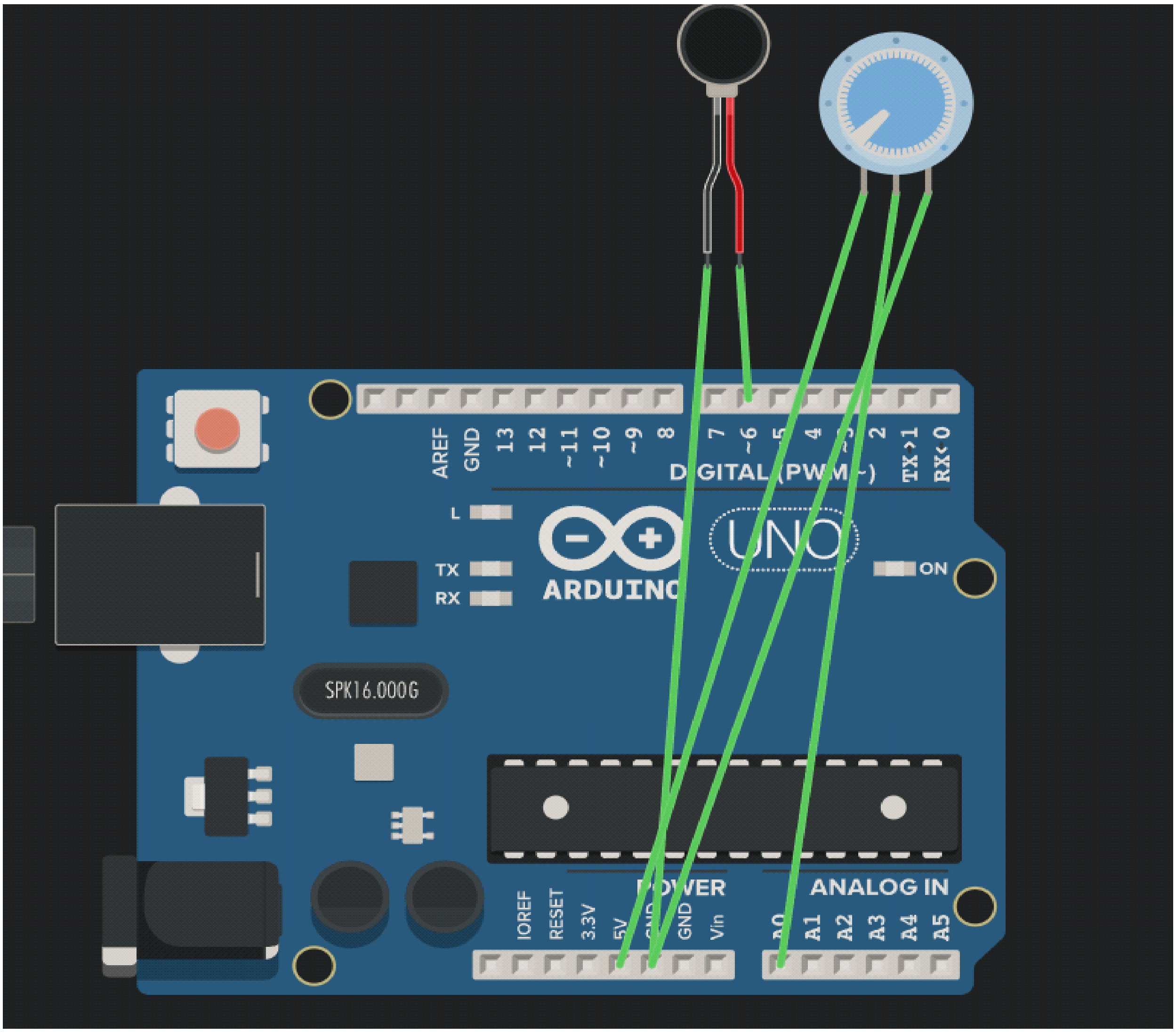
- **Description:** a component that allows continuous resistance adjustment, used to change the vibration intensity of the motor.



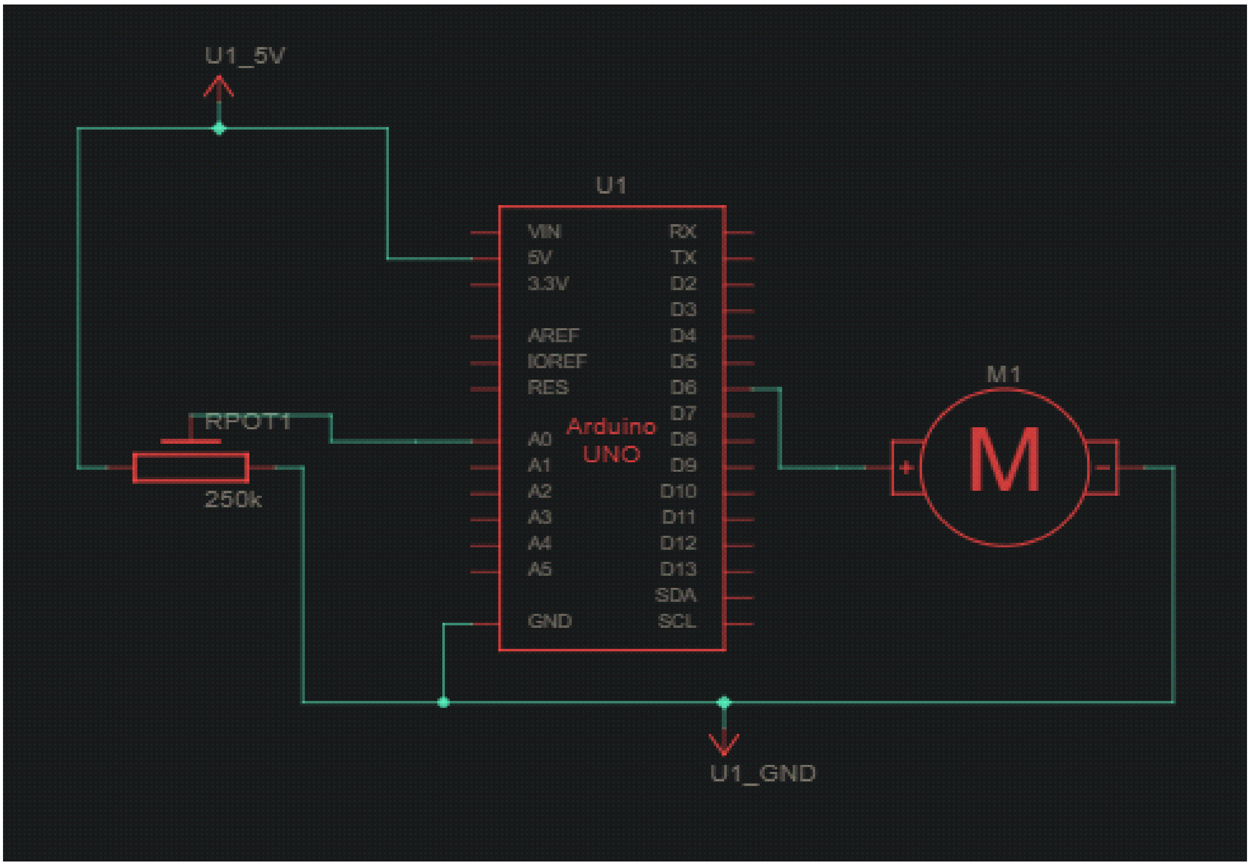
220 ohm resistor (for motor protection if required)

- **Description:** resistor used to limit the current in the motor circuit.

3. Circuit diagram



4. Wiring diagram



5. Working mode

Step-by-step description of the operations needed to carry out the experiment:

- **Component configuration:**
    - Connect the potentiometer to the analog A0 pin of the Arduino.
    - Connect the vibration motor to digital pin 9 of the Arduino through a 220 ohm resistor.
    - Ensure correct power supply to components (5V and GND).
- **Arduino programming:**
    - Write and load the Arduino code to read the potentiometer value and adjust the PWM signal sent to the vibration motor.
- **Circuit testing:**
    - Check that the vibration motor responds to changing the position of the potentiometer. Adjust the potentiometer contrast to obtain the desired vibration intensity.

6. Programming

Software used: Arduino IDE

Code:

```
const int potPin= A0;
const int motorPin= 9;

void setup()
{
  pinMode(motorPin, OUTPUT);
}

void loop()
{
  int potValue= analogRead(potPin);
  int motorSpeed= map(potValue, 0, 1023, 0, 255);
  analogWrite(motorPin, motorSpeed);
  delay(10);
}
```

7. Conclusions

- The code and wiring diagram allow precise adjustment of the vibration motor speed via potentiometer.
- The project demonstrates the use of PWM signals to control electrical components.
- The use of a transistor to control higher current motors can be explored.

8. Bibliographical references

- **Arduino Documentation:** Arduino Official Documentation
- **PWM Tutorials:** PWM Control Tutorial
- **Similar projects** Vibration Motor Projects