

*Polytechnic University of Puerto Rico*  
*Electrical & Computer Engineering and Computer Sciences Department*



*COE 4341 Microcomputer Interfacing Laboratory*

**Laboratory No 5: DC Motor: Control, Direction  
and PWM**

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DATE: **April 18, 2022**

**April 27, 2022**

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## **Introduction**

In this experiment, we were tasked with powering and controlling a motor. Our goal was to successfully connect the motor to an external power supply and then increase its power in 10% increments, from 0% to 100%. After this step, we had to decrease the motor's power all the way back down to zero. Using the duty cycle, we can program the Arduino board to control the motor in this exact fashion and complete the experiment.

## **Objectives**

Our objective in this laboratory is to power a DC Motor and control its power increments and decrements. We also must learn how to use an external power source to control the DC Motor. Initially, we began utilizing the computer as the power supply, but it was not powering the motor. Therefore, we utilized the circuit diagram provided by the professor to connect the external power source and run the motor.

## **Methods**

### **Procedure C Language Program**

In this experiment, we had to make a program to control a DC motor with the Arduino. The DC motor must increment its duty cycle for it to go with more power. The serial motor was made to print the incrementation in percent of the duty cycle. The program incremented the duty cycle to a 100% and decremented it to a 0%.

## Source Code for the C Language Program

### *MotorCWyCCW:*

```
/******  
This Program used the analodWrite function  
to Generate the PWM signal  
Arduini Mega Pin 9 is the output PWM signal  
Roman Lopez Ph. D.  
April 20, 2014  
*****/  
int PWM_CW_pin = 20;  
int PWM_CCW_pin = 21;  
int DutyClycle;  
int times = 1000;  
void setup()  
{  
  pinMode(PWM_CW_pin, OUTPUT);  
  pinMode(PWM_CCW_pin, OUTPUT);  
  Serial.begin(9600);  
}  
void loop()  
{  
  DCycle(PWM_CW_pin, times);  
  DCycle(PWM_CCW_pin, times);  
}  
void DCycle(int pin, int tm){  
  for(int i=0;i<=255;i+=25)  
  {  
    int digital_cycle = i;  
    analogWrite(pin, digital_cycle ); //Snd the command to the motor  
  
    DutyClycle=(100 * i)/255;  
    Serial.print("i= ");  
    Serial.print(i);  
    Serial.print(" Duty Cycle=");  
    Serial.print(DutyClycle);  
    Serial.println("%");  
    delay(tm); //Wait one second each speed  
  }  
  for(int i=255;i>=0;i-=25)  
  {  
    int digital_cycle = i;  
    analogWrite(pin, digital_cycle ); //Snd the command to the motor
```

```
DutyCycle=(100 * i)/255;  
Serial.print("i= ");  
Serial.print(i);  
Serial.print(" Duty Cycle=");  
Serial.print(DutyCycle);  
Serial.println("%");  
delay(tm); //Wait one second each speed  
}  
}
```

## Results

[https://youtu.be/2bEQBfWd7\\_0](https://youtu.be/2bEQBfWd7_0)



## **Conclusion**

In conclusion, during this experiment we work with powering and controlling a motor. We use the duty cycle so we can program the Arduino board to control the motor. Learned the correct form to connect the motor to an external power supply and then increase its power in 10% increments, from 0% to 100%. Then we decreased the motor's power all the way back down to zero.