# Drexel University

**To:**   Dr. Christopher Peters

**From:**   Zheren Gu

**cc:**   Amirhosein Chahe

**Date:**   5/24/2023

**Re:**   Motors

---

## Purpose

The purpose of this lab was to the DC motor and a ultrasonic sensor to get the code to react according to inputs from both. This is all to prepare us for the final project that will use this.

## Discussion

This lab was easy once I read through the document a few times, the most challenging part was understanding how the ultrasonic sensor worked and how to incorporate that with the fan. There was also sometimes that the fan would have a physical problem with spinning because I would hold it and I could feel the inside of the motor spinning, but the fan blades it self did not.

## Recommendation

I could have cleaned my wiring up better as well as tested on a cleaner surface than my desk, there are possibilities that something could have interfered that was unintended.

```cpp
#include <Arduino.h>

#include "DigitalPin.h"


DigitalPin::DigitalPin(int pin)

{

  pinMode(pin, OUTPUT);

  _pin = pin;

}


void DigitalPin::set_ICR(){

  if(_pin == 6){

        TCCR4A = (1<<WGM41) | (1<<COM4A1);

        TCCR4B = (1<<WGM43) | (1<<CS40);

        ICR4 = 255;

        OCR4A = 50;

        TCNT4 = 0;

  }


}


void DigitalPin::set_duty_cycle(int num){

  if(_pin == 6){

        OCR4A = (num * 255) / 100;
```

```
    }


}
#ifndef DigitalPin_h
#define DigitalPin_h


#include <Arduino.h>


class DigitalPin
{
public:
  DigitalPin(int pin);


  void set_ICR();
  void set_duty_cycle(int val);
};
#endif
```

```
#include <Arduino.h>
const int forward = 5;
const int backward = 7;
int redLED = 38;
int greenLED = 40;
int yellowLED= 42;
int time_delay =3000;
int val = 0;
int outval = 0;
```

```
char temp;
int trigPin = 10;    // Trigger
int echoPin = 11;    // Echo
long duration, cm, inches;

void go_forward(){
  digitalWrite(forward,HIGH);
  digitalWrite(backward,LOW);
}

void go_backward(){
  digitalWrite(forward,LOW);
  digitalWrite(backward,HIGH);
}


void brake(){
  digitalWrite(forward,LOW);
  digitalWrite(backward,LOW);
}

void setup() {
   //Serial Port begin
  Serial.begin (9600);
  //Define inputs and outputs
  pinMode(trigPin, OUTPUT);
  pinMode(echoPin, INPUT);
  pinMode(forward,OUTPUT);
  pinMode(backward,OUTPUT);
  pinMode(redLED,OUTPUT);
  pinMode(greenLED,OUTPUT);
  pinMode(yellowLED,OUTPUT);
  digitalWrite(forward,HIGH);
  digitalWrite(backward,LOW);
}

void loop() {

digitalWrite(trigPin, LOW);
delayMicroseconds(5);
digitalWrite(trigPin, HIGH);
delayMicroseconds(10);
digitalWrite(trigPin, LOW);
```

```arduino
pinMode(echoPin, INPUT);
duration = pulseIn(echoPin, HIGH);

// Convert the time into a distance
cm = (duration/2) / 29.1;      // Divide by 29.1 or multiply by 0.0343
inches = (duration/2) / 74;    // Divide by 74 or multiply by 0.0135

Serial.print(inches);
Serial.print("in, ");
Serial.print(cm);
Serial.print("cm");
Serial.println();


 if(cm > 0 && cm < 2.5){
  Serial.println("close");
    analogWrite(forward,100);
    analogWrite(backward,0);
    digitalWrite(redLED,HIGH);
    digitalWrite(yellowLED,LOW);
    digitalWrite(greenLED,LOW);
  }
  if(cm >= 2.5 && cm <= 7){
    Serial.println("mid");
    analogWrite(forward,150);
    analogWrite(backward,0);
    digitalWrite(redLED,HIGH);
    digitalWrite(greenLED,HIGH);
    digitalWrite(yellowLED,LOW);
  }
  if(cm > 7){
    Serial.println("far");
    analogWrite(forward,255);
    analogWrite(backward,0);
    digitalWrite(redLED,HIGH);
    digitalWrite(yellowLED,HIGH);
    digitalWrite(greenLED,HIGH);
  }

delay(2000);
```

```
}
```