



Lab 6: Positioning Motors

Tuesday 2/17 2:15pm

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Part 1

What voltage is on pin A0? 2.45 V

Oscilloscope:



What are the pulse durations of the waveform corresponding to the end of travel on each side?

4.75v (1.78ms) and 0v(545us)

Oscilloscope:


```
    myservo.write(val);          // sets the servo position according to
the scaled value
    delay(15);                  // waits for the servo to get there
}
```

Experiment 1 Demo #1:

```
/*
Controlling a servo position using a potentiometer (variable resistor)
by Michal Rinott <http://people.interaction-ivrea.it/m.rinott>

modified on 8 Nov 2013
by Scott Fitzgerald
http://www.arduino.cc/en/Tutorial/Knob
*/

#include <Servo.h>

Servo myservo;  // create Servo object to control a servo

int potpin = A0;  // analog pin used to connect the potentiometer
int val;         // variable to read the value from the analog pin

volatile float sensor_val = 0;
volatile float y1, y2, x, x1, x2;
volatile float voltage[8]={2.930, 2.589, 1.734, 1.356, 1.092, 0.936, 0.801,
0.724};
volatile float distance[8]={5, 10, 15, 20, 25, 30, 35, 40};
volatile float answer;

void setup() {
    myservo.attach(9);  // attaches the servo on pin 9 to the Servo object
```

```

Serial.begin(9600);
pinMode(A1, INPUT);
myservo.write(0);
}

void loop() {

    sensor_val = (analogRead(A1) / 1024.00) * 5.00;
    delay(100);

    //calculate the distance to the wall
    for(int i = 0; i < 10; i++)
    {
        if (sensor_val > voltage[i+1] && sensor_val < voltage[i])
        {
            x1 = voltage[i+1];
            x2 = voltage[i];
            y1 = distance[i+1];
            y2 = distance[i];

            answer = (((y2 - y1)/(x2 - x1)) * (sensor_val - x1)) + y1;

        }
    }

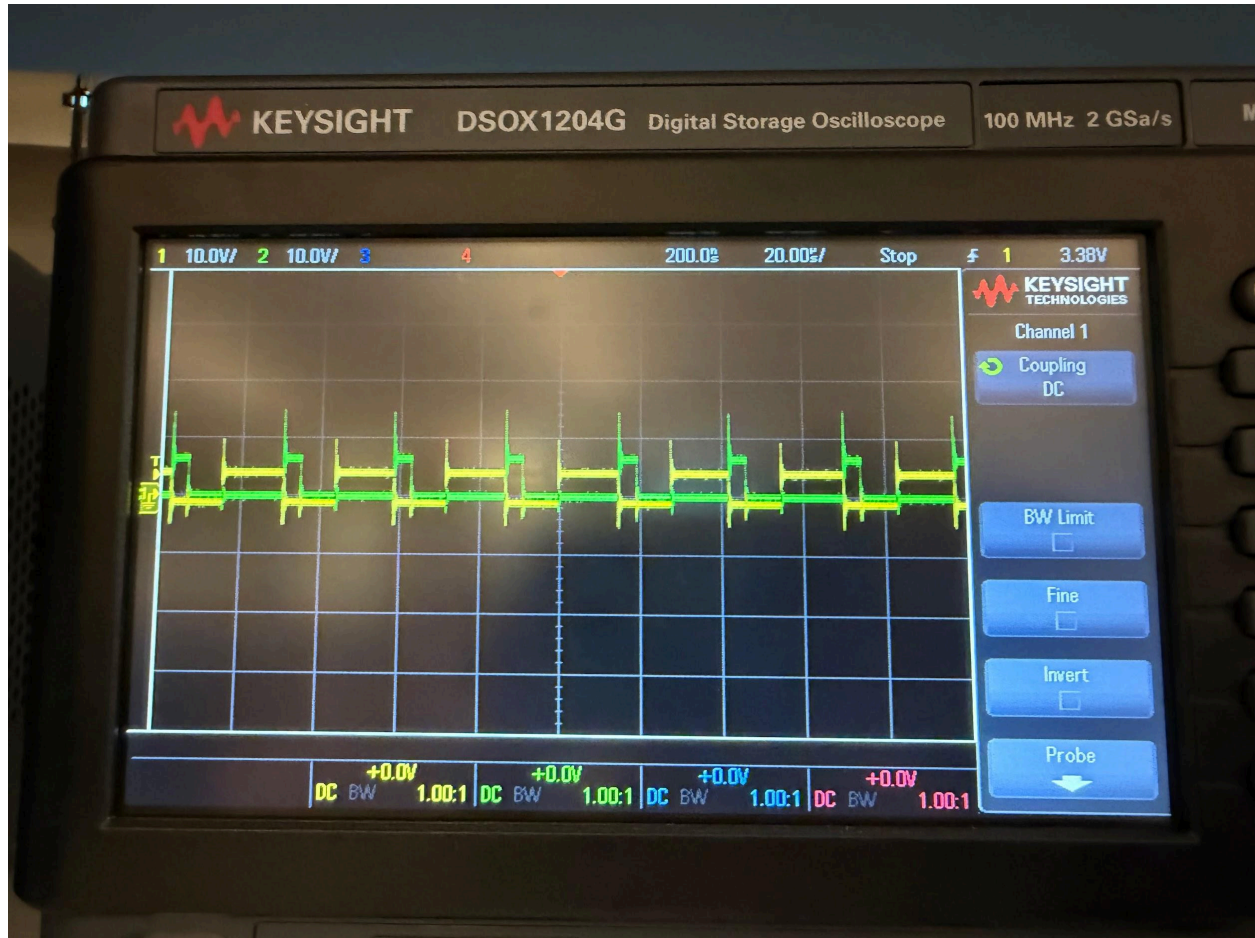
    //print to monitor
    Serial.println(answer);
    float val = map(answer, 0, 40, 120, 0);    // scale it for use with the
servo (value between 0 and 180)
    myservo.write(val);                        // sets the servo position according to
the scaled value
    delay(15);                                // waits for the servo to get there
}

```

Problems we encountered:

Experiment 2

Waveform is weird because the voltage is being quickly switched on and off and it is using pwm to approximate a sine wave so we see a magnetic field collapsing.



Verify or disprove my theory that the motor requires 384 microsteps per revolution.

Verified

Run the motor 384 microsteps forward, wait 1 second, then 384 microsteps backwards:

```
int i;  
  
void setup() {  
  pinMode(8, OUTPUT);
```

```
pinMode(9, OUTPUT);
digitalWrite(8, LOW);
digitalWrite(9, LOW);
}

void loop() {
  for (i = 0; i < 384; i++) {
    digitalWrite(9, HIGH);
    delay(1);
    digitalWrite(9, LOW);
    delay(1);
  }

  delay(1000);
  digitalWrite(8, LOW);

  for (i = 0; i < 384; i++) {
    digitalWrite(9, HIGH);
    delay(1);
    digitalWrite(9, LOW);
    delay(1);
  }

  delay(1000);
  digitalWrite(8, HIGH);
}
```


Problems We Encountered

We did not encounter any problems at all in experiment 2