



## Lab 4: Platform Build and Motor Drivers

Tuesday 2/3 2:15pm

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## Part 1

*Main()*

```
#include <TimerOne.h>
volatile int RB_Value = 0;
volatile float countr = 0;
volatile int LB_Value = 0;
volatile float countl = 0;
volatile int function;
volatile int temp;
volatile float x0;

void setup() {
  Serial.begin(9600);

  //left A
  pinMode(2, INPUT);
  //left B
  pinMode(3, INPUT);
  //enableA
  pinMode(13, OUTPUT);
  //in3
  pinMode(9, OUTPUT);
  //in4
  pinMode(10, OUTPUT);

  //right A
  pinMode(18, INPUT);
  //right B
  pinMode(19, INPUT);
  //enable B
  pinMode(8, OUTPUT);
  //in1
  pinMode(11, OUTPUT);
  //in2
  pinMode(12, OUTPUT);

  attachInterrupt(0, isr0, RISING);
```

```
attachInterrupt(5, isr1, RISING);
}

void Loop() {
    if (Serial.available() > 0) {
        temp = Serial.parseInt();
        function = temp;
    }

    if (function == 1){
        Forward();
    }

    if (function == 2){
        Reverse();
    }

    if (function == 3){
        Brake();
    }

    if (function == 4){
        Coast();
    }

    if (function == 5){
        TurnLeft();
    }

    if (function == 6){
        TurnRight();
    }

    if (function == 7){
        PivotLeft();
    }

    if (function == 8){
        PivotRight();
    }
}
```

```

//both forward EnA=H In1=H In2=L
void Forward(){

    digitalWrite(13, LOW);
    digitalWrite(8, LOW);

    //r
    digitalWrite(9, HIGH);
    digitalWrite(10, LOW);

    //l
    digitalWrite(11, HIGH);
    digitalWrite(12, LOW);

    digitalWrite(13, HIGH);
    digitalWrite(8, HIGH);

}

//both backward EnA=H In1=L In2=H
void Reverse(){
    digitalWrite(13, LOW);
    digitalWrite(8, LOW);

    digitalWrite(9, LOW);
    digitalWrite(10, HIGH);

    digitalWrite(11, LOW);
    digitalWrite(12, HIGH);

    digitalWrite(13, HIGH);
    digitalWrite(8, HIGH);

}

//both stopped EnA=H In1=L In2=L
void Brake(){
    digitalWrite(13, LOW);

```

```

digitalWrite(8, LOW);

digitalWrite(9, LOW);
digitalWrite(10, LOW);

digitalWrite(11, LOW);
digitalWrite(12, LOW);

digitalWrite(13, HIGH);
digitalWrite(8, HIGH);
}

void Coast(){
    digitalWrite(13, LOW);
    digitalWrite(8, LOW);
}

//left forward, right stopped EnA=H In1=L In2=L
void TurnLeft(){
    digitalWrite(13, LOW);
    digitalWrite(8, LOW);

    digitalWrite(9, HIGH);
    digitalWrite(10, LOW);

    digitalWrite(11, LOW);
    digitalWrite(12, LOW);

    digitalWrite(13, HIGH);
    digitalWrite(8, HIGH);
}

//right forward, left stopped EnA=H In1=L In2=L
void TurnRight(){
    digitalWrite(13, LOW);
    digitalWrite(8, LOW);

    digitalWrite(9, LOW);

```

```

digitalWrite(10, LOW);

digitalWrite(11, HIGH);
digitalWrite(12, LOW);

digitalWrite(13, HIGH);
digitalWrite(8, HIGH);
}

//right forward, left backward EnA=H In1=L In2=L
void PivotLeft(){
    digitalWrite(13, LOW);
    digitalWrite(8, LOW);

    digitalWrite(9, HIGH);
    digitalWrite(10, LOW);

    digitalWrite(11, LOW);
    digitalWrite(12, HIGH);

    digitalWrite(13, HIGH);
    digitalWrite(8, HIGH);
}

//left forward, right backward EnA=H In1=L In2=L
void PivotRight(){
    digitalWrite(13, LOW);
    digitalWrite(8, LOW);

    digitalWrite(9, LOW);
    digitalWrite(10, HIGH);

    digitalWrite(11, HIGH);
    digitalWrite(12, LOW);

    digitalWrite(13, HIGH);
    digitalWrite(8, HIGH);
}

```

```
}

void isr0() {
  RB_Value = digitalRead(3);
  if (RB_Value == HIGH){
    countr++;
  }
  if (RB_Value == LOW){
    countr--;
  }
}

void isr1() {
  LB_Value = digitalRead(19);
  if (LB_Value == HIGH){
    countL++;
  }
  if (LB_Value == LOW){
    countL--;
  }
}
```

## Part 2

```
#include <TimerOne.h>
volatile int RB_Value = 0;
volatile int LB_Value = 0;
volatile int function;
volatile int temp;
volatile float x;

volatile float countr = 0;
volatile float countl = 0;
volatile float distance = 0;
volatile float temp_distance = 0;

void setup() {
  Serial.begin(9600);
  //left A
  pinMode(2, INPUT);
  //left B
  pinMode(3, INPUT);
  //enableA
  pinMode(13, OUTPUT);
  //in3
  pinMode(9, OUTPUT);
  //in4
  pinMode(10, OUTPUT);

  //right A
  pinMode(18, INPUT);
  //right B
  pinMode(19, INPUT);
  //enable B
  pinMode(8, OUTPUT);
  //in1
  pinMode(11, OUTPUT);
  //in2
  pinMode(12, OUTPUT);

  attachInterrupt(0, isr0, RISING);
  attachInterrupt(5, isr1, RISING);
}
```



```

void loop() {

    if (Serial.available() > 0) {
        temp = Serial.parseInt();
        function = temp;
    }

    if (function == 1){
        Forward();
    }
    if (function == 2){
        Reverse();
    }
    if (function == 3){
        Brake();
    }
    if (function == 4){
        Coast();
    }
    if (function == 5){
        TurnLeft();
    }
    if (function == 6){
        TurnRight();
    }
    if (function == 7){
        PivotLeft();
    }
    if (function == 8){
        PivotRight();
    }
    if(function == 9){
        for(int i = 0; i<1; i++){
            cmForward(19);
        }
    }
    if(function == 10){
        for(int i = 0; i<1; i++){
            cmReverse(19);
        }
    }
}

```

```

    }
}

//both forward EnA=H In1=H In2=L
void Forward(){
    digitalWrite(13, LOW);
    digitalWrite(8, LOW);

    digitalWrite(9, LOW);
    digitalWrite(10, HIGH);

    digitalWrite(11, LOW);
    digitalWrite(12, HIGH);

    digitalWrite(13, HIGH);
    digitalWrite(8, HIGH);
}

//both backward EnA=H In1=L In2=H
void Reverse(){
    digitalWrite(13, LOW);
    digitalWrite(8, LOW);
    //r
    digitalWrite(9, HIGH);
    digitalWrite(10, LOW);
    //l
    digitalWrite(11, HIGH);
    digitalWrite(12, LOW);

    digitalWrite(13, HIGH);
    digitalWrite(8, HIGH);
}

//both stopped EnA=H In1=L In2=L
void Brake(){
    digitalWrite(13, LOW);
    digitalWrite(8, LOW);

    digitalWrite(9, LOW);
    digitalWrite(10, LOW);

```

```

digitalWrite(11, LOW);
digitalWrite(12, LOW);

digitalWrite(13, HIGH);
digitalWrite(8, HIGH);
}

void Coast() {
    digitalWrite(13, LOW);
    digitalWrite(8, LOW);
}

//left forward, right stopped EnA=H In1=L In2=L
void TurnLeft() {
    digitalWrite(13, LOW);
    digitalWrite(8, LOW);

    digitalWrite(9, HIGH);
    digitalWrite(10, LOW);

    digitalWrite(11, LOW);
    digitalWrite(12, LOW);

    digitalWrite(13, HIGH);
    digitalWrite(8, HIGH);
}

//right forward, left stopped EnA=H In1=L In2=L
void TurnRight() {
    digitalWrite(13, LOW);
    digitalWrite(8, LOW);

    digitalWrite(9, LOW);
    digitalWrite(10, LOW);

    digitalWrite(11, HIGH);
    digitalWrite(12, LOW);

    digitalWrite(13, HIGH);
    digitalWrite(8, HIGH);
}

```

```

//right forward, left backward EnA=H In1=L In2=L
void PivotLeft() {
    digitalWrite(13, LOW);
    digitalWrite(8, LOW);

    digitalWrite(9, HIGH);
    digitalWrite(10, LOW);

    digitalWrite(11, LOW);
    digitalWrite(12, HIGH);

    digitalWrite(13, HIGH);
    digitalWrite(8, HIGH);
}

//left forward, right backward EnA=H In1=L In2=L
void PivotRight() {
    digitalWrite(13, LOW);
    digitalWrite(8, LOW);

    digitalWrite(9, LOW);
    digitalWrite(10, HIGH);

    digitalWrite(11, HIGH);
    digitalWrite(12, LOW);

    digitalWrite(13, HIGH);
    digitalWrite(8, HIGH);
}

void cmForward (float x){
    x = x*10;
    temp_distance = distance;
    Serial.print("hi");

    while (distance - temp_distance <= x){
        Serial.print("distance");
        Serial.println(distance);
        Serial.print("temp");
        Serial.println(temp_distance);
    }
}

```

```

    Serial.print("x");
    Serial.println(x);
    distance = (count1/966) * 188.49;
    Forward();
}

Brake();
}

void cmReverse (int x){
    x = -(x*10);
    temp_distance = distance;
    Serial.print("hi");

    while (distance - temp_distance >= x){
        Serial.print("distance");
        Serial.println(distance);
        Serial.print("temp");
        Serial.println(temp_distance);
        Serial.print("x");
        Serial.println(x);
        distance = (count1/966) * 188.49;
        Reverse();
    }

    Brake();
}

void isr0() {
    RB_Value = digitalRead(3);
    if (RB_Value == HIGH){
        countr++;
    }
    if (RB_Value == LOW){
        countr--;
    }
}

void isr1() {
    LB_Value = digitalRead(19);
    if (LB_Value == HIGH){

```

```
    count1++;  
}  
if (LB_Value == LOW){  
    count1--;  
}  
}
```

## Part 3

### *DIP switch Speed Control*

```
#include <TimerOne.h>
volatile int RB_Value = 0;
volatile float countr = 0;
volatile int LB_Value = 0;
volatile float countl = 0;
volatile int function;
volatile int temp;

volatile float speed = 0;
volatile float distance = 0;
volatile unsigned long currentmillis1;
volatile int prevmillis1 = 0;
volatile int onesec = 1000;

int switch1 = 0;
int switch2 = 0;
int switch3 = 0;
int switch4 = 0;

void setup() {

  Serial.begin(9600);

  //left A
  pinMode(2, INPUT);
  //left B
  pinMode(3, INPUT);
  //enableA
  pinMode(13, OUTPUT);
  //in3
  pinMode(9, OUTPUT);
  //in4
  pinMode(10, OUTPUT);

  //right A
  pinMode(18, INPUT);
  //right B
  pinMode(19, INPUT);
```

```

//enable B
pinMode(8, OUTPUT);
//in1
pinMode(11, OUTPUT);
//in2
pinMode(12, OUTPUT);

pinMode(4, INPUT);
pinMode(5, INPUT);
pinMode(6, INPUT);
pinMode(7, INPUT);

attachInterrupt(0, isr0, RISING);
attachInterrupt(5, isr1, RISING);
}

void loop() {
  switch1 = digitalRead(4); //25
  switch2 = digitalRead(5);
  switch3 = digitalRead(6);
  switch4 = digitalRead(7); //100

  Serial.print(switch1);

  if (switch1 == HIGH){
    dc_25();
  }

  if (switch2 == HIGH){
    dc_40();
  }

  if (switch3 == HIGH){
    dc_70();
  }

  if (switch4 == HIGH){
    dc_100();
  }
}

```



```

    Brake();
}

void dc_25(){
    currentmillis1 = millis();
    Serial.println("dc 25");

    digitalWrite(13, LOW);
    digitalWrite(8, LOW);

    //r
    digitalWrite(9, HIGH);
    digitalWrite(10, LOW);

    //l
    digitalWrite(11, HIGH);
    digitalWrite(12, LOW);

    analogWrite(13, 63.75);
    analogWrite(8, 63.75);

    if (currentmillis1 - prevmillis1 >= onesec){
        count1 = 0;

        if (currentmillis1 - prevmillis1 >= (onesec * 3)){
            distance = (count1/966) * 188.49;
            Serial.print(distance);
            Serial.println("mm");

            speed = distance/2;
            Serial.print(speed);
            Serial.println("mm/sec");

            Brake();
        }
    }

    void dc_40(){
        currentmillis1 = millis();
        Serial.println("dc 40");
    }
}

```

```

digitalWrite(13, LOW);
digitalWrite(8, LOW);

//r
digitalWrite(9, HIGH);
digitalWrite(10, LOW);

//l
digitalWrite(11, HIGH);
digitalWrite(12, LOW);

analogWrite(13, 102); //255 * 0.4
analogWrite(8, 102);

if (currentmillis1 - prevmillis1 >= onesec){
    count1 = 0;

    prevmillis1 = currentmillis1;
    currentmillis1 = millis();

    if (currentmillis1 - prevmillis1 >= (onesec * 2)){
        distance = (count1/966) * 188.49;
        Serial.println("count1: ");
        Serial.println(count1);
        Serial.print(distance);
        Serial.println("mm");

        speed = distance/2;
        Serial.print(speed);
        Serial.println("mm/sec");

        Brake();
    }
}

}

void dc_70(){
    currentmillis1 = millis();
    Serial.println("dc 70");
}

```

```

digitalWrite(13, LOW);
digitalWrite(8, LOW);

//r
digitalWrite(9, HIGH);
digitalWrite(10, LOW);

//l
digitalWrite(11, HIGH);
digitalWrite(12, LOW);

analogWrite(13, 178.5);
analogWrite(8, 178.5);
if (currentmillis1 - prevmillis1 >= onesec){
    count1 = 0;
    Serial.print(currentmillis1);
    prevmillis1 = currentmillis1;
    currentmillis1 = millis();
    Serial.print(currentmillis1);

    if (currentmillis1 - prevmillis1 >= (onesec * 2)){
        distance = (count1/966) * 188.49;
        Serial.print(distance);
        Serial.println("mm");

        speed = distance/2;
        Serial.print(speed);
        Serial.println(" mm/sec");

        Brake();
    }
}

void dc_100(){
    currentmillis1 = millis();
    Serial.println("dc 100");

    digitalWrite(13, LOW);
    digitalWrite(8, LOW);

```

```

//r
digitalWrite(9, HIGH);
digitalWrite(10, LOW);

//l
digitalWrite(11, HIGH);
digitalWrite(12, LOW);

analogWrite(13, 255);
analogWrite(8, 255);

if (currentmillis1 - prevmillis1 >= onesec){
    count1 = 0;

    prevmillis1 = currentmillis1;
    currentmillis1 = millis();

    if (currentmillis1 - prevmillis1 >= (onesec * 2)){
        distance = (count1/966) * 188.49;
        Serial.print(distance);
        Serial.println("mm");

        speed = distance/2;
        Serial.print(speed);
        Serial.println("mm/sec");

        Brake();
    }
}

void Brake(){
digitalWrite(13, LOW);
digitalWrite(8, LOW);

digitalWrite(9, LOW);
digitalWrite(10, LOW);

digitalWrite(11, LOW);
digitalWrite(12, LOW);

```

```
digitalWrite(13, HIGH);  
digitalWrite(8, HIGH);  
}  
  
void isr0() {  
  RB_Value = digitalRead(3);  
  if (RB_Value == HIGH) {  
    countr++;  
  }  
  if (RB_Value == LOW) {  
    countr--;  
  }  
}  
  
void isr1() {  
  LB_Value = digitalRead(19);  
  if (LB_Value == HIGH) {  
    countl++;  
  }  
  if (LB_Value == LOW) {  
    countl--;  
  }  
}
```

*Speeds:*

*Inaccuracies:*

### **Problems We Encountered:**