



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 = (countl/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 = (countl/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) {

```

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

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) {
countl = 0;

if (currentmillis1 - prevmillis1 >= (onesec * 3)) {
distance = (countl/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) {
    countl = 0;

    prevmillis1 = currentmillis1;
    currentmillis1 = millis();

    if (currentmillis1 - prevmillis1 >= (onesec * 2)) {
        distance = (countl/966) * 188.49;
        Serial.println("countl: ");
        Serial.println(countl);
        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) {
    countl = 0;
    Serial.print(currentmillis1);
    prevmillis1 = currentmillis1;
    currentmillis1 = millis();
    Serial.print(currentmillis1);

    if (currentmillis1 - prevmillis1 >= (onesec * 2)) {
        distance = (countl/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: