Lab1

#define MOTOR\_D1\_PIN 7

#define MOTOR\_D2\_PIN 8

#define MOTOR\_PWM\_PIN 6

#define LED\_DIS 9

#define DATA\_PIN 11

#define CLK\_PIN 13

#define SS\_PIN\_1 10

int setpoint=0;

int map7seg[10]={

0x3F,0x06,0x5B,0x4F,0x66,0x6D,0x7D,0x07,0x7F,0x6F

};

int interruptChannelAPin=2;

int interruptChannelBPin=3;

volatile int encoderCount=0;

volatile int digit=0;

void moveForward (int speed)

{

digitalWrite(MOTOR\_D1\_PIN,HIGH);

digitalWrite(MOTOR\_D2\_PIN,LOW);

analogWrite(MOTOR\_PWM\_PIN,speed);

}

void write7Segment(unsigned char num){

int digit1=(num/10)%10;

int digit2=num%10;

shiftOut(DATA\_PIN,CLK\_PIN,MSBFIRST,map7seg[digit1]);

shiftOut(DATA\_PIN,CLK\_PIN,MSBFIRST,map7seg[digit2]);

digitalWrite(SS\_PIN\_1,HIGH);

digitalWrite(SS\_PIN\_1,LOW);

}

void moveBackward (int speed)

{

digitalWrite(MOTOR\_D1\_PIN,LOW);

digitalWrite(MOTOR\_D2\_PIN,HIGH);

analogWrite(MOTOR\_PWM\_PIN,speed);

}

void setSpeed (int speed)

{

if (speed>0)

{

if(speed>255)

{speed=255;}

moveForward(speed);

}

else if (speed<0)

{

speed=speed\*(-1);

if (speed>255)

{speed=255;}

moveBackward(speed);

}

else

{

moveForward(1);

}

}

void setup()

{

pinMode(MOTOR\_D1\_PIN,OUTPUT);

pinMode(MOTOR\_D2\_PIN,OUTPUT);

pinMode(MOTOR\_PWM\_PIN,OUTPUT);

pinMode(A0,INPUT);

pinMode(interruptChannelAPin,INPUT\_PULLUP);

pinMode(interruptChannelBPin,INPUT\_PULLUP);

attachInterrupt(digitalPinToInterrupt(interruptChannelAPin),ChannelA\_callback,RISING);

attachInterrupt(digitalPinToInterrupt(interruptChannelBPin),ChannelB\_callback,RISING);

Serial.begin(9600);

write7Segment(69);

}

void loop()

{

setSpeed(setpoint);

Serial.println(setpoint);

Serial.println(encoderCount);

Serial.println(digit);

delay(1000);

}

void serialEvent()

{

setpoint = Serial.parseInt();

}

void ChannelA\_callback(){

if(digitalRead(interruptChannelAPin)==1&&digitalRead(interruptChannelBPin)==0){

encoderCount++;

digit = (encoderCount/100);

}

}

void ChannelB\_callback(){

if(digitalRead(interruptChannelAPin)==0&&digitalRead(interruptChannelBPin)==1){

encoderCount--;

digit = (encoderCount/100);

}

}

Lab2

#define MOTOR\_D1\_PIN 7

#define MOTOR\_D2\_PIN 8

#define MOTOR\_PWM\_PIN 6

int setpoint=0;

void moveForward (int speed)

{

digitalWrite(MOTOR\_D1\_PIN,HIGH);

digitalWrite(MOTOR\_D2\_PIN,LOW);

analogWrite(MOTOR\_PWM\_PIN,speed);

}

void moveBackward (int speed)

{

digitalWrite(MOTOR\_D1\_PIN,LOW);

digitalWrite(MOTOR\_D2\_PIN,HIGH);

analogWrite(MOTOR\_PWM\_PIN,speed);

}

void setSpeed (int speed)

{

if (speed>0)

{

if(speed>255)

{speed=255;}

moveForward(speed);

}

else if (speed<0)

{

speed=speed\*(-1);

if (speed>255)

{speed=255;}

moveBackward(speed);

}

else

{

moveForward(1);

}

}

void setup()

{

pinMode(MOTOR\_D1\_PIN,OUTPUT);

pinMode(MOTOR\_D2\_PIN,OUTPUT);

pinMode(MOTOR\_PWM\_PIN,OUTPUT);

pinMode(A0,INPUT);

Serial.begin(9600);

}

void loop()

{

int p = setpoint;

setSpeed(p);

Serial.print(setpoint);

Serial.print(",");

delay(100);

}

void serialEvent()

{

setpoint = Serial.parseInt();

}

Lab3

#define MOTOR\_D1\_PIN 7

#define MOTOR\_D2\_PIN 8

#define MOTOR\_PWM\_PIN 6

#define LED\_DIS 9

#define DATA\_PIN 11

#define CLK\_PIN 13

#define SS\_PIN\_1 10

int setpoint=0;

int map7seg[10]={

0x3F,0x06,0x5B,0x4F,0x66,0x6D,0x7D,0x07,0x7F,0x6F

};

int interruptChannelAPin=2;

int interruptChannelBPin=3;

volatile int encoderCount=0;

volatile int digit=0;

void moveForward (int speed)

{

digitalWrite(MOTOR\_D1\_PIN,HIGH);

digitalWrite(MOTOR\_D2\_PIN,LOW);

analogWrite(MOTOR\_PWM\_PIN,speed);

}

void write7Segment(unsigned char num){

int digit1=(num/10)%10;

int digit2=num%10;

shiftOut(DATA\_PIN,CLK\_PIN,MSBFIRST,map7seg[digit1]);

shiftOut(DATA\_PIN,CLK\_PIN,MSBFIRST,map7seg[digit2]);

digitalWrite(SS\_PIN\_1,HIGH);

digitalWrite(SS\_PIN\_1,LOW);

}

void moveBackward (int speed)

{

digitalWrite(MOTOR\_D1\_PIN,LOW);

digitalWrite(MOTOR\_D2\_PIN,HIGH);

analogWrite(MOTOR\_PWM\_PIN,speed);

}

void setSpeed (int speed)

{

if (speed>0)

{

if(speed>255)

{speed=255;}

moveForward(speed);

}

else if (speed<0)

{

speed=speed\*(-1);

if (speed>255)

{speed=255;}

moveBackward(speed);

}

else

{

moveForward(1);

}

}

void setup()

{

pinMode(MOTOR\_D1\_PIN,OUTPUT);

pinMode(MOTOR\_D2\_PIN,OUTPUT);

pinMode(MOTOR\_PWM\_PIN,OUTPUT);

pinMode(A0,INPUT);

pinMode(interruptChannelAPin,INPUT\_PULLUP);

pinMode(interruptChannelBPin,INPUT\_PULLUP);

attachInterrupt(digitalPinToInterrupt(interruptChannelAPin),ChannelA\_callback,RISING);

attachInterrupt(digitalPinToInterrupt(interruptChannelBPin),ChannelB\_callback,RISING);

Serial.begin(9600);

write7Segment(69);

}

void loop()

{ setpoint = analogRead(A0);

int speed = (setpoint-encoderCount)\*0.9;

setSpeed(speed);

//Serial.println(setpoint);

Serial.println(encoderCount);

//Serial.println(digit);

delay(1000);

}

void serialEvent()

{

setpoint = analogRead(A0);

}

void ChannelA\_callback(){

if(digitalRead(interruptChannelAPin)==1&&digitalRead(interruptChannelBPin)==0){

encoderCount++;

digit = (encoderCount/100);

}

}

void ChannelB\_callback(){

if(digitalRead(interruptChannelAPin)==0&&digitalRead(interruptChannelBPin)==1){

encoderCount--;

digit = (encoderCount/100);

}

}