#include<avr/io.h>

#include<avr/interrupt.h>

float x,e1,ie1,de1,le1,pid1;

float p1,i1,d1;

float y,e2,ie2,de2,le2,pid2;

float p2,i2,d2;

float i,ct1,ho=20,rpm1,c,n;

float ct2,rpm2,set;

int k1=220;

int k2=220;

void usart\_init(void)

{

UCSR0A = 0x00;

UCSR0B = (1<<RXEN0)|(1<<TXEN0);

UCSR0C = (1<<UCSZ00)|(1<<UCSZ01);

UBRR0L = 103;

}

void usart\_sent(unsigned char n )

{

while(UCSR0A!=(UCSR0A|(1<<UDRE0)));

UDR0=n;

}

unsigned char usart\_recieve(void)

{

while(UCSR0A!=(UCSR0A|(1<<RXC0)));

return UDR0;

}

void pid\_init1() //pin 6,9

{

e1=set-rpm1; //n==set value rpm==encoder value

ie1+=e1; //ie==integrate value

de1=e1-le1; //de==derivative value

le1=e1; //le== last error

pid1=(p1\*e1)+(i1\*ie1)+(d1\*de1);

Serial.print("pid1=");

Serial.println(pid1);

if(pid1>0){k1+=2;}

else if(pid1<0){k1-=2;}

if(k1<=0){k1=0;}

else if (k1>=255){k1=255;}

//Serial.print(k1);

//Serial.println(" ");

}

void pid\_init2()// pin 5,10

{

e2=set-rpm2; //n==set value rpm==encoder value

ie2+=e2; //ie==integrate value

de2=e2-le2; //de==derivative value

le2=e2; //le== last error

pid2=(p2\*e2)+(i2\*ie2)+(d2\*de2);

Serial.print("pid2=");

Serial.println(pid2);

if(pid2>0){k2+=2;}

else if(pid2<0){k2-=2;}

if(k2<=0){k2=0;}

else if (k2>=255){k2=255;}

// Serial.println(k2);

}

int main()

{

DDRB=0b00000000;

DDRD|=0b01100000;

TCCR1A=(1<<WGM12);

TIMSK1=(1<<OCIE1A);

OCR1A=62500 ;

TCCR0A|=(1<<COM0A1)|(1<<COM0B1)|(1<<WGM01)|(1<<WGM00);

p1=1;

i1=0;

d1=0;

p2=1;

i2=0;

d2=0;

TCCR1B=(1<<CS12);

TCCR0B|=(1<<CS00);

usart\_init();

sei();

while(1)

{

n=usart\_recieve();

n-='0';

set=n;

n=0;

if((PINB & 0x02)==0b00000010 && x==1)

{

ct1++;

x=0;

}

else if ((PINB & 0x02)==0b00000000){x=1;}

if((PINB & 0x04)==0b00000100 && y==1)

{

ct2++;

y=0;

}

else if ((PINB & 0x04)==0b00000000 ){y=1;}

OCR0A=k1;

OCR0B=k2;

}

}

ISR(TIMER1\_COMPA\_vect)

{

rpm1=(ct1/ho);

Serial.print("rpm1=");

Serial.println(rpm1);

rpm2=(ct2/ho);

Serial.print("rpm2=");

Serial.println(rpm2);

ct1=0;

ct2=0;

pid\_init1();

pid\_init2();

}