#include<avr/io.h>

#include<avr/interrupt.h>

unsigned int n,set;

float x,e,ie,de,le,pid;

float p,i,d;

float ct,ho=20,rpm,y,c;

int ary[100];

int k=200;

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 adc\_init()

{

ADCSRA|=((1<<ADEN)|(1<<ADPS2)|(1<<ADPS1)|(1<<ADPS0));

}

int adc\_read()

{

ADCSRA|=(1<<ADSC);

while(!(ADCSRA&(1<<ADIF)));

ADCSRA|=(1<<ADIF);

return ADCH;

}

void pid\_init()

{

if(set>0){

e=set-rpm; //n==set value rpm==encoder value

ie+=e; //ie==integrate value

de=e-le; //de==derivative value

le=e; //le== last error

pid=(p\*e)+(i\*ie)+(d\*de);

Serial.print("pid=");

Serial.println(pid);

if (pid>0.50){k+=5;}

else if(pid<0){k--;}

else if (0.5>pid>0){k++;}

}

}

int main()

{

DDRD|=0b01000000;

TCCR1A=(1<<WGM12);

TIMSK1=(1<<OCIE1A);

OCR1A=62500 ;

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

p=1;

i=0;

d=0;

TCCR1B=(1<<CS12);

TCCR0B|=(1<<CS00);

usart\_init();

adc\_init();

int i=0;

sei();

Serial.begin(9600);

while(1)

{

n=usart\_recieve();

n-='0';

set=n;

Serial.println(set);

n=0;

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

{

ct++;

x=0;

}

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

OCR0A=k;

set=4;

}

}

ISR(TIMER1\_COMPA\_vect)

{

rpm=(ct/ho);

Serial.print("rpm=");

Serial.println(rpm);

ct=0;

pid\_init();

}