```
float KP = 9.5;


int setpoint = 525;
int position = 0;
int error = 0;
int saturation_min = -255;
int saturation_max = 255;
int output = 0;

// Process Serial
char HEADER_Y ='Y';
int MSG_LENGTH = 4;
int READ_Y = setpoint;
int READ_Y_OLD = 0;

// limitation
int rightlimit = 720;
int leftlimit = 330;

// timer
long present_time = 0;
long previous_time = 0;
int time_delay = 1000;

// PIN SETUP
```

```
int D1 =  10;
int D2 =  8;
int EN =  9;

void setup(){
  TCCR1B = TCCR1B & 0b11111000 | 0x01;
  pinMode(D1, OUTPUT);
  pinMode(D2, OUTPUT);
  pinMode(EN, OUTPUT);
  Serial.begin(9600);
}

void loop(){
  int val = processSerial();
  present_time = millis();
  if (present_time - previous_time > time_delay )
  {
    motor_stop();
  }

  if(present_time - previous_time < time_delay )
  {
    setpoint = READ_Y;
    PID();
    motor_move();
```

```
   //Serial.println(error);
  }


  if(val>0)
  {
   if(READ_Y != READ_Y_OLD)
   {
   previous_time = present_time;
   }
  }
  READ_Y_OLD = READ_Y;
}


void PID(){
  position = analogRead(0);
  error = setpoint - position;
  output = ( KP * error );
  // saturation
  if(output > saturation_max)
  {
   output = saturation_max;
  }
  if(output < saturation_min)
  {
   output = saturation_min;
```

```
  }
}

void motor_move(){
   if( output > 0 && position < rightlimit) // RIGHT
 {
   digitalWrite(D1, HIGH);
   digitalWrite(D2, LOW);
   analogWrite(EN, output);
 }
 else if( output < 0  && position > leftlimit ) // LEFT
 {
   digitalWrite(D1, LOW);
   digitalWrite(D2, HIGH);
   analogWrite(EN, output*(-1));
 }
 else{
   motor_stop();
   //Serial.println("Motor Stop");
 }
}

void motor_stop(){
   digitalWrite(D1, LOW);
   digitalWrite(D2, LOW);
```

```
  analogWrite(EN, LOW);
  //Serial.println("MOTOR STOP");
}

int processSerial()
{
 while(Serial.available() >=  MSG_LENGTH )  // process messages when all characters are received
 {
   char check = Serial.read();
   if( check == HEADER_Y )
   {
          int val = 0;
          for(int i =0; i < MSG_LENGTH-1; i++)
          {
            char ch = Serial.read();
            if(ch >= '0' && ch <= '9'){                    // is ch a number?
              val = val * 10 + ch - '0';               // yes, accumulate the value
            }
          }
      READ_Y = val;
      return 1;
   }
 }
 return -1; // return -1 if nothing recieve
}
```