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[Source Code](https://www.google.com/search?es_sm=93&q=Source+Code&spell=1&sa=X&ei=1PKKVKniNc_kuQTPqoLIDA&ved=0CBoQvwUoAA)

/\*

magnetic levitation

Chiangmai Maker Club

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\*/

#include <TimerOne.h>

#define ref\_in A2

#define hall A0

#define magnetic 5

#define filter 0.30f

#define sampling 1000.0f

//float state\_g = 0;

//float prev\_state\_g = 0;

float state = 0;

float state\_f = 0;

float prev\_state = 0;

float prev\_state\_f = 0;

float ref = 7;

float error =0;

float prev\_error =0;

float error\_dot = 0;

float error\_sum =0;

float kp =500;

float ki =30;

float kd =3.65;

float output = 0;

void setup()

{

Serial.begin(115200);

pinMode(ref\_in, INPUT);

pinMode(hall, INPUT);

pinMode(output, OUTPUT);

pinMode(12, OUTPUT);

Timer1.initialize(1000); // sampling rate 1 kHz

Timer1.attachInterrupt( PID );

}

void loop()

{

delay(200);

Serial.print("Ref ");

Serial.print(ref);

Serial.print(" ");

Serial.print("State ");

Serial.print(state);

Serial.print(" ");

Serial.print("Error ");

Serial.print(error);

Serial.print(" ");

Serial.print("Error\_sum ");

Serial.print(error\_sum);

Serial.print(" ");

Serial.print("Error\_dot ");

Serial.print(error\_dot);

Serial.print(" ");

Serial.print("Output ");

Serial.println(output);

}

void PID(void)

{

digitalWrite(12,1);

prev\_state\_f = state\_f ;

state\_f = prev\_state\_f + (0.05\*(((float)(analogRead(ref\_in))/100.0f)-prev\_state\_f));

ref = state\_f/3.3f ;

/\* Update Kd gain \*/

kd =3.65 + ref\*3.6f ;

ref = 6.3f + ref;

prev\_state = state ;

state = prev\_state + (filter\*(((float)(analogRead(hall))/100.0f)-prev\_state));

prev\_error = error;

error = ref - state;

error\_dot = (error - prev\_error)\*sampling;

error\_sum = error\_sum + error/sampling;

output = kp\*error + ki\*error\_sum + kd\*error\_dot + 220;

if(output<0) output = 0; if(output>255) output = 255;

if(state < 6)

{

output = 0;

error\_sum=0;

}

analogWrite(magnetic,output);

digitalWrite(12,0);

}