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/* "A very easy and simple inverted pendulum balancing robot"
You need only half a day to make it, if you have some Materials.
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#include   <MsTimer2.h>//01
volatile int  i  =  0;//02
volatile byte  countS  =  0;//03
long zeroOmegaI = 0;//  04
volatile int   recOmegaI[10];//05
volatile int  omegaI  =  0;//06
volatile long  thetaI  =  0;//07
volatile long  sumPower  =  0;//08
volatile long  sumSumP  =  0;//09
const int  kAngle  =  45;//10
const int  kOmega  =  85;//11
const long  kSpeed  =  57;//12
const long  kDistance  =  60;//13
volatile long   powerScale;//14
volatile int   power;//15
volatile long  vE5  =  0;//16
volatile long  xE5  =  0;//17

void setup () {  //18
  Serial .begin(115200);  //19
  pinMode(4, OUTPUT);  //20
  pinMode(5, OUTPUT);
  pinMode(6, OUTPUT);
  pinMode(7, OUTPUT);
  pinMode(8, OUTPUT);
  pinMode(9, OUTPUT);
  for ( i = 0 ; i < 10 ; i++ ) { recOmegaI[i] = 0; }//25
  delay(300);
  training();
  MsTimer2::set(5, chkAndCtl);
  MsTimer2::start();
}  //30

void loop () {  //31
  if ( power > 0 ) {
    analogWrite( 6,  power  );
    digitalWrite(  4,HIGH         );
    digitalWrite(  5,LOW   );//35
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    analogWrite( 9,  power );
    digitalWrite(  7,HIGH    );
    digitalWrite(  8,LOW  );
   }else {
    analogWrite( 6,  - power );//40
    digitalWrite(  4,LOW );
    digitalWrite(  5,HIGH );
    analogWrite( 9, - power );
    digitalWrite(  7,LOW );
    digitalWrite(  8,HIGH   );//45
  }
}  //47

void   training(){//48
  delay (1000);
  for ( i = 0 ; i < 500 ; i++ ){//50
     zeroOmegaI = zeroOmegaI +analogRead(A5);
  }
  zeroOmegaI = zeroOmegaI / i;
}  //54

void  chkAndCtl()   {//55
   omegaI =analogRead(A5) - zeroOmegaI;
  if  (abs( omegaI ) < 5 ) { omegaI = 0; }
  recOmegaI[0] = omegaI;
  thetaI = thetaI + omegaI;
   countS  =  0;//60
  for ( i = 0 ; i < 10 ; i++ ) {
    if  (abs( recOmegaI[i] ) < 8 ) { countS++; }
  }
  if ( countS > 9 ) {
     thetaI  = 0;//65
    vE5 = 0;
    xE5 = 0;
    sumPower = 0;
    sumSumP = 0;
    }//70
  for ( i = 9 ; i > 0 ; i-- ) { recOmegaI[ i ] = recOmegaI[ i-1 ]; }
  powerScale = ( kAngle * thetaI / 200 ) +  ( kOmega * omegaI / 78 ) + ( k
   power  =max  (min ( 95 * powerScale / 100 , 255 ) , -255 );
  sumPower = sumPower + power;
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   sumSumP = sumSumP + sumPower;//75
//  vE5 = ???  //76
//  xE5 = ???  //77
}  //78
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```