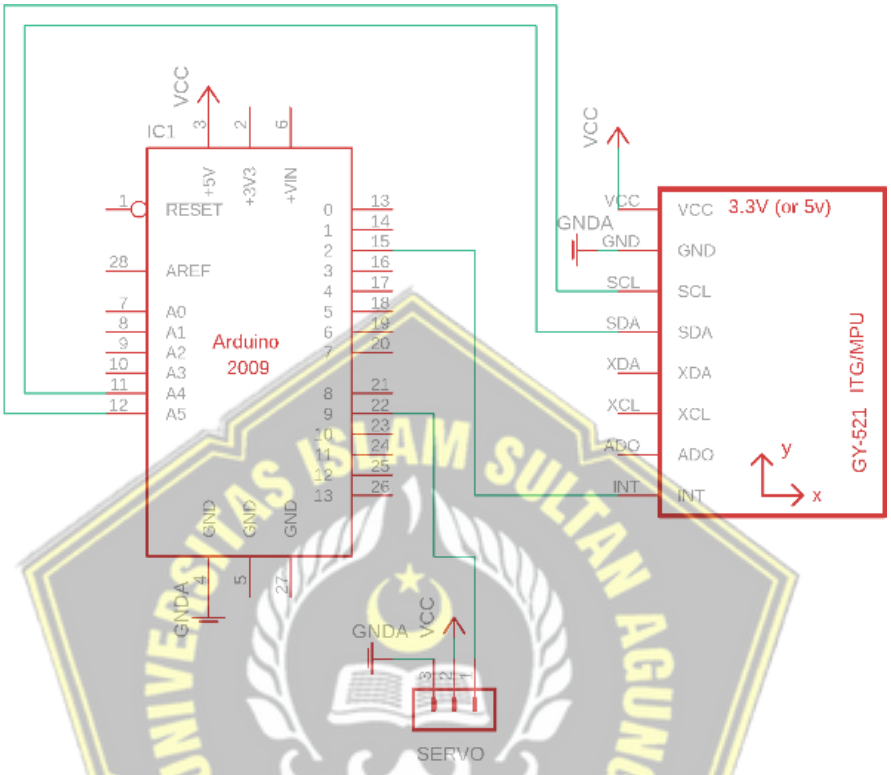
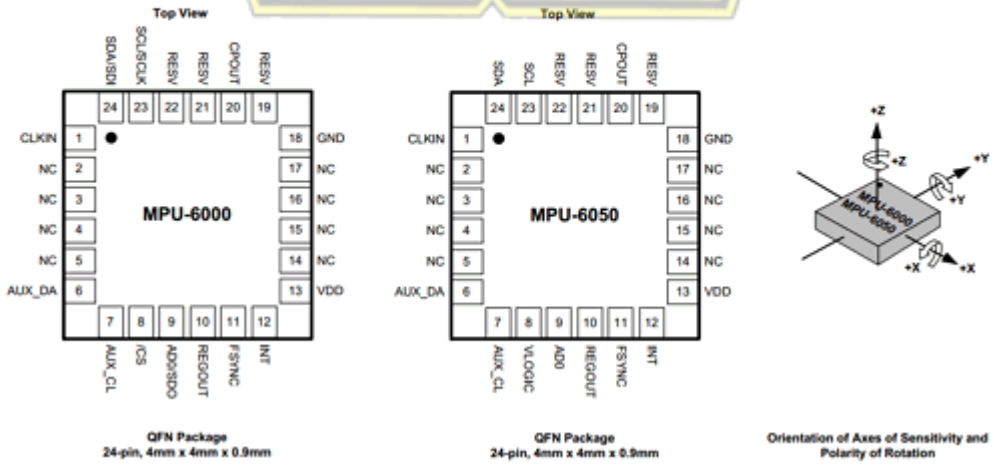
LAMPIRAN

RANGKAIAN HARDWARE



DATASHEET MPU6050

MPU6050



PROGRAM TUNNING PID

```
#include <MPU6050_tockn.h>
#include <Wire.h>
#include <Servo.h>

MPU6050 mpu6050(Wire);

Servo servo;

#define pinServo 9

float offsetGyro = 0;
#define maxServo 50

unsigned long previousTimer = 0;

float offsetServo = 80;

void setup() {
  Serial.begin(9600);
  servo.attach(pinServo);
  servo.write(offsetServo);
  delay(1000);

  mpu6050.begin();
  mpu6050.calcGyroOffsets(true);
  mpu6050.update();
  offsetGyro = mpu6050.getAngleY();
```

```
  delay(1000);

  servo.write(offsetServo-40);

  Serial.println("Tunning Start");
  delay(2000);
  int timeSampling = 2000;
  int x = 40;
  servo.write(offsetServo);
  for(int x=0; x<100; x++){
    mpu6050.update();
    float angleY = mpu6050.getAngleY();
    Serial.println(angleY);
    delayMicroseconds(10);
  }
  Serial.println("Tunning Done!");
}

void loop() {

}



//  previousTimer = millis();
//  while(1){
//    unsigned long currentTimer = millis();
//    if (currentTimer - previousTimer >= timeSampling)
    {break;}
//    mpu6050.update();
//    float angleY = mpu6050.getAngleY();
```

```
//    servo.write(offsetServo-x);
//       Serial.println(currentTimer  -  previousTimer  +
    String(" ")+ angleY);
//    x--;
//    if(x<0){x=0;}
//  }

//  servo.write(offsetServo);
//  for(int x=0; x<=40; x++){
//    mpu6050.update();
//    float angleY = mpu6050.getAngleY
//    Serial.print(x*10);
//    Serial.print(" ");
//    Serial.println(angleY);
//    delayMicroseconds(10);
//  } ();
//    Serial.print("Timer :");
```

PROGRAM KESEIMBANG SELF BALANCING

```
#include <MPU6050_tockn.h>
#include <Wire.h>
#include <Servo.h>

MPU6050 mpu6050(Wire);

Servo servo;

#define pinServo 9

#define maxServo 50
```

```
float offsetGyro = 0;
float offsetServo = 80;

const float kp = 1.41176;
const float Ti = 34;
const float Td = 8.5;

const float ki = kp/Ti;
const float kd = kp/Td;

float PIDS, P, I, D, error, error1, errorI, errorD;

unsigned long prevTime = 0;

void setup() {
  Serial.begin(9600);
  servo.attach(pinServo);
  servo.write(offsetServo);
  delay(500);

  mpu6050.begin();
  mpu6050.calcGyroOffsets(true);
  mpu6050.update();
  offsetGyro = mpu6050.getAngleY();
  prevTime = millis();

}

void loop(){
  mpu6050.update();
```

```
  float angleY = mpu6050.getAngleY();
  float dataY = angleY - offsetGyro;

  int error = dataY;

  float PIDS = (error * kp) + (error + error1)*ki +
(error1 - error)*kd;

  PIDS = constrain(PIDS, -maxServo, maxServo);

  int valServo = offsetServo - PIDS;

  error1 = error;

  servo.write(valServo);

  unsigned long presTime = millis() - prevTime;
//Serial.print("offset : ");
  //Serial.print(offsetGyro);
  Serial.print(" AngleY : ");
  Serial.println(angleY);
 // Serial.print("Timer : ");
 //Serial.print(presTime);
 // Serial.print(" dataY : ");
  //Serial.print((int)dataY);
 // Serial.print(" servo : ");
// Serial.println(valServo);

}
```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