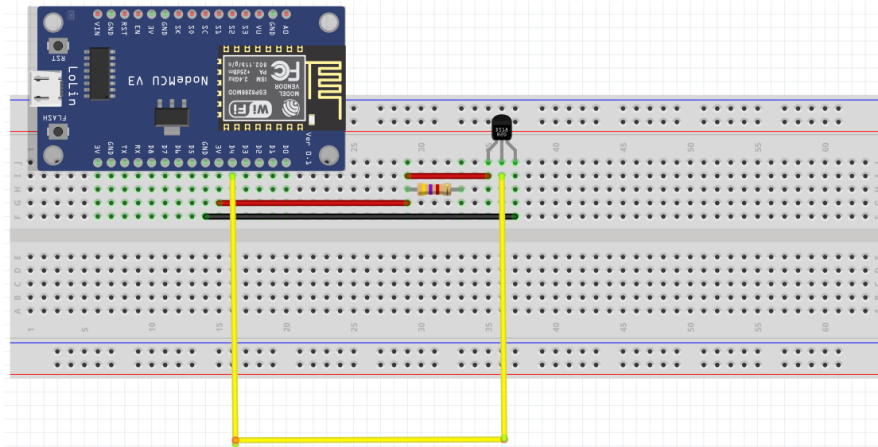


### 3.1 Pengujian bagian dan simulasi

#### 3.2.1 Pengujian fungsi sensor suhu



Gambar Error! No text of specified style in document..1 skema *proto*board

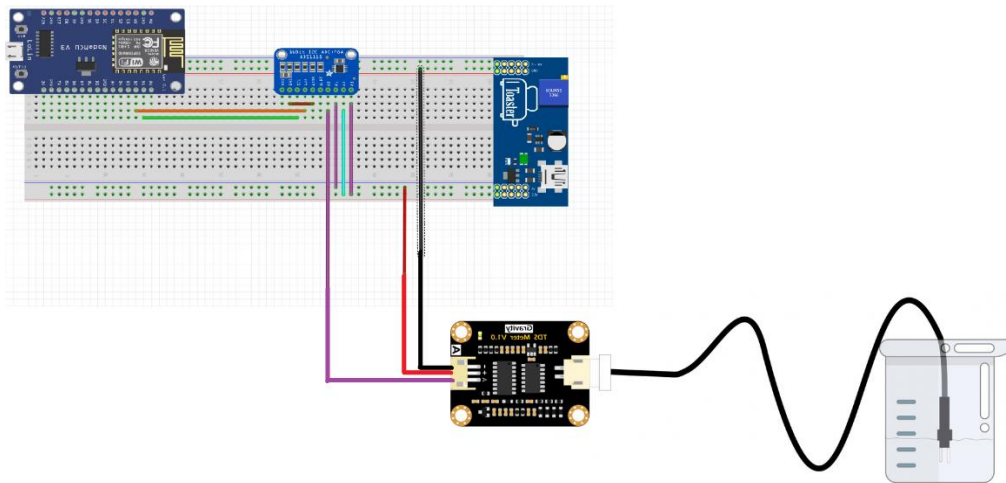
```
tesTEMPER
1 /* Arduino DS18B20 temp sensor tutorial
2   More info: http://www.ardumotive.com/how-to-use-the-ds18b20-
3   Date: 19/6/2015 // www.ardumotive.com */
4 //Include libraries
5 #include <OneWire.h>
6 #include <DallasTemperature.h>
7
8 // Data wire is plugged into pin 2 on the Arduino
9 #define ONE_WIRE_BUS 2
10 // Setup a oneWire instance to communicate with any OneWire dev
11 OneWire oneWire(ONE_WIRE_BUS);
12 // Pass our oneWire reference to Dallas Temperature.
13 DallasTemperature sensors(&oneWire);
14
15 void setup(void) {
16   Serial.begin(9600); //Begin serial communication
17   Serial.println("Arduino Digital Temperature // Serial Monitor
18   sensors.begin();
19 }
20
21 void loop(void) {
22   // Send the command to get temperatures
23   sensors.requestTemperatures();
24   Serial.print("Temperature is: ");
25   Serial.println(sensors.getTempCByIndex(0)); // Why "byIndex"?
26   //Update value every 1 sec.
27   delay(1000);
28 }
```

```
Temperature is: 25.75
Temperature is: 25.69
Temperature is: 25.62
Temperature is: 25.75
Temperature is: 25.75
Temperature is: 25.62
Temperature is: 25.75
Temperature is: 25.69
Temperature is: 25.62
Temperature is: 25.62
Temperature is: 25.69
Temperature is: 25.62
Temperature is: 25.69
Temperature is: 25.75
Temperature is: 25.69
Temperature is: 25.75
Temperature is: 25.75
Temperature is: 25.69
Temperature is: 25.62
Temperature is: 25.75
Temperature is: 25.62
Temperature is: 25.62
Temperature is: 25.56
Temperature is: 25.56
Temperature is: 25.62
Temperature is: 25.69
Temperature is: 25.62
Temperature is: 25.62
```

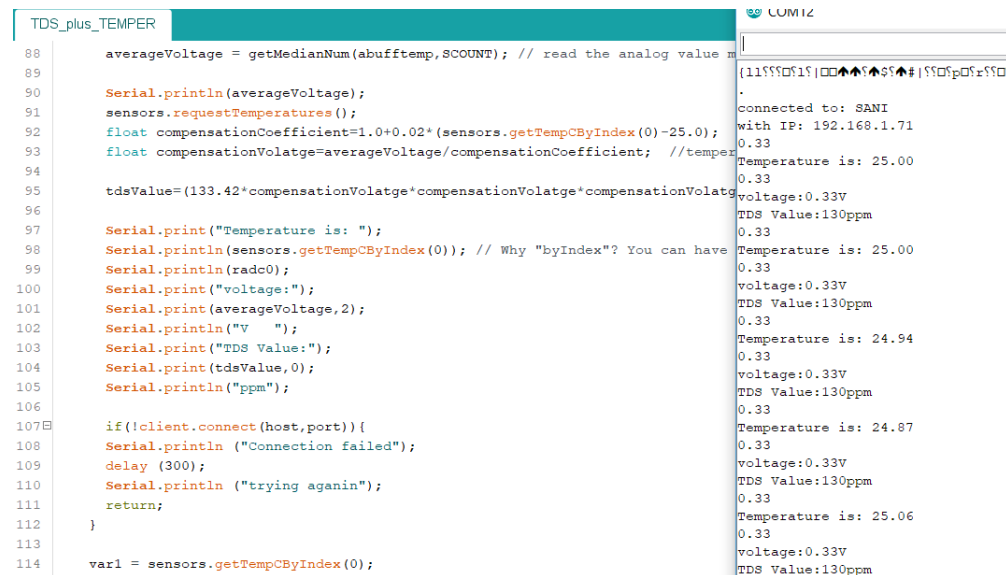
Gambar Error! No text of specified style in document..2 hasil pengukuran di layar Serial

Pada gambar 3.5 dan 3.6 merupakan hasil pengujian sensor suhu. Pada langkah ini penulis tidak mengirim data dulu ke thingspeak, karena sensor ini akan dijadikan factor koreksi terlebih dahulu sebelum datanya dikirim.

### 3.2.2 Pengujian fungsi dengan sensor TDS

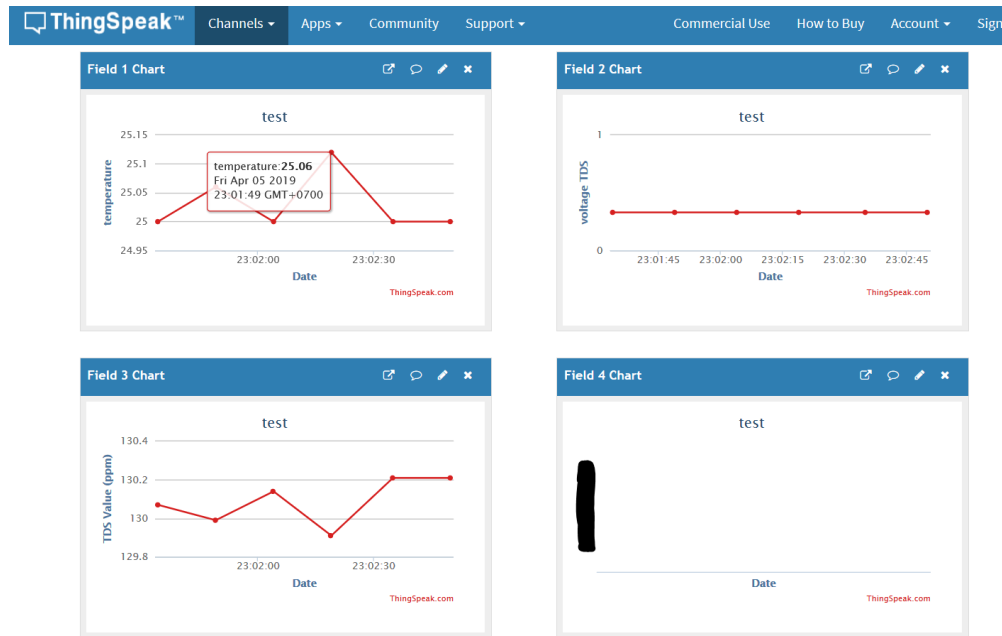


*Gambar Error! No text of specified style in document..3 Skema Protoboard pengujian kedua*



Gambar **Error! No text of specified style in document..4** Hasil Pengukuran pada laya serial

Terlihat pada gambar 3.7 dan 3.8 merupakan hasil pengukuran sensor TDS pada layar serial. Pada langkah ini data dari sensor suhu sudah dijadikan faktor koreksi untuk sensor TDS. Lalu dapat dilihat pada gambar 3.9 dibawah, merupakan respon di thingspeak yang diakses melalui *web browser*.



Gambar Error! No text of specified style in document..5 respon pada thingspeak

### 3.2.3 Pengujian fungsi alat dengan sensor Turbidity

```

TDS_plus_TEMPER_plus_TSS | Arduino 1.8.2
File Edit Sketch Tools Help

TDS_plus_TEMPER_plus_TSS
1 #include <Wire.h>
2 #include <Adafruit_ADS1015.h>
3
4 #include <OneWire.h>
5 #include <DallasTemperature.h>
6
7 #include <ESP8266WiFi.h>;
8 #include <WiFiClient.h>;
9
10 Adafruit_ADS1115 ads(0x48); /* Use this for the 16-bit version */
11
12 int16_t adc0, adc1;
13 float radc0, radc1;
14
15 #define TdsPin adc0
16 #define VREF 5.0 // analog reference voltage(Volt) of the
17 #define SCOUNT 30 // sum of sample point TDS
18 #define SSCOUNT 800 // sum of sample point TSS
19
20 #define ONE_WIRE_BUS 2
21 OneWire oneWire(ONE_WIRE_BUS);
22 DallasTemperature sensors(&oneWire);
23
24 float abuff[SCOUNT]; // store the analog value from TDS sensor
25 float abufftemp[SCOUNT];
26 int abuffindex = 0, adummyindex = 0;
27 float averageVoltage = 0, tdsValue = 0, temperature = 25;
28
29 float turbuff[SCOUNT]; // store the analog value from TSS sensor
30 float turbufftemp[SCOUNT];
31 int turbuffindex = 0, turddummyindex = 0;
32 float volt = 0;
33 float tssValue = 0;
34
35 void setup() {
36   Serial.begin(115200);
37   Wire.begin();
38   ads.begin();
39   oneWire.begin();
40   sensors.begin();
41 }
42
43 void loop() {
44   // Read TDS
45   for(int i = 0; i < SCOUNT; i++) {
46     adc0 = ads.readADC_SingleEnded(0);
47     abuff[i] = (float)adc0 / 16384 * VREF;
48   }
49   // Calculate average voltage
50   for(int i = 0; i < SCOUNT; i++) {
51     averageVoltage += abuff[i];
52   }
53   averageVoltage /= SCOUNT;
54   // Convert to TDS
55   tdsValue = (averageVoltage - 0.18) * 500;
56   // Read Temperature
57   float tempC = sensors.toCelsius(oneWire.readSingleByte());
58   temperature = tempC;
59   // Read TSS
60   for(int i = 0; i < SSCOUNT; i++) {
61     adc1 = ads.readADC_SingleEnded(1);
62     turbuff[i] = (float)adc1 / 16384 * VREF;
63   }
64   // Calculate average voltage
65   for(int i = 0; i < SSCOUNT; i++) {
66     tssValue += turbuff[i];
67   }
68   tssValue /= SSCOUNT;
69   // Convert to TSS
70   float tssValuePPM = tssValue * 1000;
71   // Send data to ThingSpeak
72   String url = "https://api.thingspeak.com/update?api_key=XXXXXXXXXXXX";
73   String data = "field1=" + temperature + "&field2=" + averageVoltage + "&field3=" + tdsValue + "&field4=" + tssValuePPM;
74   WiFiClient client = WiFi.begin("ESP8266", "password");
75   if (!client.connect(10, "192.168.1.1")) {
76     Serial.println("Connection failed");
77     return;
78   }
79   client.print(url + data);
80   Serial.println("Data sent to ThingSpeak");
81   delay(10000);
82 }

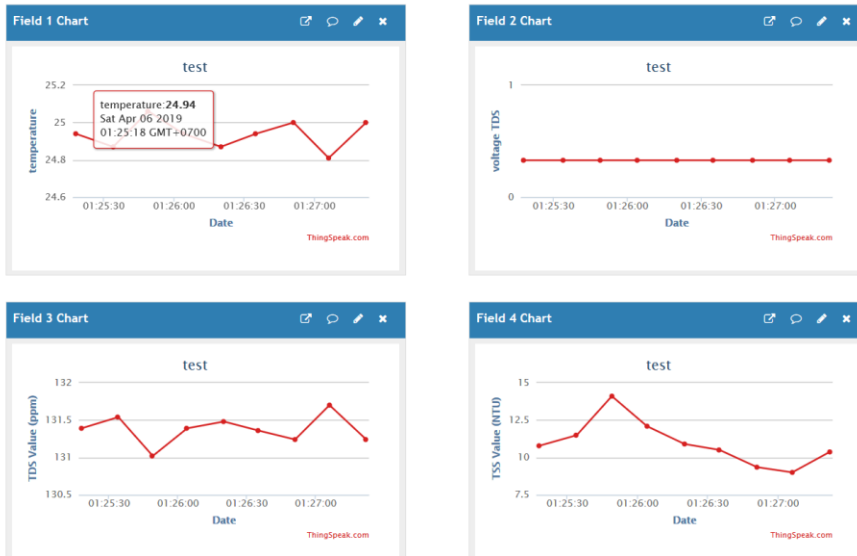
```

```

COM12
connected to: SANKI
with IP: 192.168.1.71
Getting single-ended readings from AIN0..3
0.33
voltage TSS: 2.51
4.21
NTU: 3001.58
Temperature is: 24.94
voltage:0.33V
TDS Value:131ppm
0.33
voltage TSS: 4.14
4.21
NTU: 212.51
Temperature is: 24.94
voltage:0.33V
TDS Value:131ppm
0.33
voltage TSS: 4.20
4.21
NTU: 17.24
Temperature is: 25.00
voltage:0.33V
TDS Value:131ppm
0.33
voltage TSS: 4.20
4.21
NTU: 10.02
Temperature is: 25.06
voltage:0.33V
TDS Value:131ppm
0.33
Autoscroll

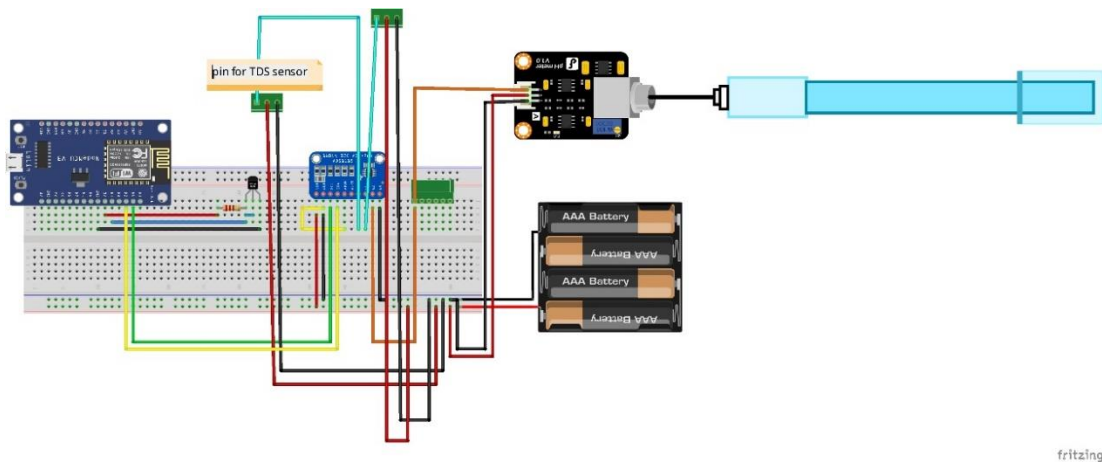
```

Gambar Error! No text of specified style in document..6 Hasil Pengukuran pada laya serial



Gambar Error! No text of specified style in document..7 respon pada thingspeak terlihat pada gambar 3.10 dan 3.11, merupakan pengujian sensor Turbidity. Hasilnya dapat dilihat pada layar serial dan halaman thingspeak. Pada langkah ini sensor TDS, sensor suhu, dan sensor Turbidity sudah bekerja dengan baik secara bersamaan.

### 3.2.4 Pengujian fungsi alat dengan sensor PH



Gambar Error! No text of specified style in document..8 skemati protoboard untuk keseluruhan sensor

```

semua_plus_PH | Arduino 1.8.2
File Edit Sketch Tools Help

semua_plus_PH

1 #include <Wire.h>
2 #include <Adafruit_ADS1015.h>
3
4 #include <OneWire.h>
5 #include <DallasTemperature.h>
6
7 #include <ESP8266WiFi.h>;
8 #include <WiFiClient.h>;
9
10 Adafruit_ADS1115 ads(0x48); /* Use this for the 16-bit version */
11
12 int16_t adc0, adc1, adc2;
13 float radc0, radc1, radc2;
14
15 #define TdsPin adc0
16 #define VREF 5.0 // analog reference voltage (Volt) of the
17 #define SCOUNT 30 // sum of sample point TDS
18
19 #define ONE_WIRE_BUS 2

```

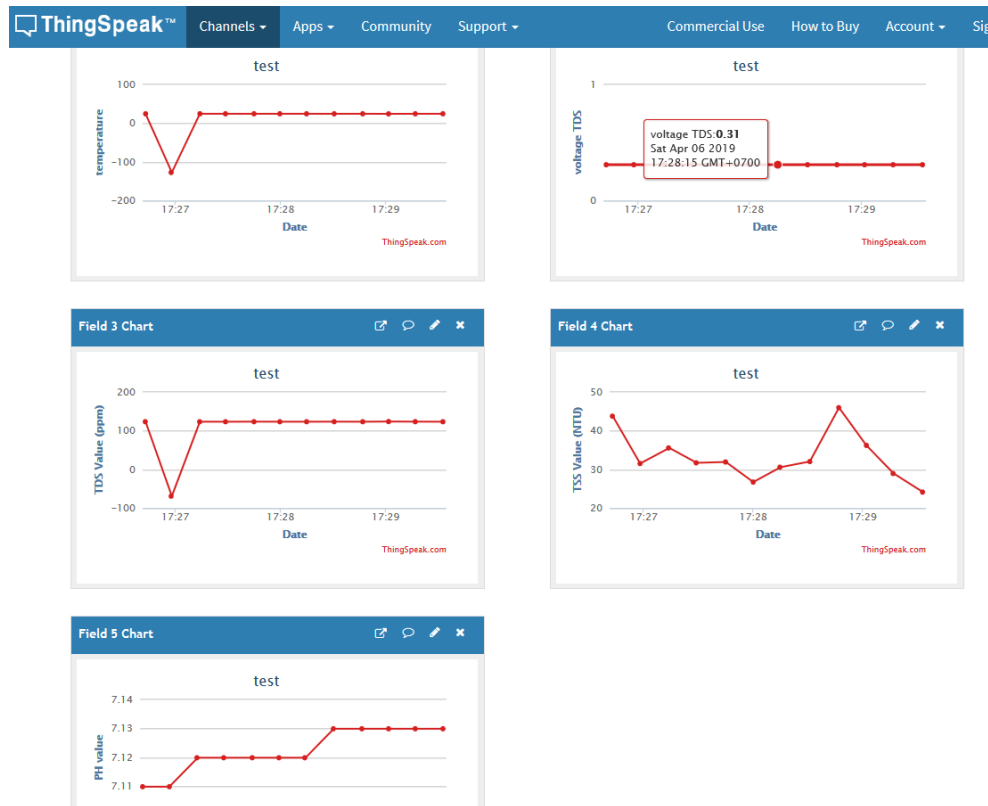
```

COM12

connected to: SANI
with IP: 192.168.1.66
Getting single-ended readings from AIN0...3
0.31
voltage TSS: 2.50
4.19
NTU: 3000.53
Temperature is: 24.69
voltage:0.31V
TDS Value:124ppm
pH:7.10
pHVolt:1.34
0.31
voltage TSS: 4.13
4.20
NTU: 243.52
Temperature is: 24.81
voltage:0.31V
TDS Value:124ppm
pH:7.10
pHVolt:1.34

```

Gambar **Error! No text of specified style in document..9** Hasil Pengukuran pada layar serial



Gambar **Error! No text of specified style in document..10** respon pada thingspeak

Pada langkah ini seluruh sensor sudah terintegrasi dengan baik. Pada gambar 3.12 dapat dilihat skema protoboard yang penulis gunakan, pada skema ini sensor TDS dan TSS berbentuk *pin header*. Lalu pada gambar 3.13 dapat dilihat hasil pengukuran ke empat sensor pada layar serial, langkah ini hanya digunakan penulis untuk memastikan data yang di kirim nilainya berada

di batas wajar. Lalu pada gambar 3.14 dapat dilihat respon yang diberikan oleh thingspeak, perlu diketahui meskipun penulis tidak memberika