Implementasi Sistem Perangkat Sensor Suhu dan Kelembaban Di Data Center PT. XYZ Menggunakan Pendekatan Standarisasi TIA-942 Dan Metode PPDIOO

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JAKARTA
2022

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KATA PENGANTAR

Puji syukur kita panjatkan kepada Allah SWT karena Rahmat dan KaruniaNya-lah penulisan tugas akhir ini dapat diselesaikan tepat pada waktunya dengan judul "Implementasi Sistem Perangkat Sensor Suhu dan Kelembaban di *Data Center* PT. XYZ Menggunakan Pendekatan Standarisasi TIA-942 Dan Metode PPDIOO"

Tugas akhir ini disusun untuk memenuhi salah satu persyaratan untuk mendapatkan Gelar Sarjana Ilmu Komputer. Selama mengikuti Pendidikan S1 Teknik Informatika sampai dengan proses penyelesaian Tugas Akhir, berbagai pihak telah memberikan fasilitas, membantu membina dan membimbing penulisan, untuk itu khususnya kepada:

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7. Teman – teman seperjuangan Mahasiswa Teknik Informatika Fakultas Ilmu Komputer Angkatan 2018 yang telah banyak berdiskusi dan bekerjasama selama masa pendidikan di Universitas Mercubuana.

Akhir kata, penulis berharap Tugas Akhir ini dapat berguna untuk keperluan akademis dan praktisi, namun tidak dapat dipungkiri masih banyaknya kelemahan dan kekurangan dalam pembuatan Tugas Akhir. Kerena itu kritik dan saran yang membangin akan diterima dengan senang hati, mudah – mudahan Tugas Akhir ini dapat bermanfaat dan menambah wawasan kita, khususnya sekitar *data center*.

Jakarta, 5 Juli 2022

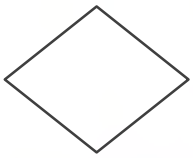
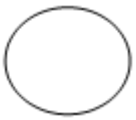
Zuli Kurnia Sandi

DAFTAR ISI

DAFTAR GAMBAR

DAFTAR TABEL

SIMBOL FLOW CHART

Simbol	Keterangan
Terminator 	Menyatakan titik awal atau titik akhir diagram alir
Input/Output 	Menyatakan proses pemasukan data dan penampilan data
Proses 	Menyatakan proses apa saja, misalnya untuk menyatakan suatu operasi aritmatika.
Keputusan 	Digunakan untuk melakukan pengambilan keputusan. Dalam hal ini, yang ada dalam symbol ini berupa suatu pertanyaan yang jawabannya berupa dua kemungkinan yaitu YA atau Tidak
Proses terdefinisi 	Tanda prosedur atau fungsi (sub algoritma)
Konektor 	Digunakan untuk menghubungkan ke berbagai bagian dalam diagram alir

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Temperature and Humidity Sensor System Implementation in Data Center Using TIA-942 Standardization and PPDIOO Method

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Abstract
Data Center is a place to store computer component, servers and storages. The most organized room in ecosystem facilities which should be protected with advanced security including the temperature, humidity, fire hazard, CCTV, and system control access, etc. advanced security implementation such as temperature and humidity Sensors to fulfil the monitoring requirement at the server devices. In this paper, it will analyse the system monitoring, and evaluate the IoT based temperature and humidity monitoring system using modular Sensors DHT1, Node MCU ESP 8366 that used as a microcontroller modular Sensors and android applications as the information facility for temperature monitoring

Keywords:
Guidance; Writing; Format; Title ; (Monitoring, Temperature and humidity, Server room, NodeMCU, DHT11, ESP8266, Blynk, Android.)

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PRELIMINARY

Technological development is something unavoidable because of the reliable information source has become the important aspect [1]. A storage which used to store all the required information is named Data Center. Data Center is a facility used to store servers, and computer system with storages with advanced power supply, air conditioner and usually included physical security system. [2].

Data Center is a enterprise that store the big data on the server with big qualification. The role of server is important to the service providers to provide the services to their clients. The impact of intolerable temperature can cause hardware damage because of overheated room. In Indonesia, the data center management is written in Regulation of the Minister of Communication and Information of the Republic of Indonesia in 2013 about Data Center Technical Guidelines are to have at least one Sensors Temperature room, that's make the room temperature should be monitored regularly to prevent the intolerable temperature which can damage the servers and followed up after. On this paper, the method used is Prepare Plan Design Implement Operate and Optimize (PPDIOO). PPDIOO method used as the initial approach an to end until the development process of initial planning [14]. There also study cases with doing the temperature and humidity nmonitoring on the Data Center room. The method used to gather the data is by observation, library

study development, and doing interviews to the incharge team at the Data Center.

TECHNICAL SPECIFICATION

The temperature and humidity monitor consist of 4 Sensors DHT11, the Sensors is used ad the starter device to read the temperature and humidity condition of the room, then the Sensors will send the data to the microcontroller Node MCU ESP8266 that will be processed as the reading result and will send again through WiFi connection to smartphone through Blynk application. This is the schema of temperature and humidity monitoring on Data Center room.

The hardware assembly should be according to the assembly planning which will match the implementation requirement of the Data Center room as seen on the figure 1 and figure 2. Thereare the required hardware used is:

1.Node MCU ESP8266
2.DHT 11 4 unit
3.NodeMCU ESP8266 expansion board
4.Laptop
5.Wifi Router
6.Distribution jumper cable
7.Cover box

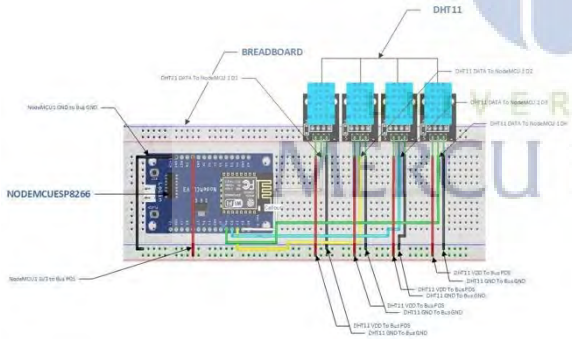

Figure 1 Temperature and Humidity Sensors Planning Scheme

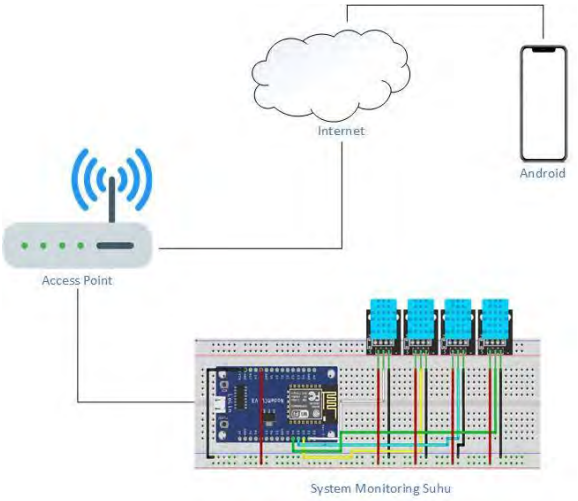

Figure 2 System Architecture

The process continues with installing the hardware and uploading it using C programming language Arduino UNO to the controller and distributing it through cables and Sensors DHT11 to Node MCU ESP8266 expansion board where in this case, the Cover Box used as the installation media to instal the temperature and humidity Sensors. The assembled hardware parts will be installed on the rack on the Data Center room and connected to the power adapter and WiFi router to be available to read on smartphone through Blynk.

METHOD USED

The method used in this paper is Prepare Plan Design Implement Operate and Optimize (PPDIOO). PPDIOO method is PPDIOO method used as the initial approach an to end until the development process of initial planning. [14].

Testing temperature and humidity Sensors in the cold air area of the Data Center room for 30 days, assuming 1 temperature and humidity data in 1 day and making comparisons with calibrated measuring instruments as seen on figure 3 to gather the temperature and humidity reading of the Data Center room and will be tested the temperature and humidity Sensors normality using one sample T test method.

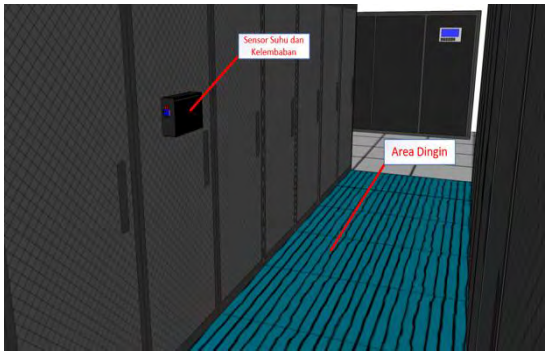

Figure 3 Temperature and Humidity Sensors installation Scheme

RESEARCH RESULT

The data monitoring system examination need IDE Arduino as the program to control the DHT11 Sensors. The examination by experimenting installation DHT11 Sensors devices on the server rack on the Data Center room with a condition where Sensors get stimulated directly by the cold air.

Figure 4 Temperature and Humidity Sensors testing on the Cold Air

On the 30 days of testing, there are the temperature and humidity Sensors logs as seen on Figure 4, then the data on the Sensors logs tested on One Sample T test.

Table 1 Sensors 1 DTH11 Temperature Data

No	*Temperature*	Thermometer	No	*Temperature*	Thermometer
1	20.4	21.1	16	21.3	20.8
2	20.6	21	17	21.5	20.5
3	20.8	21.2	18	21.4	20.8
4	21.1	21.2	19	21.1	20.8
5	20.7	21.1	20	21.1	21.6
6	20.5	21.3	21	21.2	21.1
7	20.8	21.1	22	21.1	20.1
8	20.8	21.2	23	20.1	20.7
9	21.6	21.1	24	20.7	20.2
10	20.9	21.2	25	20.2	21.3
11	20.1	21.1	26	20.8	21.5
12	20.3	21.2	27	20.8	21.1
13	20.8	21.1	28	21.6	21.2
14	21.1	20.1	29	21.0	21.1
15	21.0	20.3	30	20.7	21.0
Nilai rata-rata Thermometer :					**21**

After 30 days of testing, as seen on table 1, the logs then processed on SPSS to determine if the data has Normality according to the reference comparison of the thermometer, the result can be seen on figure 5 and figure 6.

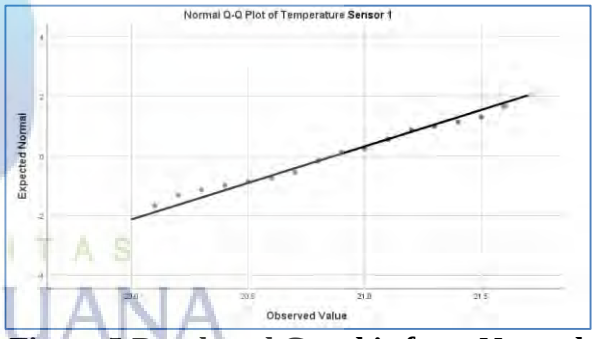

Figure 5 Developed Graphic from Normal Temperature Sensors 1

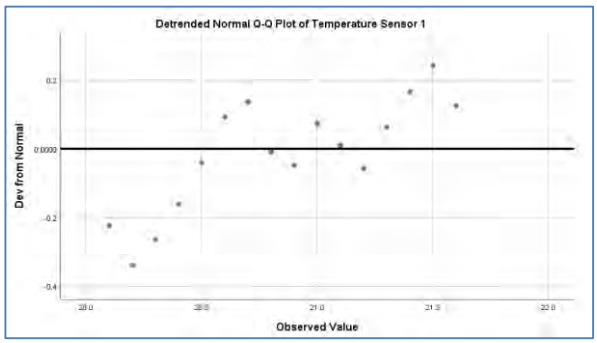

Figure 6 Expected Normal Temperature Sensors 1 Graphic

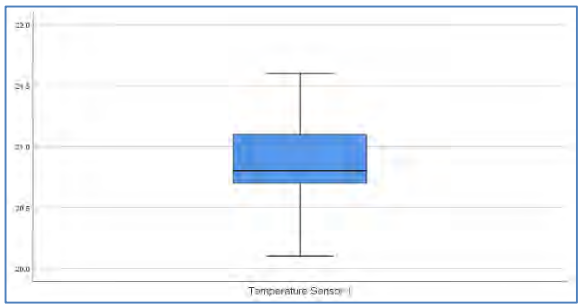

Figure 7 Temperature Sensors 1 Graphic

On Figure 7, there is graphic show the 30 days of testing logs.

Table 2 Test of Normality Temperature Sensors 1

Tests of Normality						
	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
DATA *TEMPERATURE*	.105	30	.200*	.966	30	.443
*. This is a lower bound of the true significance.						
a. Lilliefors Significance Correction						

The Sensors 1 analytic result is:

Sig. Shapiro wilk value > 0.05 = data is normally distributed. Nilai Sig. Shapiro wilk < 0.05 = data is not normally distributed.

By the output of table 2, sig. Shapiro-Wilk is 0.443. The value is greater than 0.05 which mean the data is normally distributed. Thearefore the data is fullfil the assumption to continuing to the One Sample T Test testing as seen on table 3.

Table 3 One-Sample T test Temperature Sensors 1

One-Sample Statistics				
	N	Mean	Std. Deviation	Std. Error Mean
DATA *TEMPERATURE*	30	20.870	.4086	.0746

One-Sample Test						
	Test Value = 21					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
DATA *TEMPERATURE*	-1.742	29	.092	-.1300	-.282	.022

One Sample T Test Interpretation:

It displays the statistical value of the Temperature variable on Sensors 1 as follows: The number of samples is 30, the average value of Temperature Sensors 1 is 20.870, the standard deviation is .4086 and the mean standard error is 0.746.

Hypothesis:

H0: There are no significant different between the Sensors 1 and temperature data.

H1: There are significant different between the Sensors 1 and temperature data

Criteria for Acceptance/Rejection of Hypotheses:

H0 will be rejected if Sig.(2-tailed) < 0.05. H0 will be accepted if Sig.(2-tailed) > 0.05.

Based on processed data result where Sig.(2-tailed) value is 0.092, it means H0 is accepted which conclude that there are no significant different between the Sensors 1 and thermometer data.

After the normality test and One Simple T test over the temperature Sensors result has been collected, then the same testing will be done with the humidity level based on the 30 days log as seen on table 4.

Table 4 Humidity Sensors 1 DHT11 Data

No	*Humidity*	Thermometer	NO	*Humidity*	Thermometer
1	61.0	60.5	16	60.8	60.8
2	61.2	60.3	17	60.7	61.5
3	61.1	61.6	18	61.2	61.4
4	60.2	61.8	19	61.1	60.3
5	61.5	61.5	20	62.1	60.8
6	62.1	60.4	21	61.2	61.7
7	61.0	61.3	22	61.0	61.7
8	61.4	61.2	23	60.4	61.1
9	61.6	61.5	24	61.6	60.6
10	62	60.7	25	60.2	61.4
11	61.1	60.5	26	60.2	61.8
12	61.0	60.8	27	61.4	61.5
13	61.1	61.3	28	61.6	61.1
14	61.0	60.3	29	61.1	60.1
15	60.4	60.6	30	60.9	60.4
Rata-Rata nilai *Humidity* Thermometer					61

The normal humidity Sensors is expected to be seen increasing, as shown in Figure 8.

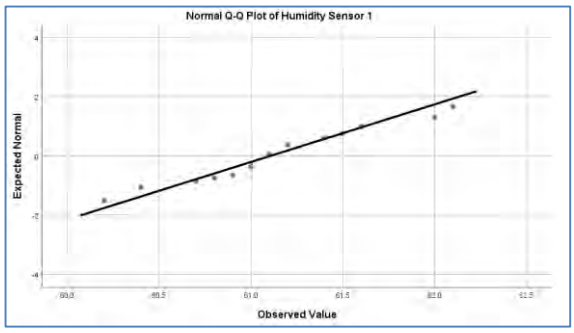

Figure 8 Expected Normal Humidity Sensors Graphic

The developed normal humidity Sensors can be seen on figure 9 where the gathered value is a little scattered.

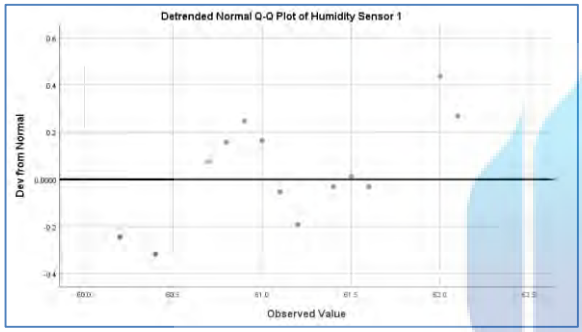

Figure 9 Dev From Normal Humidity Sensors Graphic

Meanwhile the humidity value from Sensors 1 can be seen on figure 10.

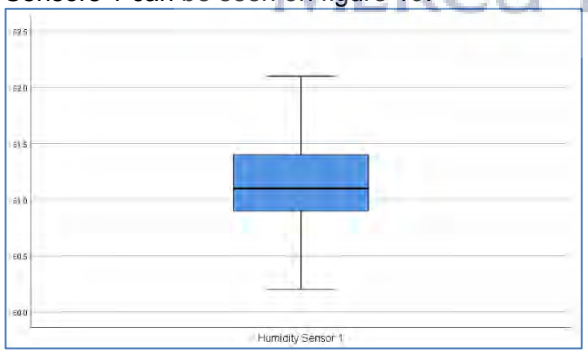

Figure 10 Humidity Sensors 1 Graphic

Based on the output shown on table 5, sig. Shapiro-Wilk is 0.141. The value is greater than 0.05 which conclude that the data is normally distributed.

Table 5 Test of Normality *Humidity* Sensors 1

Tests of Normality						
	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Data *Humidity*	.151	30	.078	.947	30	.141
a. Lilliefors Significance Correction						

The normality testing on the table shown Sig. Shapiro wilk > 0.05 = data is normally distributed and Sig. Shapiro wilk < 0.05 = data is not normally distributed.

Therefore the data is fulfil the assumption to continuing to the One Sample T Test testing as seen on table 6.

Table 6 One-Sample T test *Humidity* Sensors 1

One-Sample Statistics				
	N	Mean	Std. Deviation	Std. Error Mean
DATA *HUMIDITY*	30	61.106	.5145	.0939

One-Sample Test						
	Test Value = 61					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference Lower	Upper
DATA *HUMIDITY*	1.135	29	.266	.1067	-.085	.298

RESULT DISCUSSION

Describes the statistical value of the Humidity variable on Sensors 1 as follows: The number of sampling is 30, the average value of the Humidity Sensors 1 is 61.106, the standard deviation is .5145 and the mean standard error is .0939.

Hypothesis:

H0: There are no significant different between the Sensors 1 and Thermometer data.

H1: There are significant different between the Sensors 1 and Thermometer data.

Criteria for Acceptance/Rejection of Hypotheses:

H0 will be rejected if Sig.(2-tailed) < 0.05. H0 will be accepted if Sig.(2-tailed) > 0.05.

Based on processed data on table 4, Sig.(2-tailed) vale is 0.266 that's conclude that H0 is accepted because there are no significant different on Sensors 1 and thermometer.

CONCLUSION

Based on analytics result, it was found that Sensors DHT11 and Node MCU ESP 8266 can be used to monitor room temperature and humidity where Sensors DHT11 can read the temperature and be processed using Node MCU ESP8266 and proven that there is no significant different on data reading between the Sensors and thermometer.

Contribution

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COVER LETTER

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[6 Juli 2022]

Dear,

I/We wish to submit an original research article entitled "[**Temperature and Humidity Sensor System Implementation in Data Center Using TIA-942 Standardization and PPDIOO Method**]" for consideration by SINERGI.

I/We confirm that this work is original and has not been published elsewhere, nor is it currently under consideration for publication elsewhere.

In this paper, I/we report on / show that:

Field	:	Data Center Infrastructure
Topic	:	Data Center Room Temperature And Humidity Monitoring Sensor
Brief Background	:	The background of this research is about making temperature and humidity sensors that can be monitored via a smartphone
Research Problem	:	To replace the data center room temperature and humidity monitoring system that still uses manual temperature and humidity sensors
Overview of Method	:	Prepare (Persiapan), Plan (Perencanaan), Design (Desain), Implement (Implementasi), Operate (Operasional), and Optimize (Optimalisasi).
Significant finding	:	In this study, there is efficiency when monitoring the data center room using a mobile system that is mediated through a wireless network

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Thank you for your consideration of this manuscript.

Sincerely,
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_____

KERTAS KERJA - CODING

```
#include <Adafruit_Sensor.h>

#include <Arduino.h>
#include <ArduinoJson.h>
#include <FS.h>
#include "DHT.h"
#include <DHT_U.h>
#include <BlynkSimpleEsp8266.h>
#include <WiFiManager.h>
```

//Berfungsi sebagai library untuk mengkoneksikan logikal alat yang akan digunakan

```
#define DHTTYPE DHT11
#define RELAY D5
#define LED_A D8
#define LED_B D7

#define AUTH ""
#define WIFI_SSID "rumahkucing"
#define WIFI_PASS "1sl4m4g4m4ku"
```

//Define sendiri merupakan sebuah statement yang biasa digunakan untuk membuat atau mendeklarasikan fixed variables (variabel tetap)

```
DHT dht(D2, DHTTYPE);
DHT dht2(D3, DHTTYPE);
DHT dht3(D4, DHTTYPE);
DHT dht4(D6, DHTTYPE);
DHT dhts[4] = {dht, dht2, dht3, dht4};
```

```
//dht adalah Sensor 1, dht2 adalah sensor 2, dht3 adalah sensor 3, dht4 adalah sensor 4

struct WirelessSettings{
const char* AP_SSID =  "Healthy Monitor";
const char* AP_PASS = "12345678";
char blynkToken[65];
bool saveConfigState = false;
String blynkTokenStr;
}connection;

//Structure atau struct adalah kumpulan dari beberapa variabel dengan beragam tipe data yang dibungkus dalam satu varabel. Pemberian tanda "*" untuk data string

//Const sendiri merupakan sebuah statement yang biasa digunakan untuk membuat atau mendeklarasikan fixed variables (variabel tetap)

//Tipe data boolean adalah tipe data yang hanya bisa diisi salah satu dari 2 nilai: true atau false.

void connectBlynk();
String ipToString(IPAddress ipA);
void callback(WiFiManager *myWiFiManager);
void saveConfigCallback();
void writeFile(const char* path, const char *data);
String readFromFile(const char* path, const char* data);
void saveBlynkToken(const char *paramValue);

unsigned long tick;

//Void yaitu kata kunci (Keyword) atau kode yang digunakan hanya untuk mendeklarasikan fungsi (membuat fungsi umum pada setiap program).
```

Tujuanya agar fungsi atau program yang sudah di deklarasikan atau sudah dipanggil tidak mengembalikan informasi atau perintah ke fungsi atau program asal pemanggilan. Dalam ARDUINO IDE, terdapat 2 Void yang harus ada (wajib) yaitu Void Setup dan Void Loop.

```
BLYNK_WRITE(V13){
if(param.asInt() == 1){
digitalWrite(LED_A, HIGH);
digitalWrite(LED_B, HIGH);
Serial.print("AP Mode: ");
Serial.println(param.asInt());
// WiFi.disconnect();

Blynk.disconnect();
WiFiManagerParameter customParam("token", "Blynk Token",
connection.blynkToken, 50);
//BlynkToken untuk mengkoneksikan antara smartphone dengan cloud Blynk

WiFiManager wm;
wm.setDebugOutput(false);
wm.setAPCallback(&callback);
wm.setSaveConfigCallback(saveConfigCallback);
wm.addParameter(&customParam);
// WiFi.mode(WIFI_AP);

if(wm.startConfigPortal(connection.AP_SSID, connection.AP_PASS)){
Serial.print("SSID: ");
Serial.println(WiFi.SSID());
Serial.print("IP: ");
Serial.println(WiFi.localIP());
saveBlynkToken(customParam.getValue());
}
```

```
Serial.println("Press Reset Button to Aplly Change");
Blynk.config(connection.blynkTokenStr.c_str(), "iot.serangkota.go.id",
8080);
while(Blynk.connect() != true) {}
Serial.println("Connected To Blynk");
Blynk.virtualWrite(V14, WiFi.SSID());
Blynk.virtualWrite(V15, ipToString(WiFi.localIP()));
digitalWrite(LED_A, LOW);
}
}
// Serial Print berfungsi sebagai perintah untuk tampilan serial yang terdeteksi
oleh komputer saat melakukan koneksi serial

void setup() {
Serial.begin(115200);
pinMode(LED_A, OUTPUT);
pinMode(LED_B, OUTPUT);
pinMode(RELAY, OUTPUT);

//Void Setup yaitu kata kunci (Keyword) atau kode fungsi yang hanya berjalan
satu kali yaitu pada awal atau pertama kali program dijalankan. Fungsi Void
Setup yaitu untuk mendeklarasikan perintah pada setiap variabel, menentukan
pin mode, menentukan boudread pada serial monitor dan lain-lain. Intinya Void
Setup yaitu pengaturan awal pada setiap proram ARDUINO IDE yang dibuat.

if(SPIFFS.begin()){
if(!SPIFFS.exists("/config.json")){
File file = SPIFFS.open("/config.json", "w");
StaticJsonDocument<250> doc;
doc["blynk_token"] = "";
serializeJson(doc, file);
}
}
```

```
//Setelah boudrate terdeteksi, maka program akan melanjutkan interkoneksi ke bylnk token yang sudah kita input di konfigurasi WI-FI aksespoint

dht.begin();
dht2.begin();
dht3.begin();
dht4.begin();

connectBlynk();
}

//dht adalah Sensor 1, dht2 adalah sensor 2, dht3 adalah sensor 3, dht4 adalah sensor 4, akan di koneksikan ke aplikasi blynk


void loop() {
if(!Blynk.connected()){
connectBlynk();
}
//NodeMCU harus terkoneksi dengan bylnk untuk memonitoring sensor suhu, melalui koneksi wifi
Blynk.run();
if(millis() - tick > 2000){
tick = millis();
digitalWrite(LED_B, HIGH);
delay(50);
digitalWrite(LED_B, LOW);
delay(50);
digitalWrite(LED_B, HIGH);
delay(50);
digitalWrite(LED_B, LOW);
float h = dht.read*Humidity*();
```

```
float t = dht.readTemperature();

float h2 = dht2.readHumidity();
float t2 = dht2.readTemperature();

float h3 = dht3.readHumidity();
float t3 = dht3.readTemperature();

float h4 = dht4.readHumidity();
float t4 = dht4.readTemperature();
//Float h untuk Humidity sensor 1
//float t untuk Temperature sensor 1
//float h2 untuk Humidity sensor 2
//float t2 untuk Temperature sensor 2
//float h3 untuk Humidity sensor 3
//float t3 untuk Temperature sensor 3
//float h4 untuk Humidity sensor 4
//float t4 untuk Temperature sensor 5

if (isnan(h) || isnan(t)) {
Serial.println(F("Failed to read from DHT sensor!"));
return;
}
if (isnan(h2) || isnan(t2)) {
Serial.println(F("Failed to read from DHT2 sensor!"));
return;
}
if (isnan(h3) || isnan(t3)) {
Serial.println(F("Failed to read from DHT3 sensor!"));
return;
}
if (isnan(h4) || isnan(t4)) {
Serial.println(F("Failed to read from DHT4 sensor!"));
```

```
return;
}
```

//perintah untuk ketika sensor tidak dapat terbaca oleh program, maka akan menampilkan Print pada kolom tampilan serial monitoring.

```
Blynk.virtualWrite(V0, t);
Blynk.virtualWrite(V1, h);
Blynk.virtualWrite(V2, t2);
Blynk.virtualWrite(V3, h2);
Blynk.virtualWrite(V4, t3);
Blynk.virtualWrite(V5, h3);
Blynk.virtualWrite(V6, t4);
Blynk.virtualWrite(V7, h4);

Serial.print("H: ");
Serial.print(h);
Serial.print("\tT: ");
Serial.print(t);

Serial.print(" | H2: ");
Serial.print(h2);
Serial.print("\tT2: ");
Serial.print(t2);

Serial.print(" | H3: ");
Serial.print(h3);
Serial.print("\tT3: ");
Serial.print(t3);

Serial.print(" | H4: ");
Serial.print(h4);
```

```
Serial.print("\tT4: ");
Serial.println(t4);
}
}
```
//Serial.Print pada ARDUINO IDE berfungsi untuk menampilkan Input atau Output pada Serial Monitor. Data yang ditampilkan dapat berupa karakter, angka, byte, variable dan lain-lain.

//perintah untuk menampilkan program dengan mengkoneksikan program agar terbaca di serial monitor, namun akan terbaca secara grafik jika menggunakan smartphone untuk monitoring, karena bantuan GUI dari Blynk

```
void connectBlynk(){
digitalWrite(LED_A, HIGH);
digitalWrite(LED_B, LOW);
WiFiManagerParameter customParam("token", "Blynk Token",
connection.blynkToken, 50);
WiFiManager wm;
wm.setDebugOutput(false);
wm.setAPCallback(&callback);
wm.setSaveConfigCallback(saveConfigCallback);
wm.addParameter(&customParam);
if(wm.autoConnect(connection.AP_SSID, connection.AP_PASS)){
Serial.print("SSID: ");
Serial.println(WiFi.SSID());
Serial.print("IP: ");
Serial.println(WiFi.localIP());
```
//Serial.Print pada ARDUINO IDE berfungsi untuk menampilkan Input atau Output pada Serial Monitor. Data yang ditampilkan dapat berupa karakter, angka, byte, variable dan lain-lain.
```
saveBlynkToken(customParam.getValue());
}
Serial.println("Connecting to Blynk...");
```

```
Blynk.config(connection.blynkTokenStr.c_str(), "iot.serangkota.go.id",
8080);
while(Blynk.connect() != true) {}
Serial.println("Connected To Blynk");
Blynk.virtualWrite(V14, WiFi.SSID());
Blynk.virtualWrite(V15, ipToString(WiFi.localIP()));
digitalWrite(LED_A, LOW);
}
```

//Void yaitu kata kunci (Keyword) atau kode yang digunakan hanya untuk mendeklarasikan fungsi (membuat fungsi umum pada setiap program). Tujuanya agar fungsi atau program yang sudah di deklarasikan atau sudah dipanggil tidak mengembalikan informasi atau perintah ke fungsi atau program asal pemanggilan. Dalam ARDUINO IDE, terdapat 2 Void yang harus ada (wajib) yaitu Void Setup dan Void Loop.

//Void ConnectBlynk berfungsi sebagai fungsi untuk koneksi antara program, perangkat keras menggunakan media wifi, dengan library wifi yang sudah kita include pada awal program yaitu wifiManager dan dengan input bylnk token dari smartphone


```
String ipToString(IPAddress ipA){
String s="";
for (int i=0; i<4; i++)
s += i  ? "." + String(ipA[i]) : String(ipA[i]);
return s;
}
//Untuk mengkonversikan IP Address ke dalam string
void callback(WiFiManager *myWiFiManager){
digitalWrite(LED_A, HIGH);
digitalWrite(LED_B, HIGH);
Serial.println("Starting AP...\n");
}
```

```
//CallBack Librari Wifi Manager untuk memanggil kembali Librari Wifi Manager untuk koneksi ke ESP8266

void saveConfigCallback(){
connection.saveConfigState = true;
}

void writeFile(const char* path, const char* data){
delay(1000);
File file = SPIFFS.open(path, "w");
StaticJsonDocument<250> doc;
doc["blynk_token"] = data;
if(serializeJson(doc, file) == 0){
// Serial.println("Failed to write file!");
}
else{
Serial.println("Success to write file\n");
}
file.close();
```



```
//Untuk menyimpan log dari aplikasi blynk untuk disimpan menjadi file, berhasil menyimpan atau tidak, tetap akan ditampilkan di tampilan serial monitor

}

String readFromFile(const char* path, const char* data){
String value;
File file = SPIFFS.open(path, "r");
if(file){
StaticJsonDocument<250> doc;
deserializeJson(doc,file);
```

```
String temp = doc[data].as<String>();
value = temp;
}
file.close();
return value;
}
```

//Untuk membaca kembali log kasil dari penyimpanan file untuk di tampilkan di aplikasi blynk

```
void saveBlynkToken(const char *paramValue){
if(connection.saveConfigState){
strcpy(connection.blynkToken, paramValue);
writeFile("/config.json", connection.blynkToken);
}
if(SPIFFS.exists("/config.json")){
connection.blynkTokenStr = readFromFile("/config.json", "blynk_token");
Serial.print("Blynk Token: ");
Serial.println(connection.blynkTokenStr);
connection.saveConfigState = false;
}
}
```


//Untuk menyimpan konfigurasi blynk token

	Temperature_Sensor_1	Thermometer_Temperature_1	Humidity_Sensor_1	Thermometer_Humidity_1	Temperature_Sensor_2	Thermometer_Temperature_2	Humidity_Sensor_2	Thermometer_Humidity_2	Temperature_Sensor_3	Thermometer_Temperature_3	Humidity_Sensor_3	Thermometer_Humidity_3	Temperature_Sensor_4	Thermometer_Temperature_4	Humidity_Sensor_4	Thermometer_Humidity_4
1	20.40	21.10	61.00	60.50	21.10	21.10	60.00	60.50	20.70	21.10	60.00	60.50	21.40	21.10	53.00	60.50
2	20.60	21.00	61.20	60.30	21.20	21.00	60.80	60.30	21.70	21.00	60.50	60.30	21.30	21.00	54.80	60.30
3	20.80	21.20	61.10	61.60	20.90	21.20	61.00	61.60	21.20	21.20	61.00	61.60	21.20	21.20	55.30	61.60
4	21.10	21.20	60.20	61.80	21.10	21.20	60.30	61.80	20.90	21.20	60.30	61.80	21.50	21.20	54.30	61.80
5	20.70	21.10	61.50	61.50	20.90	21.10	60.70	61.50	21.20	21.10	60.70	61.50	21.00	21.10	53.60	61.50
6	20.50	21.30	62.10	60.40	20.80	21.30	60.40	60.40	21.20	21.30	60.90	60.40	20.90	21.30	54.50	60.40
7	20.80	21.10	61.00	61.30	21.20	21.10	60.90	61.00	20.80	21.10	60.40	61.30	21.10	21.10	53.70	61.30
8	20.80	21.20	61.40	61.20	21.10	21.20	61.10	61.20	20.90	21.20	59.70	61.20	21.40	21.20	53.60	61.20
9	21.60	21.10	61.60	61.50	21.00	21.10	60.80	61.50	20.50	21.10	60.40	61.50	21.30	21.10	53.90	61.50
10	20.90	21.20	62.00	60.70	21.20	21.20	60.70	60.70	20.80	21.20	60.10	61.70	21.10	21.20	53.90	61.70
11	20.10	21.10	61.10	60.50	20.90	21.10	61.20	60.50	20.90	21.10	60.50	60.50	21.50	21.10	53.00	60.50
12	20.30	21.20	61.00	60.80	20.80	21.20	60.80	60.80	21.10	21.20	60.80	60.80	21.00	21.20	53.70	60.80
13	20.80	21.10	61.10	61.30	21.20	21.10	60.20	61.30	21.30	21.10	60.70	61.30	20.90	21.10	53.60	61.30
14	21.10	20.10	61.00	60.30	21.40	20.10	60.10	60.30	21.40	20.10	60.70	61.30	21.20	20.10	53.70	61.30
15	21.00	20.30	60.40	60.60	21.40	20.30	61.60	60.60	21.10	20.30	61.60	61.60	21.30	20.30	53.90	61.60
16	21.30	20.80	60.80	60.80	20.50	21.30	61.90	60.80	21.90	21.30	60.70	60.80	21.10	20.80	53.90	60.80
17	21.50	20.50	60.70	61.50	20.80	21.50	60.50	61.50	22.10	21.50	60.90	61.50	21.30	20.50	54.10	61.50
18	21.40	20.80	61.20	61.40	20.80	21.40	61.10	61.40	21.10	21.40	60.80	61.40	21.00	20.80	54.20	61.40
19	21.10	20.80	61.10	60.30	21.10	21.10	60.50	60.30	20.70	21.10	61.60	60.30	20.90	20.80	54.00	60.30
20	21.10	21.60	62.10	60.80	20.90	21.10	60.70	60.80	20.50	21.10	60.70	60.80	21.10	21.60	53.70	60.80
21	21.20	21.10	61.20	61.70	21.10	21.20	60.40	61.70	20.10	21.20	60.40	61.70	21.20	21.10	53.70	61.70
22	21.10	20.10	61.00	61.70	20.90	21.10	59.70	61.70	20.00	21.10	59.90	61.70	21.10	20.10	53.60	61.70
23	20.10	20.70	60.40	61.10	20.90	20.10	60.40	61.10	20.50	20.10	60.40	61.10	21.10	20.70	53.70	61.10
24	20.70	20.20	61.60	60.60	21.30	20.70	60.10	60.60	20.70	20.70	60.10	60.60	21.20	20.20	53.90	60.60
25	20.20	21.30	60.20	61.40	20.90	20.20	60.50	61.40	20.20	20.20	61.00	61.40	21.10	21.30	54.20	61.40
26	20.80	21.50	60.20	61.80	20.80	20.80	61.20	61.80	20.80	20.80	61.00	61.80	21.10	21.50	53.00	61.80
27	20.80	21.10	61.40	61.50	21.40	20.80	62.10	61.50	20.80	20.80	61.50	61.50	20.80	21.10	53.40	61.50
28	21.60	21.20	61.60	61.10	20.70	21.60	61.20	61.10	20.80	21.60	61.80	61.10	21.20	21.20	53.50	61.10
29	21.00	21.10	61.10	60.10	20.80	21.00	60.50	60.10	21.50	21.00	60.90	60.10	21.00	21.10	53.10	60.10
30	20.70	21.00	60.90	60.40	21.20	20.70	60.40	60.40	21.10	20.70	61.70	60.40	20.70	21.00	53.40	60.40

Gambar 4. 1 Log Pencatatan Sensor *Temperature* & Kelembaban SPSS

	Name	Type	Width	Decimals	Label	Values	Missing	Columns	Align	Measure	Role
1	Temperature_Sensor_1	Numeric	8	2	Temperature Sensor 1	None	None	10	Right	Scale	Input
2	Thermometer_Temperature_1	Numeric	8	2	Thermometer Sensor 1	None	None	11	Right	Scale	Input
3	Humidity_Sensor_1	Numeric	8	2	Humidity Sensor 1	None	None	8	Right	Scale	Input
4	Thermometer_Humidity_1	Numeric	8	2	Thermometer Humidity 1	None	None	10	Right	Scale	Input
5	Temperature_Sensor_2	Numeric	8	2	Temperature Sensor 2	None	None	10	Right	Scale	Input
6	Thermometer_Temperature_2	Numeric	8	2	Thermometer Sensor 2	None	None	12	Right	Scale	Input
7	Humidity_Sensor_2	Numeric	8	2	Humidity Sensor 2	None	None	8	Right	Scale	Input
8	Thermometer_Humidity_2	Numeric	8	2	Thermometer Humidity 2	None	None	10	Right	Scale	Input
9	Temperature_Sensor_3	Numeric	8	2	Temperature Sensor 3	None	None	10	Right	Scale	Input
10	Thermometer_Temperature_3	Numeric	8	2	Thermometer Sensor 3	None	None	11	Right	Scale	Input
11	Humidity_Sensor_3	Numeric	8	2	Humidity Sensor 3	None	None	8	Right	Scale	Input
12	Thermometer_Humidity_3	Numeric	8	2	Thermometer Humidity 3	None	None	11	Right	Scale	Input
13	Temperature_Sensor_4	Numeric	8	2	Temperature Sensor 4	None	None	10	Right	Scale	Input
14	Thermometer_Temperature_4	Numeric	8	2	Thermometer Sensor 4	None	None	12	Right	Scale	Input
15	Humidity_Sensor_4	Numeric	8	2	Humidity Sensor 4	None	None	8	Right	Scale	Input
16	Thermometer_Humidity_4	Numeric	8	2	Thermometer Humidity 4	None	None	11	Right	Scale	Input

Gambar 4. 2 Variable View SPSS

SPSS Report DATASET

```
GET
FILE='D:\Kuliah\TUGAS AKHIR_Semester 8\Data Base Log Sensor.sav'.
DATASET NAME DataSet1 WINDOW=FRONT.
EXAMINE VARIABLES=Temperature_Sensor_1 Temperature_Sensor_2
Temperature_Sensor
```

_3
Temperature_Sensor_4
/PLOT BOXPLOT STEMLEAF NPPLOT
/COMPARE GROUPS
/STATISTICS DESCRIPTIVES
/CINTERVAL 95
/MISSING LISTWISE
/NOTOTAL.

Explore

Output Created		30-JUN-2022 12:17:06
Comments		
Input	Data	D:\Kuliah\TUGAS AKHIR_Semester 8\Data Base Log Sensor.sav
	Active Dataset	DataSet1
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	30
Missing Value Handling	Definition of Missing	User-defined missing values for dependent variables are treated as missing.
	Cases Used	Statistics are based on cases with no missing values for any dependent variable or factor used.

[DataSet1] D:\Kuliah\TUGAS AKHIR_Semester 8\Data Base Log Sensor.sav

Case Processing Summary

	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Temperature Sensor 1	30	100.0%	0	0.0%	30	100.0%
Temperature Sensor 2	30	100.0%	0	0.0%	30	100.0%
Temperature Sensor 3	30	100.0%	0	0.0%	30	100.0%
Temperature Sensor 4	30	100.0%	0	0.0%	30	100.0%

Descriptives

			Statistic	Std. Error
Temperature Sensor 1	Mean		20.8700	.07461
	95% Confidence Interval for Mean	Lower Bound	20.7174	
		Upper Bound	21.0226	
	5% Trimmed Mean		20.8722	
	Median		20.8000	
	Variance		.167	
	Std. Deviation		.40866	
	Minimum		20.10	
	Maximum		21.60	
	Range		1.50	
	Interquartile Range		.43	
	Skewness		-.126	.427
	Kurtosis		-.370	.833
Temperature Sensor 2	Mean		21.0100	.04106
	95% Confidence Interval for Mean	Lower Bound	20.9260	
		Upper Bound	21.0940	
	5% Trimmed Mean		21.0130	
	Median		20.9500	
	Variance		.051	
	Std. Deviation		.22491	
	Minimum		20.50	
	Maximum		21.40	
	Range		.90	
	Interquartile Range		.40	
	Skewness		.042	.427
	Kurtosis		-.471	.833
Temperature Sensor 3	Mean		20.9500	.08838
	95% Confidence Interval for Mean	Lower Bound	20.7693	
		Upper Bound	21.1307	
	5% Trimmed Mean		20.9407	
	Median		20.9000	
	Variance		.234	
	Std. Deviation		.48406	
	Minimum		20.00	
	Maximum		22.10	

Descriptives

			Statistic	Std. Error
	Range		2.10	
	Interquartile Range		.50	
	Skewness		.303	.427
	Kurtosis		.396	.833
Temperature Sensor 4	Mean		21.1333	.03534
	95% Confidence Interval for Mean	Lower Bound	21.0611	
		Upper Bound	21.2056	
	5% Trimmed Mean		21.1352	
	Median		21.1000	
	Variance		.037	
	Std. Deviation		.19357	
	Minimum		20.70	
	Maximum		21.50	
	Range		.80	
	Interquartile Range		.30	
	Skewness		-.050	.427
	Kurtosis		-.098	.833

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Temperature Sensor 1	.105	30	.200*	.966	30	.443
Temperature Sensor 2	.188	30	.009	.946	30	.132
Temperature Sensor 3	.108	30	.200*	.973	30	.630
Temperature Sensor 4	.135	30	.171	.971	30	.581

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Temperature Sensor 1

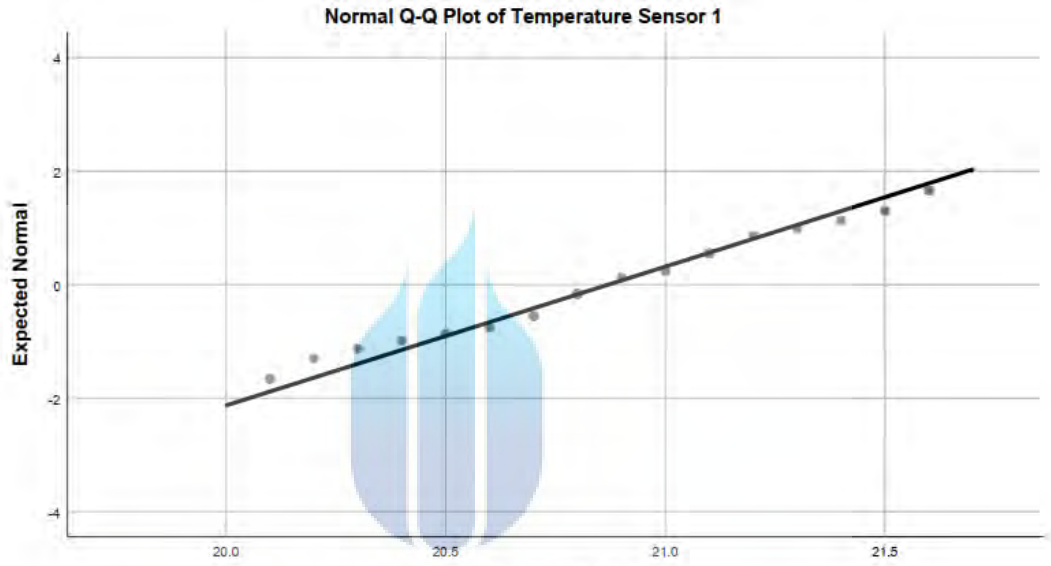
Temperature Sensor 1 Stem-and-Leaf Plot

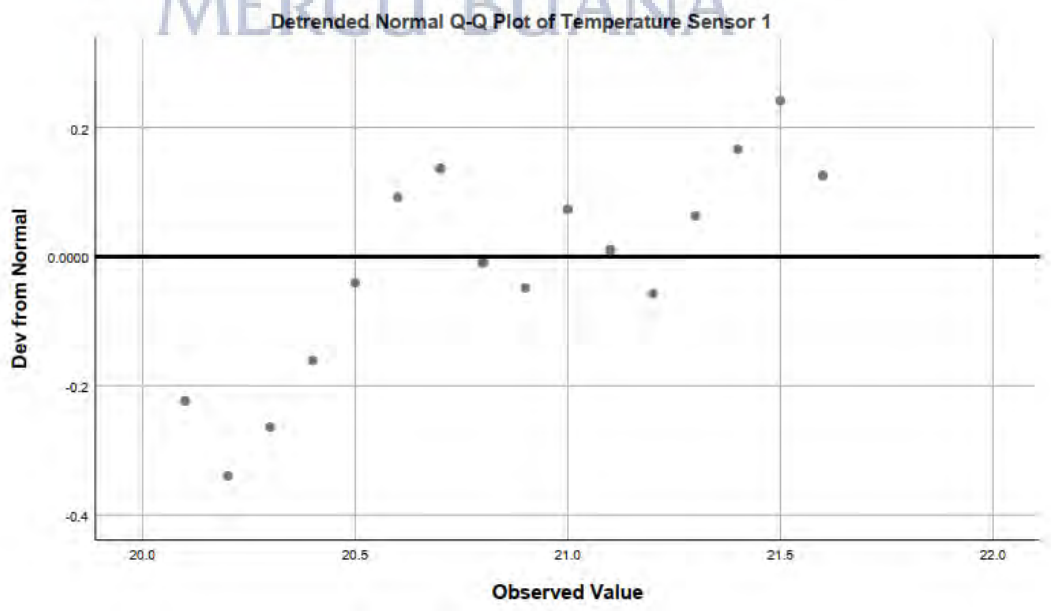
Frequency	Stem & Leaf
2.00	20.11
2.00	20.23
2.00	20.45

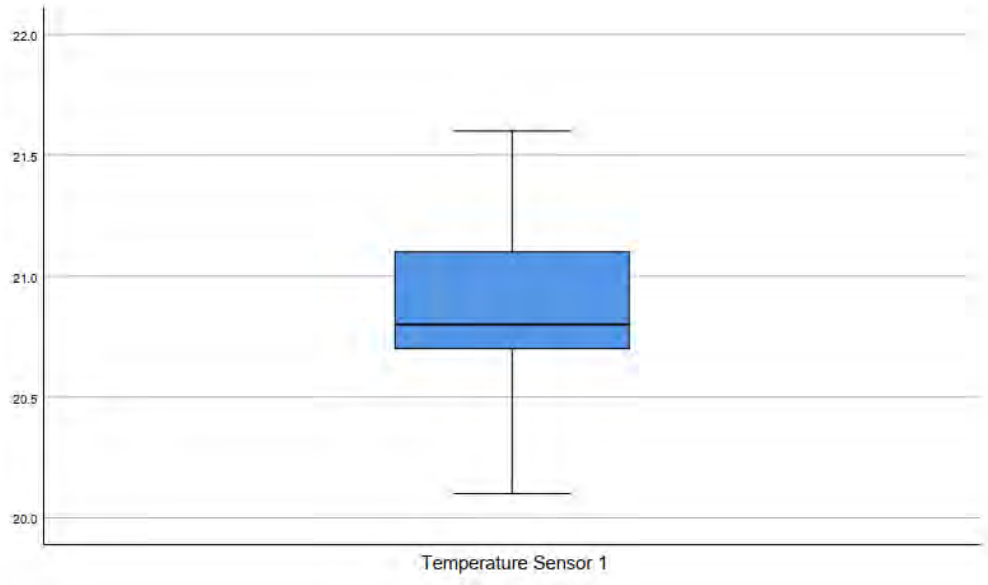
4.00	20.6777
7.00	20.888889
7.00	21.0011111
2.00	21.23
2.00	21.45
2.00	21.66

Stem width: 1.00
Each leaf: 1 case(s)

Normal Q-Q Plot of Temperature Sensor 1





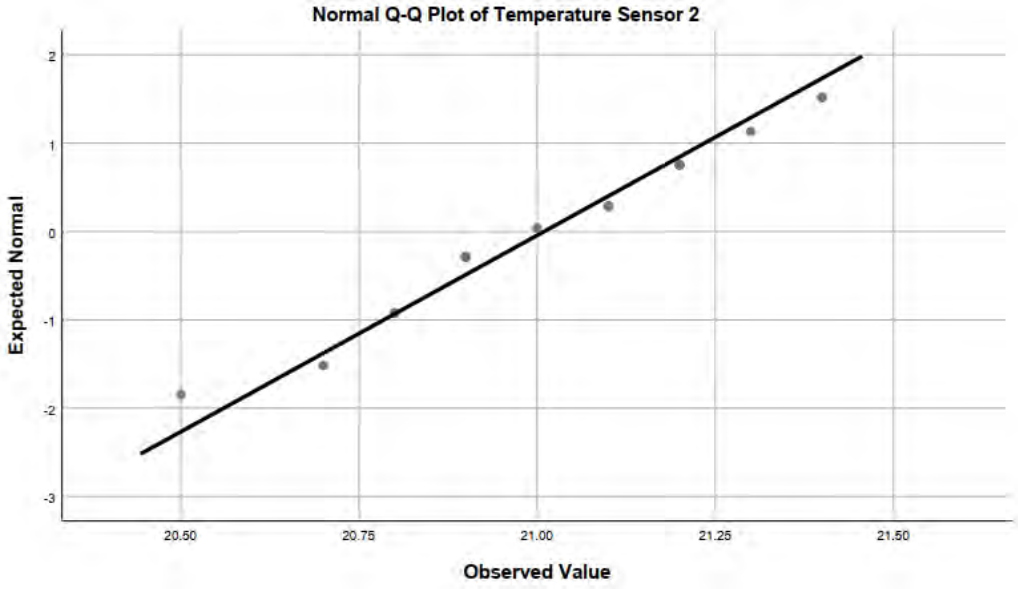


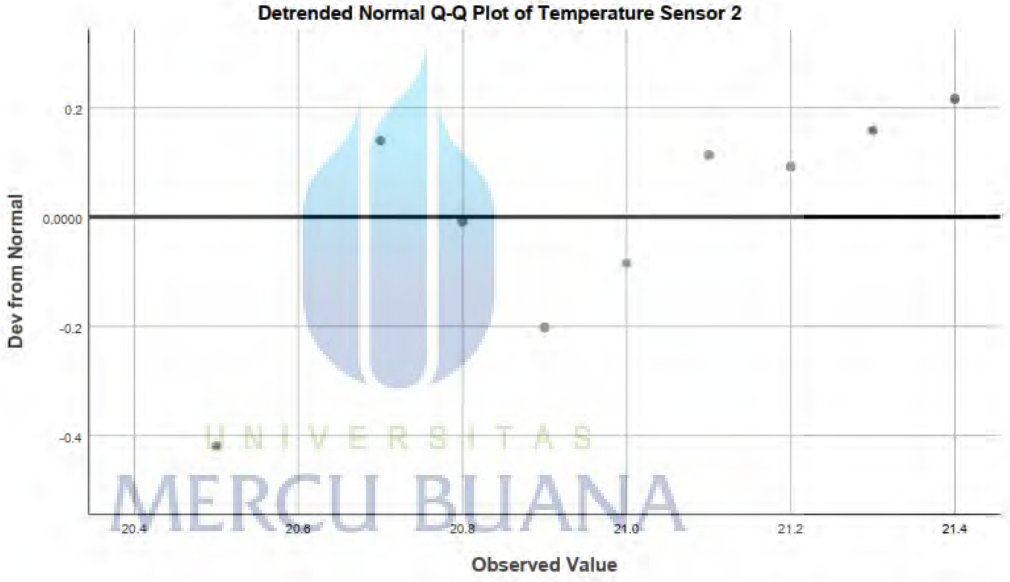
Temperature Sensor 2

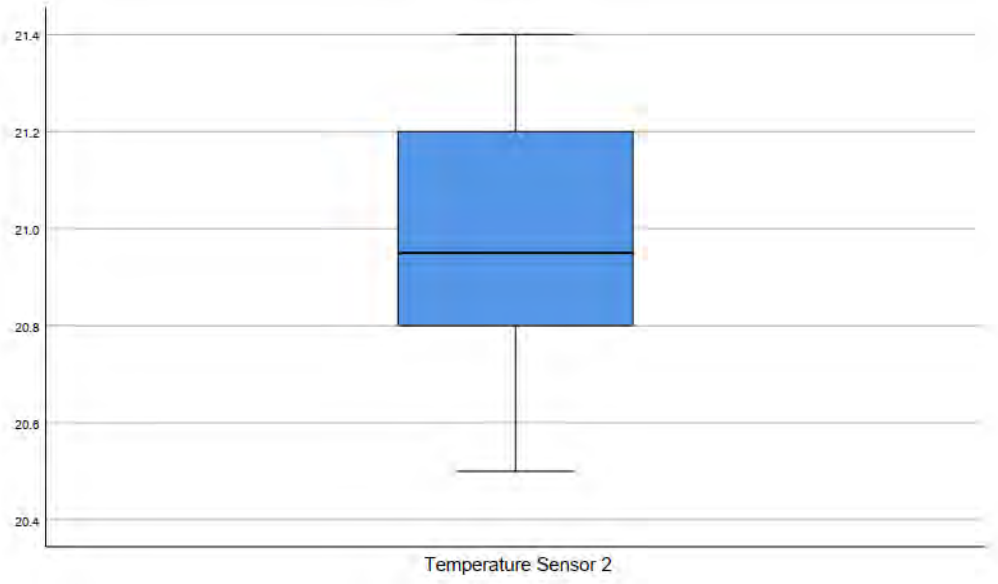
Temperature Sensor 2 Stem-and-Leaf Plot

Frequency	Stem & Leaf
1.00	205.0
.00	206.
1.00	207.0
6.00	208.000000
7.00	209.0000000
1.00	210.0
5.00	211.00000
5.00	212.00000
1.00	213.000

Stem width: .10
Each leaf: 1 case(s)





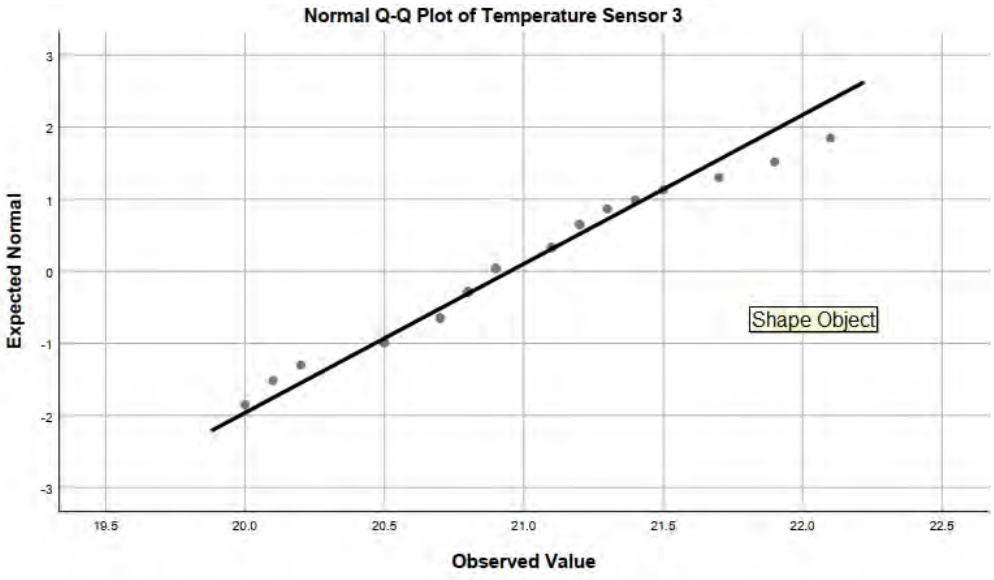


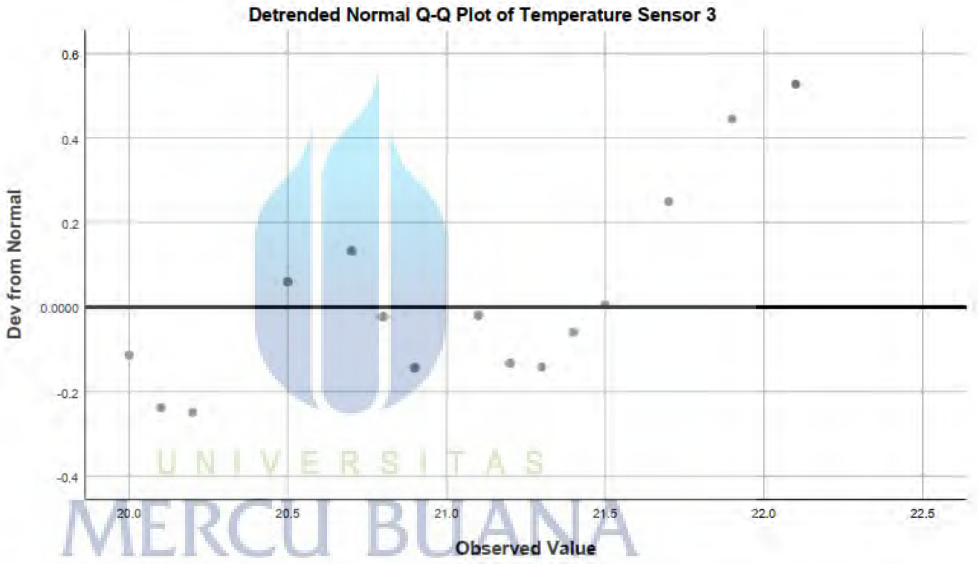
Temperature Sensor 3

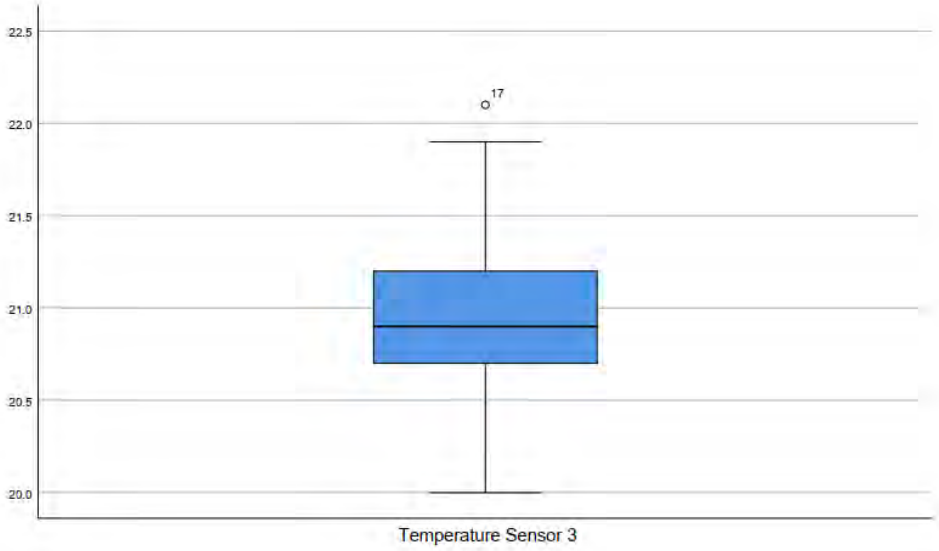
Temperature Sensor 3 Stem-and-Leaf Plot

Frequency	Stem & Leaf
2.00	20.01
1.00	20.2
3.00	20.555
3.00	20.777
8.00	20.88888999
4.00	21.1111
4.00	21.2223
2.00	21.45
1.00	21.7
1.00	21.9
1.00	Extremes (>=22.1)

Stem width: 1.00
Each leaf: 1 case(s)





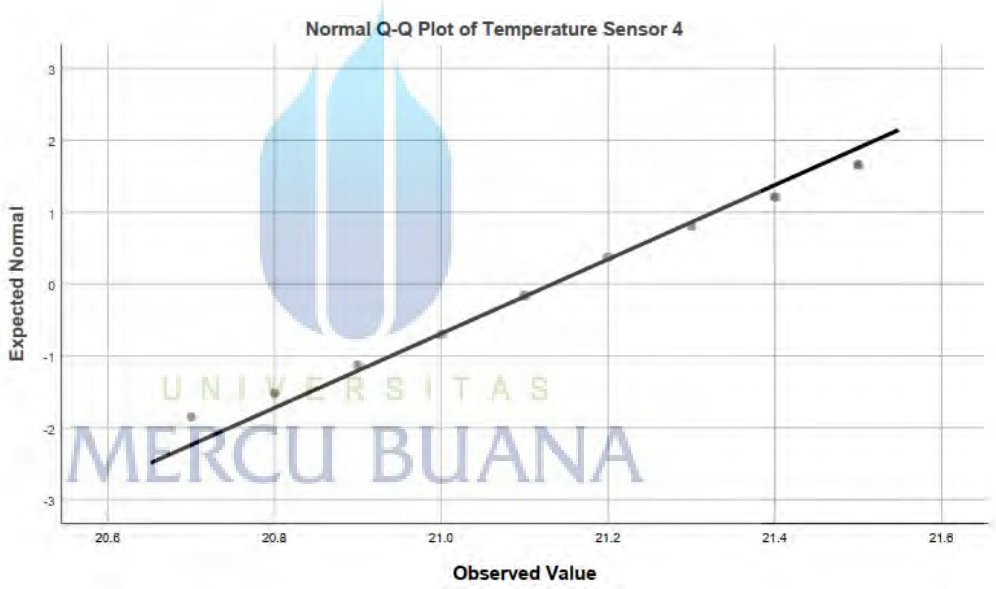


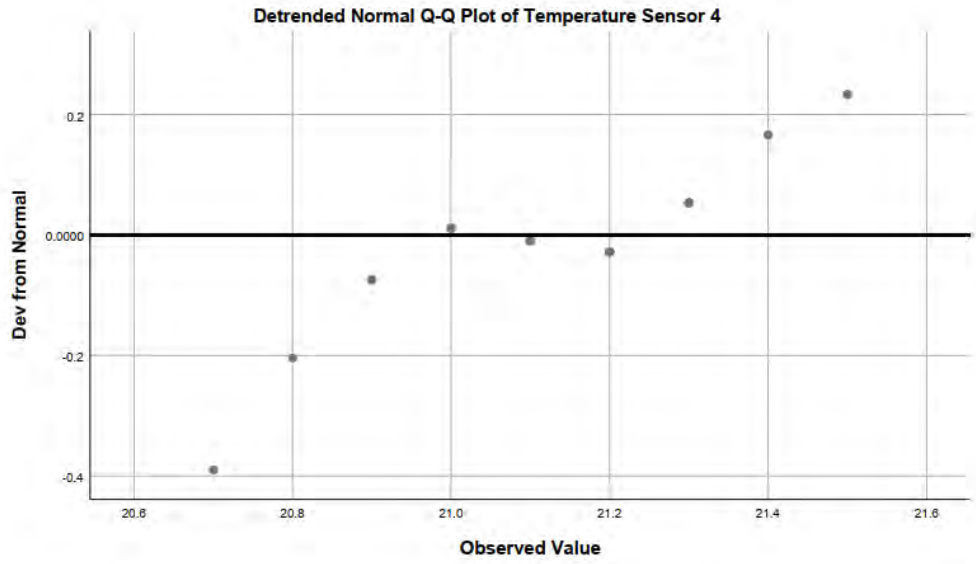
Temperature Sensor 4

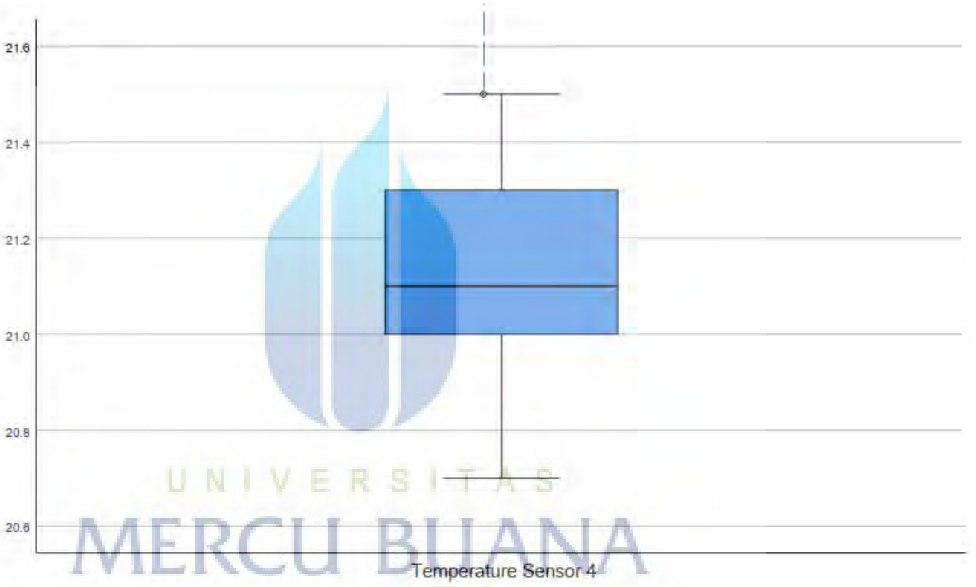
Temperature Sensor 4 Stem-and-Leaf Plot

Frequency	Stem & Leaf
1.00	207.0
1.00	208.0
3.00	209.000
4.00	210.0000
8.00	211.00000000
5.00	212.00000
4.00	213.0000
2.00	214.00
2.00	215.00

Stem width: .10
Each leaf: 1 case(s)







EXAMINE VARIABLES=Humidity_Sensor_1 Humidity_Sensor_2
Humidity_Sensor_3 Humidi

ty_Sensor_4
/PLOT BOXPLOT STEMLEAF NPPLOT
/COMPARE GROUPS
/STATISTICS DESCRIPTIVES
/CINTERVAL 95
/MISSING LISTWISE
/NOTOTAL.

Explore

Output Created		30-JUN-2022 12:17:35
Comments		
Input	Data	D:\Kuliah\TUGAS AKHIR_Semester 8\Data Base Log Sensor.sav
	Active Dataset	DataSet1
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	30
Missing Value Handling	Definition of Missing	User-defined missing values for dependent variables are treated as missing.
	Cases Used	Statistics are based on cases with no missing values for any dependent variable or factor used.
Syntax		EXAMINE VARIABLES=Humidity_Sensor_1 Humidity_Sensor_2 Humidity_Sensor_3 Humidity_Sensor_4 /PLOT BOXPLOT STEMLEAF NPPLOT /COMPARE GROUPS /STATISTICS DESCRIPTIVES /CINTERVAL 95 /MISSING LISTWISE /NOTOTAL.
Resources	Processor Time	00:00:03.89
	Elapsed Time	00:00:01.61

Case Processing Summary

	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Humidity Sensor 1	30	100.0%	0	0.0%	30	100.0%
Humidity Sensor 2	30	100.0%	0	0.0%	30	100.0%
Humidity Sensor 3	30	100.0%	0	0.0%	30	100.0%
Humidity Sensor 4	30	100.0%	0	0.0%	30	100.0%

Descriptives

			Statistic	Std. Error
Humidity Sensor 1	Mean		61.1067	.09395
	95% Confidence Interval for Mean	Lower Bound	60.9145	
		Upper Bound	61.2988	
	5% Trimmed Mean		61.1019	
	Median		61.1000	
	Variance		.265	
	Std. Deviation		.51457	
	Minimum		60.20	
	Maximum		62.10	
	Range		1.90	
	Interquartile Range		.55	
	Skewness		.026	.427
	Kurtosis		-.091	.833
Humidity Sensor 2	Mean		60.7267	.09918
	95% Confidence Interval for Mean	Lower Bound	60.5238	
		Upper Bound	60.9295	
	5% Trimmed Mean		60.7056	
	Median		60.7000	
	Variance		.295	
	Std. Deviation		.54326	
	Minimum		59.70	
	Maximum		62.10	
	Range		2.40	
	Interquartile Range		.70	
	Skewness		.680	.427
	Kurtosis		.605	.833

Descriptives

			Statistic	Std. Error
Humidity Sensor 3	Mean		60.7233	.09775
	95% Confidence Interval for Mean	Lower Bound	60.5234	
		Upper Bound	60.9233	
	5% Trimmed Mean		60.7185	
	Median		60.7000	
	Variance		.287	
	Std. Deviation		.53542	
	Minimum		59.70	
	Maximum		61.80	
	Range		2.10	

	Interquartile Range		.60	
	Skewness		.325	.427
	Kurtosis		-.224	.833
Humidity Sensor 4	Mean		53.7967	.09303
	95% Confidence Interval for Mean	Lower Bound	53.6064	
		Upper Bound	53.9869	
	5% Trimmed Mean		53.7667	
	Median		53.7000	
	Variance		.260	
	Std. Deviation		.50955	
	Minimum		53.00	
	Maximum		55.30	
	Range		2.30	
	Interquartile Range		.45	
	Skewness		.842	.427
	Kurtosis		1.697	.833

Tests of Normality

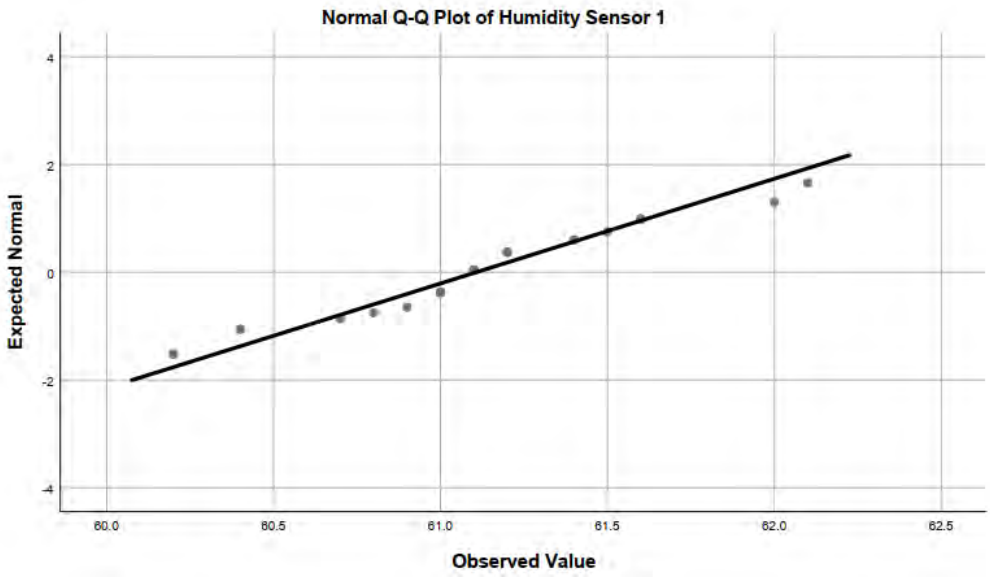
	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Humidity Sensor 1	.151	30	.078	.947	30	.141
Humidity Sensor 2	.128	30	.200*	.960	30	.315
Humidity Sensor 3	.136	30	.164	.959	30	.294
Humidity Sensor 4	.153	30	.071	.932	30	.055

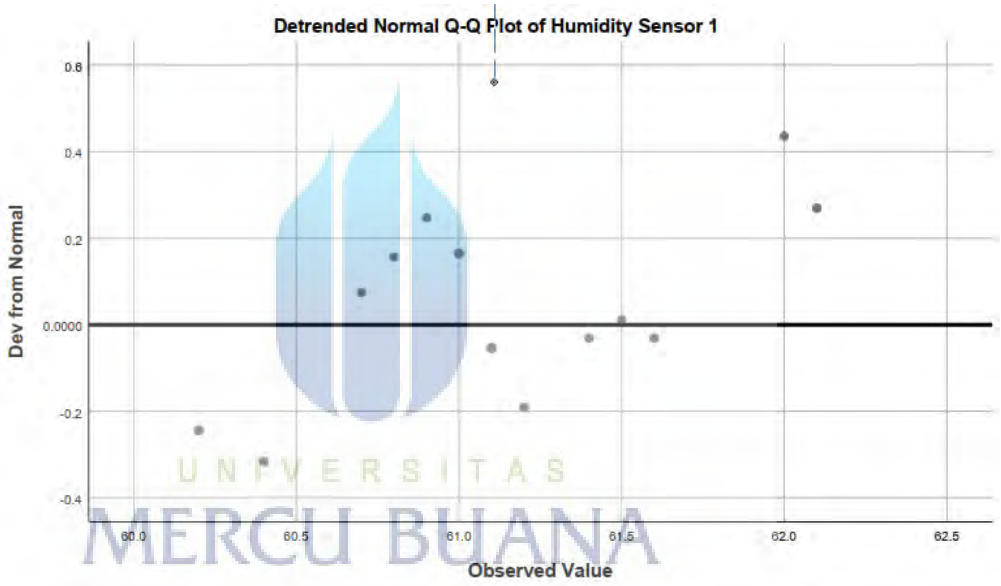
*. This is a lower bound of the true significance.
a. Lilliefors Significance Correction

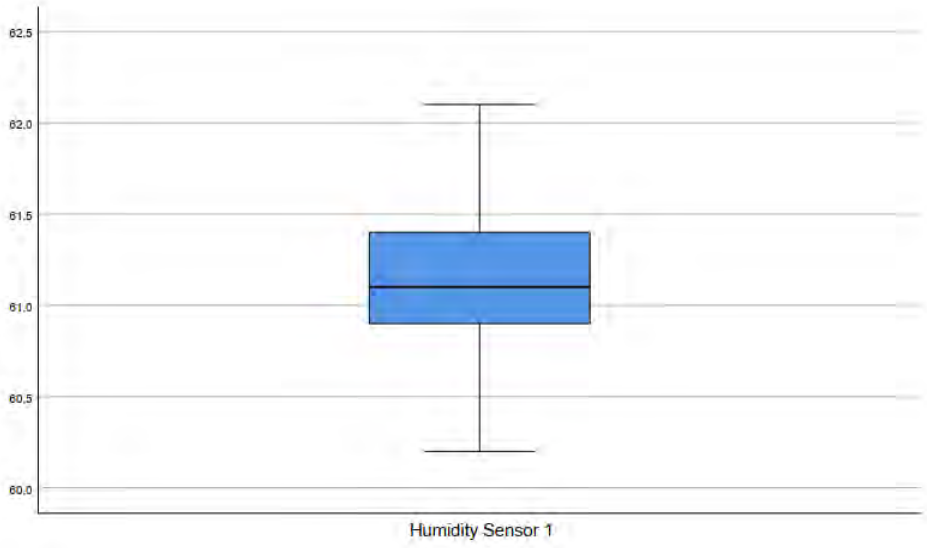
Humidity Sensor 1
Humidity Sensor 1 Stem-and-Leaf Plot

Frequency	Stem & Leaf
5.00	60.22244
3.00	60.789
15.00	61.000001111122244
4.00	61.5666
3.00	62.011

Stem width: 1.00
Each leaf: 1 case(s)





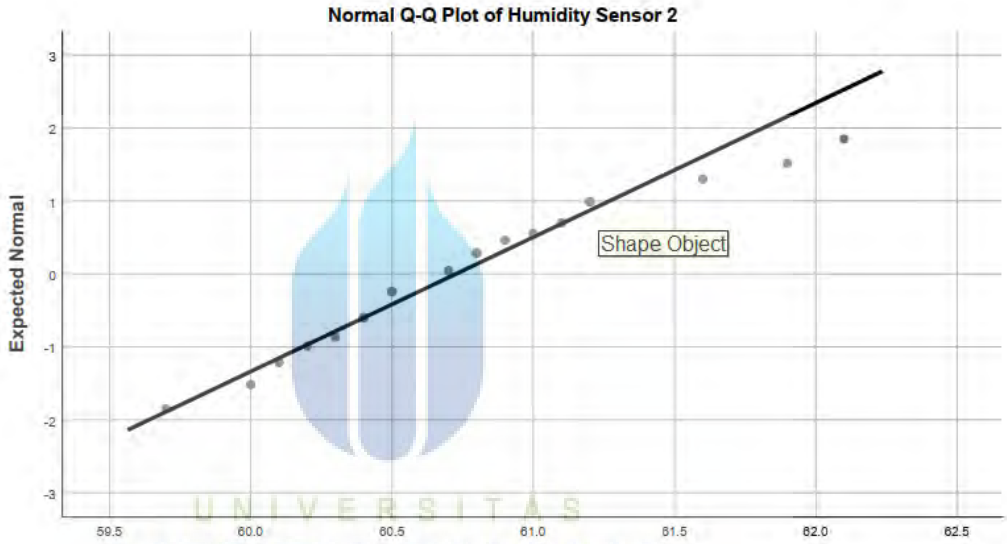


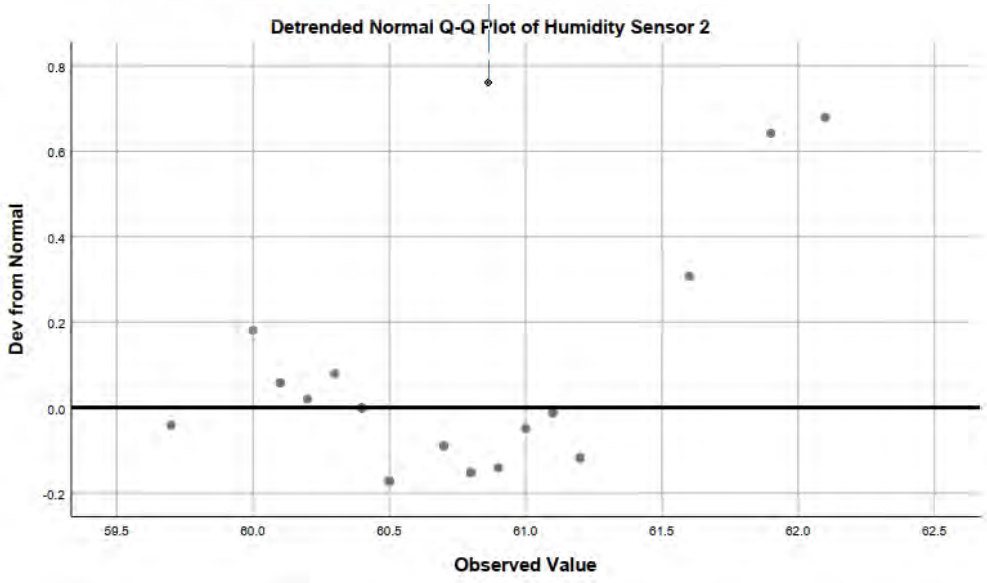
Humidity Sensor 2

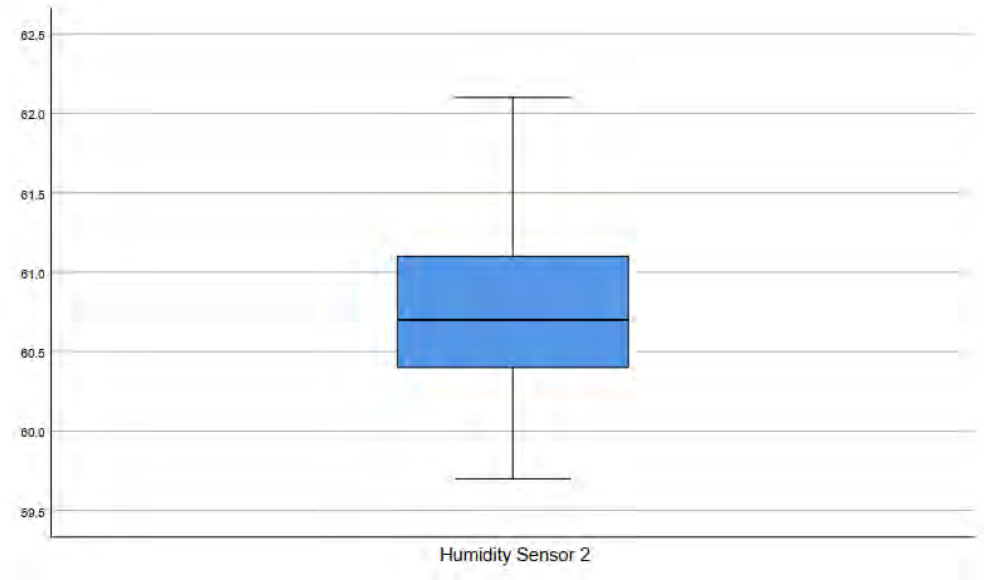
Humidity Sensor 2 Stem-and-Leaf Plot

Frequency	Stem & Leaf
1.00	59.7
9.00	60.011234444
11.00	60.55557778889
6.00	61.011222
2.00	61.69
1.00	62.1

Stem width: 1.00
Each leaf: 1 case(s)





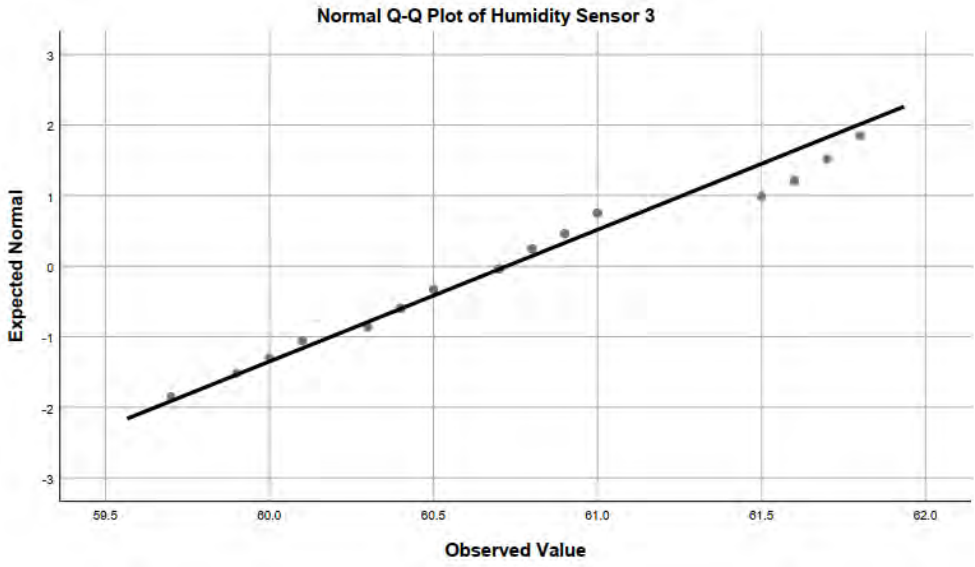


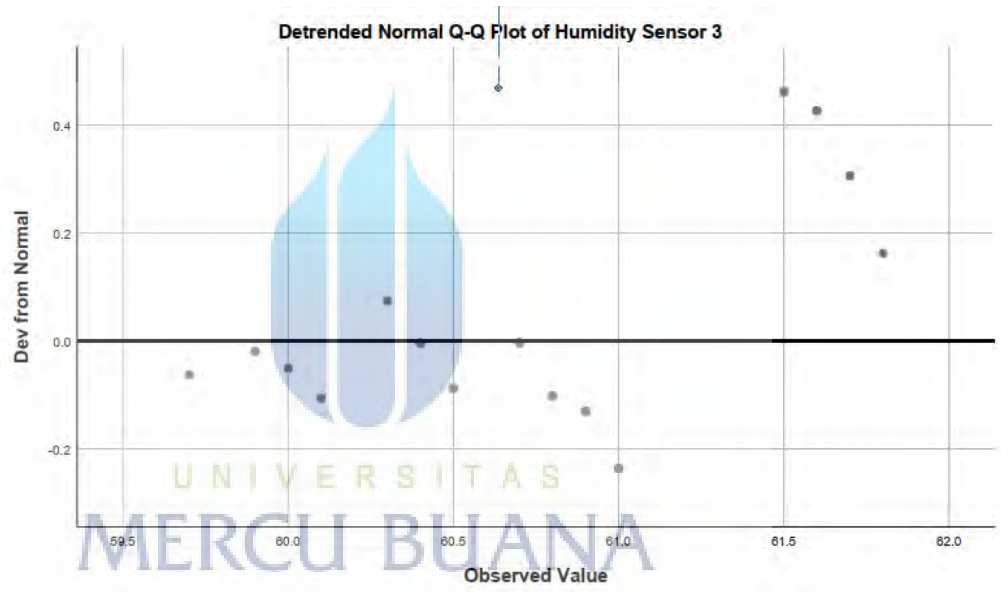
Humidity Sensor 3

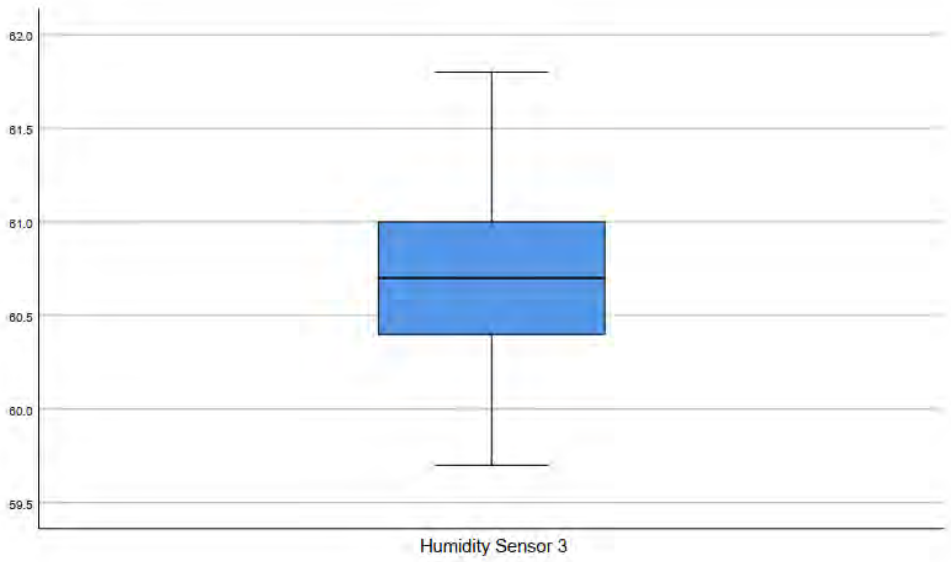
Humidity Sensor 3 Stem-and-Leaf Plot

Frequency	Stem & Leaf
2.00	59.79
8.00	60.01134444
12.00	60.557777788999
3.00	61.000
5.00	61.56678

Stem width: 1.00
Each leaf: 1 case(s)





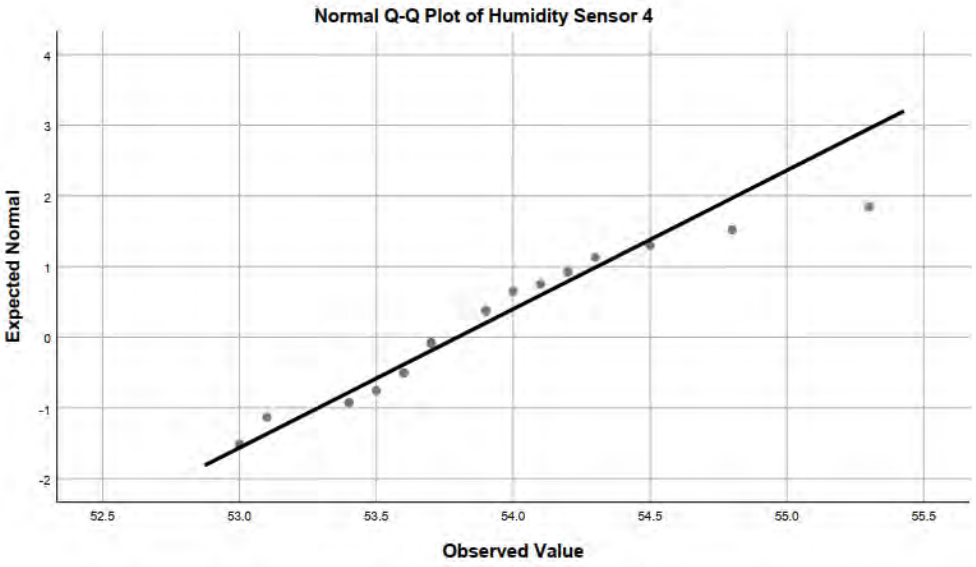


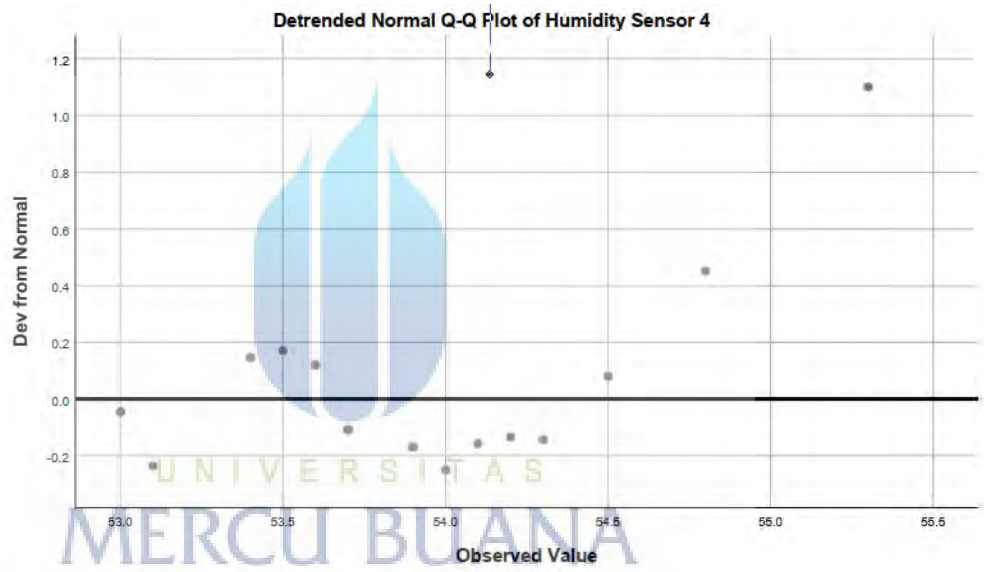
Humidity Sensor 4

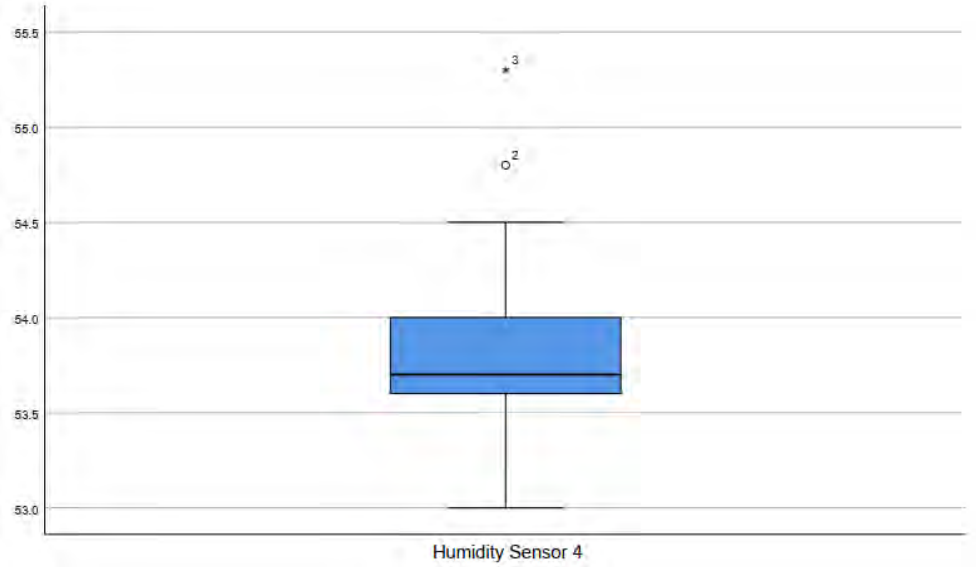
Humidity Sensor 4 Stem-and-Leaf Plot

Frequency	Stem & Leaf
4.00	53.0001
.00	53.
3.00	53.445
10.00	53.6666777777
5.00	53.99999
2.00	54.01
3.00	54.223
1.00	54.5
2.00	Extremes (>=54.8)

Stem width: 1.00
Each leaf: 1 case(s)







```
T-TEST
/TESTVAL=21
/MISSING=ANALYSIS
/VARIABLES=Temperature_Sensor_1 Temperature_Sensor_2
Temperature_Sensor_3 Te mperature_Sensor_4
/CRITERIA=CI(.95).
```

T-Test

Output Created		30-JUN-2022 12:18:19
Comments		
Input	Data	D:\Kuliah\TUGAS AKHIR_Semester 8\Data Base Log Sensor.sav
	Active Dataset	DataSet1
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	30
Missing Value Handling	Definition of Missing	User defined missing values are treated as missing.
	Cases Used	Statistics for each analysis are based on the cases with no missing or out-of-range data for any variable in the analysis.
Syntax		T-TEST /TESTVAL=21 /MISSING=ANALYSIS /VARIABLES=Temperature_Sensor_1 Temperature_Sensor_2 Temperature_Sensor_3 Temperature_Sensor_4 /CRITERIA=CI(.95).
Resources	Processor Time	00:00:00.02
	Elapsed Time	00:00:00.02

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
Temperature Sensor 1	30	20.8700	.40866	.07461
Temperature Sensor 2	30	21.0100	.22491	.04106
Temperature Sensor 3	30	20.9500	.48406	.08838
Temperature Sensor 4	30	21.1333	.19357	.03534

One-Sample Test

Test Value = 21

	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence ... Lower
Temperature Sensor 1	-1.742	29	.092	-.13000	-.2826
Temperature Sensor 2	.244	29	.809	.01000	-.0740
Temperature Sensor 3	-.566	29	.576	-.05000	-.2307
Temperature Sensor 4	3.773	29	.001	.13333	.0611

Test Value = 21
95% Confidence Interval of the ...

	Upper
Temperature Sensor 1	.0226
Temperature Sensor 2	.0940
Temperature Sensor 3	.1307
Temperature Sensor 4	.2056

T-TEST
/TESTVAL=61
/MISSING=ANALYSIS
/VARIABLES=Humidity_Sensor_1 Humidity_Sensor_2 Humidity_Sensor_3 Humidity_Se nsor_4
/CRITERIA=CI(.95).

T-Test

Output Created		30-JUN-2022 12:18:43
Comments		
Input	Data	D:\Kuliah\TUGAS AKHIR_Semester 8\Data Base Log Sensor.sav
	Active Dataset	DataSet1
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	30
Missing Value Handling	Definition of Missing	User defined missing values are treated as missing.
	Cases Used	Statistics for each analysis are based on the cases with no missing or out-of-range data for any variable in the analysis.
Syntax		T-TEST /TESTVAL=61 /MISSING=ANALYSIS /VARIABLES=Humidity_Sensor_1 Humidity_Sensor_2 Humidity_Sensor_3 Humidity_Sensor_4 /CRITERIA=CI(.95).
Resources	Processor Time	00:00:00.00
	Elapsed Time	00:00:00.01

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
Humidity Sensor 1	30	61.1067	.51457	.09395
Humidity Sensor 2	30	60.7267	.54326	.09918
Humidity Sensor 3	30	60.7233	.53542	.09775
Humidity Sensor 4	30	53.7967	.50955	.09303

One-Sample Test
Test Value = 61

	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence ... Lower
Humidity Sensor 1	1.135	29	.266	.10667	-.0855
Humidity Sensor 2	-2.756	29	.010	-.27333	-.4762
Humidity Sensor 3	-2.830	29	.008	-.27667	-.4766
Humidity Sensor 4	-77.429	29	.000	-7.20333	-7.3936

One-Sample Test
Test Value = 61
95% Confidence
Interval of the ...

	Upper
Humidity Sensor 1	.2988
Humidity Sensor 2	-.0705
Humidity Sensor 3	-.0767
Humidity Sensor 4	-7.0131