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## LAMPIRAN A

### 1. Listing Program Arduino

```
#include <WiFi.h>
#include <ESPAsyncWebServer.h>
#include <SPIFFS.h>
#define SOIL_MOISTURE_PIN 35
#define PUMP_PIN 32
int p_atas = 2;
int p_bawah = 4;
int solenoid = 15;

const char* ssid = "CK";
const char* password = "ibucantik";

AsyncWebServer server(80);

#define bb_soil 60 // batas bawah
#define ba_soil 70 // batas atas

int hasil_soil = 0;
String soilMoisture() {
    int val = analogRead(SOIL_MOISTURE_PIN);
    hasil_soil = map(val, 4095, 1100, 0, 100);
    hasil_soil = constrain(hasil_soil, 0, 100);
    // Serial.print("soil\t");
    // Serial.print(val);
    // Serial.print("\t");
    // Serial.println(hasil_soil);
    return String(hasil_soil);
}

void setup() {
    Serial.begin(9600);
    pinMode(PUMP_PIN, OUTPUT);
    pinMode(SOIL_MOISTURE_PIN, INPUT);
    pinMode(p_atas, INPUT_PULLUP);
    pinMode(p_bawah, INPUT_PULLUP);
    pinMode(solenoid, OUTPUT);
    digitalWrite(solenoid, LOW);
    delay(3000);
```

```

if (!SPIFFS.begin()) {
  Serial.println("An Error has occurred while mounting SPIFFS");
  return;
}
WiFi.begin(ssid, password);
while (WiFi.status() != WL_CONNECTED) {
  delay(1000);
  Serial.println("Connecting to WiFi..");
}
Serial.println(WiFi.localIP());

server.on("/", HTTP_GET, [](AsyncWebServerRequest * request) {
  request->send(SPIFFS, "/index.html");
});

server.on("/soilmoisture", HTTP_GET, [](AsyncWebServerRequest * request)
{
  request->send_P(200, "text/plain", soilMoisture().c_str());
});
server.on("/pumpstatus", HTTP_GET, [](AsyncWebServerRequest * request) {
  if (digitalRead(PUMP_PIN)) {
    request->send_P(200, "text/plain", "Pump is OFF");
  } else {
    request->send_P(200, "text/plain", "Pump is ON");
  }
});
server.on("/solenoidstatus", HTTP_GET, [](AsyncWebServerRequest *
request) {
  if (digitalRead(solenoid)) {
    request->send_P(200, "text/plain", "Solenoid is OFF");
  } else {
    request->send_P(200, "text/plain", "Solenoid is ON");
  }
});
server.on("/sumptankstatus", HTTP_GET, [](AsyncWebServerRequest *
request) {
  if (digitalRead(solenoid)) {
    request->send_P(200, "text/plain", "Sump Tank is HIGH");
  } else {
    request->send_P(200, "text/plain", "Sump Tank is LOW");
  }
});

```

```

server.begin();
}

void loop() {
int sm = soilMoisture().toInt();
if (sm <= bb_soil) {
digitalWrite(PUMP_PIN, LOW);
} else if (sm >= ba_soil) {
digitalWrite(PUMP_PIN, HIGH);
}

Serial.print(digitalRead(p_atas));
Serial.print("\t");
Serial.println(digitalRead(p_bawah));
if (digitalRead(p_atas) == LOW && digitalRead(p_bawah) == LOW) {
digitalWrite(solenoid, LOW);
}
else if (digitalRead(p_atas) == HIGH && digitalRead(p_bawah) == HIGH) {
digitalWrite(solenoid, HIGH);
}
}
}

```

## 2. Listing program VSCode

```

<!DOCTYPE HTML>
<html>
<head>
<meta name="viewport" content="width=device-width, initial-scale=1">
<script src="https://code.highcharts.com/highcharts.js"></script>
<script src="https://code.highcharts.com/modules/accessibility.js"></script>

<style>
body {
min-width: 310px;
max-width: 800px;
height: 400px;
margin: 0 auto;
}
h2 {
font-family: Arial;
font-size: 2.5rem;
text-align: center;

```

```

}
table {
  width: 100%;
  border-collapse: collapse;
  table-layout: fixed;
}
th, td {
  border: 1px solid black;
  padding: 8px;
  text-align: center;
  overflow: hidden;
  white-space: nowrap;
  text-overflow: ellipsis;
}
th {
  background-color: #f2f2f2;
}
td{
  min-width: 310px;
  height: 100px;
  margin: 0 auto;
}
</style>
</head>
<body>
<h2>ESP Soil Moisture Monitoring</h2>
<div id="chart-moisture" class="container"></div>
<table>
<tr>
<th>Nilai Kelembaban</th>
<th>Status Pompa</th>
<th>Status Solenoid</th>
<th>Status Sump Tank</th>
</tr>
<tr>
<td id="moisture"></td>
<td id="pumpstatus"></td>
<td id="solenoidstatus"></td>
<td id="sumptankstatus"></td>
</tr>
</table>
<script>

```



```

var chartM = new Highcharts.Chart({
  chart: { renderTo:'chart-moisture' },
  title: { text: 'Soil Moisture' },
  time: {
    useUTC: false
  },
  series: [{
    showInLegend: false,
    data: []
  }],
  plotOptions: {
    line: {
      animation: false,
      dataLabels: { enabled: true }
    },
    series: { color: '#18009c' }
  },
  xAxis: {
    type: 'datetime',
    dateTimeLabelFormats: { second: '%H:%M:%S' }
  },
  yAxis: {
    title: { text: 'Moisture Level' }
  },
  credits: { enabled: false }
});

setInterval(function ( ) {
  var xhttp = new XMLHttpRequest();
  xhttp.onreadystatechange = function() {
    if (this.readyState == 4 && this.status == 200) {
      var x = (new Date()).getTime(),
          y = parseFloat(this.responseText);
      document.getElementById("moisture").innerHTML = this.responseText;
      if(chartM.series[0].data.length > 40) {
        chartM.series[0].addPoint([x, y], true, true, true);
      } else {
        chartM.series[0].addPoint([x, y], true, false, true);
      }
    }
  };
}
);

//ambil data kelembaban dari esp

```

```

xhttp.open("GET", "/soilmoisture", true);
xhttp.send();

//ambil data pompa dari esp
xhttp = new XMLHttpRequest();
xhttp.onreadystatechange = function() {
    if (this.readyState == 4 && this.status == 200) {
        document.getElementById("pumpstatus").innerHTML = this.responseText;
    }
};
xhttp.open("GET", "/pumpstatus", true);
xhttp.send();

//ambil data solenoid dari esp
xhttp = new XMLHttpRequest();
xhttp.onreadystatechange = function() {
    if (this.readyState == 4 && this.status == 200) {
        document.getElementById("solenoidstatus").innerHTML =
this.responseText;
    }
};
xhttp.open("GET", "/solenoidstatus", true);
xhttp.send();

//ambil data SUMPTANK dari esp
xhttp = new XMLHttpRequest();
xhttp.onreadystatechange = function() {
    if (this.readyState == 4 && this.status == 200) {
        document.getElementById("sumptankstatus").innerHTML =
this.responseText;
    }
};
xhttp.open("GET", "/sumptankstatus", true);
xhttp.send();

}, 1000);
</script>
</body>
</html>

```

**LAMPIRAN B**  
Hasil Alat



Box Modul



Tangki Penampungan Air



1 Agustus 2023



30 Agustus 2023



Pengujian Tanah Sangat Kering



Pengujian Tanah Kering



Pengujian Tanah Normal



Pengujian Tanah Basah



Pengujian Tanah Sangat Basah