

# **LAMPIRAN**

## A. Lampiran 1

### Layak Etik

#### KOMITE ETIK PENELITIAN KESEHATAN HEALTH RESEARCH ETHICS COMMITTEE POLTEKKES TANJUNGPINANG

#### KETERANGAN LAYAK ETIK DESCRIPTION OF ETHICAL EXEMPTION "ETHICAL EXEMPTION"

No.167/KEPK-TJK/VI/2021

Protokol penelitian yang diusulkan oleh :  
*The research protocol proposed by*

Peneliti utama : Ayu Permata Sari  
*Principal In Investigator*

Nama Institusi : Politeknik Kesehatan Tanjung Pinang  
*Name of the Institution*

Dengan judul:  
*Title*

**"Prototype sistem monitoring suhu, derajat asam (pH) dan ketinggian Air berbasis IoT (Internet of Things)"**

*"Prototype monitoring system for temperature, degree of acid (pH) and water level based on IoT (Internet of Things)"*

Dinyatakan layak etik sesuai 7 (tujuh) Standar WHO 2011, yaitu 1) Nilai Sosial, 2) Nilai Ilmiah, 3) Pemerataan Beban dan Manfaat, 4) Risiko, 5) Bujukan/Eksploitasi, 6) Kerahasiaan dan Privacy, dan 7) Persetujuan Setelah Penjelasan, yang merujuk pada Pedoman CIOMS 2016. Hal ini seperti yang ditunjukkan oleh terpenuhinya indikator setiap standar.

*Declared to be ethically appropriate in accordance to 7 (seven) WHO 2011 Standards, 1) Social Values, 2) Scientific Values, 3) Equitable Assessment and Benefits, 4) Risks, 5) Persuasion/Exploitation, 6) Confidentiality and Privacy, and 7) Informed Consent, referring to the 2016 CIOMS Guidelines. This is as indicated by the fulfillment of the indicators of each standard.*

Pernyataan Laik Etik ini berlaku selama kurun waktu tanggal 21 Juni 2021 sampai dengan tanggal 21 Juni 2022.

*This declaration of ethics applies during the period June 21, 2021 until June 21, 2022.*

June 21, 2021  
Professor and Chairperson,



Dr. Aprina, S.Kp., M.Kes

## B. Lampiran 2

### Surat Izin Penelitian

|                                                                                   |                                                                                                                                                                                    |                                                                                                            |
|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|
|  | <b>PEMERINTAH KOTA BANDAR LAMPUNG</b><br><b>PERUSAHAAN DAERAH AIR MINUM WAY RILAU</b><br>Jl. Pangeran Emir M. Noer No. 11A Telp. (0721) 483855 Fax (0721) 484611<br>BANDAR LAMPUNG | <br><b>TIRTA DHARMA</b> |
| Bandar Lampung, 07 Mei 2021                                                       |                                                                                                                                                                                    |                                                                                                            |
| Nomor : KPI/295/                                                                  | PDAM/05/V/2021                                                                                                                                                                     | Kepada Yth :                                                                                               |
| Lamp : -                                                                          |                                                                                                                                                                                    | Ketua Prodi Sarjana Terapan                                                                                |
| Perihal : <u>Persetujuan Penelitian</u>                                           |                                                                                                                                                                                    | Sanitasi Lingkungan Politeknik                                                                             |
|                                                                                   |                                                                                                                                                                                    | Kesehatan Tanjung Karang                                                                                   |
|                                                                                   |                                                                                                                                                                                    | Di -                                                                                                       |
|                                                                                   |                                                                                                                                                                                    | Bandar Lampung                                                                                             |

Dengan hormat,

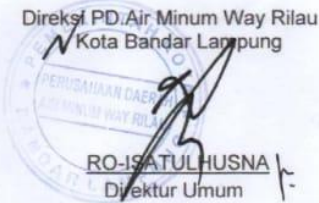
Menindaklanjuti surat Saudara Nomor : PP.03.01/1.1/1466/2021 perihal Permohonan Penelitian, dengan ini kami menyetujui dan menerima mahasiswa Saudara untuk Penelitian dalam rangka penyusunan skripsi di Perusahaan kami. Berikut nama mahasiswa:

| No. | Nama                   | Program Studi       | Waktu Pelaksanaan      |
|-----|------------------------|---------------------|------------------------|
| 1   | Galluh Cahyaning Putri | Sanitasi Lingkungan | 17 Mei s.d 21 Mei 2021 |
| 2   | Ayu Permata Sari       |                     |                        |

Agar menjadi perhatian, bahwa selama melaksanakan Penelitian harus mengikuti ketentuan-ketentuan yang berlaku di PDAM Way Rilau Kota Bandar Lampung dan tetap mengikuti protokol COVID 19.

Demikian disampaikan, atas kerjasamanya diucapkan terimakasih.

Direksi PD.Air Minum Way Rilau  
Kota Bandar Lampung



**RO-ISATUL HUSNA**  
Direktur Umum

### C. Lampiran 3

#### Surat Keterangan Penelitian (SKP)



**PEMERINTAH KOTA BANDARLAMPUNG**  
**DINAS PENANAMAN MODAL DAN PELAYANAN TERPADU SATU PINTU**  
Jalan Dr. Susilo Nomor 2 Bandar Lampung, Telepon (0721) 476362  
Faksimile (0721) 476362 Website: [www.dpmpstsp.bandarlampungkota.go.id](http://www.dpmpstsp.bandarlampungkota.go.id)  
Pos-el: [sekretariat@dpmpstsp.bandarlampungkota.go.id](mailto:sekretariat@dpmpstsp.bandarlampungkota.go.id)

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**SURAT KETERANGAN PENELITIAN (SKP)**  
**Nomor :1871/070/00333/SKP/III.16/IV/2021**

Berdasarkan Peraturan Menteri Dalam Negeri Republik Indonesia Nomor 03 Tahun 2018 tentang Penerbitan Surat Keterangan Penelitian dan Rekomendasi dari Kepala Badan Kesatuan Bangsa Dan Politik Kota Bandar Lampung Nomor 070/045/IV.05/2021 Tanggal 22 APRIL 2021, yang bertandatangan dibawah ini Kepala Dinas Penanaman Modal dan Pelayanan Terpadu Satu Pintu Kota Bandar Lampung memberikan Surat Keterangan Penelitian (SKP) kepada :

|                                              |                                                                                                                            |
|----------------------------------------------|----------------------------------------------------------------------------------------------------------------------------|
| 1. Nama                                      | : AYU PERMATA SARI                                                                                                         |
| 2. Alamat                                    | : GANJAR AGUNG 14-2 KEL./DESA GANJAR AGUNG KEC. METRO BARAT KAB/KOTA KOTA METRO PROV. LAMPUNG                              |
| 3. Judul Penelitian                          | : PROTOTYPE SISTEM MONITORING SUHU DERAJAT ASAM (pH) DAN KETINGGIAN AIR BERBASIS (INTERNET OF THINGS) IoT                  |
| 4. Tujuan Penelitian                         | : UNTUK MENGETAHUI PROTOTYPE SISTEM MONITORING SUHU DERAJAT ASAM (pH) DAN KETINGGIAN AIR BERBASIS (INTERNET OF THINGS) IoT |
| 5. Lokasi Penelitian                         | : PADA PDAM WAY RILAU KOTA BANDAR LAMPUNG                                                                                  |
| 6. Tanggal dan/atau lamanya penelitian       | : 15 APRIL 2021                                                                                                            |
| 7. Bidang Penelitian                         | : SANITASI LINGKUNGAN                                                                                                      |
| 8. Status Penelitian                         | : -                                                                                                                        |
| 9. Nama Penanggung Jawab atau Koordinator    | : WARIJIDIN ALIYANTO, SKM., M. Kes.                                                                                        |
| 10. Anggota Penelitian                       | : AYU PERMATA SARI                                                                                                         |
| 11. Nama Badan Hukum, Lembaga dan Organisasi | : POLITEKNIK KESEHATAN TANJUNGPINANG                                                                                       |

Dengan Ketentuan sebagai berikut :

1. Pelaksanaan Penelitian tidak disalahgunakan untuk tujuan tertentu yang dapat mengganggu stabilitas pemerintah.
2. Setelah Penelitian selesai, agar menyerahkan hasilnya kepada Badan Kesatuan Bangsa Dan Politik (BAKESBANGPOL) Kota Bandar Lampung.
3. Surat Keterangan Penelitian ini berlaku selama 1 (satu) tahun sejak tanggal ditetapkan.



Ditetapkan di : Bandarlampung  
pada tanggal : 28 April 2021

Kepala Dinas,  
  
**Drs. A. Fachruddin, M.M.**  
NIP 19670205 198712 1 002

**Tembusan:**

1. BAKESBANGPOL Kota
2. Bappeda Kota Bandar L
3. Peringgal

#### D. Lampiran 4

##### Hasil Pengujian Sensor Suhu

| Kode Bahan  | Sensor Suhu °C                                                               | Rata – rata Sensor | Digital Thermometer | Deviasi (%) |
|-------------|------------------------------------------------------------------------------|--------------------|---------------------|-------------|
| Pengujian 1 | 30.0<br>30.0<br>30.0<br>30.0<br>30.0<br>30.0<br>30.0<br>30.0<br>30.0<br>30.0 | 30.0 °C            | 30.0 °C             | 0 %         |
| Pengujian 2 | 29.5<br>29.5<br>29.5<br>29.5<br>29.5<br>29.5<br>29.5<br>29.5<br>29.5<br>29.5 | 29.5 °C            | 29.3 °C             | 0.68 %      |
| Pengujian 3 | 30.0<br>30.0<br>30.0<br>30.0<br>30.0<br>30.0<br>30.0<br>30.0<br>30.0<br>30.0 | 30.0 °C            | 29.9 °C             | 0.33%       |

|                                |      |         |         |        |
|--------------------------------|------|---------|---------|--------|
| Pengujian 4                    | 30.5 | 30.0 °C | 30.0 °C | 0 %    |
|                                | 30.5 |         |         |        |
|                                | 30.5 |         |         |        |
|                                | 30.0 |         |         |        |
|                                | 30.0 |         |         |        |
|                                | 30.0 |         |         |        |
|                                | 30.0 |         |         |        |
|                                | 29.5 |         |         |        |
|                                | 29.5 |         |         |        |
|                                | 29.5 |         |         |        |
| Rata-rata Persentase Kesalahan |      |         |         | 0.25 % |

## E. Lampiran 5

### Hasil Pengujian Sensor pH

| Kode Bahan  | Sensor pH                                                                    | Rata – rata Sensor | pH Meter | Deviasi (%) |
|-------------|------------------------------------------------------------------------------|--------------------|----------|-------------|
| Pengujian 1 | 6.78<br>6.75<br>6.78<br>6.80<br>6.81<br>6.78<br>6.80<br>6.85<br>6.81<br>6.87 | 6.803              | 6.8      | 0.04%       |
| Pengujian 2 | 9.79<br>9.79<br>9.79<br>9.79<br>9.79<br>9.79<br>9.78<br>9.78<br>9.78<br>9.78 | 9.786              | 9.7      | 0.88        |
| Pengujian 3 | 6.80<br>6.81<br>6.79<br>6.75<br>6.78<br>6.81<br>6.87<br>6.80<br>6.81<br>6.81 | 6.803              | 6.7      | 1.53        |

|                                |      |       |     |      |
|--------------------------------|------|-------|-----|------|
| Pengujian 4                    | 3.89 | 3.922 | 3.9 | 0.56 |
|                                | 3.96 |       |     |      |
|                                | 3.84 |       |     |      |
|                                | 3.83 |       |     |      |
|                                | 3.90 |       |     |      |
|                                | 3.96 |       |     |      |
|                                | 3.90 |       |     |      |
|                                | 4.00 |       |     |      |
|                                | 3.94 |       |     |      |
|                                | 4.00 |       |     |      |
| Rata-rata Persentase Kesalahan |      |       |     | 0.75 |

## F. Lampiran 6

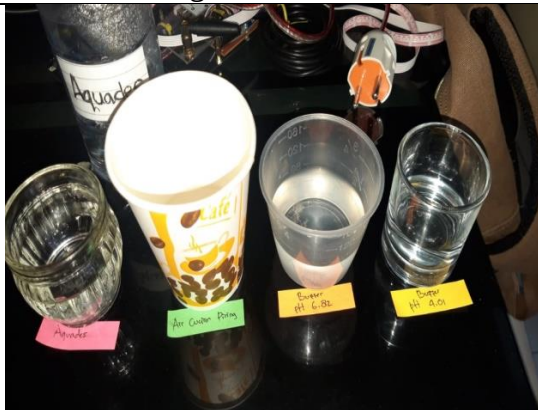
### Dokumentasi Penelitian



Rangkaian Hardware



Proses Kalibrasi Sensor



Proses Kalibrasi Sensor



Proses Kalibrasi Sensor



Proses Kalibrasi Sensor



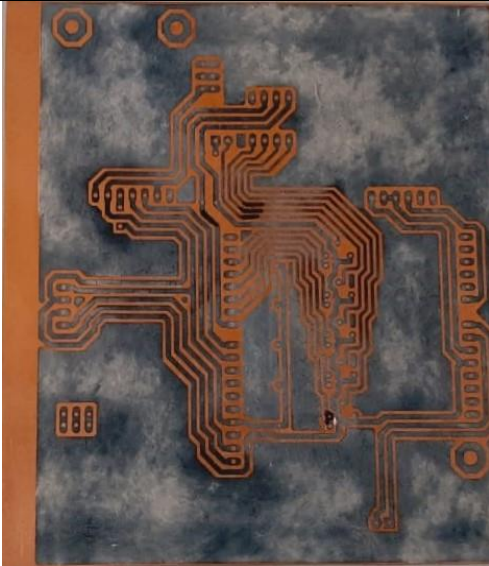
Proses Kalibrasi Sensor



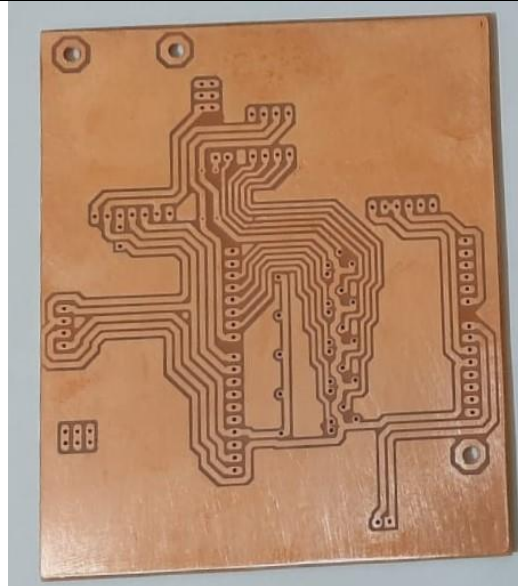
Proses Kalibrasi Sensor



Proses Kalibrasi Sensor



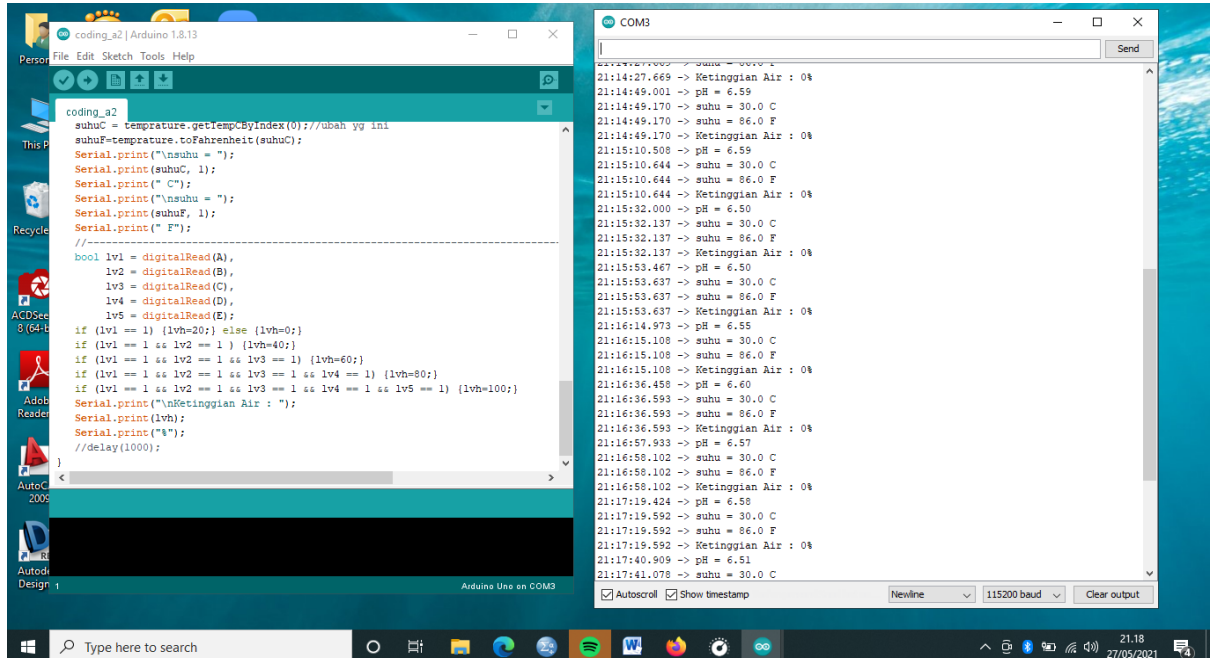
Papan Boad PCB



Papan Board PCB

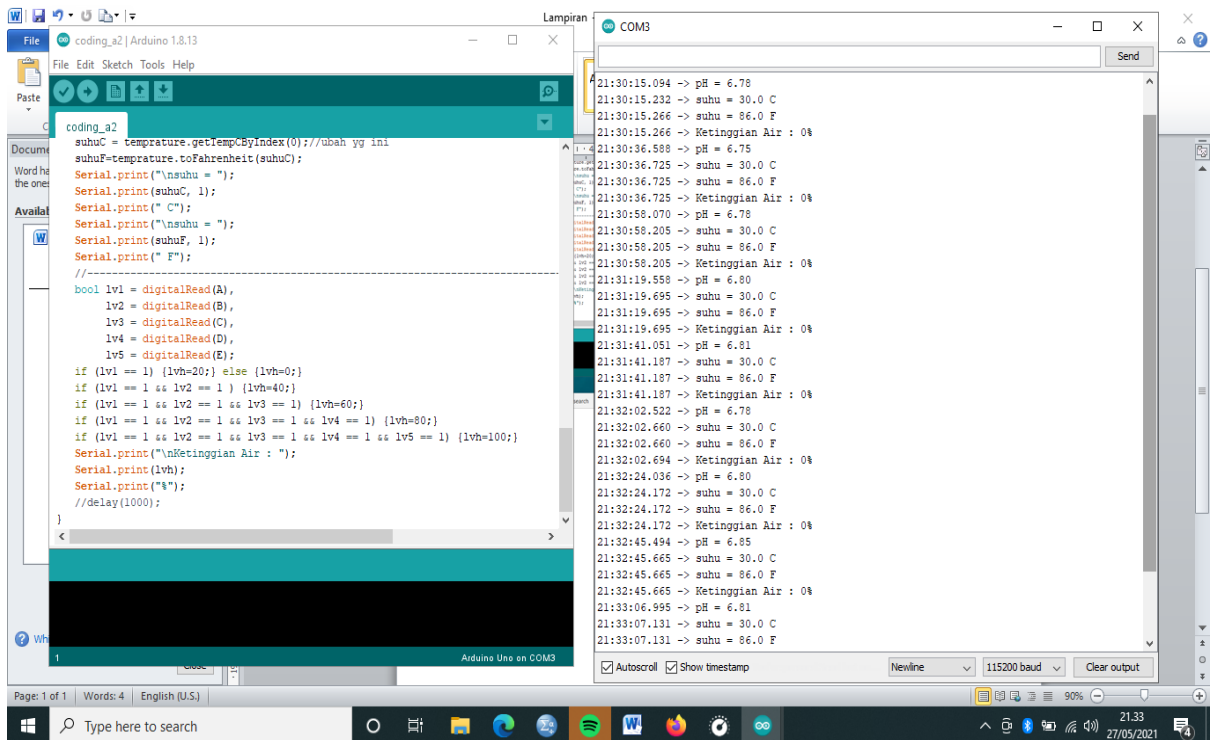
## G. Lampiran 7

### Dokumentasi Program Kalibrasi Sensor



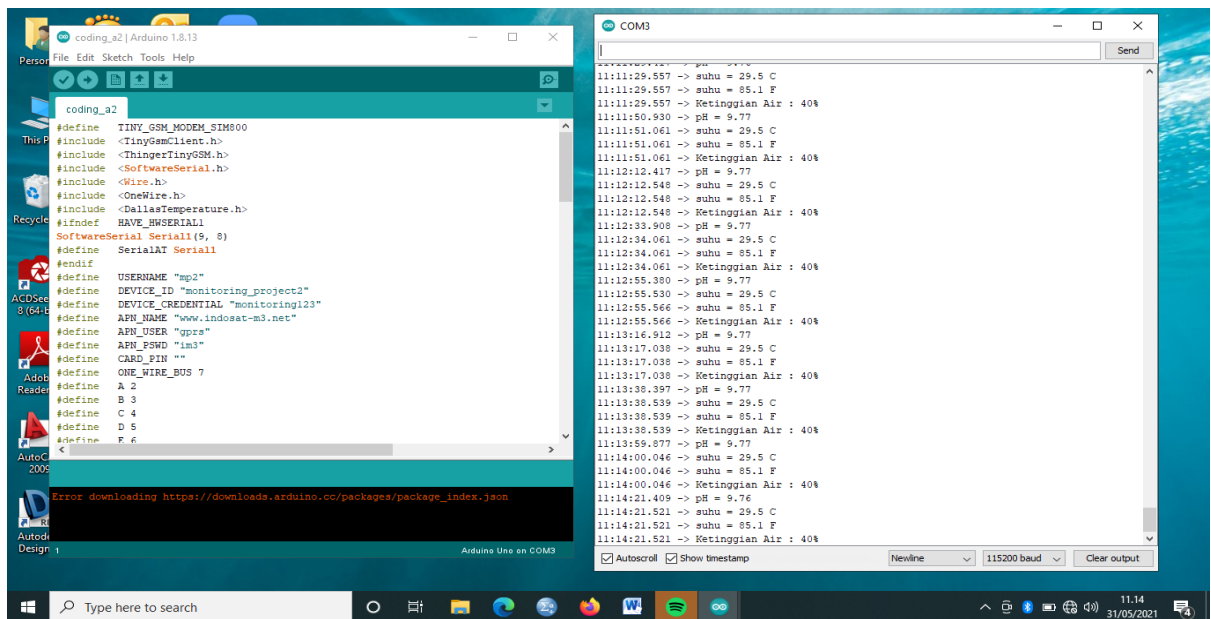
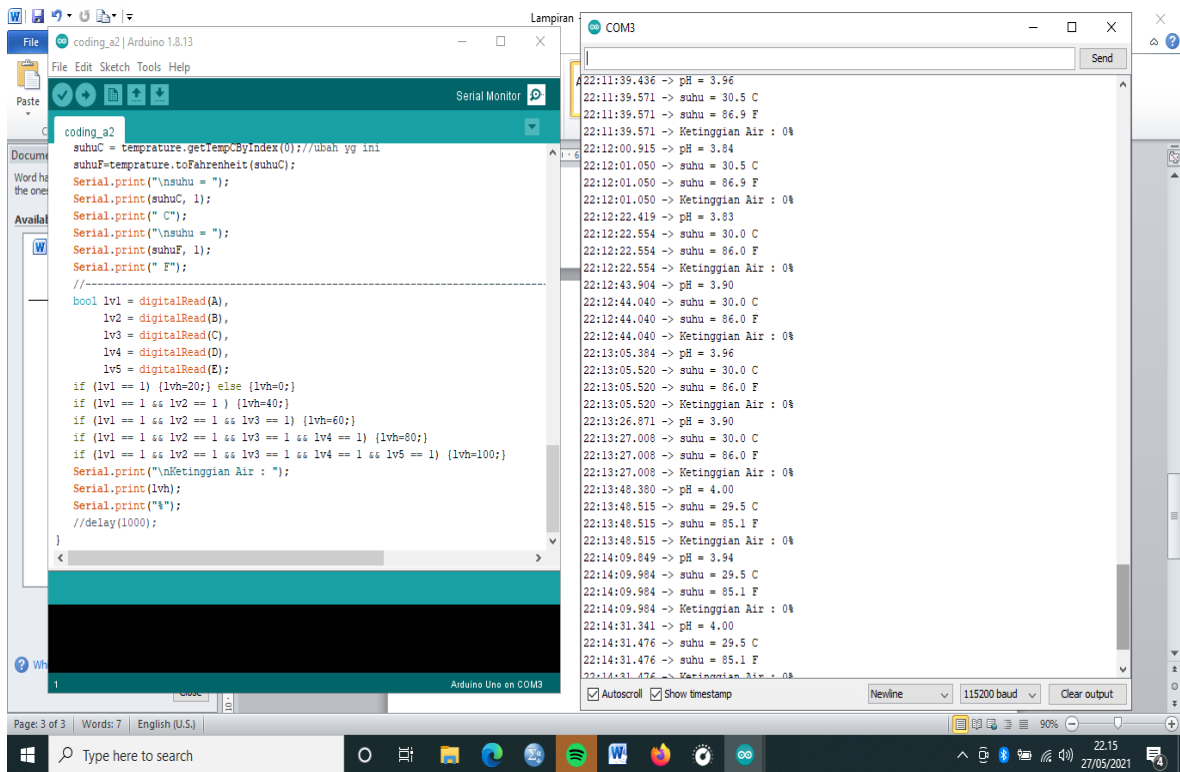
The screenshot displays the Arduino IDE interface with the 'coding\_a2' sketch loaded. The code is designed to read data from five digital sensors (A, B, C, D, E) and output temperature and air level readings. The output window (COM3) shows the following data stream:

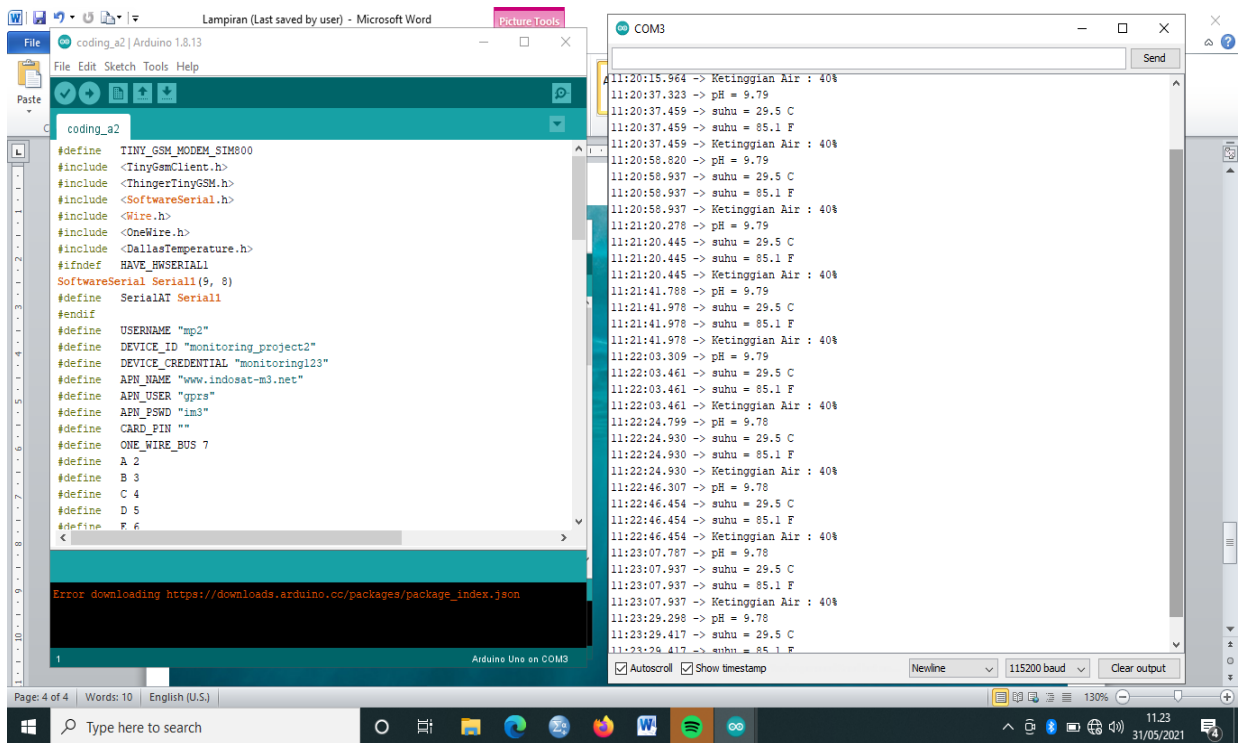
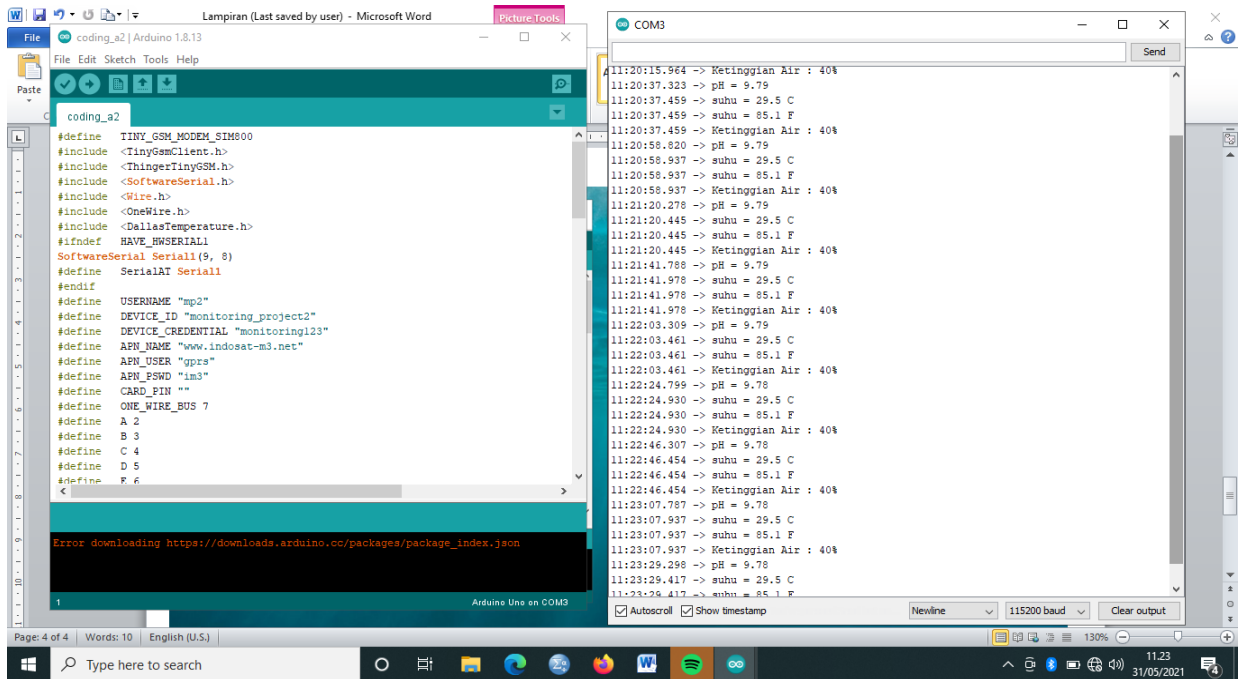
```
21:14:27.669 -> Ketinggian Air : 0%
21:14:49.001 -> pH = 6.59
21:14:49.170 -> suhu = 30.0 C
21:14:49.170 -> suhu = 86.0 F
21:14:49.170 -> Ketinggian Air : 0%
21:15:10.508 -> pH = 6.59
21:15:10.644 -> suhu = 30.0 C
21:15:10.644 -> suhu = 86.0 F
21:15:10.644 -> Ketinggian Air : 0%
21:15:32.000 -> pH = 6.50
21:15:32.137 -> suhu = 30.0 C
21:15:32.137 -> suhu = 86.0 F
21:15:32.137 -> Ketinggian Air : 0%
21:15:53.467 -> pH = 6.50
21:15:53.637 -> suhu = 30.0 C
21:15:53.637 -> suhu = 86.0 F
21:15:53.637 -> Ketinggian Air : 0%
21:16:14.973 -> pH = 6.55
21:16:15.108 -> suhu = 30.0 C
21:16:15.108 -> suhu = 86.0 F
21:16:15.108 -> Ketinggian Air : 0%
21:16:36.458 -> pH = 6.60
21:16:36.593 -> suhu = 30.0 C
21:16:36.593 -> suhu = 86.0 F
21:16:36.593 -> Ketinggian Air : 0%
21:16:57.933 -> pH = 6.57
21:16:58.102 -> suhu = 30.0 C
21:16:58.102 -> suhu = 86.0 F
21:16:58.102 -> Ketinggian Air : 0%
21:17:19.424 -> pH = 6.58
21:17:19.592 -> suhu = 30.0 C
21:17:19.592 -> suhu = 86.0 F
21:17:19.592 -> Ketinggian Air : 0%
21:17:40.909 -> pH = 6.51
21:17:41.078 -> suhu = 30.0 C
```



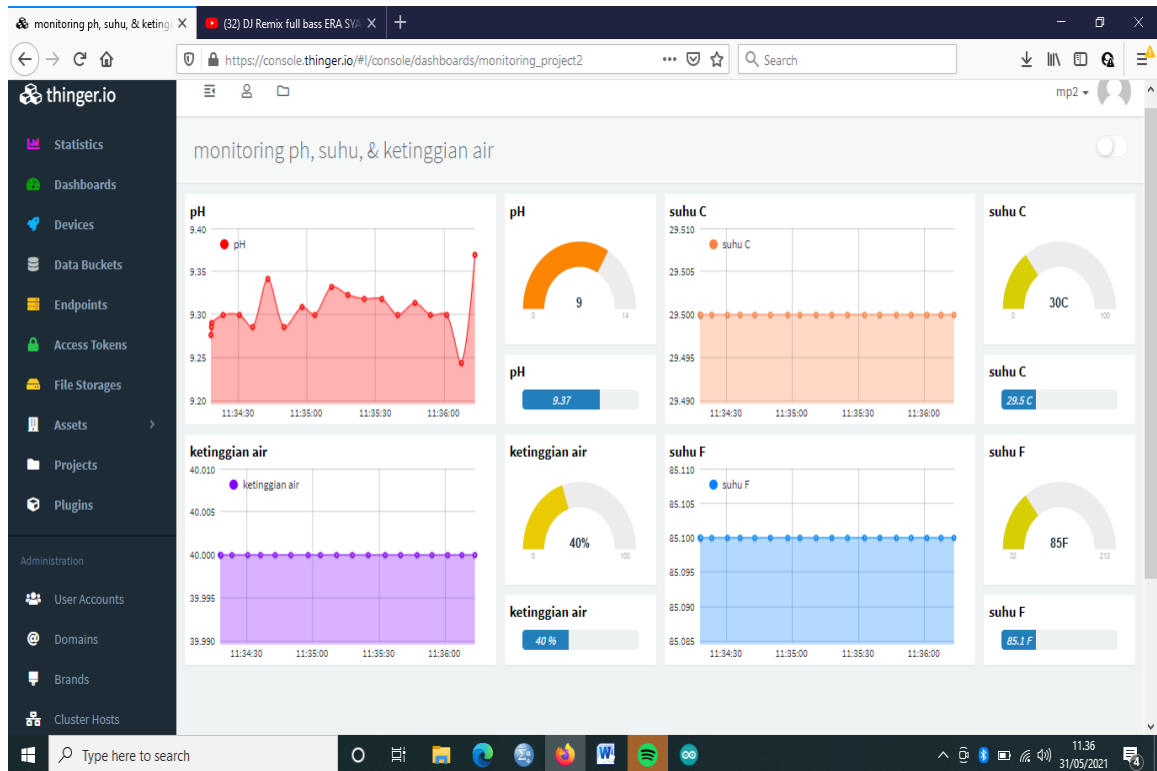
This screenshot shows the same Arduino IDE interface as the previous one, but with a yellow box highlighting the 'COM3' output window. The output window displays the following data stream:

```
21:30:15.094 -> pH = 6.78
21:30:15.232 -> suhu = 30.0 C
21:30:15.266 -> suhu = 86.0 F
21:30:15.266 -> Ketinggian Air : 0%
21:30:36.588 -> pH = 6.75
21:30:36.725 -> suhu = 30.0 C
21:30:36.725 -> suhu = 86.0 F
21:30:36.725 -> Ketinggian Air : 0%
21:30:58.070 -> pH = 6.78
21:30:58.205 -> suhu = 30.0 C
21:30:58.205 -> suhu = 86.0 F
21:30:58.205 -> Ketinggian Air : 0%
21:31:19.558 -> pH = 6.80
21:31:19.695 -> suhu = 30.0 C
21:31:19.695 -> suhu = 86.0 F
21:31:19.695 -> Ketinggian Air : 0%
21:31:41.051 -> pH = 6.81
21:31:41.187 -> suhu = 30.0 C
21:31:41.187 -> suhu = 86.0 F
21:31:41.187 -> Ketinggian Air : 0%
21:32:02.522 -> pH = 6.78
21:32:02.660 -> suhu = 30.0 C
21:32:02.660 -> suhu = 86.0 F
21:32:02.694 -> Ketinggian Air : 0%
21:32:24.036 -> pH = 6.80
21:32:24.172 -> suhu = 30.0 C
21:32:24.172 -> suhu = 86.0 F
21:32:24.172 -> Ketinggian Air : 0%
21:32:45.494 -> pH = 6.85
21:32:45.665 -> suhu = 30.0 C
21:32:45.665 -> suhu = 86.0 F
21:32:45.665 -> Ketinggian Air : 0%
21:33:06.995 -> pH = 6.81
21:33:07.131 -> suhu = 30.0 C
21:33:07.131 -> suhu = 86.0 F
```





## Hasil data dari thinger.io



## H. Lampiran 8

### Hasil Uji SPSS

#### Group Statistics

| GRUP |                     | N  | Mean   | Std. Deviation | Std. Error Mean |
|------|---------------------|----|--------|----------------|-----------------|
| SUHU | ARDUINO_SENSOR SUHU | 40 | 29,875 | ,2942          | ,0465           |
|      | TERMOMETER          | 40 | 29,800 | ,2953          | ,0467           |

### Independent Samples Test

|      |                             | Levene's Test for Equality of Variances |      | t-test for Equality of Means |        |
|------|-----------------------------|-----------------------------------------|------|------------------------------|--------|
|      |                             | F                                       | Sig. | t                            | df     |
| SUHU | Equal variances assumed     | ,032                                    | ,858 | 1,138                        | 78     |
|      | Equal variances not assumed |                                         |      | 1,138                        | 77,999 |

### Independent Samples Test

|      |                             | t-test for Equality of Means |                 |                       |                                           |
|------|-----------------------------|------------------------------|-----------------|-----------------------|-------------------------------------------|
|      |                             | Sig. (2-tailed)              | Mean Difference | Std. Error Difference | 95% Confidence Interval of the Difference |
|      |                             |                              |                 |                       | Lower                                     |
| SUHU | Equal variances assumed     | ,259                         | ,0750           | ,0659                 | -,0562                                    |
|      | Equal variances not assumed | ,259                         | ,0750           | ,0659                 | -,0562                                    |

### Group Statistics

| GRUP1 |                   | N  | Mean   | Std. Deviation | Std. Error Mean |
|-------|-------------------|----|--------|----------------|-----------------|
| PH    | ARDUINO_SENSOR PH | 40 | 6,7670 | 2,10370        | ,33262          |
|       | PH METER          | 40 | 6,7750 | 2,07720        | ,32843          |

**Independent Samples Test**

|    |                             | Levene's Test for Equality of Variances |      | t-test for Equality of Means |        |
|----|-----------------------------|-----------------------------------------|------|------------------------------|--------|
|    |                             | F                                       | Sig. | t                            | df     |
| PH | Equal variances assumed     | ,028                                    | ,868 | -,017                        | 78     |
|    | Equal variances not assumed |                                         |      | -,017                        | 77,987 |

• **Independent Samples Test**

|    |                             | t-test for Equality of Means |                 |                       |                                           |
|----|-----------------------------|------------------------------|-----------------|-----------------------|-------------------------------------------|
|    |                             | Sig. (2-tailed)              | Mean Difference | Std. Error Difference | 95% Confidence Interval of the Difference |
|    |                             |                              |                 |                       | Lower                                     |
| PH | Equal variances assumed     | ,986                         | -,00800         | ,46745                | -,93862                                   |
|    | Equal variances not assumed | ,986                         | -,00800         | ,46745                | -,93862                                   |