

## DAFTAR ISI

|   |              |
|---|--------------|
| <b>HALAMAN JUDUL .....</b>                                    | <b>i</b>     |
| <b>HALAMAN PENGESAHAN .....</b>                               | <b>ii</b>    |
| <b>PERNYATAAN BEBAS PLAGIASI .....</b>                        | <b>iii</b>   |
| <b>KATA PENGANTAR.....</b>                                    | <b>iv</b>    |
| <b>DAFTAR ISI.....</b>  | <b>vii</b>   |
| <b>DAFTAR GAMBAR.....</b>                                     | <b>x</b>     |
| <b>DAFTAR TABEL.....</b>                                      | <b>xiv</b>   |
| <b>DAFTAR LAMPIRAN .....</b>                                  | <b>xv</b>    |
| <b>INTISARI.....</b>  | <b>xvii</b>  |
| <b>ABSTRACT .....</b>   | <b>xviii</b> |
| <b>BAB I. PENDAHULUAN.....</b>                                | <b>1</b>     |
| 1.1. Latar Belakang .....                                     | 1            |
| 1.2. Rumusan Masalah .....                                    | 7            |
| 1.3. Batasan Masalah.....                                     | 7            |
| 1.4. Tujuan Penelitian.....                                   | 7            |
| 1.5. Manfaat Penelitian.....                                  | 8            |
| <b>BAB II. TINJAUAN PUSTAKA.....</b>                          | <b>9</b>     |
| 2.1. Tantangan Urbanisasi .....                               | 9            |
| 2.2. Pertanian Presisi .....                                  | 10           |
| 2.3. Budidaya Hidroponik .....                                | 12           |
| 2.4. <i>Plant Factory</i> dan <i>Mini Plant Factory</i> ..... | 15           |

|   |           |
|---|-----------|
| 2.5. Sistem <i>Monitoring (Microclimate dan Nutrient Condition)</i> ..... | 20        |
| 2.6. <i>IoT dan Cloud Technology</i> .....                                | 22        |
| <b>BAB III. METODOLOGI .....</b>  | <b>25</b> |
| 3.1. Kerangka Pikir.....  | 25        |
| 3.2. Tempat dan Waktu Penelitian .....                                    | 26        |
| 3.2.1. Tempat .....   | 26        |
| 3.2.2. Waktu.....   | 26        |
| 3.3. Alat dan Bahan Penelitian .....                                      | 27        |
| 3.3.1. Alat.....  | 27        |
| 3.3.2. Bahan .....  | 46        |
| 3.4. Prosedur Penelitian.....   | 49        |
| 3.4.1. Perancangan Konstruksi <i>Mini Plant Factory</i> .....             | 50        |
| 3.4.2. Perancangan Sistem Elektronik <i>Mini Plant Factory</i> .....      | 51        |
| 3.4.3. Perancangan <i>Microclimate Sensor</i> .....                       | 52        |
| 3.4.4. Perancangan <i>Nutrient Dosing System</i> .....                    | 54        |
| 3.4.5. Perancangan <i>Artificial Growthlight</i> .....                    | 56        |
| 3.4.6. Perancangan Sistem Ventilasi.....                                  | 58        |
| 3.4.7. Kalibrasi Sensor .....   | 60        |
| 3.4.8. Pengambilan Data .....   | 67        |
| 3.4.9. Analisis Data.....   | 73        |
| <b>BAB IV. HASIL DAN PEMBAHASAN.....</b>                                  | <b>75</b> |
| 4.1. Hasil Perancangan Sistem .....                                       | 75        |
| 4.1.1. Perancangan Alat .....   | 76        |

|  |            |
|--|------------|
| 4.2. Kalibrasi Sensor .....  | 81         |
| 4.2.1. Kalibrasi <i>DHT 22 Air Temperature Sensor</i> .....                  | 82         |
| 4.2.2. Kalibrasi <i>Gravity: Analog Electrical Conductivity Sensor</i> ..... | 84         |
| 4.2.3. Kalibrasi <i>Gravity: Analog pH Meter</i> .....                       | 85         |
| 4.2.4. Kalibrasi <i>Gravity: Waterproof DS18B20 Water Temperature</i> .....  | 86         |
| 4.3. Verifikasi dan Validasi Sistem <i>Mini Plant Factory</i> .....          | 86         |
| 4.3.1. Validasi Sistem <i>Mini Plant Factory</i> dalam Kondisi Kosong .....  | 88         |
| 4.3.2. Validasi Sistem <i>Mini Plant Factory</i> dengan Tanaman.....         | 89         |
| 4.4. Implementasi Sistem <i>Mini Plant Factory</i> .....                     | 91         |
| 4.5. Uji Kinerja <i>Online Data Logging</i> .....                            | 98         |
| <b>BAB V. PENUTUP.....</b>   | <b>100</b> |
| 5.1. Kesimpulan.....   | 100        |
| 5.2. Saran.....  | 101        |
| <b>DAFTAR PUSTAKA.....</b>   | <b>103</b> |
| <b>LAMPIRAN.....</b>   | <b>118</b> |