

ABSTRAK

SISTEM MANAJEMEN DAYA BERBASIS *IOT* SEBAGAI CATU DAYA MULTIFUNGSI UNTUK *PLANT-BASED AIR PURIFIER*

(2026 : 74 Halaman + 42 Gambar + 18 Tabel + Daftar Pustaka + Lampiran)

SULTHAN SYACH GAUTAMA

062330320707

JURUSAN TEKNIK ELEKTRO

PROGRAM STUDI TEKNIK ELEKTRONIKA

POLITEKNIK NEGERI SRIWIJAYA

Keberlangsungan operasi *Plant-Based Air Purifier* memerlukan sistem catu daya yang stabil, berkelanjutan, serta mampu dipantau secara *real time*. Laporan akhir ini bertujuan merancang dan membangun sistem manajemen daya berbasis *Internet of Things* (IoT) sebagai catu daya multifungsi untuk *Plant-Based Air Purifier* menggunakan ESP8266 dan sensor INA219. Sistem dilengkapi baterai lithium-ion 3S4P, BMS 3S 40A, modul UPS DC, konverter DC-DC, LCD 16×2 I2C, dan aplikasi Blynk sebagai media monitoring. Pengujian meliputi kalibrasi sensor, pengujian tegangan keluaran, stabilitas tegangan, konsumsi daya, dan kinerja sistem selama tiga hari. Hasil pengujian menunjukkan sensor INA219 memiliki kesalahan pengukuran tegangan di bawah **0,2%** dan kesalahan pengukuran arus sebesar **0,8–4,0%**. Seluruh keluaran sistem mampu menghasilkan tegangan yang mendekati nilai rancangan dengan regulasi tegangan sebesar **0,08–3,24%**. Selama pengujian diperoleh rata-rata tegangan **11,82–11,83 V**, arus **0,57–0,58 A**, dan daya **6,80–6,94 W**. Hasil laporan akhir menunjukkan bahwa sistem yang dirancang mampu menyediakan catu daya yang stabil, serta melakukan monitoring parameter kelistrikan secara *real time* sehingga layak digunakan sebagai sistem pendukung operasional *Plant-Based Air Purifier*.

Kata kunci: Sistem Manajemen Daya, *Internet of Things* (IoT), ESP8266, INA219, UPS DC, *Plant-Based Air Purifier*.

ABSTRACT

DESIGN AND DEVELOPMENT OF AN IOT-BASED POWER MANAGEMENT SYSTEM AS A MULTIFUNCTIONAL POWER SUPPLY FOR A PLANT-BASED AIR PURIFIER

(2026 : 74 Pages + 42 Pictures + 18 Tables + References + Attachment)

SULTHAN SYACH GAUTAMA

062330320707

DEPARTMENT OF ELECTRICAL ENGINEERING

ELECTRONICS ENGINEERING STUDY PROGRAM

STATE POLYTECHNIC OF SRIWIJAYA

*The continuous operation of a **Plant-Based Air Purifier** requires a stable, reliable, and real-time monitored power supply system. This study aims to design and develop an **Internet of Things (IoT)-based power management system** as a multifunctional power supply for a Plant-Based Air Purifier using an ESP8266 microcontroller and an INA219 sensor. The proposed system consists of a 3S4P lithium-ion battery pack, a 3S 40A Battery Management System (BMS), a DC UPS module, DC-DC converters, a 16×2 I2C LCD, and the Blynk application for remote monitoring. System evaluation included sensor calibration, output voltage testing, voltage stability analysis, power consumption measurement, and system performance testing over a three-day period. The results showed that the INA219 sensor achieved a voltage measurement error of less than **0.2%** and a current measurement error ranging from **0.8% to 4.0%**. All system outputs produced voltages close to the designed values, with voltage regulation ranging from **0.08% to 3.24%**. During the three-day testing period, the system recorded an average voltage of **11.82–11.83 V**, an average current of **0.57–0.58 A**, and an average power consumption of **6.80–6.94 W**. The results demonstrate that the proposed system is capable of providing a stable power supply while enabling real-time electrical parameter monitoring, making it suitable as a supporting power management system for the continuous operation of a Plant-Based Air Purifier.*

Keywords: *Power Management System, Internet of Things (IoT), ESP8266, INA219, DC UPS, Plant-Based Air Purifier.*