

ABSTRAK

RANCANG BANGUN ROBOT MOBILE PENYIRAM TANAMAN MENGUNAKAN PANEL SURYA

(2026: 62 Halaman + 50 Gambar + 15 Tabel + Daftar Pustaka + Lampiran)

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TEKNIK ELEKTRO

PROGRAM STUDI TEKNIK ELEKTRONIKA

POLITEKNIK NEGERI SRIWIJAYA

Kegiatan penyiraman tanaman pada area perkebunan masih banyak dilakukan secara manual sehingga membutuhkan waktu, tenaga, dan pengawasan yang cukup besar. Selain itu, keterbatasan akses listrik pada beberapa area perkebunan mendorong pemanfaatan energi terbarukan sebagai sumber energi alternatif. Oleh karena itu, dipilih judul *Rancang Bangun Mobile Robot Penyiram Tanaman Otomatis Menggunakan Panel Surya* untuk merancang sistem penyiraman yang dapat bekerja secara otomatis, memanfaatkan energi surya, serta menampilkan data sensor melalui sistem *Internet of Things* (IoT). Sistem menggunakan panel surya 10 WP, baterai 12 V, sensor INA219, sensor ACS712, sensor ultrasonik, webcam, Arduino Mega 2560, Raspberry Pi 4, driver motor BTS7960, dan pompa air. Berdasarkan hasil pengujian selama empat hari, tegangan baterai berada pada rentang 7,48–11,29 V, sedangkan tegangan panel surya berkisar 12,15–12,32 V. Hasil analisis menunjukkan konsumsi daya meningkat saat mode otomatis karena motor dan pompa bekerja bersamaan. Kesimpulannya, mobile robot mampu melakukan navigasi, mendeteksi tanaman, melakukan penyiraman otomatis, serta menampilkan data sensor secara *real-time* melalui sistem IoT.

Kata kunci: *Mobile robot*, panel surya, penyiraman tanaman otomatis, Internet of Things (IoT), sensor ultrasonik.

ABSTRACT

DESIGN AND DEVELOPMENT OF A MOBILE ROBOT FOR PLANT WATERING USING SOLAR PANELS

(2026: 62 Pages + 50 Pictures +15 Tables + Bibliography + Appendix)

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ELECTRICAL ENGINEERING

STUDY PROGRAM OF ELECTRONICS ENGINEERING

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Plant watering activities in plantation areas are still commonly performed manually, requiring considerable time, labor, and continuous supervision. Moreover, limited access to electrical power in certain plantation areas encourages the use of renewable energy as an alternative power source. Therefore, this study proposes the Design and Development of an Automatic Plant Watering Mobile Robot Using Solar Panels to develop an autonomous watering system powered by solar energy while displaying real-time sensor data through an Internet of Things (IoT) platform. The system utilizes a 10 WP solar panel, a 12 V battery, INA219 and ACS712 sensors, ultrasonic sensors, a webcam, an Arduino Mega 2560, a Raspberry Pi 4, a BTS7960 motor driver, and a water pump. Based on four days of testing, the battery voltage ranged from 7.48 V to 11.29 V, while the solar panel voltage ranged from 12.15 V to 12.32 V. The results indicate that power consumption is higher in automatic mode because the drive motors and water pump operate simultaneously. Overall, the mobile robot successfully performs autonomous navigation, detects plants, carries out automatic watering, and displays sensor data in real time through an IoT system.

Keywords— *Mobile robot, solar panel, IoT, automatic watering, image processing.*