

ABSTAK

SISTEM PENYIRAMAN OTOMATIS TANAMAN DAUN BAWANG PADA *GREENHOUSE* MENGGUNAKAN MEDIA TANAH BERBASIS *SENSOR SOIL MOISTURE*

(2026: 135 Halaman + 45 Gambar + 13 Tabel + Daftar Pustaka + Lampiran)

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Budidaya tanaman daun bawang (*Allium fistulosum* L.) pada media tanah masih banyak dilakukan secara manual sehingga penyiraman dan pemberian nutrisi kurang efisien. Penelitian ini bertujuan merancang sistem penyiraman otomatis berbasis sensor *soil moisture* dan monitoring nutrisi menggunakan sensor *Total Dissolved Solids* (TDS) pada greenhouse berbasis *Internet of Things* (IoT). Sistem menggunakan sepuluh sensor *soil moisture* yang dihubungkan melalui multiplexer dan diproses oleh ESP32. Penyiraman dikendalikan berdasarkan metode mayoritas, yaitu pompa aktif jika minimal enam sensor mendeteksi kelembapan tanah <40% dan berhenti jika minimal enam sensor mendeteksi kelembapan >60%. Sensor TDS memantau konsentrasi nutrisi AB mix pada kisaran 800–1100 ppm yang diberikan setiap hari Senin, Rabu, dan Jumat pukul 09.00 WIB. Hasil pengujian menunjukkan sistem mampu mengendalikan penyiraman dan pemberian nutrisi secara otomatis serta menampilkan informasi kelembapan tanah, nilai TDS, dan status pompa pada LCD dan Blynk secara *real-time*. Sistem yang dirancang mampu menjaga kelembapan tanah dan ketersediaan nutrisi sehingga mendukung pertumbuhan tanaman daun bawang.

Kata Kunci: *Greenhouse*, Daun Bawang, *Sensor Soil Moisture*, *Sensor Total Dissolved Solids* (TDS), ESP32, *Internet of Things* (IoT).

ABSTRACT

AUTOMATIC WATERING SYSTEM FOR SPRING ONION PLANTS IN A GREENHOUSE USING SOIL MEDIA BASED ON SOIL MOISTURE SENSORS

(2026: 135 Pages + 45 Figures + 13 Tables + References + Appendices)

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*The cultivation of spring onions (*Allium fistulosum* L.) in soil media is still commonly carried out manually, making irrigation and nutrient application less efficient. This study aims to design an automatic irrigation system based on soil moisture sensors and nutrient monitoring using a Total Dissolved Solids (TDS) sensor in an Internet of Things (IoT)-based greenhouse. The system employs ten soil moisture sensors connected through a multiplexer and processed by an ESP32 microcontroller. Irrigation is controlled using the majority method, where the water pump is activated when at least six sensors detect soil moisture below 40% and deactivated when at least six sensors detect soil moisture above 60%. The TDS sensor monitors the concentration of AB mix nutrient solution within the range of 800–1100 ppm, which is supplied every Monday, Wednesday, and Friday at 09:00 WIB. The test results show that the system is capable of automatically controlling irrigation and nutrient supply while displaying soil moisture, TDS values, and pump status on the LCD and the Blynk application in real time. The proposed system is able to maintain stable soil moisture and nutrient availability, thereby supporting the growth of spring onions.*

Keywords: *Greenhouse, Spring Onion, Soil Moisture Sensor, Total Dissolved Solids (TDS) Sensor, ESP32, Internet of Things (IoT).*