

ABSTRAK

Patrick Aprilia Baretta. 2026. Rancang bangun sistem penyiraman otomatis pada tanaman air mata pengantin sebagai vegetasi lebah madu klanceng berbasis *Internet of Things* (IoT) menggunakan esp32 devkit v1 dan *spreadsheet*. Skripsi. Program Studi Teknik Elektro, Fakultas Teknik, Universitas PGRI Madiun. Pembimbing (I) Irna Tri Yuniahastuti, S.Pd., M.T. (II) Ridam Dwi Laksono, S.Si., M.Pd.

Penyiraman tanaman secara manual sering menyebabkan kelembapan tanah tidak terjaga secara konsisten sehingga berpotensi menghambat pertumbuhan tanaman serta memerlukan waktu dan tenaga dalam proses perawatannya. Penelitian ini bertujuan merancang dan membangun sistem penyiraman otomatis berbasis Internet of Things (IoT) menggunakan ESP32 DevKit V1 dan Google Spreadsheet untuk mengontrol penyiraman sekaligus memantau kondisi kelembapan tanah. Sistem terdiri atas ESP32 DevKit V1, tiga sensor kelembapan tanah, relay, pompa air, LCD I2C, keypad, dan jaringan Wi-Fi. Penyiraman dilakukan secara otomatis berdasarkan nilai rata-rata kelembapan tanah, yaitu pompa aktif saat kelembapan di bawah 60% dan berhenti ketika mencapai atau melebihi 60%. Hasil pengujian menunjukkan tingkat keberhasilan penyiraman otomatis sebesar 79,1% pada hari Jumat, 100% pada hari Sabtu hingga Selasa, 91,6% pada hari Rabu, dan 64% pada hari Kamis. Monitoring melalui Google Spreadsheet berhasil menampilkan data dengan tingkat keberhasilan pengiriman sebesar 63,5%–98,9%. Selain itu, tanaman Air Mata Pengantin yang menggunakan sistem penyiraman otomatis menunjukkan pertumbuhan yang lebih baik dibandingkan penyiraman manual. Penelitian menunjukkan bahwa sistem yang dikembangkan mampu mendukung penyiraman otomatis dan monitoring kelembapan tanah secara efektif.

Kata Kunci: Air mata pengantin, Lebah Madu Klanceng, ESP32 DEVKIT V1, kelembapan tanah, penyiraman otomatis, *Google spreadsheet*.

ABSTRACT

Patrick Aprilia Baretta. 2026. *Design and Development of an Internet of Things (IoT)-Based Automatic Irrigation System for Heterotrigona itama Honey Bee Vegetation Gardens*. Undergraduate Thesis. Electrical Engineering Study Program, Faculty of Engineering, Universitas PGRI Madiun. Supervisor (I) Irna Tri Yuniahastuti, S.Pd., M.T. (II) Ridam Dwi Laksono, S.Si., M.Pd.

*Manual plant irrigation often results in inconsistent soil moisture, which may inhibit plant growth and requires considerable time and effort for maintenance. This study aims to design and develop an Internet of Things (IoT)-based automatic irrigation system using the ESP32 DevKit V1 and Google Sheets to control irrigation while monitoring soil moisture conditions. The system consists of an ESP32 DevKit V1, three soil moisture sensors, a relay module, a water pump, an I2C LCD, a keypad, and a Wi-Fi network. Irrigation is performed automatically based on the average soil moisture value, where the water pump is activated when the soil moisture falls below 60% and stops when it reaches or exceeds 60%. The experimental results indicate that the automatic irrigation system achieved success rates of 79.1% on Friday, 100% from Saturday to Tuesday, 91.6% on Wednesday, and 64% on Thursday. Data monitoring through Google Sheets successfully displayed sensor readings with transmission success rates ranging from 63.5% to 98.9%. Furthermore, Coral Vine (*Antigonon leptopus*) plants irrigated using the automatic irrigation system exhibited better growth than those irrigated manually. The findings demonstrate that the developed system effectively supports automatic irrigation and efficient soil moisture monitoring.*

Keywords: *Antigonon leptopus, Stingless Bee (Heterotrigona itama), ESP32 DevKit V1, Soil Moisture, Automatic Irrigation, Google spreadsheet.*