

**RANCANG BANGUN ROBOT PENGENDALI GULMA OTOMATIS  
BERBASIS *CONVOLUTIONAL NEURAL NETWORK (CNN)* PADA  
TANAMAN OBAT KELUARGA**

**LAPORAN TUGAS AKHIR TEKNIK KOMPUTER**

**UNIVERSITAS ANDALAS**

**ILHAM  
2111512011**



**DOSEN PEMBIMBING:**

**RIFKI SUWANDI, M.T**

**NIP. 199402062022031004**

**KEDJAJAAN**

**UNTUK**

**DEPARTEMEN TEKNIK KOMPUTER**

**BANGSA**

**FAKULTAS TEKNOLOGI INFORMASI**

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# RANCANG BANGUN ROBOT PENGENDALI GULMA OTOMATIS BERBASIS *CONVOLUTIONAL NEURAL NETWORK (CNN)* PADA TANAMAN OBAT KELUARGA

Ilham<sup>1</sup>, Rifki Suwandi, M.T<sup>2</sup>

<sup>1</sup>*Mahasiswa Teknik Komputer Fakultas Teknologi Informasi Universitas Andalas*

<sup>2</sup>*Dosen Teknik Komputer Fakultas Teknologi Informasi Universitas Andalas*

## ABSTRAK

Indonesia memiliki keanekaragaman tanaman obat yang banyak dimanfaatkan melalui Tanaman Obat Keluarga (TOGA). Namun, pertumbuhan gulma sering mengganggu dan menurunkan kualitas produksi. Metode pengendalian manual maupun kimiawi kurang efisien serta berisiko merusak lingkungan, sehingga diperlukan solusi berbasis teknologi. Penelitian ini merancang *Robot Pengendali Gulma Otomatis* berbasis *YOLOv5* yang diimplementasikan pada Jetson Nano dengan kamera Raspberry Pi Cam, motor DC, dan servo pemotong gulma. Robot dilengkapi fitur perekaman jalur menggunakan *push button* serta notifikasi hasil kerja melalui Telegram. Hasil pengujian menunjukkan akurasi deteksi gulma 85% pada 11–12 FPS, pemotongan efektif pada durasi  $\geq 6$  detik, dan notifikasi terkirim dengan rata-rata waktu 1,5–2 detik. Sistem ini terbukti efektif dan efisien dalam membantu pengendalian gulma pada TOGA, meskipun masih memerlukan pengembangan lebih lanjut untuk meningkatkan akurasi dan adaptasi terhadap kondisi lapangan.

**Kata kunci:** Robot Pengendali Gulma, Tanaman Obat Keluarga (TOGA), *YOLOv5*, *Convolutional Neural Network (CNN)*, Jetson Nano, Deteksi Objek

# DESIGN AND DEVELOPMENT OF AN AUTOMATIC WEED-CONTROL ROBOT BASED ON *CONVOLUTIONAL NEURAL NETWORK* (CNN) FOR FAMILY MEDICINAL PLANTS

Ilham<sup>1</sup>, Rifki Suwandi, M.T<sup>2</sup>

<sup>1</sup>*Undergraduated Student Of Computer Engineering Faculty of Information Technology Andalas University*

<sup>2</sup>*Lecturer Of Computer Engineering Faculty of Information Technology Andalas University*

## ABSTRACT

*Indonesia has a rich diversity of medicinal plants that are widely utilized through Family Medicinal Plants (TOGA). However, weed growth often disrupts cultivation and reduces production quality. Manual and chemical weed control methods are inefficient and pose environmental risks, thus requiring a technology-based solution. This study designed an Automatic Weed-Control Robot based on YOLOv5, implemented on a Jetson Nano with a Raspberry Pi Camera, DC motors, and a weed-cutting servo. The robot is equipped with a path recording feature using push buttons and a notification system via Telegram. Experimental results show that the system achieved 85% detection accuracy at 11–12 FPS, effective weed cutting at durations  $\geq 6$  seconds, and notifications delivered within 1.5–2 seconds on average. The system proved to be effective and efficient in assisting weed control for TOGA, although further development is needed to improve detection accuracy and adaptability to field conditions.*

**Keyword:** *Automatic Weed-Control Robot, Family Medicinal Plants (TOGA), YOLOv5, Convolutional Neural Network (CNN), Jetson Nano, Object Detection*