

**Prototyping an Effective Semi-Automated Traffic Cone Placement System for
Road Safety**

By

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Revision after The Thesis Defense on 7th July 2025

STATEMENT BY THE AUTHOR

I hereby declare that this submission is my own work and to the best of my knowledge, it contains no material previously published or written by another person, nor material which to a substantial extent has been accepted for the award of any other degree or diploma at any educational institution, except where due acknowledgement is made in the thesis.

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ABSTRACT

Prototyping an Effective Semi-Automated Traffic Cone Placement System for Road Safety

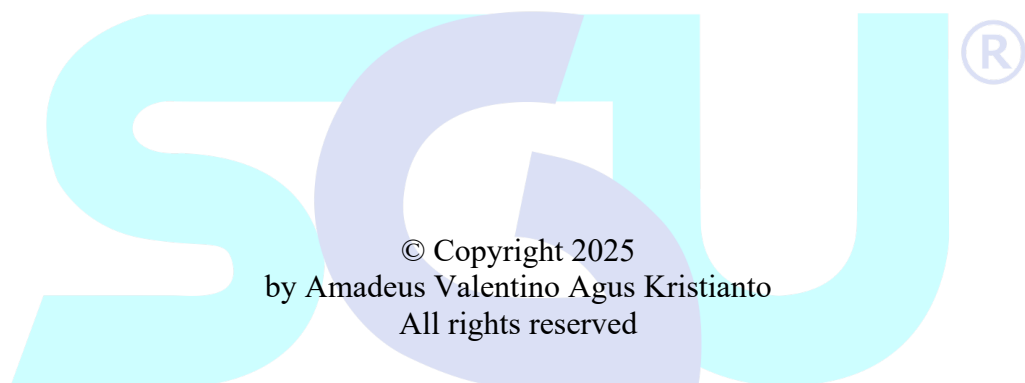
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This research aims to design and prototype a semi-automated traffic cone placement system to enhance road safety and operational efficiency, addressing the risks and inefficiencies of manual cone deployment in Indonesia. The methodology integrates experimental design and prototyping, combining mechanical design (CAD and 3D printing), electrical integration (ESP32 microcontroller, sensors, and actuators), and embedded software for sequential automation. The system was validated through repeated experimental tests measuring deployment accuracy, timing, and cycle consistency at different release intervals (150 mm and 800 mm per cone). Findings indicate that the prototype successfully automated cone deployment, with consistent upright placement and repeatable sequence timing. Longer release intervals provided improved spacing consistency, closely matching real-world requirements. The main limitation was sliding due to lightweight prototype cones and smooth testing surfaces. In conclusion, the results provide a solid foundation for further research and real-world adaptation using standard traffic cones and field testing.

Keywords: Mechatronics, automation, traffic safety, embedded systems, experimental validation, ESP32, prototype.



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DEDICATION

I dedicate this work to the future of engineering research and the continued advancement of technology in Indonesia. May this thesis serve as a small contribution toward inspiring innovation, creativity, and problem-solving in the field of mechatronics and beyond. I hope that the knowledge and experience gained through this project will benefit not only the academic community but also those who are committed to improving safety, efficiency, and quality of life in our nation. This work is a tribute to the educators, engineers, and visionaries who strive to build a better future for Indonesia and the world.



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