REAL-TIME TRAFFIC SIGN DETECTION USING YOLO AND DEEP LEARNING FOR AUTONOMOUS VEHICLES.

THESIS REPORT

MUHAMMAD SHARJIL ASHFAQ
41521010171

INFORMATICS ENGINEERING STUDY PROGRAM
FACULTY OF COMPUTER SCIENCE
MERCU BUANA UNIVERSITY
JAKARTA
2025

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Submitted as one of the requirements to obtain a bachelor's degree

INFORMATICS ENGINEERING STUDY PROGRAM
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2025

DECLARATION PAGE OF OWN WORK

I, the undersigned below:

Name	: MUHAMMAD SHARJIL ASHFAQ
NIM	*: 41521010171*
Study program	: Information Technology
Research Proposal Title	: Real-time Traffic Sign Detection Using YOLO and Deep Leaming for Autonomous Vehicles.

I declare that this Thesis Report is my own work and not plagiarized, and all sources quoted or referred to have been stated correctly. If it is found that my Research Proposal contains elements of plagiarism, then I am ready to receive academic sanctions that apply at Mercu Buana University.

Jakarta, December 7th, 2024

Muhammad Sharjil Ashfaq

APPROVAL PAGE

This Thesis Report is submitted by:

Name	: MUHAMMAD SHARJIL ASHFAQ
NIM	: 41521010171
Program Study	: Informatics Engineering
Report Title Thesis	: Real-time Traffic Sign Detection Using YOLO and Deep Learning for Autonomous Vehicles.

Has been successfully defended at the hearing before the Board of Examiners and accepted as part of the requirements needed to obtain a Bachelor's degree in the Informatics Engineering Study Program, Faculty of Computer Science, Mercu University The world.

Endorsed by:

Supervisor	: Ilham Nugraha, S.Kom., M.Sc.,	( )
NIDN	: 307098904	
Head Examiner	: Ilham Nugraha, S.Kom., M.Sc.,	( )
NIDN	: 307098904	
Examiner 1	: Dr. Hadi Santoso, S.Kom., M.Kom.	( )
NIDN	: 0225067701	
Examiner 2	: Dr. Ir. Eliyani, M.Kom.	
NIDN	: 0321026901	

Jakarta, August 8, 2025

Know,

Dean	Head of Study Program
Dr. Bambang Jokonowo, S.Si., MTI	Dr. Hadi Santoso, S.Kom., M.Kom

FOREWORD

All praise and gratitude are due to the Almighty Allah, whose mercy and guidance have enabled me to complete this thesis proposal, titled *" **Real-time Traffic Sign Detection Using YOLO and Deep Learning for Autonomous Vehicles**."* This proposal has been prepared as a requirement for earning a bachelor's degree in the International Class S-1 Study Program within the Informatics Department, Faculty of Computer Science, Universitas Mercu Buana Jakarta.

As a researcher, I acknowledge my human limitations, and I am aware that this work may not be free of mistakes or shortcomings due to my limited knowledge and experience. However, the process of completing this proposal would not have been possible without the support, guidance, and encouragement from many individuals who have helped me along the way.

First and foremost, I would like to extend my deepest gratitude to my supervisor, **Ilham Nugraha, S.Kom., M.Sc**., for his invaluable guidance, advice, and motivation throughout this journey. His unwavering support has been instrumental in shaping this research.

I would also like to express my heartfelt thanks to the following individuals who have contributed to the successful completion of this work:

1. **Prof. Dr. Andi Adriansyah, M. Eng,** Rector of Universitas Mercu Buana, for his leadership and vision.
2. **Dr. Bambang Jokonowo, S.Si., MTI,** Dean of the Faculty of Computer Science, for fostering a supportive academic environment.
3. **Dr. Hadi Santoso, S.Kom., M.Kom,** Head of the Informatics Engineering Department, for his encouragement and leadership.
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6. **Afiyati, Dr., S.Si., MT,** Deputy Dean of the International Department of Informatics Engineering, for her guidance and support.
7. **Ilham Nugraha, S.Kom., M.Sc.,** Secretary of the International Department of Informatics Engineering, for his assistance throughout my academic journey.
8. **Miss Febi, S.Kom.,** of the International Department of Informatics Engineering, for her contribution and help towards my proposal.
9. **Mr. Agung S.Kom., and The Fasilkom Department** for helping me with the administration problems and guiding me through the process

A special thank you goes to my parents, whose endless support and prayers have been my greatest source of strength and motivation. I am also incredibly grateful to my friends for their encouragement and support, both emotionally and physically,

during this journey. Lastly, I want to acknowledge all the individuals and parties who have shared their knowledge and inspired me along the way.

I am fully aware that this proposal is not perfect, and there is always room for improvement. I humbly welcome any constructive feedback, suggestions, or criticism to help me grow and enhance my work. I hope that this thesis proposal can contribute meaningfully to the field of study and provide a solid foundation for future research.

With humility, I sincerely apologize for any shortcomings or errors that may exist in this work.

Jakarta, 10th July 2025

Muhammad Sharjil Ashfaq

PAGE OF STATEMENT OF CONSENT TO PUBLICATION OF FINAL ASSIGNMENT FOR ACADEMIC PURPOSE

As an academic member of Mercu Buana University, I, the undersigned:

Name	:	Muhammad Sharjil Ashfaq
NIM	:	41521010171
Program Study	:	Informatics Engineering
Report Title Thesis	:	Real-time Traffic Sign Detection Using YOLO and Deep Learning for Autonomous Vehicles.

For the sake of scientific development, hereby grant permission and agree to grant Mercu Buana University Non- ***Exclusive Royalty*- Free Rights** for my scientific work entitled above along with the existing equipment (if necessary).
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Thus I make this statement in truth.

Jakarta, July 10, 2025
That state,

Muhammad Sharjil Ashfaq.

ABSTRACT

Name	:	Muhammad Sharjil Ashfaq
NIM	:	41521010171
Study program	:	Information Technology
Research Proposal Title	:	Real-time Traffic Sign Detection Using YOLO and Deep Learning for Autonomous Vehicles.
Supervisor	:	Ilham Nugraha, S.Kom., M.Sc

Real-time and accurate detection of traffic signs is essential for the safe and efficient operation of autonomous vehicles within intelligent transportation systems. Traffic signs provide critical navigational cues, yet detecting them in real-world conditions remains challenging due to factors such as variable weather, lighting conditions, occlusions, and diverse sign appearances. This study evaluates and compares the performance of two deep learning-based object detection models—You Only Look Once version 8 (YOLOv8) and Single Shot Multibox Detector (SSD300)—for real-time traffic sign recognition. Both models were trained on a diverse traffic sign dataset using data augmentation techniques to improve generalization across various conditions. The models were assessed using precision, recall, and mean Average Precision at a 0.50 IoU threshold (mAP@50), along with confusion matrices to analyze detection accuracy and misclassification trends. Performance comparison results show that YOLOv8 significantly outperformed SSD300, achieving a precision of 0.9517, recall of 0.9002, and mAP@50 of 0.9577, while SSD300 reached a precision of 0.6321, recall of 0.6325, and mAP@50 of 0.7224. YOLOv8 demonstrated faster inference and higher accuracy, making it more suitable for real-time applications, whereas SSD300, despite its lower performance, offers advantages in scenarios with limited computational resources due to its smaller model size. These findings emphasize the trade-offs between speed, accuracy, and model complexity, offering practical insights for selecting appropriate detection models in autonomous driving environments.

Keywords: *Autonomous Vehicles, Traffic Sign Detection, YOLOv8, SSD300, Real-time Detection, Deep Learning, Precision, Recall, mAP@50, Confusion Matrix.*

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