



REPUBLIC OF INDONESIA DEFENSE UNIVERSITY

**DEEP LEARNING BASED CLOSED CIRCUIT TELEVISION (CCTV)
SENSOR SYSTEM DESIGN FOR ANOMALY IDENTIFICATION IN
MASS CROWDS**

THESIS

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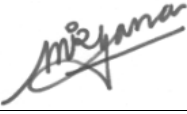

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ORIGINALITY STATEMENT

I hereby declare that in this thesis proposal there is no work or part of the work that has ever been submitted for obtaining a graduate degree at any level at a university; and as far as I know there are no terms, phrases, sentences, paragraphs, subchapters or chapters from works that have ever been written or published; except those submitted in writing in this manuscript are mentioned in the Reference List

If in the future it is proven that there is plagiarism in this thesis, I am willing to accept sanctions in accordance with the provisions of the applicable regulations/laws.

Jakarta, January 13, 2024

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The researcher would like to thank the presence of God Almighty, because thanks to His mercy and grace the preparation of the thesis with the title: "DEEP LEARNING BASED CLOSED CIRCUIT TELEVISION (CCTV) SENSOR SYSTEM DESIGN FOR ANOMALY IDENTIFICATION IN MASS CROWDS" can be completed.

The preparation of this thesis is intended as one of the requirements for obtaining a master's degree in the Cyber Defense Engineering Study Program, Faculty of Defense Science and Technology, Defense University.

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The researcher realizes that this thesis is still imperfect, therefore he humbly hopes for constructive criticism and suggestions for the perfection of this thesis.

Finally, we hope that this thesis can provide benefits to the development of defense science and be useful for relevant stakeholders in efforts to overcome existing problems.

Jakarta , January 13, 2023

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ABSTRACT

DEEP LEARNING BASED CLOSED CIRCUIT (CCTV) SENSOR SYSTEM DESIGN FOR ANOMAL IDENTIFICATION IN MASS CROWDS

FADHIL MUHAMMAD HADINI

This thesis presents a deep-learning-based closed-circuit television (CCTV) sensor system design for anomaly identification in mass crowds. This system is really needed when there are large-scale demonstrations, making it easier for security forces to act early to prevent clashes. This application uses deep learning with the 8th version of the YOLO method to train data training. The data used is footage from CCTV recordings to be processed into reference data in order to detect anomalies. By using more than 2500 clips to be used as data training, it is hoped that it can become a reference for detecting clashes at demonstrations, then the data was trained for 50 iterations to produce accurate reference data for detecting anomalies in the demonstration. This application can be integrated with CCTV using the Real Time Stream Protocol (RTSP) method which can immediately take CCTV images for identification. This application is able to detect any anomalies in the occurrence of clashes. In conclusion, the deep learning-based CCTV sensor system design for anomaly identification in mass crowds offers a promising solution for intelligent video surveillance in public places. It is hoped that this application can help security forces in monitoring demonstration activities to avoid clashes and can monitor suspicious things.

Keywords: Deep learning, Closed-circuit television (CCTV), Sensor system design, Anomaly identification, Mass crowds

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