UNDERGRADUATE THESIS

DESIGN AND DEVELOPMENT OF AN INVENTORY RENTAL SYSTEM USING THE RAPID APPLICATION DEVELOPMENT METHOD AND OPTICAL CHARACTER RECOGNITION-BASED STUDENT IDENTITY CARD VALIDATION

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Hereby declares that this undergraduate thesis contains no part of any other scientific work that has been submitted to obtain an academic degree at any higher education institution. Furthermore, it does not contain any work or opinions previously written or published by others, except for those which are explicitly cited in this thesis and listed completely in references.

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ABSTRACT

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Thesis Title	:	Design and Development of an Inventory Rental System Using The Rapid Application Development Method and Optical Character Recognition-Based Student Identity Card Validation
Advisor	:	1. Retno Mumpuni, S.Kom, M.Sc 2. Afina Lina Nurlaili, S.Kom, M.Kom

Inventory management at the Islamic Spiritual Activity Unit (UKKI) of UPN "Veteran" Jawa Timur is currently operated manually using spreadsheets. This method is susceptible to data entry errors, hinders real-time stock monitoring, and has security vulnerabilities in validating borrowers' identities, which increases the risk of asset misuse. This study aims to design and develop a web-based Inventory Rental Management Information System to overcome these problems. The system was developed using the Rapid Application Development (RAD) method, which proved effective in accommodating business flow changes iteratively. To ensure transaction security, the system integrates Optical Character Recognition (OCR) technology using the Tesseract engine to automatically extract and validate the Student Identity Card (KTM). To overcome the decrease in OCR accuracy due to noise and poor physical lighting conditions, the system applies post-processing algorithms based on Regular Expressions (Regex), Levenshtein Distance, and Bayesian Probability to intelligently correct reading errors (typos) by matching them with the internal database. The functional testing (Black Box) results prove that all features, including QR Code validation and transaction tracking, function properly. Algorithm performance testing shows an average character accuracy (Levenshtein Accuracy) of 95.51%. Decision accuracy evaluation using the Confusion Matrix yielded an accuracy rate of 83.33% with a 0% False Positive rate, proving the system is highly rigorous and secure in rejecting document manipulation. The implementation of this system has successfully realized an efficient, transparent, and accountable inventory management.

Keywords: Information System, Inventory, Rapid Application Development, Optical Character Recognition, Levenshtein Distance.

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The author realizes that there are still many shortcomings in the preparation of this thesis. Therefore, constructive criticism and suggestions from all parties are highly expected for the perfection of this thesis writing. Finally, with all the author's limitations, it is hoped that this thesis report can provide benefits and inspiration for all parties in general, and for the author in particular.

Surabaya, May 22nd 2026

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