A Smart Door Lock Prototype Using Fingerprint and RFID Access

Phí Đức Bình Minh
Thai Nguyen University of Information and Communication Technology
Thai Nguyen University, Thai Nguyen, Vietnam
dtc19h4801080010@ictu.edu.vn

***Abstract*—This undergraduate thesis investigates a smart-door-lock prototype with fingerprint and RFID access methods. An electronic lock can use a credential reader to control entry without a conventional key. The author studies Arduino programming, a NodeMCU controller, a fingerprint reader, and an RFID module. The thesis documents circuit design, credential enrollment, and example lock interactions. The report presents the built model and shows fingerprint and card workflows. The conclusion discusses potential convenience and security, but does not demonstrate a validated improvement in access control across real installations. Fingerprint recognition may fail under poor sensor conditions, and credential management requires secure design. The source does not include a formal attack test, accessibility assessment, or quantified reliability study. The contribution is a documented student study or prototype whose stated scope can guide further testing.**

***Index Terms*—smart lock, fingerprint, RFID, NodeMCU**

I. Introduction

An electronic lock can use a credential reader to control entry without a conventional key. This thesis investigates a smart-door-lock prototype with fingerprint and RFID access methods. It begins from a practical engineering need and explains the technologies and workflow chosen for the case. The objective is to document a student implementation or comparative investigation, together with the evidence available in the manuscript. Broader operational or economic effects require separate measurements and are not assumed from the existence of a prototype [1]. Earlier ICTU student work on related designs is included here for context [2], [3], [4]. Related published studies provide context for the subject and methods [5], [6], [7], [8], [9], [10]. These contextual works were selected for this English summary; they are not asserted to appear in the original thesis bibliography.

II. Methods

The author studies Arduino programming, a NodeMCU controller, a fingerprint reader, and an RFID module. The thesis documents circuit design, credential enrollment, and example lock interactions. The source is summarized through its stated design, implementation material, examples, and conclusion. Features shown in the manuscript are distinguished from proposals for later development. This review does not add a new experiment, fill missing measurements with estimates, or treat a planned capability as an observed result. The source thesis remains the provenance for the reported work [1].

Supervisor: Đào Thị Hằng, Thai Nguyen University of Information and Communication Technology (dthang@ictu.edu.vn).

III. Results

The report presents the built model and shows fingerprint and card workflows. The conclusion discusses potential convenience and security, but does not demonstrate a validated improvement in access control across real installations. The report's screens, configurations, examples, or measurements constitute the evidence for this summary. A capability described only as a design intention is not counted as a validated operational outcome. No additional performance, adoption, financial, or safety figure has been introduced here. The result is interpreted within the scope of the student's documented setup [1].

IV. Discussion

Fingerprint recognition may fail under poor sensor conditions, and credential management requires secure design. The source does not include a formal attack test, accessibility assessment, or quantified reliability study. A later pilot could measure false accepts, false rejects, power-loss behavior, and the handling of users who cannot provide a usable fingerprint. These limitations affect how the evidence should be read. The current manuscript can support understanding of the design and reported demonstration, while independent tests would be needed for stronger claims. Any later deployment should document its environment and separate observed outcomes from intended benefits [1].

V. Conclusion

The thesis documents a smart-door-lock prototype with fingerprint and RFID access methods. The report presents the built model and shows fingerprint and card workflows. The conclusion discusses potential convenience and security, but does not demonstrate a validated improvement in access control across real installations. Fingerprint recognition may fail under poor sensor conditions, and credential management requires secure design. The source does not include a formal attack test, accessibility assessment, or quantified reliability study. A later pilot could measure false accepts, false rejects, power-loss behavior, and the handling of users who cannot provide a usable fingerprint. Accordingly, the present contribution is a source-grounded account of the student work and its

tested or illustrated scope. Claims about broader effectiveness should be assessed in later work using explicit evaluation conditions [1].

References

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