A Smart Parking Model Using Image Processing and RFID

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***Abstract*—This thesis builds a smart-parking model combining camera images, RFID cards, plate-information processing, a database, and fee calculation. The report describes the equipment, software interface, and entry and exit workflows. Its practical section tests different plate images and shows examples where matching entry and exit plates allow a barrier to open, while mismatches are rejected. The author notes that some plates are recognized incorrectly and that automated recognition is not fully optimized or integrated. The source does not give a reliable overall accuracy rate, a deployment trial in a public car park, or a long-term fault analysis. The contribution is a demonstrated parking-system model and a record of its remaining recognition and integration limitations.**

***Index Terms*—smart parking, RFID, license plate, image processing, barrier control**

I. Introduction

A parking facility must associate a vehicle with its entry record and calculate the correct charge at exit. The thesis explores camera-based plate information and RFID identifiers as inputs to that workflow. It introduces image-processing concepts and the hardware modules used in the model. The objective is to build a prototype that records vehicles and controls a barrier. The source does not present an operational installation at a commercial facility [1]. Earlier ICTU student work on related designs is included here for context [6], [7]. Related published studies provide context for the subject and methods [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 connects RFID readers, cameras, a control unit, and a desktop software interface. The report discusses image-processing libraries, including EmguCV and OpenCV, and describes database recording and fee calculation. A practical section exercises plate-image cases, card setup, camera connection, and barrier behavior when the compared plates match or differ. The tests are demonstrations with selected examples rather than a statistically designed recognition experiment [1].

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III. Results

The manuscript shows screens for login, registering cards, viewing available spaces, capturing vehicle images, and checking plates at exit. It reports that card, camera, database, and fee functions operated in the tested model. Some plate images were recognized incorrectly, and the concluding section still proposes stronger automatic recognition. No reproducible accuracy percentage or sustained operation under real parking traffic is established [1].

IV. Discussion

The prototype integrates several useful operations, but its plate-recognition errors and incomplete automation restrict practical reliability. Lighting, camera placement, plate variation, and card handling would matter in a real facility. The source does not measure those factors systematically. A later installation would need a larger labeled test set, access controls, dependable barrier safety, and integration checks before its records and fees could be trusted [1].

V. Conclusion

The thesis documents a smart-parking model using RFID, camera images, database records, and fee handling. The reported tests show selected entry and exit workflows, including plate comparison. The author also records recognition errors and further automation work. The source supports a functioning educational model, not a quantified production system. Broader image testing and operational validation are required for real deployment [1].

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