



BUILDING ACCESS CONTROL SOLUTION USING RFID & FACIAL RECOGNITION

INSTRUCTOR

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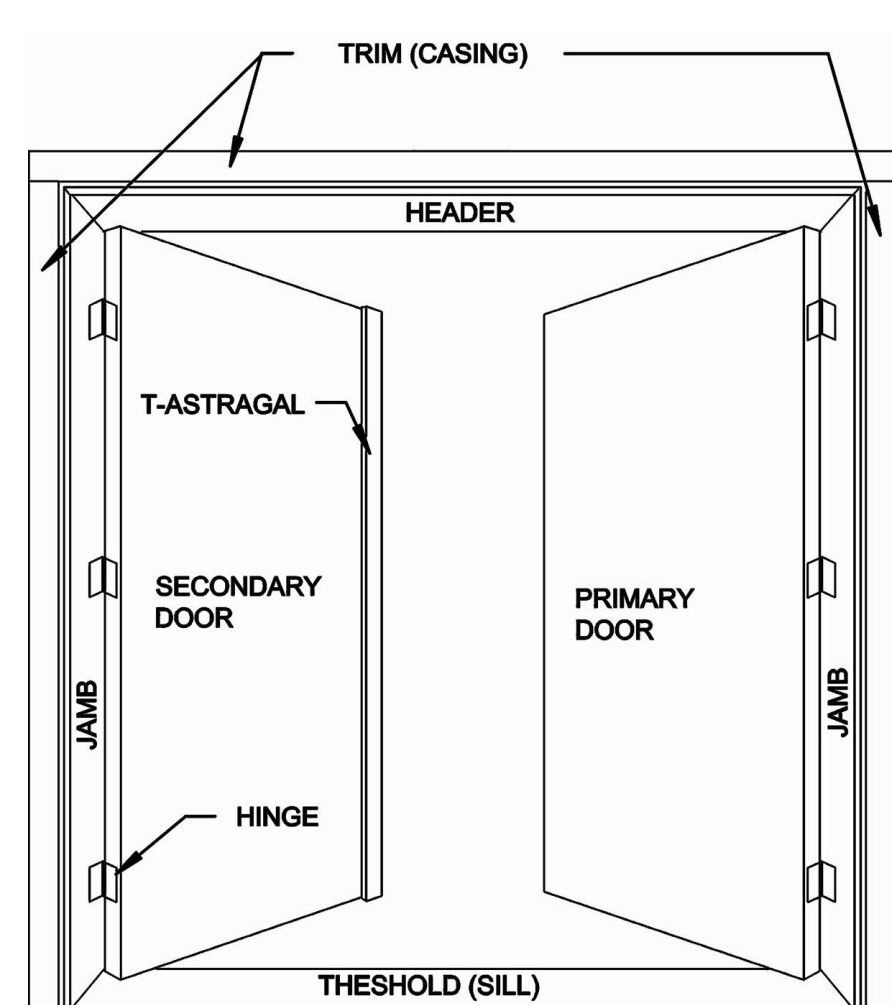
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ABSTRACT

Based on the fact that security technologies are needed in today's world, when houses, buildings, factories, airports need to be secured the technological way, this project is chosen. The project aims to create a complete system that supports 5 different stages of an access control system including Authentication, Authorization, Decision, Management and Logging combined with automatic swing door control and safety functions. The system provides both proximity and biometrics for Authentication, which uses RFID cards and facial recognition. We have built up a prototype that has been tested in ideal environment and actual environment. The results are proved to be good in ideal environment for all times, while actual-use environment require more time to record and analyze.

INTRODUCTION

Currently, swing-door control systems are present, but not plentiful, the most common authentication method is proximity cards. Facial recognition is also used for authentication, but while it is used for other types of entrances like slide-doors, optical or barrier arm turnstiles, very few swing-door control systems are applied this technology. Furthermore, we hardly see any double swing-door systems that show safety functions. This project creates a system that solves 3 main problems with the proposed methods to each problem.



Problems To Solve	Proposed Method
No-key authentication 1. How can a person access from outside when door is locked from inside? 2. Is there a more convenient way to authenticate rather than keys? 3. What if he lost his authentication device?	Face Verification combined with RFID Cards
Swing-door control 1. How to make sure door is closed and locked after the person enters? 2. During rush hours, how to speed up the process?	Linear Actuators to control closing/opening operation Solenoid Locks to lock the door Snap-Action Switches to detect "fully-opened", "fully-closed" events
Door safety functions 1. What if a person or obstacle blocks the door swing area while it is closing? 2. What if a child puts his hand between the edge of the door and the door jamb?	IR Distance Sensors mounted to specific positions of the door to detect obstacles Audible Warnings

RESULT

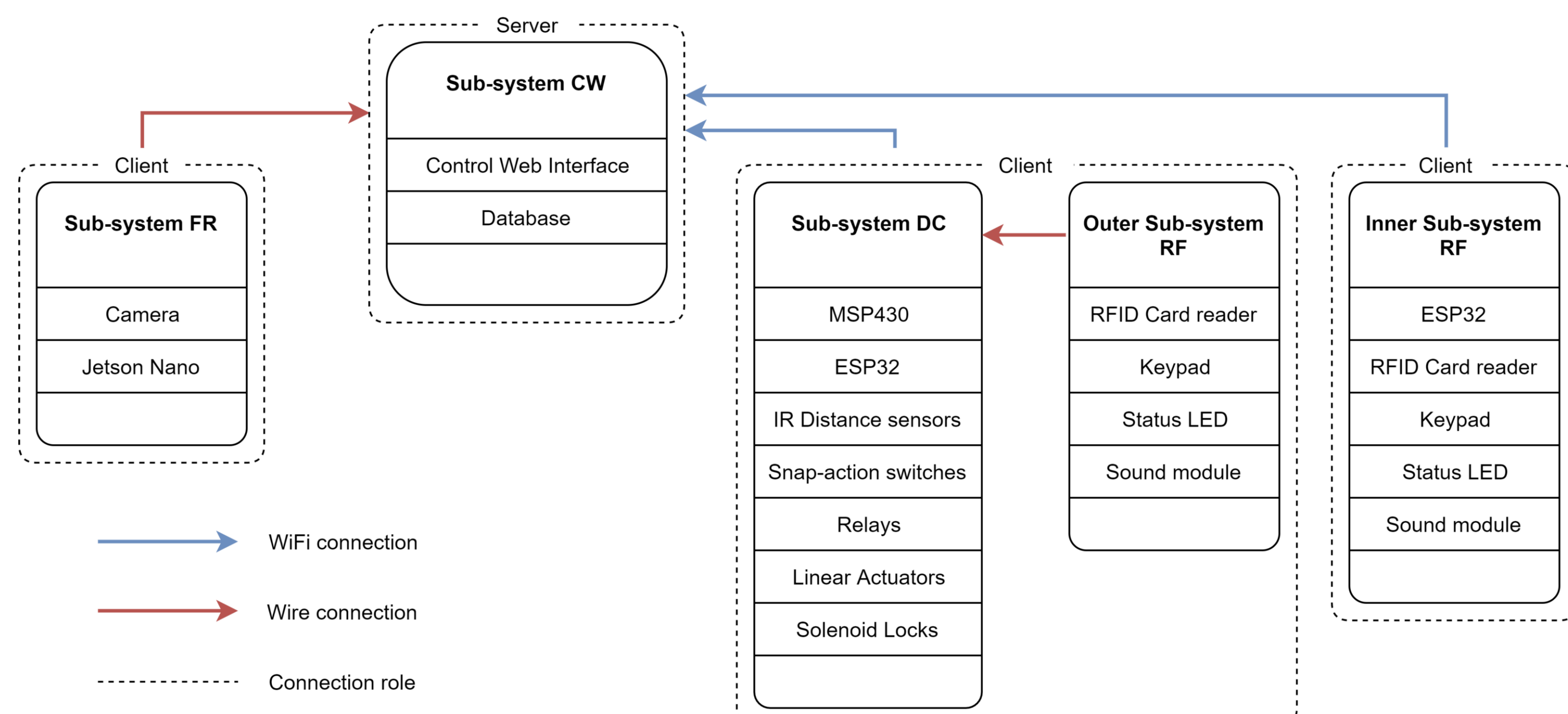
DC and RF circuits have been tested and assembled. For FR, Face detection and verification program provides just above average accuracy with detection speed of ~28FPS. Further improvements need to be done, especially on identity verification accuracy.



PROPOSED METHOD

The whole system includes 4 sub-systems: DC, CW, RF and FR. Ideally, each one is in charge of a specific task, DC for Door Control, CW for Control Website, RF for RFID Cards and FR for Facial Recognition. The authentication process is 2-factor: RFID card & Face verification. A typical operation process goes with these steps:

1. Person approaches the door
2. Scan his RFID card
3. Get his face verified
4. Door opens or remains closed



CONCLUSION

For functionality, our proposed method works well, when each sub-system performs expected functions, individually and when combined together. For perfection, however, there still exists several disadvantages:

1. RF sub-system: Voice warning alerts is not loud enough
2. FR sub-system: A screen should be equipped to better showing face verification process
3. DC sub-system: Lack hardware fault self detection functionality
4. CW sub-system: Not-so-professional user interface. Several door management sections need to be added.

More on further improvements:

- Improve each sub-system, especially FR
- Split RFID and face verification into 2 independent authentication methods, which means the system can operate on 1-factor when desired.
- Perform actual experiment
- Develop system's data security mechanism