Team 10 Documentation

Project Title

Table of Contents

[Introduction 1](#_Toc462049716)

[Materials 1](#_Toc462049717)

[Instructions 1](#_Toc462049718)

[Conclusion 1](#_Toc462049719)

[References 2](#_Toc462049720)

# Introduction

Security comes before convenience. Fancy cutting edge home automation devices are no use if they are robbed by illegal break in. Our project starts there. We aim to implement automated home security system which enables consumers to lock and unlock the door by specified keys, turns on the alarm when illegal attempts are detected, locks the door automatically when they forget to lock it by telling if the door is closed.

Our primary focus was to make this practical and usable in real life. You can actually apply this system by replacing door knob to digital one, and save your phone NFC ID to the system by a little tweak in the code.

# Materials

1. NFC tag

Read keys by their UID number

If authorized keys: Blink green light, run servo to unlock the door

If unauthorized keys: Blink red light, turn on the buzzer

2. LED lights

Indicate whether access allowed or not

3. Buzzer

Makes alarming noise

4. Servo motor

Connected to the door knob and actually lock/unlock the door

5. IR sensor

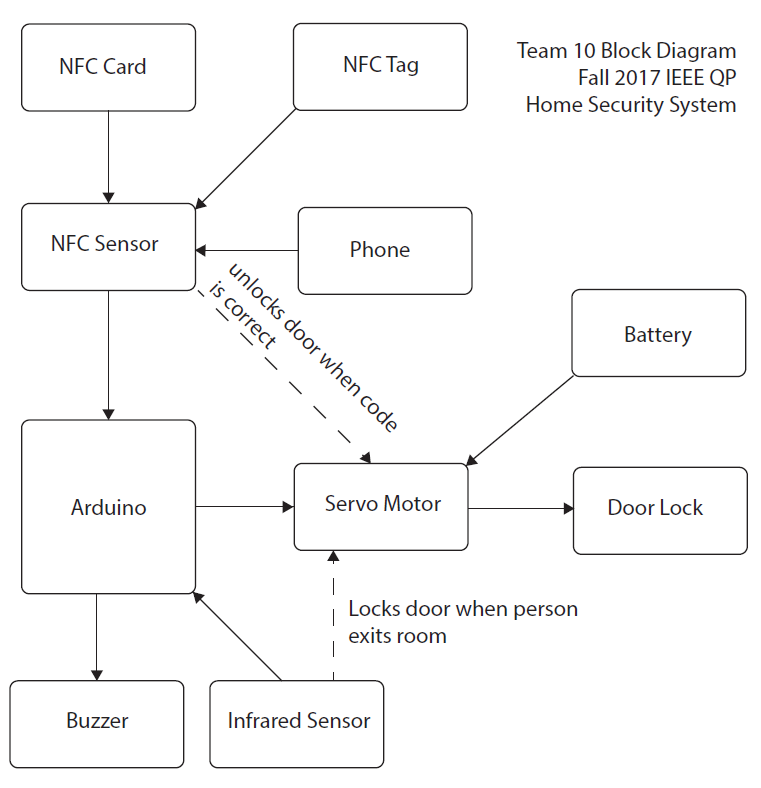
Detect the door status by its distance

If the door is closed: Run servo to lock the door

6. Arduino

Puts NFC sensor tag, LED lights, Buzzer, Servo motor, and IR sensor all together and connects them to work interactively.

# Instructions



This project is composed of three sections.

1. Getting user input, which is reading the key.

2. Action based on access permission.

3. Detecting door status and unlock it.

Section 1.

When user tags the NFC card, NFC sensor reads the UID of the card. If the UID matches the one saved in the program, the programs gives an access to the user. If not, the program turns on the alarm system.

Section 2.

If access allowed: -Turns on the green light.

- Rotates the servo in order to unlock the door.

If access denied: -Turns on the red light.

- Turns on the buzzer.

Section 3.

IR sensor has two pins, trigger pin which sends the pulse, and echo pin which gets the pulse. This sensor tells if the door is closed or not, by detecting the distance between door and door frame. This is done by converting the pulse into distance. If the door is closed, program rotates the servo and lock the door.

# Conclusion

[Potential improvements]

1. Replace the classic door knob to digital door lock.

2. Add a beam breaker sensor to detect illegal approach.

3. Add other options to unlock the door. (i.e. number pads or fingerprints)

4. Link home AI system (i.e. Alexa) to control the security system.

[Challenges]

[Victories]

[Role distribution]

Personal focus:

Esther Soyoung kang: Writing code on reading NFC card and following actions.

Antony Nguyen: Writing code on reading IR sensor and following actions.

Jianing Zhang: Building circuits and wiring.

Cooperation:

Brainstorming

Testing parts

Combining codes and Arduino

Building demo models

# References

NFC library: <https://github.com/miguelbalboa/rfid>

Referred to his ‘DumpInfo’ example to read the UID of the NFC cards.