**Use Cases**

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**Enroll Fingerprint**

Participating Actors:

1. Authenticating System
2. Homeowner

Entry Conditions:

1. User selects the option to add a user's fingerprint to the database

Flow of Events:

1. Ask for user name
2. User selects which hand and finger to enroll
3. User places previously indicated finger on scanner to record print
4. Repeat step 3 until five similar prints are recorded
5. If 5 similar prints are not recorded in 10 attempts, display error and exit
6. If 5 similar prints are recorded in 10 attempts or less, display success and exit

Exit Conditions:

1. Fingerprint successfully enrolled
2. User cancels the enrollment operation
3. Cannot record similar enough fingerprints

Quality Requirements:

1. The system should not require multiple scans of a given finger in order to enter it into the database.

**Unlock Door**

Participating Actors:

1. Authenticating System
2. Homeowner
3. Emergency Personnel

Entry Conditions:

1. User initiates unlock operation

Flow of Events:

1. User initiates authentication with the system
2. If the fingerprint method is chosen, disable Bluetooth and keypad at that door and go to the Unlock Door with Fingerprints use case.
3. If a code is being entered, go to the Unlock Door with Code use case
4. If a key is in the lock, turn off fingerprint scanner, Bluetooth, and keypad at that door and go to the Unlock Door with Key use case.
5. User finishes authenticating
6. If it was successful, enable all devices and exit
7. If successful, clear counter of unsuccessful authentication attempts
8. If it was unsuccessful, go to the Failed Authentication use case

Exit Conditions:

1. User finished entering authentication method

Quality Requirements:

1. There should be no perceptible delay when switching between authentication methods, e.g. disabling Bluetooth when a button on the keypad is pressed.

Unlock Door with Code:

Participating Actors:

1. Authenticating System
2. Homeowner
3. Emergency Personnel

Entry Conditions:

1. User begins authentication by not using a key or fingerprint scanner

Flow of Events:

1. User enters code
2. If a previously paired Bluetooth device comes into contact, go to Enter Code over Bluetooth
3. If a key on the keypad is pressed, disable Bluetooth and go to Enter Code with Keypad
4. Compare received code with database
5. If code matches, exit with a success message
6. If code does not match, exit with an unsuccessful message

Exit Conditions:

1. User finishes entering code
2. Power loss

Quality Requirements:

1. The timeout for entering the code on the keypad should be long enough to accommodate potentially handicapped users who have difficulty in typing quickly on a keypad.

**Enter code over Bluetooth**

Participating Actors:

1. Authenticating System
2. Homeowner

Entry Conditions:

1. User comes into proximity of the door with a Bluetooth device active which has been paired with the system.

Flow of Events:

1. User approaches the door
2. User opens app to unlock door
3. User selects “Unlock Door” option from app menu

Exit Conditions:

1. Door unlocks
2. Power loss
3. User passes out of Bluetooth range

Quality Requirements:

1. Database comparison for the entered code should be imperceptible to the User.

**Enter code with keypad**

Participating Actors

1. Authenticating System
2. Homeowner

Entry Conditions:

1. User approaches door and presses a key on the keypad.

Flow of Events:

1. The user enters a code on the physical keypad and presses “Enter”

Exit Conditions:

1. The code is entered completely
2. Only a partial code is entered and the system times out
3. Hardware failure of the keypad

Quality Requirements:

1. The timeout for entering the code on the keypad should be long enough to accommodate potentially handicapped users who have difficulty in typing quickly on a keypad.

**Unlock Door with Fingerprints**

Participating Actors:

1. Authenticating System
2. Homeowner

Entry Conditions:

1. User places finger on fingerprint reader

Flow of Events:

1. System scans the fingerprint
2. System compares fingerprint with enrolled fingerprints
3. Fingerprint matches, and door is unlocked
4. Fingerprint does not match, go to Failed Authentication

Exit Conditions:

1. Authentication is successful, and door is unlocked
2. Authentication fails, door remains locked

Quality Requirements:

1. Fingerprint comparison should not have a user-perceptible delay.

**Unlock Door with Key**

Participating Actors:

1. Homeowner

Entry Conditions:

1. User approaches door with physical key

Flow of Events:

1. Homeowner attempts to insert key into lock
2. The key fits, and inserts successfully
3. The key does not fit, go to Failed Authentication
4. User rotates key
5. The key successfully rotates, unlocking the door
6. The key does not fit properly, and will not rotate; go to Failed Authentication

Exit Conditions:

1. The door is unlocked
2. The key is not compatible with the door; the door remains locked

Quality Requirements:

1. The key should not require a large amount of force to turn.

**Failed Authentication**

Participating Actors:

1. Authenticating System
2. Homeowner
3. Emergency Personnel

Entry Conditions:

1. An authentication method did not complete successfully

Flow of Events:

1. System increments counter of unsuccessful attempts
2. If counter is greater than maximum, go to Lockdown All Doors
3. System sends an email to the homeowner notifying them of the authentication attempt

Exit Conditions:

1. The system returns to the ready state
2. The system is locked down

Quality Requirements:

1. Any error message displayed to the User should be clear and concise, written in plain English.

**Lockdown All Doors**

Participating Actors:

1. Authenticating System
2. Homeowner

Entry Conditions:

1. There were 5 failed authentications in the past hour

Flow of Events:

1. Disable all controlled authentication devices (excludes physical key)
2. Start lockdown timer

Exit Conditions:

1. Lockdown timer expires, and system returns to ready state
2. The door is unlocked by a physical key, and system returns to ready state

Quality Requirements:

1. A message should be displayed informing the User that the system is in lockdown.

**Change Passcode**

Participating Actors:

1. Authenticating System
2. Homeowner

Entry Conditions:

1. The change passcode timer expired
2. The user initiated change passcode

Flow of Events:

1. The User is prompted to enter their old password
2. The User enters their old password
3. The User is prompted for their desired new password
4. The User enters their new password
5. The User is prompted to confirm their new password
6. The User reenters their new password

Exit Conditions:

1. Password change is successful, and the system returns to ready
2. An error occurs and the system exits with an error message

Quality Requirements:

1. The System should require that the password meet certain security requirements, e.g. having at least one capital letter and number.