

Submission 2 - Smart lock

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1 Conceptualizations

1.1 Brainstorming

1.1.1 Adam Wu

- As a person who has amnesia, I would like to be able to find my keys anytime so that when I forget where I place them, I can find them.
 - Having a "find my" solution with a key.
- As a person who loves security, I would like to have the best lock for my house so that lock pickers are not able to pick my lock.
 - Making an "authentication" key that resets the key code within a set time, making it harder for hackers to unlock the door.
- As a person who is always last-minute out the door, I fear forgetting to lock the door when I close it.
 - Auto-locking door when a person closes the door.
- As a person who often forgets to bring their keys, I am scared of getting locked out.
 - Having a notification from the key to the phone that alerts: "keys are not close by to you."
- As a parent, I am scared of my kids forgetting their keys and locking themselves out of their room.
 - Creating a "master key" that only parents/admins can use to unlock specific doors.
- Concerned about key battery life.
 - Send a notification to the user when the key is on low battery.

1.1.2 Nathaniel Laurente

- Key has the ability to notify the user when too far away from the user's phone/body.
- Key deactivates/won't be able to open the door if too far away from the owner.
- "Tap to Pay" technology concept.
 - Unlocks the door like a credit card tap on a phone.
 - If too complex, explore alternative ways to unlock the door.
 - Eliminates the need for a physical key.

- Prevents stolen keys from working if the user still has their phone.
- Secure deactivation of the key when too far from the user.
 - Possible solution: Use the user’s phone for deactivation.
- One-time password generator between lock and key to ensure only this exact key can enter the house.
- Backup way to get into the house if the user forgets/loses their key.
 - Pin access code.
 - App allows for 2FA authentication using a thumbprint and/or Face ID.
- Will the battery last long enough for multiple years?

1.1.3 Neena Nguyen

- Existing smart lock solutions:
 - Smart locks for dorm rooms using mobile apps, passcodes, and scanners.
- Who will use this lock?
 - People with memory issues (elderly, ADHD).
 - University students in dorm rooms.
 - Student ID scanner integration.
 - Parents with small children (child-proof locks).
- Features for parental control.
 - Locks after a curfew time.
 - Prevents children from unlocking without parental approval.
 - Alerts parents when kids come home from school.
- What kind of door lock will it be?
 - Facial recognition (requires camera and database knowledge).
 - Logs entry and exit timestamps.
 - Digital passcode through an app.
 - Auto-relocking mechanism after failed attempts.
 - Bluetooth detection for unlocking within a certain range.
 - Dual authentication (PIN + scan).
 - Optional security trigger after specific hours.
 - Alerts when the door is left unlocked for too long.
 - Auto-locking after prolonged unlocking.
 - Detection system to check if the key is on the person.
 - Prevents intruders from entering without a key.

1.1.4 Jackson Kennedy

- Normal keys can be lock-picked, but digital keys can be secured based on a communication protocol.
- Secure authentication methods.
 - PIN authentication with 2FA.
 - Optimal PIN length (e.g., 4-digit PIN has 1,048,576 combinations).
 - Brute force prevention strategies.
- Preventing communication protocol vulnerabilities.
 - What protocol should be used? (Bluetooth has vulnerabilities and short range.)
 - Cloud-based solutions rely on third-party vendor security.
 - What information needs to be transferred? (Video data, authentication signals?)
- Lock activation logic.
 - How exactly will the lock know when to unlock? (Sending a 0 or 1 signal based on specific conditions?)
- Security and alerting technologies.
 - Sensors to detect nearby people.
 - Hidden camera or biometric verification for identity confirmation.
- Scheduling and timed access.
 - Physical locks do not have scheduling options.
 - Implement timed unlocking (e.g., unlock for 15 minutes for a babysitter).
 - Extra verification to prevent intruders from exploiting schedules.

1.2 6-3-5 method

1.3 Morphological Charts

1.4 Mind Maps

1.5 Decision Tables

2 Basic Planning

2.1 Gantt Chart