TEAM12 Division of labor scheme

Embedded Systems and Hardware Development

Responsible person: Peining Liu (2615219L)
Main responsibilities: Responsible for the selection, integration and driver development of all hardware modules.

Specific tasks:
1. Hardware selection and procurement
-Select a suitable infrared camera, fingerprint identification module, matrix keyboard, motor driver and relays, etc
-Ensure that each module is compatible with Raspberry Pi, consult the data manual to avoid communication conflicts.

2. Hardware circuit design and welding
-Connect the infrared camera (I2C / SPI), fingerprint sensor (UART / SPI), and matrix keyboard (GPIO).
-Connect the motor drive module to the switch controlling the electronic lock.
-Commissibug the power supply scheme to ensure the sensors and motor work properly under different loads.

3. Drive development & equipment communication
-Write the communication code for the Raspberry Pi and each sensor (C + + / Python).
-Debug the transmission of face recognition data (infrared camera Raspberry Pi).
-Ensure the accurate transmission of the fingerprint identification module data.
-Open the generator control logic (open / close the lock).

4. Equipment optimization
-Solve hardware interference problems (such as the performance of infrared cameras under different lighting conditions).

Software-System Communication

Responsible person: Hao Sun (2955851S)

Main responsibilities: Responsible for the software development, database management and remote communication of the authentication system.

Specific tasks:
1. Certification algorithm development
-Face recognition: OpenCV + DLib for face detection and matching.
-Fingerprint recognition: extract the fingerprint feature value and compare it with the database to realize identity authentication.
-Password verification: Develop a matrix keyboard input processing program to determine whether the input is correct.

2. Database and local storage
-Design the SQLite / MySQL database to store user information (face features, fingerprint ID, password).
-Record the access log, including timestamps, authentication results, etc.

Remote monitoring and automation control

Responsible person: Mengyang He (3030975H)
Main responsibilities: Design the remote control system to realize the networking function of the intelligent lock.

Specific tasks:
1. Remote alarm system
-When someone attempts illegal access (wrong password / fingerprint), trigger:
-The buzzer rings out
-The screen displays "ACCESS DENIED"
-Send alert messages via LAN (LAN) or MQTT.

2. Motor control
-Design automatic unlocking logic (such as 3 consecutive error input, lock for 5 minutes).
-Optimize the motor drive code to ensure smooth locking opening.

3. Data acquisition & log management
-Collect the authentication data and record the time, method (face / fingerprint / password), success / failure of each visit.
-Design the exception detection mechanism to automatically send a remote notification if multiple failures in a short time.

3. Remote API development
-Develop API to remotely view logs and control locks.
-API endpoint example:

Get the authentication records
Remote unlock
Trigger remote alert

4. User interface (Web / APP side)
-Design of the remote management interface.
-Provide real-time status display (current lock status, most recent access record, etc.).

Product Testing and Quality Assurance

Responsible person: Hao Zhang (3028132Z)
Main responsibilities: Responsible for testing the stability and ease of use of the system, and proposing the optimization scheme.

Specific tasks:
1. Functional test
-Test whether all the authentication methods are accurate (face, fingerprint, password).
-Record the error rate and analyze the robustness of the system.

2. Environmental adaptability test
-Light change: test the effect of different brightness and angles during face recognition.
-Humidity test: Test the fingerprint sensor performance in a wet / dry environment.

3. Pressure test
-Simulate large numbers of user logins, testing the database and processing capabilities.
-Detects the response time of the remote API at high concurrency.

Social Media Promotion

Responsible person: Chengyi Lyu (2960858L)
Main responsibilities: Responsible for promoting products, making publicity content, and increasing exposure.

Specific tasks:
1. Social media operations
-Maintain the Instagram and Github accounts.
-Regularly release product developments, development progress, and demonstration videos.

2. Product presentation

-Take a video of the product to show how to unlock the human face / fingerprint.

-Publish the user guide & technical documentation to let more people know about the product.

3. User feedback management

-Collect feedback from early users and organize improvement suggestions to the development team.