Secure Door Opener

Team Members:

Name	Email
James Pabisz	jpabisz2020@my.fit.edu
Christopher Kiefer	ckiefer2019@my.fit.edu
Warren Smith	wsmith2019@my.fit.edu
Luke Bucher	lbucher2017@my.fit.edu

Faculty Advisor:

Dr. Marius Silaghi - msilaghi@fit.edu

Client:

Dr. Marius Silaghi - Graduate Professor at Florida Institute of Technology

Meeting Dates:

Date	Topic
August 29,2022	Initial kick off meeting/ preliminary requirements gathering

Goal and Motivation:

Motivation-

The motivation behind this project is producing a secure and easy to use product that maintains the functional security of an upgraded door lock while integrating additional modern connectivity features into a door lock. Our primary goal is to integrate a secure mobile application into the physical security system to maintain the security of the overall system while adding flexibility for the end user to easily allow/disallow access on the fly without the need for additional setup or personnel.

Currently network attached secure locks follow two paths, financially and technically expensive gear that needs to be maintained by a dedicated team, or cheaper alternatives that sacrifice the security of the system in exchange for ease of access. Many enterprise solutions are expensive to maintain and require professional installation to convert a security system into a larger system, and will require a dedicated security team to permit access and fix issues when the system fails. While consumer solutions suffer from security flaws and minimal integration with other systems. These consumer solutions also sacrifice functionality tending to lean towards a singular way of accessing the lock other than a physical key.

Goal-

Our product is designed to maintain the security of enterprise solutions while leaving behind the issues of enterprise scale that requires dedicated personnel and professional installation. The ability for the lock to recognize who is attempting to access an area via facial recognition allows for users to dynamically configure who will have automatic access to the system. Additionally integration with a mobile application allows for a dynamic security environment that is designed to fit around the dynamic security needs of an individual. The mobile application will provide the ability to remotely monitor doors as well as lock or unlock them remotely.

Approach:

Never worry about leaving your door unlocked again.
> Worried that someone left that door unlocked when they left for the night? Check right from within the app and monitor your doors status. Multiple locks? No problem, our app lets you monitor all of the locations and ensure that your safety remains your number one priority.

Unlock your door with just your face.
> Let your lock tell you who is at the door. Our secure lock will determine who is trying to unlock the lock and let you make the decision if you want to unlock the door. Your friends and family will be recognized and welcomed right in, while our app will let you know when a stranger is trying to enter. Have peace of mind wherever you are home or away.

Keyless entry and locking from anywhere in the world
> Stop hiding that spare key underneath your matt and let your phone unlock your door for you. With the power of your phone let the Secure lock unlock your door right from your phone. Rushing to work and forget to lock the door? Lock that door right from your phone and never worry about your home not being secured when you are not there.
> -

Novel Features:

Visual notifications of an individual attempting to access the door.

> Users will be notified within the mobile application that an individual is requesting access to the door providing a clear image of the individual to the end user. The user will then be able to approve/deny access to the door based on the provided information.

Remote lock/unlock from a mobile device.
> Users will be able to remotely unlock and lock the door from within the application.

Technical Challenges:

Facial recognition on an embedded platform-

Adaptive learning facial recognition is generally regarded as a resource intensive operation generally preserved to a dedicated system on chip (SOC). Our primary objective with facial recognition will be to establish if it is possible to house an independent facial recognition model within the embedded system while maintaining a low power consumption model that is required by the system design without further reliance on additional SOC.

Integration with an embedded system and a mobile application-

Using a RESTful style approach we will need to establish a relationship with IOT devices as well as communicate updates successfully with the mobile application. This integration will occur in realtime and will need to be immediately responsive to avoid potential user frustration related to miss reporting from the app or extended wait times to unlock a door.

Ensuring proper failover options upon system failure-

While our primary goal is ensuring a robust and user friendly experience, guarding against possible attack vectors will ensure that we maintain our security without exposing ourselves to a potential security issue. Our primary goal will be documenting possible vulnerabilities and failure scenarios and ensuring that proper controls are in place to maintain a secure system.

Milestone 1 Itemized Tasks:

- Compare and Select Tech stack for web architecture
  - REACT vs Angular
- Design proper IOT acceptance criteria
- Set up Jira Board
  - Project should adhere closely to an agile methodology to ensure that tasks are completed quickly and accurately.
- Requirements documentation
- Design documentation for the three subsystems: Embedded Platform, Networking, Mobile Application
- Integration Documentation for the three subsystems
- Design solution for lightweight facial recognition
- Design the needed infrastructure to integrate all systems together

Milestone 2 Itemized Tasks:

- Integration of camera and Raspberry PI system
- Creation of initial .apk for testing and basic mock up
- Development of backend endpoints necessary for integration

Milestone 3 Itemized Tasks:

- Implementation of the Facial recognition system on the Raspberry PI
- Completion of app UI and beginning functionality of the system
- Initial integration between all subsystems

Milestone 1 Task Matrix:

Task	James	Christopher	Warren	Luke
Selection of Tech Stack	40%	20%	20%	20%
IOT Acceptance Criteria	20%	20%	20%	40%
Set up Proper Tasking and User Stories	40%	20%	20%	20%
Requirements Documentation	20%	20%	20%	40%
Subsystem Design Documentation	20%	20%	20%	40%
Integration Documentation	20%	20%	20%	40%
Lightweight Facial recognition Research	20%	40%	20%	20%
Infrastructure Research	20%	40%	20%	20%

Approval from Faculty Advisor

"I have discussed with the team and approve this project plan. I will evaluate the progress and assign a grade for each of the three milestones."

Signature: _Jilaghi_____ Date: 09/01/22_____

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Goal-

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Approach:

Verify that your home really is secure.
> Worried that someone left that door unlocked when they left for the night? Check right from within the app and monitor your doors status. Multiple locks? No problem, our app lets you monitor all of the locations and ensure that your safety remains your number one priority.

Customize who has access to your locks
> Grant access to those you trust from right within the app. Add and remove remote lock and unlock permission from anyone on your trusted list. Your trusted list will be built directly from our visual detection system so there will be no setup to begin granting access to those you trust.

Unlock your door with just your face.
> Let your door decide who it lets in.Our secure lock will determine who is trying to unlock your door and let you make the decision to unlock the door. Your friends and family will be recognized and welcomed right in, while potential intruders are going to be left outside.

Check who is at the door.
> Get notified when someone is at your door right inside your app. Is your friend Dropping off your kids back at home or is something more sinister going on. Make the final decision to unlock your front door with visual verification from right inside the app.

Secure your home from anywhere in the world.
> Expecting visitors while you are not home? Stop hiding that spare key underneath your matt and let your phone unlock your door for you. With the power of your phone let the Secure lock unlock your door right from your phone. Rushing to work and forget to lock the door? Lock that door right from your phone and never worry about your home not being secured when you are not there.
> -

Novel Features:

Facial recognition software built into the integrated camera.
> Users will be able to control who has access to automatically unlock the door using the built in camera and facial recognition software.

Visual notifications of an individual attempting to access the door.
> Users will be notified within the mobile application that an individual is requesting access to the door providing a clear image of the individual to the end user. The user will then be able to approve/deny access to the door based on the provided information.

Remote lock/unlock from a mobile device.
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