

HOME SECURITY

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CS3910 Software Engineering

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Product Description

A complete aspect of home security. A path to reduce human effort and worries. A home security system is installed in each home to prevent against theft. There are many homes that have primitive systems installed and a few of the modern homes are being equipped with high-end technologies. Some homes still use simple locks and keys. Security is paramount in houses today, and to achieve this, many latest technologies like facial recognition, fingerprint scanner, pin codes, etc. have been developed.

The main motive of this project is to eliminate the slightest error in home security that might occur due to software or hardware present in today's systems. We can achieve this by improving existing software, implementing new ideas, and installing new devices with advanced code that will enable the owner to feel safe in his/her adobe.

Nowadays, homes have to be self-sustainable in terms of security. The main things that are involved in security planning for any new home include analyzing the cost of installation of new hardware and software, predicting the time taken to install the system, analyzing the customer's needs and deciding the level of security needed, surveying existing systems, and finally installing a complete product that satisfies the customer's needs.

The core handling of this product will be through the client's phone after installing all the hardware, database and software's around the house. An application will be installed in the client's phone through which the owner will have to provide its credentials and then can control everything.

For the application we will be using XCode to design and format the user interface. It's easy to understand and implement. Making further adjustments and maintenance goes handy with it too. The database where the passwords, the analysis, default components and hardware properties will be saved is going to be designed with Hadoop framework with SQL. The front end will be designed on swift. The back end will be all written in python. The hardware includes cameras (thermal and night), internet-controlled lock system in doors and windows, main door display, wiring for connecting all equipment in case internet fails and a stable high-speed internet with modem

The features of the planned system. The first and foremost objective of this project will be to define the specific roles of each user in the house. There can be a maximum of two owners who will have an "all-access pass" for the home security. They will be able to decide when to allow someone in or when to deny a person, who to add as a guest/visitor, etc. They will be able to change the central PIN of the security system, and also make changes in any fingerprints. The new system that will be installed will have at least the following features:

- Biometric scanner; including but not limited to facial recognition, fingerprint scanner.
- Central PIN which can be used to open all entrances of the house.
- Heat sensor cameras with thermal and night vision.
- Live Tracking: Centralized monitoring system that will record activities in the house on a regular basis and upload that data into a database.

The system is designed such that there will be a main entrance in the house which will have a board. The board will be equipped with a camera, which will scan a face. All the cameras in the house will be equipped with thermal and night vision for enhanced security. The board will also have a PIN entering system and a fingerprint scanner. This can be used in the case face detection fails or there is a guest user in the house. The owner will be notified and asked if that person is to be allowed in the house.

We as humans can make mistakes all the time. Can we make something that can think of security by itself? Be smart enough and reduce human effort. That's what technology is for right?

Considering traditional homes in mind, we don't have many security measures in our houses. Just basic doors with a key lock, door chain and one additional lock to secure the door. That's it. What can go wrong?

Locks can wear out, keys can get lost, copies can be made, windows can be left open, anyways windows aren't too secure.

Nowadays in advanced homes in urban areas, we see a lot of technological advancements related to security and safety. Biometric access, heat sensors, advanced fire alarm system but still there can be glitches.

So, what can we do to make sure we create something that is smart enough to handle all the problems stated above?

There will be three levels of users: owner, visitor, and servants. The owner will have access to all rooms regardless, the visitors cannot access certain rooms, and the servants will also have limited access to the house. All this will be specified by the owner. If any new body is detected at the entrance, the owner will have a link to add that person as a "trusted" individual. This person's roles and accesses will be defined by the owner, saved to the database on the cloud, and remembered the next time this person tries to enter the house. If the owner decides not to add the person or fails to add him/her within the next 24 hours, the link will expire, and the owner will be asked again the next time.

There will be three things going on in the house at all times: a facial recognition software running to detect any new faces, a thermal sensing technology that will look for any human, and a live tracking facility that will keep uploading feeds to the server online. These feeds will contain the daily activity, movement patterns of people in the house, new faces that were not saved, etc. If anything, unusual is detected, the owner will be notified immediately.

There will also be a vacation mode in the security system. This can be enabled by the owner whenever they are going out for more than a couple of days. This will lock down the house after checking everyone has left. In vacation mode, if anyone tries to enter the house, the owner will be notified and asked if the person is to be allowed. Suppose a pest control service was requested, the house will open only those rooms which the owner specifies, keep them open, and lock down the house once again. In case there is a break in during non-vacation time, the owner will be notified immediately, an alarm will sound, and the nearest police station will also be called. The house will not be locked down, but the unusual person's biometrics will be stored. This will be done to prevent the burglar from being locked down in the house and causing harm to the residents. In case of a break in during vacation time, the house will lock down along with all the above being executed. In case of fire, the nearest fire department will also be notified in addition to the sprinklers being activated.

Finally, the system is self-sustainable. Meaning, it will update itself in pieces (not all parts of the system at the same time to ensure a monitoring is active at all times), will notify the owner about any faults either in hardware or software, and ask the user to update the system time to time and also in case of any failures.

The tools and resources can be expensive for these kinds of projects but it's better to be safe than sorry. The tools that we can use to make it happens includes cameras with thermal detection and night vision, software controlled physical locks, 24-hour cellular, and internet facility. And finally, a database to keep track of everything. A live feed will be up all the time and it will store information on this database.

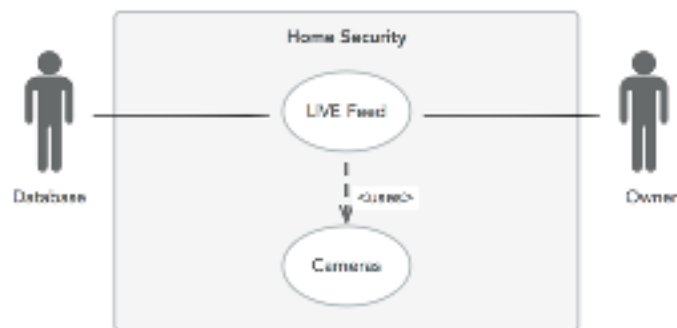
Discussing the target customer for personnel use, this product is not for everyone. It is an advanced level security system. Not everyone can afford a product like this. And even if they can most people feel secure enough with the traditional system. But the system does not only solve the security purposes it's a safety system too. Fire alarms, handling emergency situation and could save someone's life.

The product can also be modified for industrial use, banks, offices, museums or anywhere where the customer needs additional security and safety.

ADVANTAGES	DISADVANTAGES
Quick response time	Very expensive
Adaptive	Software or hardware errors could occur
Learns from itself	Not portable.
Stores data for future use, analyze situations and act according	
Secure	
Provides all aspects of security	

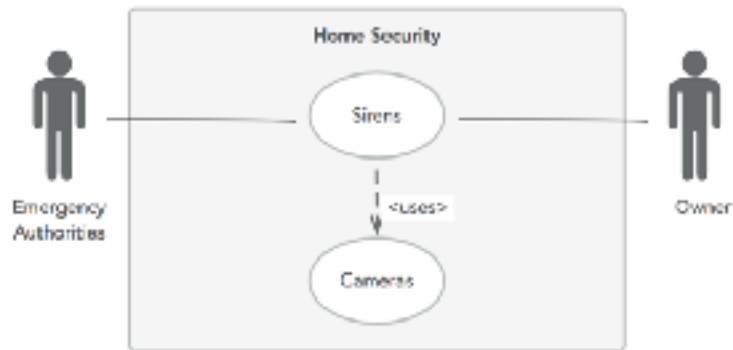
System Requirement

Functional Requirements



Use Case for LIVE Feed

The above use case shows how the LIVE Feed will work. It uses the cameras in the house as it has to send all the recording to two places: the owner's phone as well as the database. Hence, the main use case here, the LIVE Feed, is shared by Database as well as the Owner. There is one precondition to this diagram: there should be constant reliable internet connection. If at some point the internet connection is interrupted, the owner will not be able to access the live feed, but a copy of the recording will be stored at all times to the cloud as well as to other database locations since all the systems are connected through wires too.



Use Case for Sirens

Here, the sirens play an important role in maintaining the security of the household. They will activate anytime there is some unusual activity detected. The owner and the authorities have access to sirens because if the sirens go off for more than 10 seconds, the authorities will be contacted and only a designated official will be able to turn the sirens off. If suppose the owner is cooking something and the sirens go off by mistake, the owner can turn the sirens off. In this case, the authorities will be notified to check on the owner just in case there is a mishap. No other individual will be able to turn the sirens off. In case the house is set to vacation mode, and there is unusual activity detected on the cameras, the sirens will ring. Also, if the thermal mode in cameras is on and detects the temperature going over a specific value (in case of fire), the authorities will be contacted. This is helpful at places where smoke detectors are not installed. Cameras cover the entire house, so they will be useful.

Product Backlog

Priority	Story	Case ID	Estimated time of completion (in days)
1	As an authorized user, I want to log in	2	1
2	I want to change my house PIN	5	0
3	Ring siren	11	2
4	Call emergency services	12	1
5	Biometric registration	3	2
6	Biometric authentication	3	2
7	User add/remove	1	1
8	I want to see the LIVE Feed	8	3

Priority	Story	Case ID	Estimated time of completion (in days)
9	I want to control appliances	6	2
10	I want to control doors/windows	6	1
11	Upload/download the LIVE Feed	9	2
12	Vacation mode	10	2
		Total	19

Sprint Backlogs (Sample)

Sprint 2:

Not started	Test Cases	Coding/ Unit Testing	Ready for QA	In QA	Ready for User Test	In User Test	Done
		Register all biometrics					
	Check with Database is biometric is valid						
	Upload to Database						
Adding owner							
			Adding guest				

Sprint 3:

Not started	Test Cases	Coding/ Unit Testing	Ready for QA	In QA	Ready for User Test	In User Test	Done
		Stream LIVE Feed to mobile					

	Control doors/ windows						
	Control appliances						

Non-functional requirements

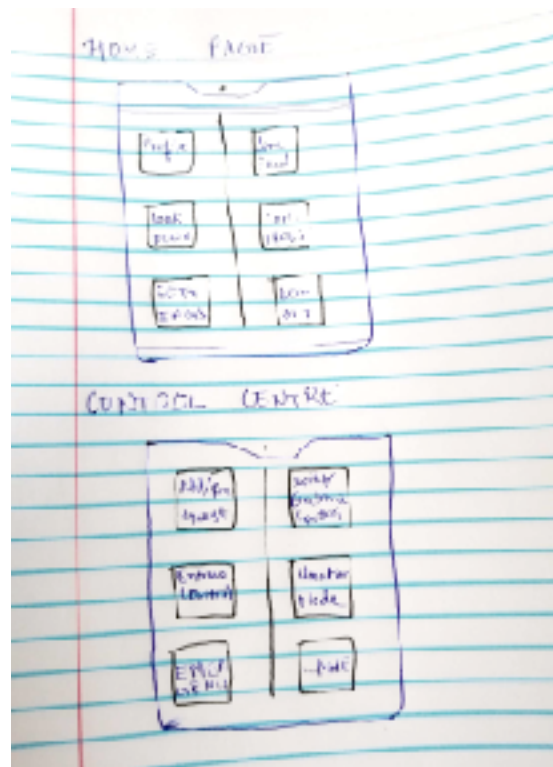
The product is designed such that it utilizes face id feature present in the iPhone X as well as fingerprint authentication in previous versions for logging in. It takes around 2-3 seconds for authenticating and displaying the home page. All the devices are already on the same network, so they are always online. They do not take time to process/check-in.

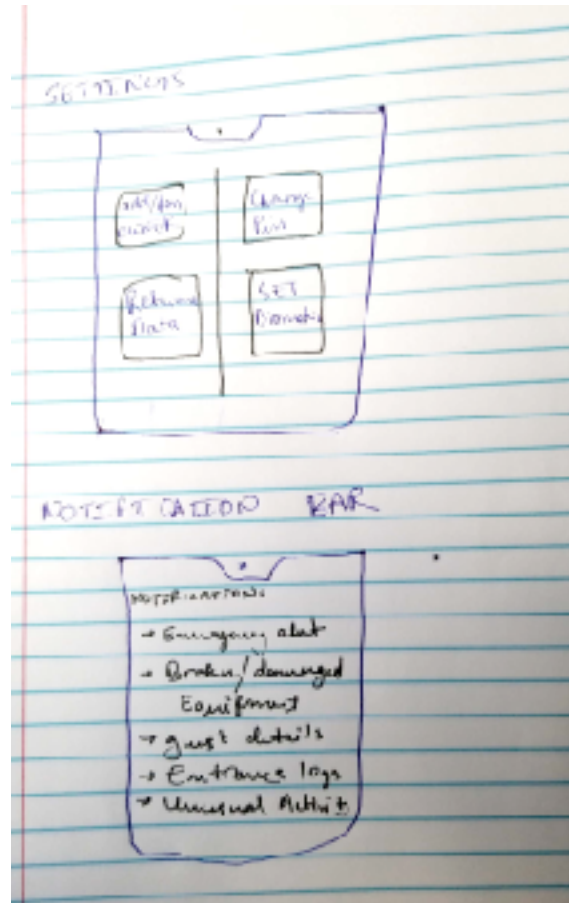
The application runs very smooth as long as the mobile is connected to an active internet. The features like turning lights on and off, closing/opening doors will be affected if the internet speed is very slow.

The application is very reliable since it gives live updates and live statuses of each element in the house. The internet is always required for proper functioning. As soon as a property changes (eg. A door is opened), the change is reflected within milliseconds on the app. This makes the response time very fast.

In the initial version, the application is only designed for the iPhone. It will not work on other platforms like android or windows. Also, there is no desktop application or website where you can control the house.

The UI





Logs of Meetings

Software engineering Project report

Date : 10/08/18	Time : 5:00 pm	Location: Library
Meeting called by	Kishan Polekar	
Type of meeting	General	
Facilitator	Monis Ahmed Khan	
Note taker	Manthan Kale	
Timekeeper	Monis Ahmed Khan	
Attendees	All the members	

Agenda Topic 1: What to do in this project?

Time: 6:00 pm	By: Kishan Polekar
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Discussion	About the User interface outline of the home security model
Conclusions	Made the model

Action Items	Person Responsible	Deadline
Present all the ideas for the user interface	Monis Ahmed Khan	Time 6:30 pm
Take the notes, check and implement it.	Manthan Kale	Time 6:30 pm

Agenda Topic 2: How to make the report

Time 7:00 pm	By: Monis Ahmed Khan
Discussion	What are the things that needs to be included in the report
Conclusions	Final outline of report is made and tasks has been assigned

Action Items	Person Responsible	Deadline
Required Document and product Description	Manthan Kale	8:00 pm
System requirements and UML	Kishan Polekar	8:00 pm

Agenda topic 3: The final report and revision

Time 9:00 pm	By: Manthan Kale
Discussion	How to arrange and organize the tasks and fit in the report
Conclusions	The report is completed

Action Items	Person Responsible	Deadline
Take all the work and organize it.	Monis Ahmed Khan	10:00 pm
Verify the report check for any errors	Kishan Polekar	11:00 pm

Contribution Report

Team Name: Peaky Blinders

Team Leader: Kishan Polekar

Members: Kishan Polekar, Monis Ahmed Khan, Manthan Kale

	Kishan Polekar	Manthan Kale	Monis Ahmed Khan
Product Description	Yes	Yes	No
Requirements	No	Yes	Yes
User interface Design	Yes	No	No
Logs and report	No	No	Yes
Final check	Yes	Yes	Yes

	Kishan Polekar	Monis Ahmed Khan	Manthan Kale	Total
Contribution	33.34%	33.33%	33.33%	100%

References:

https://www.researchgate.net/profile/Mohammed_Mynuddin/publication/293173717_Design_and_Implementation_of_Smart_Home_Security_System/links/56b610a608ae5ad360598bfb/Design-and-Implementation-of-Smart-Home-Security-System.pdf?origin=publication_detail

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