# CPSC 481 – Phase 2 Report

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## Project Idea – Smart Home Manager

We want to design an application that implements a smart home manager. Our application will allow the user to visualize their house/apartment/living space that they reside in while giving them control to perform actions they wish. Some specific actions would include turning the lights off, closing the garage door, turning up the temperature on the thermostat and many more. It will be able to connect to and interface with however many smart devices you want, so long as it is connected to the internet.

Our application will be web based and accessible from any location with an internet connection.

**Users**

- Anyone with a living space (eg. apartment, house)
    - They desire external control of the functions in their household
    - They should own a device capable of connecting to the internet
- (example) A family consisting of a mother, father, 2 daughters and a son, everyone can be a potential user of the application

**Stakeholders**

- Landlords/renters
    - Are people who can lend control of the system to people who live under them. These users may or may not have any experience with a system with this depending on the technological background, however they probably have some idea on how it works since they are implementing it into their home in order to lend out the home to others.

- The project team
    - The project team would be the one developing and designing the system. Most likely they would have some experience in order to develop the system.

- Smart device creators
    - People who create smart products that would be able to connect to the app. They would be most likely experienced on this subject and would most likely not need much training to use this system.

- Smart device users
    - The main users who will be using this app for their smart devices. The amount of training and knowledge that these users have will vary from person to person depending on their previous experiences.

- Investor
    - The investor is somebody who has a financial investment into this system. They would be a stakeholder since even though they are not using it they are funding the system.

# USER RESEARCH METHODS

**1) SurveyMonkey Survey: HERE**
The survey method was chosen because it allows for a large collection of information in a relatively short period of time. The survey was tailored towards reviewing the Google Home app, one of the most popular smart home managers out there due to its incorporation with Google Assistant and compatibility with most smart gadgets. The survey included numbered questions regarding the overall appeal of the app's interface as well as comment sections where people could give advice on improvements. The survey focused on two main elements of the Google Home interface: The room layout and the device layout.

The combination of numbered appeal questions as well as comment sections allowed us to weigh the answers that people gave in the comment section. If they rated either the room layout of device layout section positively then we could keep that in mind when reviewing their comments and vice versa.

- **What went well:** We were able to gather suggestions on features/aspects that we may use for our app through the survey. Using Google's app as a basis, we have found good aspects and aspects that can be improved on.
- **What went poorly:** The scope of surveys are limited and it is difficult to get a lot of information out of a 5-10 question survey without it being inconvenient and time consuming for the surveyee.
- **What we would have done differently:** Added questions about the type of devices that people have in their homes to improve the range of compatibilities and functionalities when designing our app and interface.

**2) Shadowing**
This method was chosen to give us a better understanding of the day to day needs of smart home users as well as more specific information regarding how users use smart devices and which devices we will want to support in our application.

In this research method a smart home user was shadowed for one day as they used their smart devices. Their home included four smart sockets for turning on various devices including a

lava lamp, humidifier, lights in their living room, and an electric heater. They also had a Google Home Mini smart speaker.

We found that in this case the user prefers to use their smart speaker because of how unintuitive they find the Google Home interface. The four sockets are from Smart Life and they were often flipping between the Smart Life app and the connected Google Home app. In the Home app you can only turn a socket on and off, while in the Smart Life app you could add timers and on/off schedules. This was something that they found quite frustrating when they wanted to set up new functionality such as running their lava lamp for only 8 hours so they wouldn't forget to turn it off, causing damage to it. They did find that the routine features of Google Home were especially helpful so they could say a few words and link a lot of different features.

- **What went well:** We were able to see which devices are typically used as well as how they are used.
- **What went poorly:** We couldn't get a lot of information regarding how the users feel about the actual interface besides the fact that they found it unintuitive and lacking in features. A smart speaker was used often which removed the need to use the Google Home interface.
- **What we would have done differently:** There isn't much we could have done differently - shadowing has its limitations. However, when combined with other methods we are able to determine a lot of information about our users' needs, the devices they use, and their thoughts on the interface that control them.

**3) Extreme user interview**

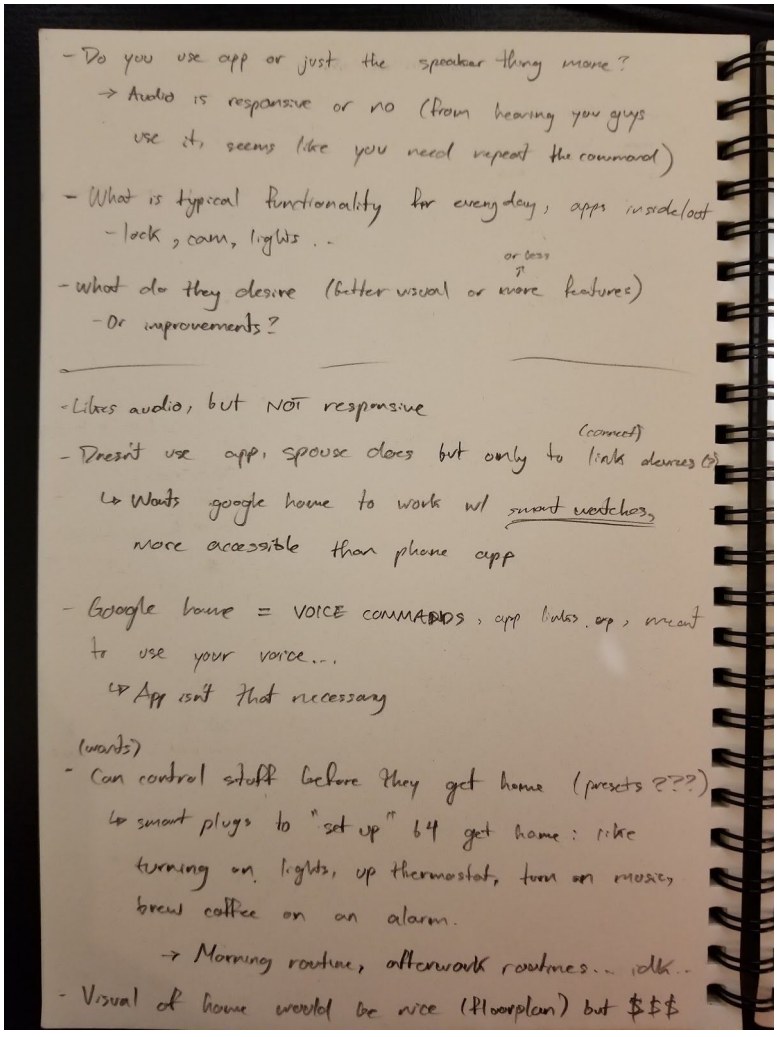
This user research method was chosen because there are many people that have heard of Smart Home but do not have any of its features implemented into their home (extremely unknowledgeable), while there are few people who have outspread implementation in their homes, therefore being extremely knowledgeable of the functionality.

Conducting an extreme user interview on a family member that uses features of a smart home (Google Home, security cameras, door lock safety systems) extensively. The context of use depends on whether they are inside or outside of the house. While inside, they use voice command features for controlling the inner household, like turning on/off the television, turning on/off the lights, etc. When outside, features are controlled through mobile phone apps, one for security cameras and another for the door locks.

Some key points taken from the interview were 1) application was not necessary to use; the point of Google Home is for it to be voice controlled for convenience sake, 2) the voice detection in their Google Home is unresponsive and could be improved, 3) the purpose of implementing a Smart Home is to do less work and be just as productive, so any way that activities could be controlled in a "smart" way would be appreciated. The user also stressed

the importance of being able to set up your home for specific scenarios (they used coming back home from a busy day) to settle in faster and easier.

- **What went well:** the user interviewed was knowledgeable about the improvements they wanted, responses were well-versed and relevant to our design idea
- Got a sense of the problems with existing smart home applications and what they wanted instead
- Able to identify more specific user tasks
- **What went poorly:** the user rarely uses the application (Google Home) that we wanted to use to gain some feedback for (instead they use the audio functionality)
- User tasks, in terms of using the phone application itself were minimal
- **What we would have done differently:** done quick brainstorming/sketching of some possible solutions when in interview



(notes for extreme user interview)
(was conducted in person in their home WHILE they use it)

# TASK DESCRIPTIONS

1. Dave Dilly wants to impress his neighbours and the neighbourhood kids this upcoming Halloween. He has the front of his house and his lawn well decorated with spooky decorations and wants his home to match. Using his smart home manager, he is able to set his exterior lighting and the lighting at the entrance to his home orange Maintaining a normal colour of light where his guests won't be going as to not disturb his newborn son, Dwight. He wants to go a step further and change the sound of his doorbell to a much spookier one using the program. After Halloween is over. He is able to revert his home to how it was previously as the program showed him his most recently used colours.

2. Jordan Mills is a smart home owner and a new user of the smart home manager. He has very poor vision and has difficulty reading small text. This can make adjusting the settings and operating the smart home manager difficult for him. Later, with his magnifying glass, he reads the user manual; and realizes he is able to rectify his issue by increasing the font size of his program. On his smart home manager he switches to a 'large-text' mode and is able to operate it much more easily from then on. The program saves his settings for him and he does not have to adjust the size of the text again in the future.

3. Jordans son, Dante Mills, is even more visually impaired than his father and finds that even reading the larger text still strains his eyes. His father enables for him a text-read out, or text-to-speech mode within the smart home managers settings, that reads out the text and explains relevant information to the task that the user is trying to accomplish. In this, both Jordan and his son Dante are both able to use the program comfortably despite previously having accessibility issues with it.

4. Jeremiah Black is a raw vegan. He only eats fruits and vegetables that he grows himself; picking them on the same day. He has no need for a refrigerator and wants to save power. Jeremiah is 77 years old and is very physically weak. He rents his home so he cannot have the refrigerator removed but doesn't want to waste money and electricity powering it. Unfortunately he isn't nimble enough to get behind the fridge and unplug it. He is however, able to use his smart home manager to cut power to his fridge without having to unplug it.

5. Stephanie Morgan is a self sufficient environmentalist. She wants to be able to manage her home's electricity, which she generates with her rooftop solar panels. She uses her smart home manager to see how much power she is spending in her home and where it is going. She is also to see how much power she has generated over a given period of time. The program is able to estimate if she will have enough electricity from her solar panels to get her through the coming winter, when there will be less available

light. She notices that her usage would be too high and cuts back.

6. Lain Morgan is expecting a package today. When the package comes to her door, she is in her room, but had just taken a shower and is naked. She uses her smart home manager to unlock the front door. She then uses the program to speak to the delivery person, letting them know to bring the package in. They leave the package just inside her front door and close the door behind them as they leave. She tries to lock the front door using the program but the delivery person didn't close the door far enough behind them. The bolt isn't able to travel far enough to lock the door. The program notifies Lain that it failed in trying to lock the door. She later closes the door the rest of the way and locks it manually.