

INFO10003 – Tutorial 3 Group 5 – Assignment 1

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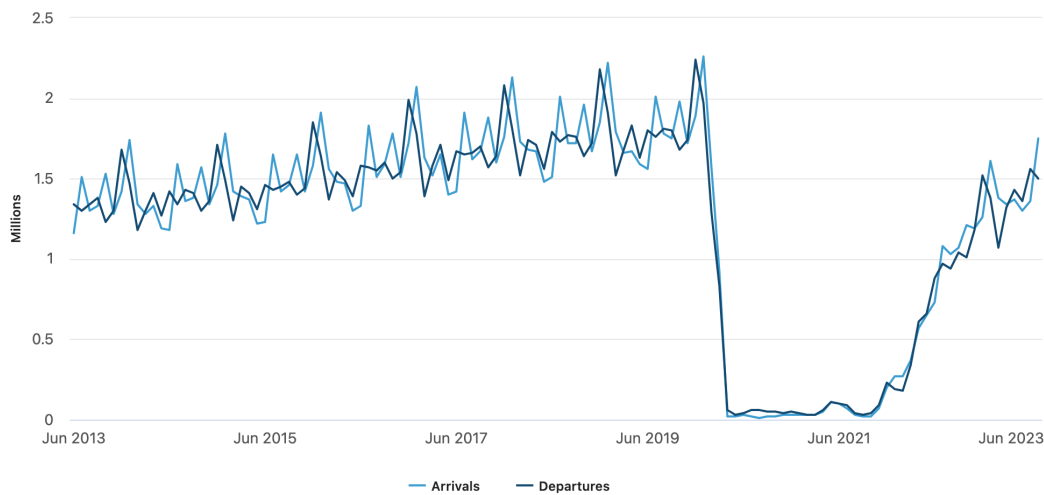
ABSTRACT

This report aims to present our research and design considerations for a new smart home app aimed at people who frequently travel/leave their house unoccupied. By conducting extensive background research and performing methods like brainstorming, surveying, interviewing and participatory design, a strong demand for home security, home maintenance and effective app design was realised. Using this data, we were able to create a basic design concept; a mobile app with a corresponding smart home panel that is installed within the user's home, working synergistically so that users are able to control their home and its upkeep with limited interaction from other humans. We were able to determine particular system requirements, use cases and personas for our smart home app which directly reflect our research and findings. Essentially, we gained a clear understanding of what we should aim to achieve through our wireframe prototype.

INTRODUCTION

According to the latest report from the Australian Bureau of Statistics (ABS) titled "Overseas Arrivals and Departures in Australia" the number of international travellers has increased in the past year. The report states that total arrivals in Australia had an annual increase of 627,280 and departures had an increase of 675,850. A positive trend is observed roughly between 2021 to 2023 as shown in [Figure 1] after the initial COVID19 outbreak.

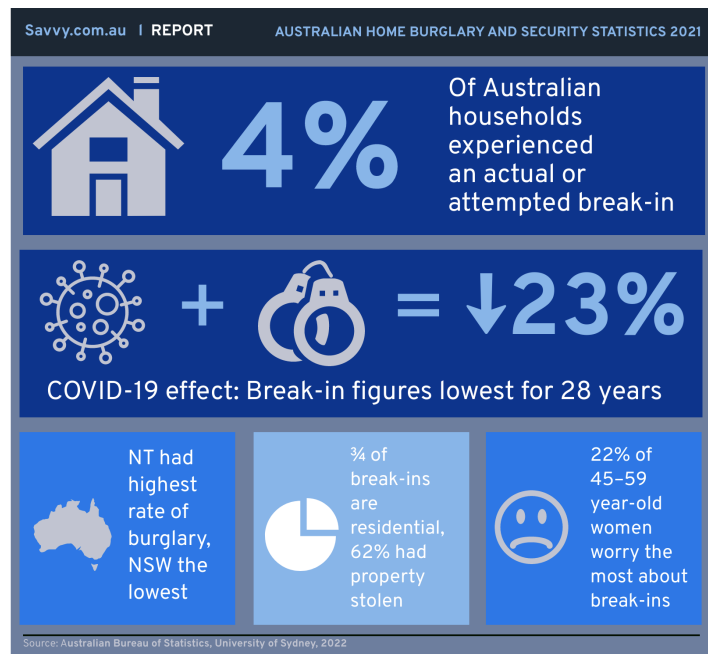
1.3 Total overseas arrivals and departures - June 2013 to July 2023(a)



[Figure 1]

With the increase of travel, more houses are being left unattended while home owners are staying elsewhere. Naturally, leaving the house unoccupied has its disadvantages, namely decreased home security, inoperative home appliances which may lead to dysfunctions, and difficulty settling back in.

In continuation to these downsides, the ABS recorded in 2022 that over 4% of Australian homes had experienced an attempted or an actual break-in (as shown in [Figure 2]). In light of data from the ABS collected in early 2023, the number of break-ins are also increasing. One of the main risks of leaving a house unattended is burglary. In fact, a set of interviews conducted by Budget direct with convicts affirms that “An unoccupied-seeming house is the most enticing to a burglar.” and that “Reduced activity around the premises increases the risk for a house robbery the most”. This is a major concern for travellers who own property or store valuables within their places of residence.



[Figure 2]

Treating home security and maintenance as the primary issue, this smart-home app project aims to minimise such concerns from users when leaving their homes and to optimise the efficiency and the experience of the users while helping guard their property.

In this project, people who leave their houses unattended frequently or for long periods of time are selected as the target group. This group may include travellers residing elsewhere who intend on: visiting family, attending career related occasions, travelling for leisure, etc.

It will be assumed that:

- The technologies mentioned in system requirements are all available to the users by their individual preferences.
- The smart home app can be accessed by users through a variety of means by their preferences.
- The users are able to connect their app to the devices they own in their households.

The primary objectives of this project are to ensure that the uninhabited home is secure, well-maintained and ready for inhabitation. Additionally, focus areas such as specific house elements, pets and living creatures, and Mail and notification are to be taken into consideration for specific cases.

BACKGROUND WORK

To acquire knowledge in the field of smart home security apps, three major brands with top rankings across numerous reviews, namely "ADT", "Vivint" and "Simplisafe" will be examined by their System Components and their apps.

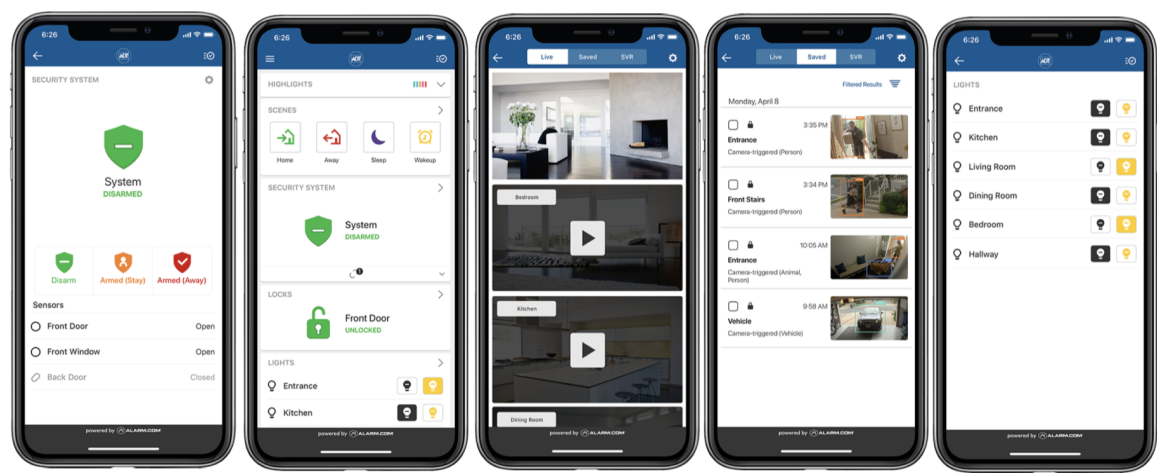
(*note that pricing and subscription will not be mentioned, as the focus of this background research is on the features of the security system.)

ADT

ADT, founded in 1874 and operating for nearly 150 years, is the oldest security company in America. Despite its age, the ADT security system has been continuously upgraded and refined to adapt to modern technology. Currently, ADT's newest system "ADT Control system" is widely regarded as their best, and hence will be examined in this study.

Aside from common Components shared with other systems, ADT also includes Emergency buttons and keychain remotes.

The ADT Control app additionally allows users to create schedules and automation.



[Figure 3]

As displayed in [Figure 3], the mobile app utilises a number of clear symbols and colouring to direct the user's attention to main components of the system. These include the *Security and Lock status* with the "Traffic Light System" of colouring, *Lights Panel* with dark and bright colouring and *Camera Footage* with labels of locations. These aid the user's perception and recognition, allowing the features to be understood.

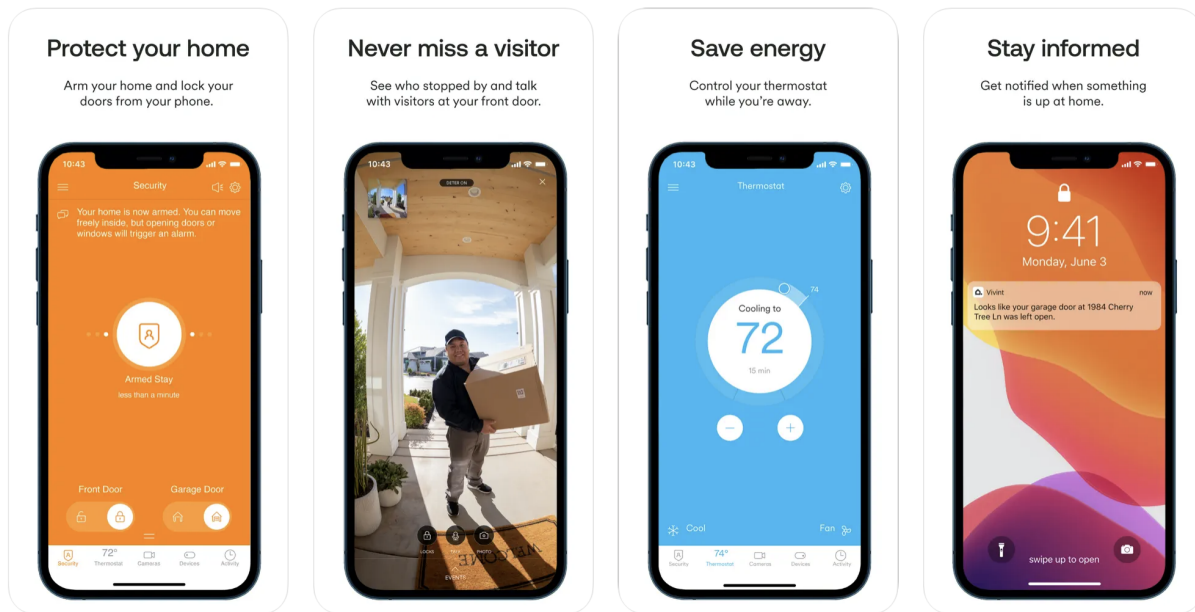
Separate from the ADT Control app, a second app "MyADT" is used to monitor the user account status. In Addition to that, the ADT web interface allows the user to perform certain advanced options inaccessible from the apps such as the video analytics feature.

Advantages	Disadvantages
<ul style="list-style-type: none">Well-refined technology, high quality equipmentsLarge list of devices availableCan integrate with third party smart home products (Alexa, Google assistant) which allows voiced instructions as an interaction optionClear and easy-to-use Control app	<ul style="list-style-type: none">Requires professional installationHaving multiple apps and platforms can be confusing
iOS rating	4.8
Android rating	4.7

Vivint

Vivint Smart Home, founded in 1999 in the United States and Canada, is a smart home company well known for its strong smart home security systems. There are currently two apps available for download, "Vivint" and "Vivint Classic". In this study, the newest app "Vivint" will be examined.

Aside from common features, Vivint also includes the Kwikset Smart Lock and allows the users to speak through two-way audio.



[Figure 4]

As shown in [Figure 4], the Vivint smart home app design adopts a more minimalistic style, with status symbols shown on large circles in the centre of the phone screen. Specific colours related to the statuses are chosen as the background, making the current page and state of the system obvious to the user. The live camera feed is displayed using the entire screen with small translucent buttons which manipulate the device, helping the users perceive their interactions with the app easily.

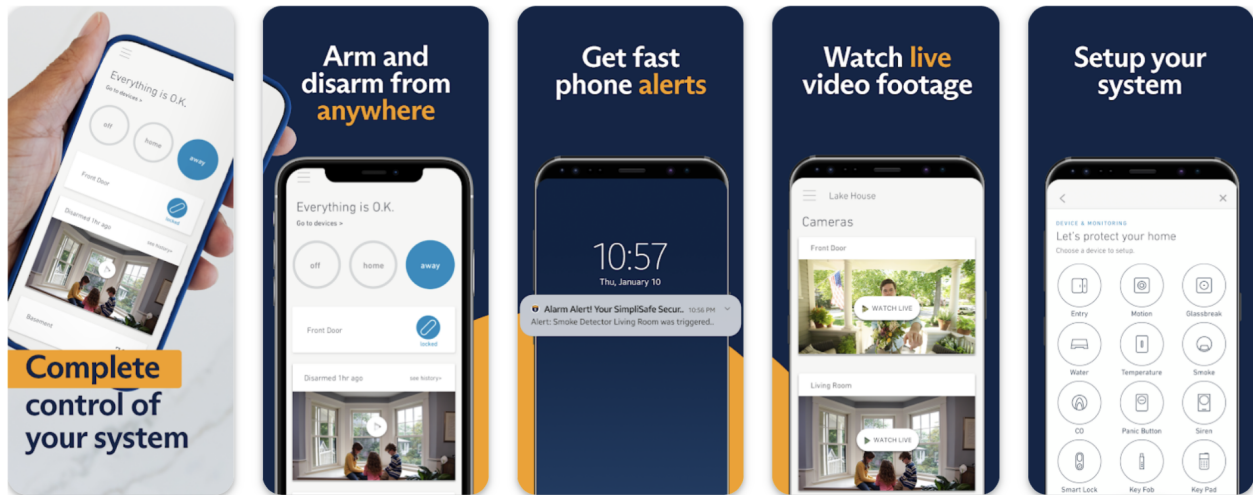
Advantages	Disadvantages
<ul style="list-style-type: none">○ High quality outdoor camera with AI to help distinguish people from moving objects.○ Has built-in AI assistant for learning routines○ Amazon and Google integration, which allows voiced instructions○ App is clear, easy to use and supports multiple platforms	<ul style="list-style-type: none">○ Requires professional installation○ Proprietary equipment, which makes them unusable with other monitoring companies
iOS rating	4.7
Android rating	4.2

Simplisafe

Founded in 2006, the relatively new home security company SimpliSafe is well known for their flexibility and versatility. An example of that is their offer for DIY or professional monitoring and installation. The system is considered simple yet intuitive, and can satisfy the users' needs. The Simplisafe app will be examined in this study.

The Simplisafe customisable system includes keypads, panic buttons, key fobs, Auxiliary sirens and freeze sensors in addition to the common components shared by reviewed systems.

The Simplisafe app's main functionalities are common to the previous apps inspected.



[Figure 5]

Observing the app layout presented in [Figure 5], a simple light toned colour scheme is used. The selected status is represented by a light blue icon while the inactive options are shown using grey icons. The shape used for each icon has consistent rounded edges, some are printed with symbols that relate to the items. The video footage includes location names above each window, helping the users position themselves in relation to the cameras. The simplicity of the design helps users achieve their goals straightforwardly.

Advantages	Disadvantages
<ul style="list-style-type: none">○ Integration with Alexa and Google assistant, which allows voiced instructions○ App supports Iphones and Android, allows remote control of the home security system.○ Multiple options of installation, can be personally or professionally installed○ Straightforward and reliable features	<ul style="list-style-type: none">○ Security Camera cannot operate under -6 degrees Celsius○ Security Camera lacks facial recognition○ Limited smart home compatibility (does not work with Apple homekit etc.)○ No support for multiple logins (one user only for one system)○ Connection problems and app outage
iOS rating	4.8
Android rating	4.6

Essential takeaway

Devices

The home security apps generally offered connections to the following devices:

- Digital panel
- Security Sensors (including motion sensors, contact sensors, window sensors and glass break sensors)
- Video doorbells
- Indoor & Outdoor Cameras
- Smoke detectors
- Carbon monoxide detectors
- Flood sensors

Additional useful components supported by the reviewed systems include:

- Emergency Button
- Siren / Alarm
- Smart Lock

Services

The home security apps generally offered the following services:

- Arm or disarm the security system
- Control connected devices
- Receive notifications
- Access live footage of cameras
- View cloud storage
- Access to customer support

Additional useful services used by research entities include:

- Create schedules and automation
- Speak through two-way audio
- Integrate with third party smart home products (Alexa, Google assistant)
- Has built-in AI assistant for learning routines

It is also beneficial when an app supports multiple platforms (iPhone/Android) and does not have multiple apps connected to one system. This allows the app to be more accessible and less confusing.

Notably, the iOS rating of the selected apps were all higher than the Android rating. This could suggest that more refinement is required for apps released for Android platforms.

Design

The design used for the reviewed apps generally featured:

- Distinct colour choices that reflect status
- Rounded edges
- Recognisable icons for devices
- Labelling of location and other details
- Menu bar on the bottom of the screen (easier to access using thumb)

While certain apps were more minimalistic and succinct than others, such general design choices should be followed, as it makes the app pages clear and coherent.

Suggestions

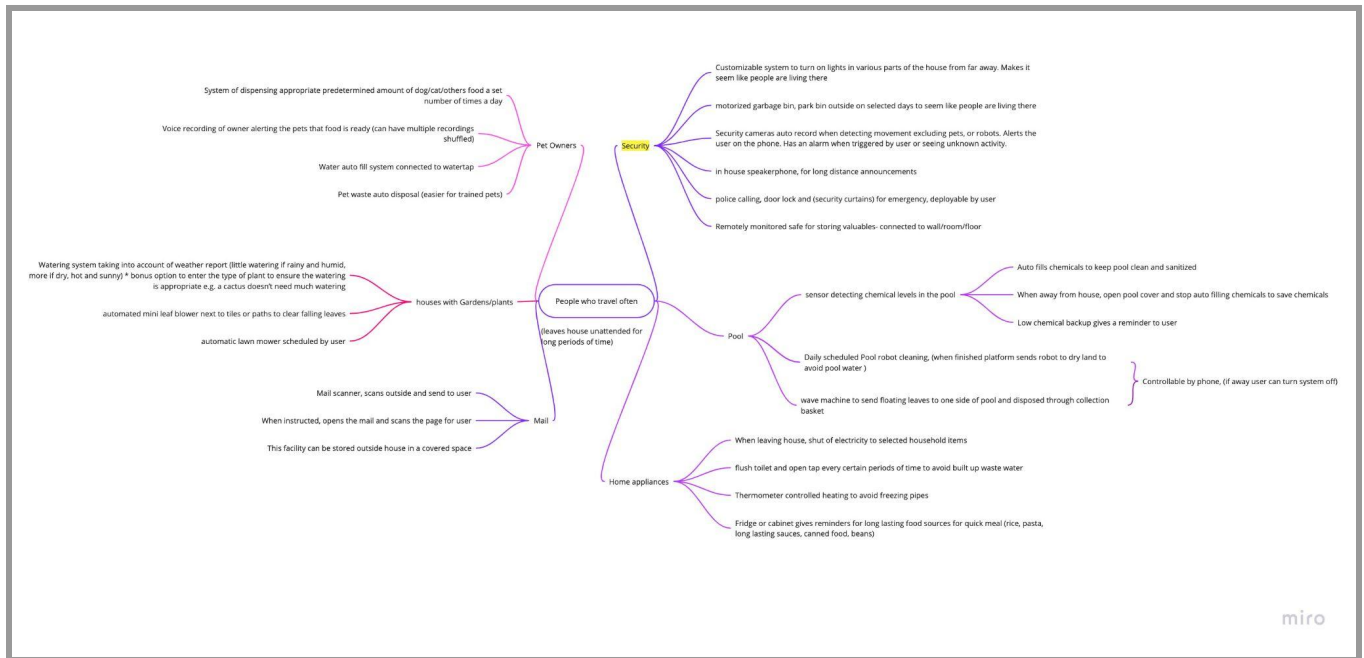
The reviewed apps were found to be reliant on having internet access, which can be challenging to access immediately when arriving in a foreign country. Here are some proposed solutions:

- Send concise text message to the owner's phone, incident report
- Option to automatically alert local police
- Option to automatically alert the neighbourhood (trusted friends and family)
- Have a receiver with an indicator, which receives the signal via Radio Frequency / Bluetooth (or Satellite communication if overseas). The signal is sent when an unexpected incident occurs, the indicator helps notify the owner without the internet.

METHODS

Brainstorming

The [Figure 6] below shows the mind-map about our chosen group. This aided us in the visualisation of features of our app.



[Figure 6]

Surveying

Initiating our surveying process, we utilised Google forms to create our survey as it is user-friendly and highly accessible. Our key focus was to gather sufficient data regarding the potential users' ages, lifestyles, occupations, particular concerns, and liabilities. We wanted to set aside user demands and recurring patterns to develop our smart home application plans.

Interview

With our interviews, we expanded on some of the survey questions, as we believed that interviewing may garner more personal and detailed evaluations. Respondents were given greater freedom to elaborate on their priorities as well as their concerns upon leaving their home unattended.

Participatory Design

The participatory design research aimed to construct a solid and precise understanding of what users want within the app while specifying particular system requirements. Participants were able to be more involved in the creation process of the application.

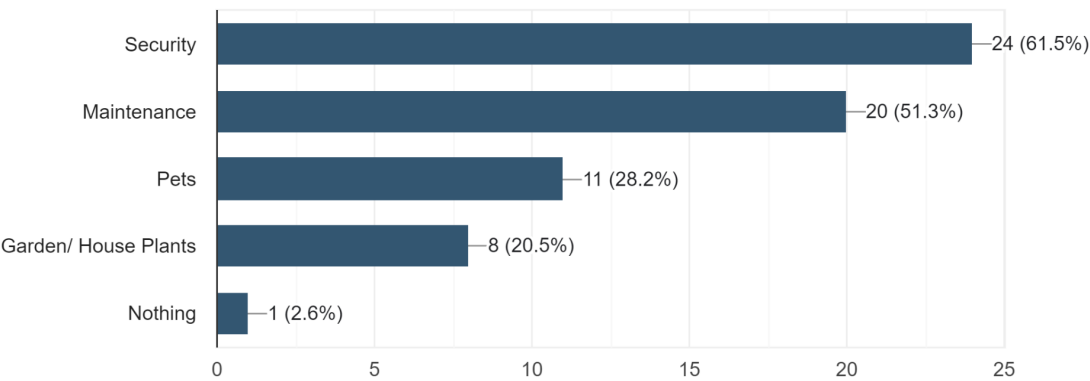
RESULTS

Survey Results

42 people were surveyed about their travel habits, preparations before leaving the house, and main concerns about leaving their accommodation unattended. The majority of respondents were young people, with half of them living in houses and the other half - in apartments (or student accommodation). Most were concerned about their household security and maintenance, along with pets and plants as seen in [Figure 7].

What are your main concerns regarding your house/apartment when you travel?

39 responses



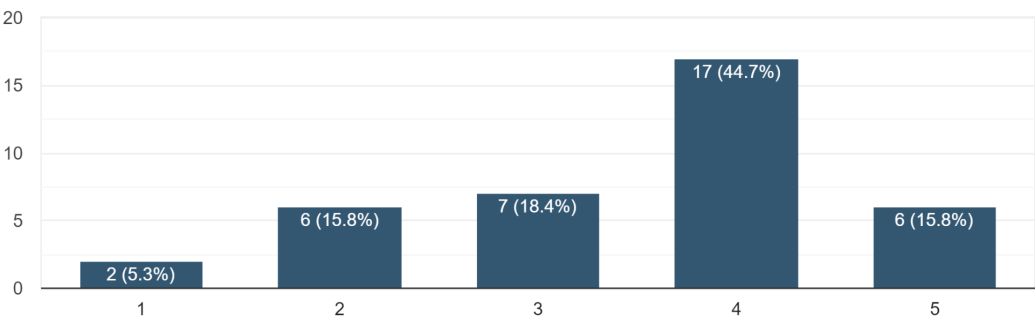
[Figure 7]

About $\frac{3}{4}$ of the people travel a few times a year, while $\frac{1}{4}$ travelling once per year or less. They tend to travel overseas, without pets, and do so mostly for holidays and family visits. Approximately half of the respondents leave their homes unattended for less than a week, while the rest leave their houses for a few weeks to several months.

When leaving their homes, a quarter of the respondents only lock their doors. A similar number of people have security measures, like CCTV, security personnel and alarms. About a fifth of the people involve their family, friends or neighbours, by asking them to keep an eye out, tend to the house personally or just to keep the keys safe. Some respondents take additional measures, such as keeping some lights on, turning off appliances and throwing out food. Additionally, as seen in [Figure 8], the majority of survey respondents think of the security of their home as being above average.

How would you rank the overall security of your home?

38 responses



[Figure 8]

According to some respondents, there are still certain tasks within their home which require human assistance, such as plant watering and pet feeding. Some had more specific problems, like taking care of a pool, occasionally starting up a car, opening a window to maintain correct humidity levels, or doing general housekeeping actions like plumbing, pruning and electrical.

Interview/Participatory Design

9 people, most of which were young adults, were interviewed. All travel at least once a year, usually during the holidays. Most of the respondents travel for vacation or familial reasons, with one travelling for business. Their biggest concerns were security and pet care, with other concerns being power, fire or pool maintenance related. Interviewees implemented several measures before and upon leaving their homes, including asking friends and family to look after the house, using cameras and motion sensors, leaving all the appliances turned off, locking all the doors and throwing out perishable items. While leaving their house unattended, most want it to be kept clean and their pets to be fed. Upon returning, some expected “nothing to be changed,” while others wanted “heaters [to] turn on” and their “bedsheets changed”.

The interviewees also had many suggestions regarding the technical details - they wanted the app to connect to different systems (like cameras, heaters, taps, doorbells and alarms), to manage package delivery and to call the police in case of an emergency. One suggested “timers for the lights” to create the appearance of someone being home. Most people wanted the app to be customisable, but to also have templates for the less tech savvy people who are not interested in customization. Opinions differed on the app design between “minimalistic” and “easy to understand”, and “not too minimalistic” with “multiple functionalities on one screen”. Most of the respondents preferred to install the systems themselves rather than by a professional, and to share information with family and other contacts easily.

Personas

Sally

An interactional design university student in her mid-20s, currently residing in Australia, with family overseas in Japan. She visits family/friends every term holiday for approximately one to three months. She has a deep understanding of modern technology.

Needs:

- Prefers using Japanese over English therefore she requires a system that is multilingual and easy for her to adjust language settings.
- The ability to adjust the application's font size would be greatly helpful as she has poor eyesight.
- Has experienced a house fire from electric faults so now is paranoid about all the electronics being shut off when she is not home.

Goals:

Sally requires a multilingual application in which she can adjust her language and font settings accordingly to her needs. Since she does not struggle with technology, she would like to be able to access advanced settings in order for her to be able to tend to her home's needs with precision and accuracy to eliminate any possibility of mishaps.

Lilly and Jake

A young influencer couple in their late-20s who frequently travel due to their shared passion of travel and exploration along with content creation purposes and other collaborations. Due to the nature of their job, they must leave their house unattended for weeks to months at a time.

Needs:

- Ability to remotely manage their home's security all the while maintaining the facade of activity despite being away from home.
- The couple often receive PR packages and make online purchases straight to their home; they require a system which alerts them when a package has been delivered.
- Easy monitoring of their security cameras would also be preferred so they will be able to manually check on the security and motion sensors of their home.
- Lighting control for when they are home and away would be highly preferred. This is useful for energy efficiency monitoring and adjusting lighting for content creation.

Goals:

This couple requires a system which helps regulate their and monitor home security accordingly while they are away. They prioritise the security of their home as they own valuables that are significant to their career.

Harry and Mary

Harry and Mary are a middle-aged couple who live in a large house. Harry is a businessman who is often away due to business meetings and other work related travel. Mary is a housewife who indulges in travelling abroad. Her main responsibilities are her 5 high-maintenance dogs.

Needs:

- They require a system which allows them to monitor all sections of their house both inside and out. Motion sensor alerts would be highly necessary for their large house.
- Some forms of maintenance within their home require human assistance, workers such as gardeners, electricians, and Mary's dog groomers may require access inside the residence.
- They want to be able to monitor each corner of the house and be alerted if any unusual motion happens within and outside their residence.
- Since the couple is middle-aged, they require an application that is straightforward and easy to understand. A simple and direct application would benefit the couple greatly in terms of efficiency.

Goals:

Harry and Mary's main priority is their house's security and their dogs' well-being. They want everything to be well maintained and monitored whenever they are outside their residence. The app must be easy to use and accessible as the couple are not tech-savvy.

Use Cases

Ideal/expected use

- Step 1: Installation and preparation of app and required hardware

James decided to travel overseas for a holiday for five days next month. Since he lives alone with a dog, his house will be left unattended and his dog will be left in the house during that period. For the house's security and dog's safety, he decides to install surveillance cameras and motion detectors in his house and monitor the house while being away. Firstly, he installs this app on his phone and prepares the hardware required. Since he lives with a dog that needs feeding every morning and evening, he sets a camera in front of the dog's cage so that he can monitor the dog while being away. Concerned about a possible house break-in, he sets up a motion sensor by the front door to detect suspicious activity. After setting up every camera and sensor, he then synchronises every hardware to the app. He goes to the app and opens a synchronising screen to connect each hardware to the app one at the time.

- Step 2: Sharing the app's information with trusted people

He has a reliable relative who lives in close proximity so he decides to share the app data with her. He asks her to install the app and opens the main screen. He then proceeds to a screen which links her account to his account. This is securely done by him setting up a password on his account and her typing in the password. He will then receive a confirmation email on his email to double check that he conducted the linkage. After the linking is successfully done, she sets notification settings for her app.

- Step 3: Scheduling on the app's calendar to establish the setting specific to the trip

Once he has finalised the dates of departure and arrival for the trip, he then puts these dates on the calendar built in the app. Adding a trip onto the calendar then takes him to a new screen for the trip-specific setting, which allows him to set what to be reminded on the day before the departure and other settings such as the automation of some of the systems and notifications during the stay and the frequency of the notification.

- Step 4: Before and During the trip

On the day before the departure, He gets a reminder notification, which tells what needs to be done prior to the trip for the safety of the house such as switching off the gas.

During the trip, He occasionally gets notifications from the app telling the situation of the house. While sleeping at the hotel, he does not want the app to disturb his sleep so he goes to the app's notification setting and turns off the notifications for six hours. After six hours, the notification automatically turns back on. In the morning, He wants to watch his dog's cage to check if the dog is doing well so he remotely accesses the camera set in front of the cage to see it.

Non-ideal use

Because of the characteristics of this app involving cameras and a person's remote access to them, there is a potential of this app being used in crimes. Tom is committing secret photography and decides to use this app as the media to remotely access his camera. He installs and initialises the app in the same way that it was done in the ideal case. He then synchronises it with a micro-camera and sets it to the target's private space. He opens the app on his phone and accesses the live video of the room whenever he desires.

System requirements

Home Security

Through our survey, we gathered that 77% of people already use some common tactics to increase home security. As a result, we plan to include variations of these tactics in our system:

- Users can download and observe CCTV footage of their house and surrounding areas through our mobile app and control any digital locks around their home by using 'lock' and 'unlock' buttons. To ensure security for the user, they will be prompted to enter a password before entering the app and being allowed to control digital locks and other features.
- Users can also add their trusted family members/friends to the system so they are recognised as "trusted faces". The users can then take appropriate action if the system detects an unfamiliar face.
- Users can control which lights are turned on and off inside and outside the house to make it appear that the house is occupied using a simple on/off button on the app interface.

Home Maintenance

Our survey also found that almost 90% of people travel without their pets and have to rely on someone else to take care of them. There were also concerns for pool, garden and kitchen upkeep as well general cleanliness of the home. As such, we plan to include system features that will directly tackle these issues:

- Users can set pet feeding times on the smart home system which connects to a robotic pet feeder. This pet feeder will then dispense a predetermined amount of pet food and water to cater for the pet's specific needs.
- Users can control mechanical pool covers and monitor water filters, chemicals, etc.
- Users can set times for watering plants so that an irrigation system will activate and water plants based on plant-specific water needs.
- Users can observe what is inside the fridge and whether produce has sat in the fridge for long periods of time so that disposal can be arranged.
- Users can connect a robotic vacuum cleaner to the system so that the house is vacuumed to avoid dust build up upon return.

App Design

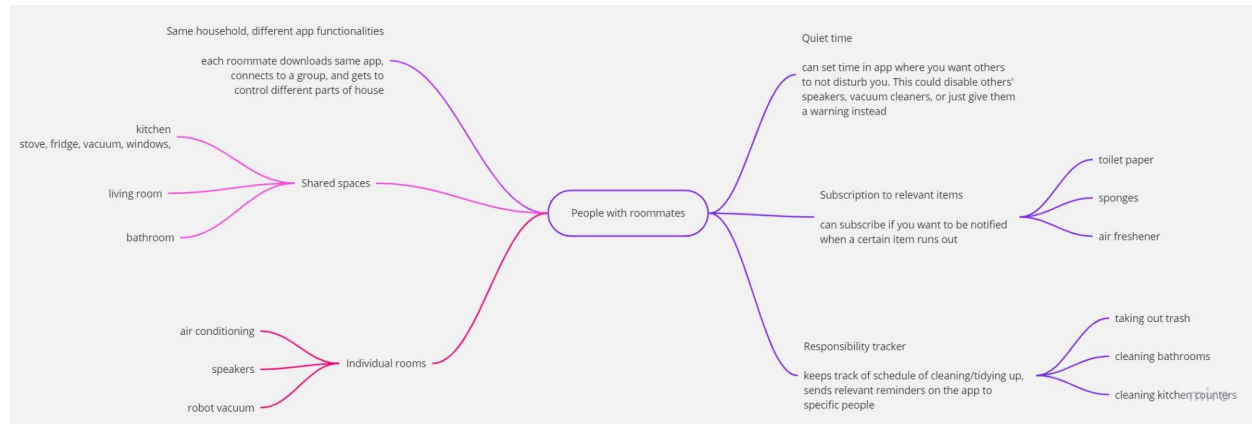
Through interviewing, we understood a strong demand for certain app design features. As a result, we have made the following decisions:

- Our interface will feature a drop-down menu featuring important pages such as 'FAQ', 'Help', 'Event History' and a 'Settings' page. The 'Settings' page will allow users to control basic features like language, text size, etc. to make our app more accessible for users.
- Our app will also have a range of interfaces to suit our diverse user base. We will have a standard, minimalist and customisable template so that the user can decide which functions of the app are most relevant to them.
- Our app will deliver notifications based on its scale of urgency. Emergencies will be communicated through text messages and distinct notifications, utilising haptic, visual, audio feedback. Less urgent matters will be sent as casual notifications so that users are not overwhelmed during their travels.
- Our app will allow users to share information with trusted family/friends. This will be done through a profile/password system.

DISCUSSION DONATA

Methods

The methods we decided to use gave us a sufficient amount of data to work with and so were a good choice. We had initially considered including A/B testing and bodystorming, but we ultimately decided to exclude these methods as we did not have a physical demo for the application to test with. Additionally, the brainstorm we scrapped is shown in [Figure 9] below.



[Figure 9]

The personas were well balanced and helped us understand the potential audience for our application and better system requirements. Use cases turned out less varied and thus gave us less insight into possible system requirements, but were still useful.

While the various survey and interview questions gave us sufficient information to work with, the content of the questions themselves could have been improved to avoid repetition and ensure that the respondents gave satisfactory answers.

Results from survey and interviews

Most of the results were predictable with some outliers. The degrees of safety measures taken differed greatly - from only locking their door to setting up cameras, turning off appliances and leaving lights on.

The previously analysed applications covered our respondents' security needs. However, since they are primarily security applications, they do not have other crucial functions we aim for - like feeding pets or watering plants, connecting to appliances to turn them off and vacuums to keep the house clean.

Additionally, our results might be skewed towards a particular age group as most of the people we interviewed were young adults.

System flaws

Limitations:

- Feature overflow
- Costly
- Trust from users
- Reliant on local power

Solutions

- Filter and cut out features
- Show users statistics and reviews
- Add ability to connect to generator

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TIMETABLE FOR ASSIGNMENT 2

Deadline	Task
Week 7	Brainstorm the ideas on interface design
Week 8	Create two rough wireframes
Week 9	Evaluate by testing with people
Week 9	Choose a wireframe and refine it
Week 10	Add more functionalities and details in appearance
Week 10	Create scenarios for usage, draw them
Week 11	Make more adjustments based on people's responses and scenario testing
Week 11	Finalise the design
Week 12	Write report

SUMMARY OF CONTRIBUTIONS

Section	Contributors
Abstract	Chamathna
Introduction	Kerui
Background work	Kerui
Methods	Discussion of methods - Rachelle Brainstorm - Donata, Kerui Survey questions - Yuta, Rachelle, Kerui & Chamathna Interview questions - Yuta, Rachelle, Kerui Conducting interviews - Yuta, Rachelle, Kerui
Results	Survey results - Donata Interview results - Donata Personas - Rachelle Use cases - Yuta System requirements - Chamathna & Donata (supplied ideas for this section)
Discussion	Discussion - Donata
Other	Formatting & Editing - Donata, Kerui, Rachelle, Yuta & Chamathna