



Figure 1: Safety Beacon Logo

ASSIGNMENT 1

CMPT 275

Group 7

Nathan Tannar
Jason Tsang
Philip Leblanc
Josh Shercliffe
Youjung Kim

Website

github.com/nathantannar4/Safety-Beacon

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2. Revision History

| Version | Status | Publish/Revision Date | Authors |
|---------|---------|-----------------------|--|
| 1.0 | Created | September 25, 2017 | Nathan Tannar Jason Tsang Philip Leblanc Josh Shercliffe Youjung Kim |

3. Project Summary

Alzheimer's is a disease that affects not only the patient but everyone who is close to them. You may find yourself worried that your family members might one day forget where they live or get lost when they wander off. As a matter of fact, it is statically shown that 6 out of 10 patients that wander off will get lost! [1] You may also find yourself worried that they are taking too many trips to the pharmacy and purchasing over the counter medication. Or even to the casino and spending their money whilst not remembering how much they lost. While you may not always be able to be by their side, with Safety Beacon you can rest easy knowing you have a direct link to their current and previous whereabouts. [2] Safety Beacon is the first mobile iOS app specifically tuned for helping caretakers/family members keep track of an Alzheimer's patient and will soon be available for download on the App Store.

4. Project Overview

The consistent memory loss associated with Alzheimer's disease can put significant strain on family and friends of the patient. An estimated 1 in 10 Americans over the age of 65 suffer from Alzheimer's disease. Of these 10%, "15.9 million family and friends provided 18.2 billion hours of unpaid assistance to those with Alzheimer's" [3].

To assist the caretakers of Alzheimer's patients, Safety Beacon is an application designed to track and analyze the patient's real-time position, remember important and consistently visited locations, and alert the caretaker when the patient leaves a designated safe-zone.

We define the PATIENT as the user with Alzheimer's and the CARETAKER as the user responsible for managing one or more PATIENTs.

The PATIENT can access:

- A simple map view with easy navigation to a list of important locations; because Google Maps is too featureful and complicated if you just want to navigate to specific locations
- An Augmented Reality overlay of walking navigation; making it easier to follow directions by viewing the live route overlay through the display
- An emergency button available to the patient that will automatically guide the patient home in the case of getting lost

The CARETAKER can access:

- Real-time location access; in case they go missing
- Designation of "safe-zones" defined by the caretaker, in which the caretaker will be alerted when the patient enters or leaves these zones (i.e. patient leaving or entering their home or senior centre)
- Push navigation instructions to patient
- Location history trace; to see where they went
- Set a saved list of important locations; to add map makers like "home" or "grocery store"
- Generate daily report of patient location history

The users of the application will include both caretakers and Alzheimer's patients. Each of the two users will have a slightly different UI. The patient's features will mainly focus on the memorization of important locations, and the emergency "take me home" button. The caretaker's features will include the same feature set as the patient's, with the addition of activity summaries, location tracking, safe-zone designation, and admin configuration screens.

Stakeholders of the application include:

- Sufferers and caretakers of Alzheimer's patients
- CMPT275 Group 7 members
- Professor Herbert Tsang

5. Project Planning

The project will span a timeline of approximately four months from conception to completion. During this timeline, efficient communication in between the team members is key to successful app development. As a communication plan, we will meet in person at least once each week for at least an hour. Using the Agile methodology, these scrum meetings will be basis for us to discuss everyone's progress on current assignments, future goals as a group, and any issues or concerns we might have.

There will be bi-weekly sprint reports on progress to review upcoming deliverables. Additionally, we will be frequently using Facebook and Slack as an online communication tool to provide any important updates, or to raise a gating issue. If the gating issue calls for an urgent fix, we will try to triage the issue as soon as possible via a Skype call. We also intend to revise the communication plan regularly if more input is required. As a result, we will always be in frequent communication with one another, which ensures the entire team is generally on the same page and trying to achieve the right milestones/deliverables in every stage of the software cycle.

Currently, we do not need to hire anyone because we are capable of planning, developing, testing, and managing all the proposed features on our mobile app. However, as a team we still need to evaluate our cost estimation for other requirements for our app. Firstly, some of the app's feature needs real-time information access, which requires a back-end server. To set up and host a back-end server on google cloud platform costs approximately 10.00 CAD per month. Besides the server cost, all other costs are minimum since our app does not require any external hardware components. Furthermore, we can minimize our cost further by using cost-free GitHub as our team website and version control software. In brief, we believe the total cost of developing our mobile solution will be very inexpensive.

Additional information regarding agenda, meeting minutes, and documentation are found on our website: github.com/nathantannar4/Safety-Beacon

| Key Tasks | Start Date | End Date | Milestones/Deliverables |
|---|--------------------|--------------------|---|
| Project Initialization | September 18, 2017 | September 27, 2017 | <ul style="list-style-type: none"> - Assignment 1 - Clear Vision |
| UI/UX Design and App Architecture | September 25, 2017 | October 18, 2017 | <ul style="list-style-type: none"> - Assignment 2 - UI Design - Backend DB Setup - Familiarity with Xcode and Swift 4 |
| Basic Location Features | October 23, 2017 | November 6, 2017 | <ul style="list-style-type: none"> - Assignment 3 - Presentation - Functional Prototype |
| Machine Learning Push Notifications AR Overlay | November 6, 2017 | November 20, 2017 | <ul style="list-style-type: none"> - Assignment 4 - Prototype with all features |
| UI Finalization QA Testing Battery Life Optimizations | November 20, 2017 | December 4, 2017 | <ul style="list-style-type: none"> - Assignment 5 - Presentation - App Store Deployment - Final Demo |

6. Project Schedule

The project timeline is from September 5th to December 4th, spanning thirteen weeks. As of now three weeks have passed, two of which we have been spent as a team to plan and get to know each other. We are now entering the fourth week and we have a total of ten weeks before the deliverables are due.

This project is for CMPT 275: Software Engineering I, therefore the timeline should reflect the course credit system. Since the course is worth 4 credits, this means approximately 3 hours/week for each credit (12 hours/week) should be spent on this course: not considering study time for exams. Since the course project is worth 50% of the grade it is reasonable to divide half of the hours towards studying for exams and the other half towards the course project. Furthermore, 6 hours/week for each team member equals 30 hours/week. In sum, for the next 10 weeks we are aiming to put in a total of 300 hours of work to this project.

A timeline and Gantt chart were created in MS Project to further illustrate our initial project schedule in *Figure 2* and *Figure 3* below.

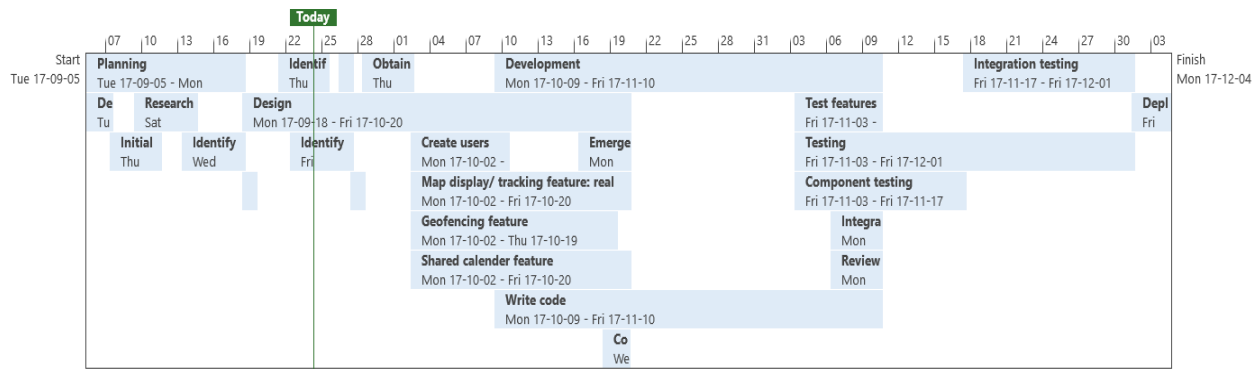


Figure 2: Initial Project Schedule

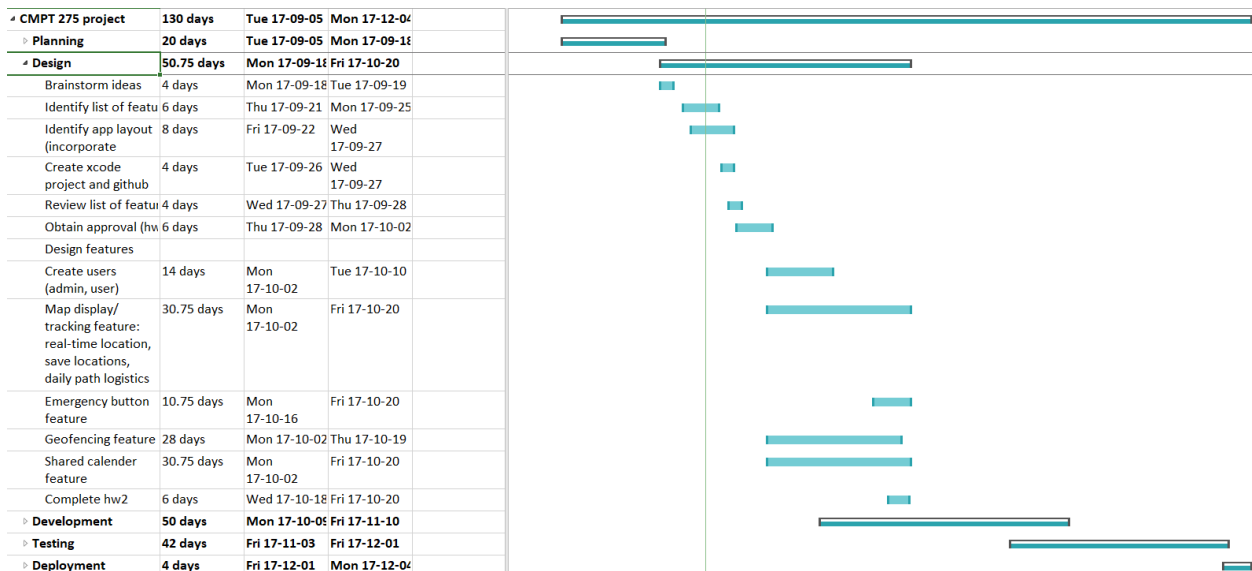


Figure 3: Feature Development Breakdown

After Homework 2 is completed (requirements document + design document and quality assurance plan) the design stage of our project will end (October 20). Concurrently, we will complete the full design of the feature set and begin development to give more time to learn Swift and development practices with Xcode and iOS. This is to increase our limited three week window for the development of a functioning base app from October 20 to November 6. Version 2 of the app and Homework 3 is another milestone (November 20), as well as the Final Presentation and Version 3 (December 4) in revising those features.

7. Risk Management

Reference Headers

Likelihood:

| | |
|--------|--|
| Low | Rare and negligible chance of occurring |
| Medium | Possible of occurring |
| High | Almost certain of occurring, likely with repeated offenses |

Impact:

| | | |
|---|-------------|--|
| 5 | Severe | One or more critical objectives will not be achieved, project delayed |
| 4 | Significant | One or more objectives will be below acceptable levels, project could be delayed, or released with issues or missing features |
| 3 | Moderate | One or more objectives are only met with minimal acceptable levels, project will not likely be delayed, but released sub-optimally |
| 2 | Minor | Minor impact on objectives, highly unlikely project will be delayed |
| 1 | Minimal | Little or no impact, no delay to project deadlines |






Potential Problems that can hinder the Progress of this Project

| Risks | Impact | Likelihood | Impact Area | Mitigation |
|--|--------|------------|-------------------------|--|
| Technology | | | | |
| Use of public APIs contains defects or does not execute as desired | 5 | Medium | Application development | <ul style="list-style-type: none">- Ensure that there is compatibility between the APIs being exercised before using them- Create a quick prototype with it executing the basics of what we want, before investing time into the specifics |
| Merge conflicts | 4 | High | Application development | <ul style="list-style-type: none">- Merge trunk with local workspace frequently- Assign dedicated trunk manager to resolve all merge conflicts- Merge local changes to trunk (after review) as early as possible- Have developers work on separate features |

| | | | | |
|--|---|--------|---|--|
| Unexpected Bugs | 3 | High | Application development | <ul style="list-style-type: none"> - Code with testing in mind - Start QA early to identify flaws in code before they pile up - Assign developer with QA for co-development of code and test code |
| Security concerns regarding location tracking and information collection | 1 | Low | Consumer | <ul style="list-style-type: none"> - Confirm that iOS privacy filters are strong enough to prevent leakage of location tracking information - Confirm that database server is acceptably secure to hacks |
| iPhone battery is depleted rapidly in testing | 1 | Low | Consumer | <ul style="list-style-type: none"> - Off-load processing to the server-side - Check that optimal APIs are being used that minimize battery usage - Only update location when significant movement of the iPhone is detected |
| People | | | | |
| Lost of team member (sick, drops class, etc.) | 4 | Medium | Entire project or deliverables for HW due | <ul style="list-style-type: none"> - Assign secondary roles to all members, so that a missing member's role can be quickly covered - Start project early to minimize the potential time lost to cover said role |
| Members not pulling their weight | 4 | Low | Deliverables for HW due | <ul style="list-style-type: none"> - Have members exercise their secondary roles - Have a member communicate with those having trouble, to see if they are being blocked - Setup 1:1 or physical meeting to work with member having trouble |

| | | | | |
|---------------------------------------|---|--------|-------------------------|--|
| Lack of experience in iOS development | 3 | High | Application Development | <ul style="list-style-type: none"> - Make use of tutorials on iOS development online - Start coding early to identify potential issues that could arise with development - Seek help for TA, Professor, other students, or online forums as soon as the problem becomes a blocker |
| Tools | | | | |
| Lack of development platform (Mac) | 3 | Low | Application Development | <ul style="list-style-type: none"> - Occupy Macs in CSIL earlier to ensure that there is availability - Install Hackintosh on Windows for remote development - Purchase a Mac (worst case scenario) |
| Requirements | | | | |
| Project Idea is rejected | 5 | Low | Entire project | <ul style="list-style-type: none"> - Talk with Professor to ensure that project idea is one that is acceptable before submission of HW1 |
| Estimation | | | | |
| Underestimation of work to be done | 4 | Medium | Deliverables for HW due | <ul style="list-style-type: none"> - Set deadline earlier than that of the submission deadline to allow an extra buffer for corrections - Start working on deliverables ASAP |

8. Project Organization and Staffing Plan

| | |
|---|---|
| Project Lead | |
|  | <p>Nathan Tannar (<i>ntannar@sfu.ca</i>)</p> <p>Mobile development is my jam. I did a one year Co Op with SAP where I worked on remote System Support and iOS development. I have experience with Swift from some personal projects I work on. With that I have learned how to setup a backend system for mobile apps that support a wide arrangement of cloud services including push notifications.</p> |
| Developers | |
|  | <p>Jason Tsang (<i>jrtsang@sfu.ca</i>)</p> <p>I am a 4th year Computer Engineering student with an industry background primarily in firmware. In addition to firmware, I have experience working with automation, regression testing and build and CI. I have been exposed to the Apple development environment before, having created a status-bar application for macOS.</p> |
|  | <p>Philip LeBlanc (<i>paleblan@sfu.ca</i>)</p> <p>I am a fourth-year computer engineering student with experience with C++, Javascript, Python. Previously had a co-op at Simba technologies/ Magnitude Software on the Build and Test Automation Team. Had me working on an internal webpage using Angular.js and python but I am more comfortable with VS C++ through courses at SFU. Outside of school, I enjoy soccer, hiking, and skiing.</p> |
| QA | |
|  | <p>Josh Shercliffe (<i>jshercli@sfu.ca</i>)</p> <p>I am a SFU student pursuing a degree in computer engineering. I am competent in computer hardware, and have built several personal computers. I have worked in IT at ICBC, as well as taken several computing courses at SFU such as CMPT 128, 225, and ENSC 251.</p> |
|  | <p>Youjung Kim (<i>youjungk@sfu.ca</i>)</p> <p>My name is Youjung Kim, I am a senior student in Computer Engineering. So far in my academic career, I have completed 5 co-op terms at 2 different companies as an R/D associate and software tester. I am currently finishing my last terms at SFU as I am seeking post graduate opportunities.</p> |

9. References

- [1] A. Association, "Alzheimer's Association," 2017. [Online]. Available: <http://www.alz.org/care/alzheimers-dementia-wandering.asp>.
- [2] A. Association, "Alzheimer's Association," 2009. [Online]. Available: http://www.alz.org/alzheimers_disease_10_signs_of_alzheimers.asp.
- [3] A. Asociation, "2017 ALZHEIMER'S DISEASE FACTS AND FIGURES," 2017. [Online]. Available: <http://www.alz.org/facts/>.

Appendix

Meeting Minutes 1 – September 17, 2017

github.com/nathantannar4/Safety-Beacon/blob/master/docs/Meeting_Minutes_1.pdf

Meeting Minutes 2 – September 19, 2017

github.com/nathantannar4/Safety-Beacon/blob/master/docs/Meeting_Minutes_2.pdf

Meeting Minutes 3 – September 23, 2017

github.com/nathantannar4/Safety-Beacon/blob/master/docs/Meeting_Minutes_3.pdf