

Deliverable D

Group 16

10/08/24

Abstract

This document will explore the various subsystems involved in the operation of the program to create and enforce restricted areas within company grounds. Then the subsystems will then be used to generate 3 possible solutions; which will then be promptly ranked according to the design criteria generated by the previous document. The highest-ranking solution will be chosen as the current prototype and be developed.

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1. Introduction

Within this deliverable, the technical document will demonstrate and record the ideate step of the design process. This document shall host generated ideas for subsystems, then the possible solutions of the problem highlighted by the problem statements.

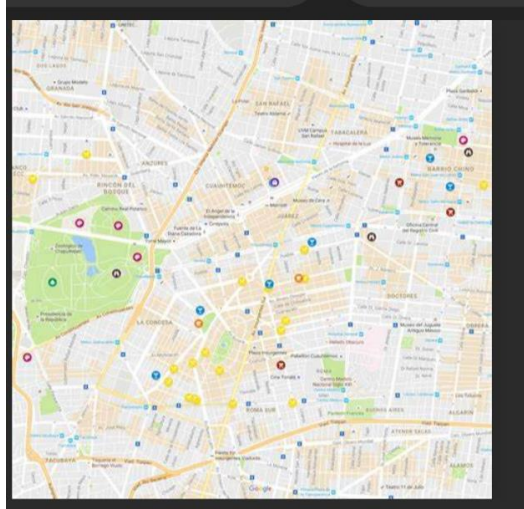
1.1 Problem Statement

The company Shabodi requires a network aware, modular code that will alert administration and the user of the device that they are approaching a restricted zone. It must use at least 2 API's and be demonstratable in their sandbox.

2. Generated Ideas and Compared to Design Criteria

2.1 Aesthetics - Tariq

- User Interface
 - A full map that covers the entire viewport of the screen. This offers users a complete view of the geographical scope. (Ex. Google Maps, Waze)
 - Partial Maps that only embody section of the user interface allowing for other UI elements such as text, images, or filter to operate.
- Accessibility
 - Cross platform consideration of map Ui
 - IOS: Apple's Human interface guidelines are usually clean and minimalistic; leveraging features like force touch for map interaction and iconography.
 - Adaption of screen sizes
- Customization Options
 - Zoom in/out
 - Click/tap interactions: highlight clickable areas/ cursor changes to signify interactivity
 - Layer toggles: customization of map, displaying only relevant geographical information
 - Points of Interest: Specific location or landmarks user find helpful.



2.2 Location Tracking - Dennis

- Usage Location API
- The user would be pinged by the API every 30 seconds, sending the location data to the admin servers
- Then the notification data would be compared to existing restricted zones made by the restricted zone subsection
- If there is a match a ping is sent to notification subsystems to send an alert to the device and admins
- If there are no matches the device will ping the API again after 30 seconds

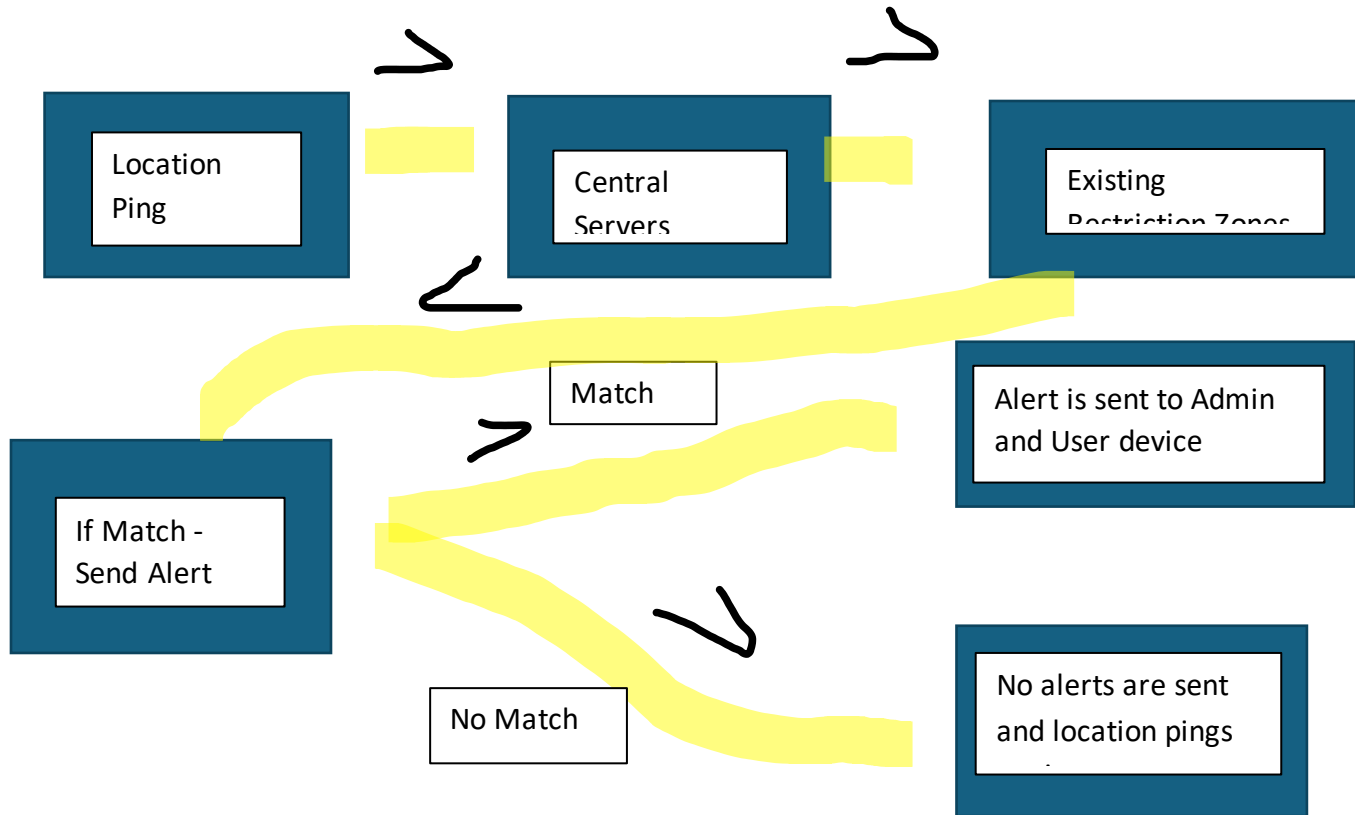


Figure 1: Location Tracking Example

2.3 Notifications and Alerts – Rachael

- This app will use notifications to update admin and user when in restricted areas.
- Notifications are alert tones that user can hear or feel vibrations of to be warned entering a restricted zone.
- Admin will also get updates through similar notifications of user's location if they are in restricted zones.
- These notifications are similar to receiving a text message with customized sounds, vibrations, and different ring tones.
- The customized sounds could be customized to user or admins liking depending on different circumstances.

- For instance, individuals who are hard of hearing set louder notifications while admins can use a more aggressive vibration and louder sound for more hazardous restricted zones.
- Notifications are similar to life360, an app which updates other users when someone has entered or left a zone.
- A notification will be sent to the user when they enter a restricted area that their internet access will be limited until they leave the zone.

2.4 Restricted Zone Creation - William

- The user would be able to create zones that can be restricted to certain individuals.
- The user would be able to choose who is restricted and who has access to these zones
- Zones can be created by user by input of coordinates in the custom map OR zones can be defined by doorways or walls that have already been created in the custom map.
- How ankle monitors detect users' location: restrictions are determined by supervisor and offender is tracked using GPS and monitored by a supervisor.

(<https://www.ontario.ca/page/gps-monitoring-program>)



shutterstock.com · 1157160817

<https://www.shutterstock.com/search/ankle-monitoring>

- Neuron scooter zone restriction: when you enter a No Riding Zone (restricted zone) the scooter will be disabled <https://support.rideneuron.com/hc/en-us/articles/900000284463-What-is-a-No-Riding-Zone>



2.5 Administrative Control- Taryn

- Each person's account will be directly connected to any administrative persons who need to have control over a specific employee's zones
- Admin will be able to quickly and efficiently change any employees "No Go" zones based off of where they need to be that day or any job changes
- Admin will be able to easily add or subtract employees from any zone at any given time through an easy-to-use map of the workplace
- If an employee does enter a "No Go" zone, then the administrator who is directly in charge of that person will receive a notification- allowing them to help redirect the employee
- Administrators will be able to see where an employee is anytime that are in the workplace
- Possible opportunity to use bandwidth API to throttle employee device of the internet when in restricted zones.

3. Functional Solutions

3.1 Solution 1

Made with limited user interface, no accessibility, no customization, every 30 seconds signal sent straight to admin, location compared to restricted zone that it created by admin by providing coordinates. Once the signal is received bandwidth is throttled to incentivize leaving the area using location and bandwidth API's; limiting bandwidth to minimal instructions on how to leave the area.

3.2 Solution 2

Customizable interface, wearable tracker (ankle or wrist bracelet or modified RFD chip), location tracked by signals sent to central servers then it is compared to pre-set restrictions. Notification sent to bracelet and alerts user by vibration or loud sound.

3.3 Solution 3

Location shown on device display, some interface/ customization (Waze/Google Maps?). Admins will have the ability to assign different access levels for employees while providing standard access for visitors, allowing them to enter designated areas.

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4. Analysis and Evaluation

4.1 Design Criteria

Design Criteria	Ranking (5 most important, 1 least important)
Two APIs are used	5
Application utilizes Shabodi technology	5
Application is network aware - On private and/or public networks	5
Application is presentable to corporations by design day	4
The application is demonstratable	4
Admin can set and modify zones of restriction	3
Possibly multi-floor capability	2
Noticeable Notifications (Amber Alert)	2
The application is modular to other Shabodi applications	1
Fast update capable	1

4.2 Rankings

Solution 1 / Ranking	Design Criteria	Reasoning
5	Two APIs are used	In this solution 2 APIs are used Location and Bandwidth
5	Applications utilizes Shabodi Technology	This solution will utilize Shabodi sandbox to demonstrate
5	Applications is presentable to corporations by design day	This solution will be very time efficient, and will provide the most opportunity to test vital functions
4	The application is demonstratable	Application will be functional and demonstratable for corporation to effectively show and explain the design. However, there will be no physical item to help demonstrate.
4	Admin can set and modify zone restrictions	Admin will be able to restrict and modify zones for users, however it may not have an intuitive user interface
3	Possible multi-floor capability	Multi-floor capability may be possible to develop, piggybacking on existing device GPS functions, however it may not be developed in time
5	Noticeable notifications	By setting the device notifications to be like an amber alert, it will be extremely noticeable.
4	The application is modular to other Shabodi applications	The application is lightweight enough to possible fit in as an

		extension of an existing program
5	Fast update capability	The minimal dedication to interface will allow for updates that push functionally focused updates at a fast rate.
Solution 2 / ranking		
5	Two APIs are used	Solution two will utilize a multitude of APIs including those using location and administrative control.
5	Application utilizes Shabodi technology	The APIs used in this design were created by Shabodi.
4	Application is presentable by design day	This solution could utilize a physical prototype which would also need to be presentable on design day along with any coding done, so it would be another hurdle.
5	The application is demonstratable	Application can be a relatively simple circuit to demonstrate idea.
5	Admin can set and modify zone restrictions	This design would require admin to set up zone restrictions so that technology would need to be a part of the design.
1	Possible multi-floor capacities	Physical trackers often have a hard time sensing rises in elevation, especially at the more subtle level, so this design may not be able to have a multi-floor capacity.
4	Noticeable notifications	This design would have skin to tech contact which would allow for any notifications to be very noticeable.
3	The application is modular to other Shabodi applications	Could use other Shabodi programs but it might not be super effective with those programs.

3	Fast update capabilities	The programing itself could be capable of fast updates, however, updating the physical aspects of this design would be more time intensive and expensive.
Solution 3 Ranking		
5	Two APIs are used	2 APIs are used; Location and Bandwidth
5	Application utilizes Shabodi technology	The APIs were designed and created by Shabodi
3	Application is presentable by design day	The user would be able to interact with the application to customize the interface and to assign different access levels to employees and visitors, which could involve complex code and slow down our development.
4	Application is demonstratable	Will be able to demonstrate within the Shabodi sandbox but may also be able to figure out a physical demonstration.
5	Admin can set and modify zone restrictions	The solution gives the admin control over the location of the restricted zone by adding coordinates into the application.
4	Possible multi-floor capacities	The restricted areas on different floors will be set for users and admins. May not be possible, sandbox pending.
4	Noticeable notifications	Notifications will be noticeable enough for the admin and user when user has trespassed into a restricted zone.
3	The application is modular to other Shabodi applications	The complex nature of the application may interfere with integration to existing Shabodi applications

3	Fast update capabilities	Fast updates ensure admin and users that the user is not trespassing a restricted area.
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1. Solution 1 (Throttles Bandwidth, Send Signals ever 30 sec)
 - Achieves basic functionality but lacks user friendliness and customization. The limited interface and accessibility make it less appealing
 - Throttling bandwidth is a punitive measure but may not be the most effective way to encourage compliance

2. Solution 3 (Displays, Location, Admin Control)
 - It is focused on user experience and flexibility. Admin-defined access levels accommodate various scenarios (e.g. Employees's vs visitors)
 - User display is intuitive and user friendly
 - Overall, solution 3 balances technical functionality making it an appealing choice, other than the development time

3. Solution 2 (Customizable interface, Notifications, Wearable Tracker)
 - Improves user experience by offer customization and wearable technology
 - Wearable technology provides real time location data, allowing for accurate restriction enforcement
 - It lacks some feature such as the administrative ability to easily customize zones
 - The notification system enhances user awareness but may not be as critical as other criteria

5. Final Solution

The chosen final solution is solution 1, this solution was chosen due to it fitting the existing criteria of a barebones functional application that Shabodi expects. Additionally, it will take the least amount of developing time, leaving more time to be allocated to learning the sandbox and testing the prototype. While the user interface leaves much to be desired, some user interface options will be considered from solution 3, time permitting.

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