

Prototype III and Customer Feedback

Gentleman's Guild of Engineering Excellence

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1. Objective

The objective of Prototype III is to refine the functionality and usability of the security and alert system based on feedback gathered from prior prototypes. With an emphasis on improving system connectivity, real-time responsiveness, and accuracy, this stage seeks to achieve a polished and robust prototype that aligns with both technical specifications and client expectations. Special attention is directed toward addressing outdoor geofencing scenarios, optimizing bandwidth efficiency, and enhancing the overall user experience.

2. Prototype Development

Why, What and When of Prototyping

Prototype III is the result of iterative feedback and testing from earlier prototypes. It builds on the success of Prototype II by further integrating system features like geofencing, notification delivery, and video capture, while shifting development to more complex and realistic outdoor scenarios. The timing of this prototype coincides with increased access to client tools, such as Shabodi APIs, enabling us to implement higher fidelity solutions.

Targeted objectives and specific tests

The objectives targeted and test in prototype 3:

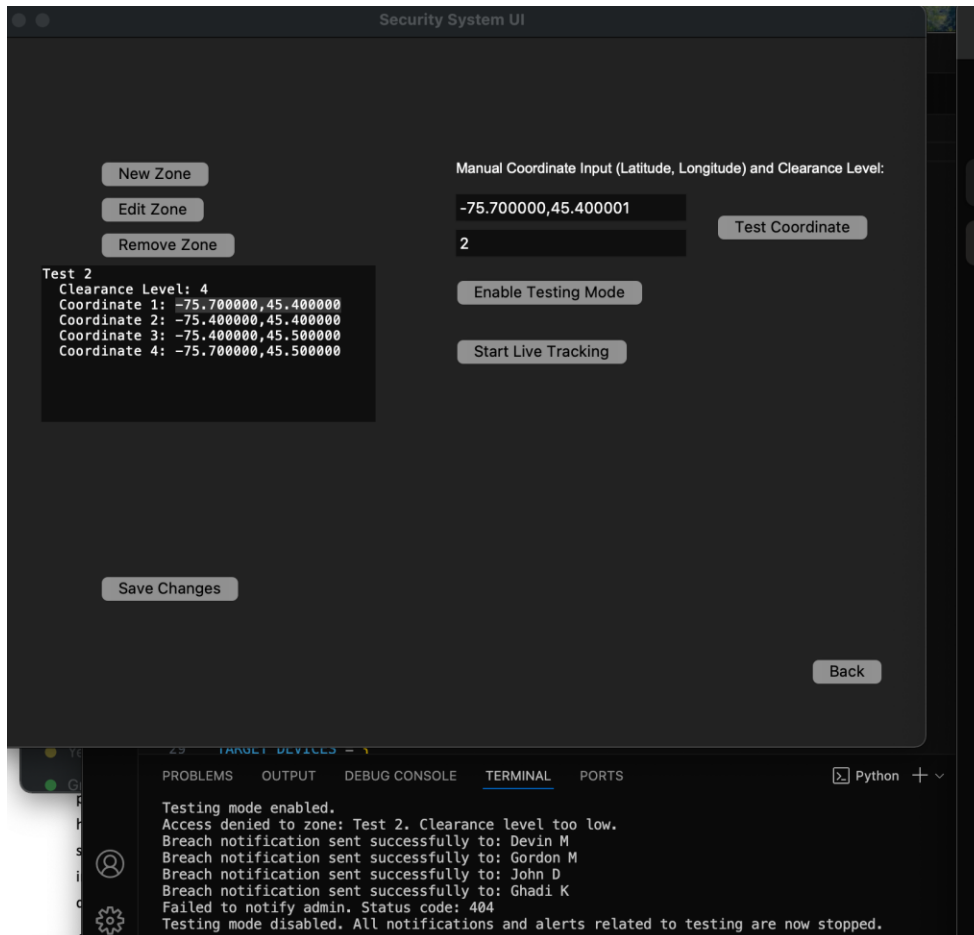
Tested accuracy and range

- Indoor test provided different results for different phones
- Devins Phone: 3-5 m accuracy, range limited by walls
- Ghadi's Phone 35m accuracy, range limited by walls
- Outdoor testing
 - Devins phone: 2-3m accuracy, range not limited within testing zone of 30m
 - Ghadi's phone: 8-9m accuracy, range not limited within 30m testing zone
- Large scale test
 - 3.3km out, 13 m accuracy

- Alert testing
 - Devin received notifications in the terminal when exiting an outdoor zone
 - Ghadi did not trigger a notification when entering the same zone, improper zone setting may have been the culprit.
 - UI manual coordinate and geofencing testing
- Manual input of coordinate testing
 - Notifications produced from setting zone and user coordinates manually.
 - Alerts only sent 3 to user and 1 to admin, to be fixed
- Live video integration
 - Does not work, 3 methods tried, displaying live video in this UI unfeasible for the moment.
- Live video
 - Time to start capturing 5 seconds
 - Time of capture 5 seconds
 - Time until its uploaded 10 seconds

3. Documentation and Analysis

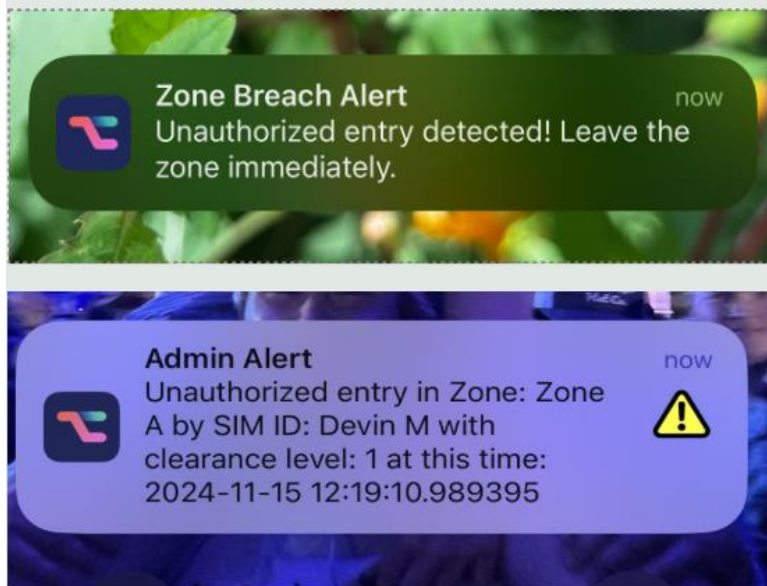
UI with manual coordinate input



Live location gathers

```
Fetching target device locations...
Ghadi's iPhone: Latitude=45.43769005368489, Longitude=-75.71431165873112, Accuracy=13.356372068017546 meters
Devin's iPhone: Latitude=45.4278185724045, Longitude=-75.68721559416284, Accuracy=25.16746878287019 meters
```


Alert Notification



4. Customer Feedback

Summary of feedback

Following a meeting with Shabodi, it was determined that an exterior setting is more feasible for future development, as implementing zone restrictions using coordinate settings is constrained by altitude. Indoor settings would depend heavily on existing building infrastructure and security measures, making outdoor implementation simpler. Additionally, Shabodi advised assuming that system users are inherently trustworthy, as the system is not intended to serve as a comprehensive security solution. Instead, its purpose is to showcase the functionality of Shabodi APIs—such as jitter, bandwidth, and location tokens—in enhancing secure environments.

5. Prototype Refinement

Prototype 3 represents the first step in completion of this project. This prototype will need further refinement in an additional phase before development of the final prototype. From prototype 3 to 4 the following improvements needs to be made:

- Implementation of Live video and video library calls to UI
- Live location implementation into the UI for geofencing location sets
- Updating breach history in UI

- Modular approach to application construction

Updated target specs

Location accuracy: 5-10m in exterior environments.

Video face tracking if within 5m. Else will rely on object detection.

Video call time: 20 seconds total to the cloud, ideally video capture start delay < 1sec

Bill of material and design changes

Design changes included changing from facial recognition to just facial tracking. As well as switching from Shabodis location API, to an external “Find My” API, that allowed us to track at a significantly accurate rate, as Shabodis location API was not functional.

Category	Actual Expenses	Budget Remaining
PushCut App Membership	\$2.49	\$25-\$2.49=\$22.51
Phone	\$0	\$25-\$0=\$22.51
Internal/External API's	\$0	\$25-\$0=\$22.51
Camera	\$0	\$25-\$0=\$22.51
User-Registration Portal	\$0	\$25-\$0=\$22.51
Server/Cloud Storage	\$0	\$25-\$0=\$22.51
Backend Database	\$0	\$25-\$0=\$22.51
5G Sim Cards	\$0	\$25-\$0=\$22.51
Phone Integration	\$0	\$25-\$0=\$22.51
Bristol Board	\$3	\$22.51-\$3=\$19.51

6. Connection to Previous Prototypes

Results from former prototypes

Prototype II successfully demonstrated core functionalities such as geofencing, alert notifications and video capture. However, its limitations like slow response time and challenges with indoor zone definitions, informed the direction for prototype III. Lessons learnt from these

earlier stages have been implemented in our final prototype to improve performance and make everything run smoothly.

Justification for final prototype

This phase of development is critical to address the gaps identified in our project, and to ensure the system meets client expectations. By focusing on outdoor zones and incorporating feedback-driven changes, Prototype III represents a significant step forward in creating a reliable and user-friendly security solution.

7.Task Plan Update

Sub-task and Timeline Adjustments

Hard-Time Tasks

1. Gathering data from phone location: **Completed**
2. Testing multiple device tracking in real time: **Semi-Completed**
3. Integration of Location API into required functions: **Technologically Impossible**
4. Integration of Camera functions: **Completed**
5. Boundary system: **Completed**
6. Alerting from boundary: **Completed**
7. Detect person in an area: **Completed**
9. Recognize person in area: **Out of Scope**
10. Send data to soft time: **Semi-Completed**
11. UI development/refinement: Oct 27- Nov 27, Devin, John, Ghadi, Gordon, Sean

Soft-Time Tasks

1. Include Bandwidth API to relevant functions Nov 27 – Gordon, Ghadi Date pushed
2. Live Location Updates and Alert Responsiveness: **Completed**

4. Admin Live Video Access Upon Request: Nov 27 – Completed
5. Admin controls (dashboard options): Semi-Completed

Availability and Allocations Considerations

Team members schedules and tasks reviewed and re-evaluated to high priority tasks. Additional team meetings and time are being spent on testing and debugging.

8. Conclusion

Prototype III represents a significant advancement in the project, addressing the limitations of earlier iterations while incorporating user feedback. The focus on geofencing accuracy, notification responsiveness, and admin usability positions the system for successful final deployment. Future steps involve preparing for large-scale testing, preparing all the codes together and finalizing the user interface.