Deliverable E

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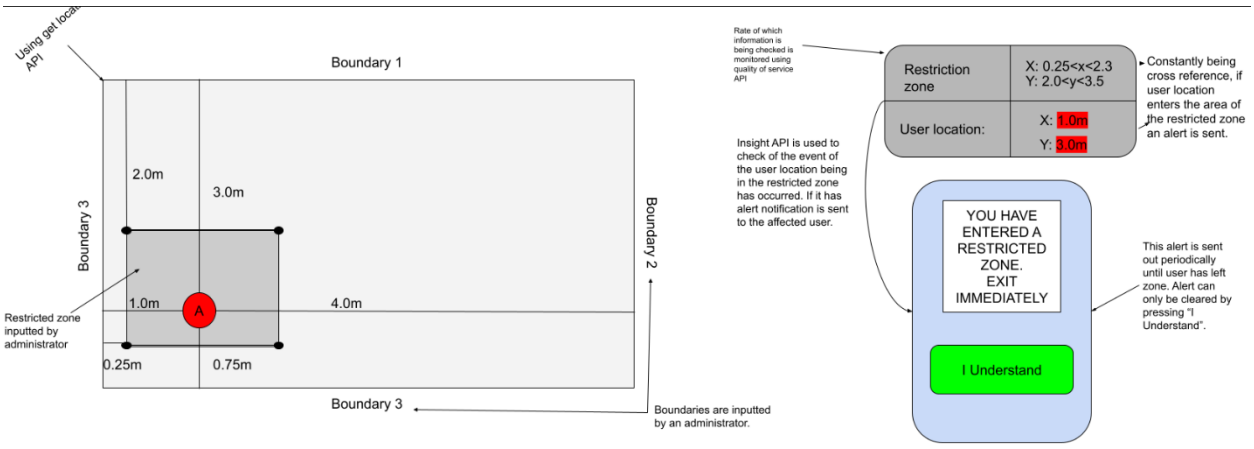
GNG1103

1. Abstract

This document provides a detailed design drawing of Group 12's chosen design concept, including all relevant information, such as APIs used, for Shabodi's zone restriction project. It then discusses a prototyping schedule, detailing the projected timeline for the group's prototypes and their experimentation. Following this, a bill of materials (BOM) for the project is discussed, further exploring elements from the design drawing, as well as the tools needed to implement all the elements in the BOM. Finally, there is an initial prototyping test plan, which outlines the details of preliminary test to assure the project is kept on track.

2. Design Drawing



3. Plan

Tasks	Estimated Duration	Ideal Time to Complete	Responsibility
Prototype 1	1 Week	27/10 - 03/11	Nick
Test 1	1 Day	04/11	Jaron
Test 2	2 Days	07/11-08/11	Shailen
Prototype 2	1 Week	03/11 - 10/11	Nick
Test 3	1 Day	08/11	Shailen
Test 4	2 Days	16/11-17/11	Jaron
Prototype 3	2 Weeks	10/11 – 24/11	Brayden
Design Day Presentation	3 Weeks	06/11 – 27/11	Team
User and Product Manual	1 Week	24/11 – 03/12	Team

Critical Risks	Contingency Plan
Failure to complete GUI	Modify our plan to a very barebones GUI which is a Minimally Viable Product
Inadequate Testing	Allocate additional resources for testing if time is short, and consider using automated testing tools
Communication Gaps	Set up regular check-ins and an escalation process for issues that require immediate attention, ensuring stakeholders are involved.
Scope Creep	Implement a change control process to evaluate and approve changes, documenting new requirements separately.
Resource Availability	Cross-train team members to cover for one another and have a backup plan for sourcing temporary resources.

4. Bill of Materials:

Component	Quantity	Unit	Unit Cost	Total Cost	Link
Visual Studio Code	4	EA	0.00	0.00	https://code.visualstudio.com/
Arduino IDE	4	EA	0.00	0.00	https://www.arduino.cc/en/software
Shabodi Workshop	1	EA	0.00	0.00	
Python 3.13	4	EA	0.00	0.00	https://www.python.org/downloads/
Aduino Uno R3	1	EA	37.99	37.99	Amazon
GPRS GSM Shield	1	EA	24.69	24.69	Amazon
Prepaid SIM card	1	EA	~10.00	10.00	Not Determined
				Total	
			Added Total	72.68	
			Final	82.13	

Potential Add-ons					

PLA	Unknown	kg	0.00	0.00	
Bristle Board	1 or 2	EA	~2.00	2.00-4.00	
Coloured Duct Tape Rolls	1	EA	~5.00	5.00	

5. Equipment List:

   Visual Studio Code

   Arduino IDE

   Shabodi Workshop

   Python 3.13

   Aduino Uno R3

   GPRS GSM Shield

   Prepaid SIM card

   Tape Mesure

   Computers/Laptops

   Internet Connection

   VPN

6. Prototyping Test Plan

Test Number	1	2	3	4
Test Description	Zone Change Test: an Arduino (UE) will be made to cross a specified boundary	Zone Proximity Test: an Arduino (UE) will write to the console its distance to a specified boundary, which will be compared to a tape measure	Updates Test: a computer will periodically update a file accessed via network	Ease of Zone Definition Test: a user will be asked to use the GUI to define a zone
Reason for Prototype	Analysing critical subsystems --- Reducing risk and uncertainty	Analysing critical subsystems --- Verifying feasibility	Analysing critical subsystems --- Verifying feasibility	Analysing critical subsystems --- Communicating and getting feedback on ideas

Evaluation Criteria	Proximity to boundary when change detected	Difference between Arduino and tape measure distances	Proportion of successful updates --- Delay between send and receive	Time needed to create 3 zones described in a prompt
Level of Prototype	Middle fidelity --- Focused	Low fidelity --- Focused	Low fidelity --- Focused	Middle fidelity --- Focused
Kind of Prototype	Physical	Physical	Analytical	Physical
Metrics	Distance (cm)	ΔDistance (cm)	Proportion (%) --- Delay (s)	Time (s)
Analysis Method	A light will turn on on the Arduino if it detects that it is in a certain zone	The distance between the Arduino and boundary will be compared to that measured by a tape measure between the same points	A Google Docs file will show the changes being done to it by this test in real time	Someone unfamiliar with the software will be asked to create 3 different zones as fast as they can
Stopping Criterion	10 total tests accomplished	10 evenly spaced intervals between 0-10m are tested	20 updates sent	3 users are timed

7. Conclusion

After the second client meeting with Shabodi, our group has realized that our prior subsystem designs were overcomplicated for the project's demands, so we have made a conscious effort during this deliverable to be much more realistic with our timeframe in terms of the detailed design drawing and the prototyping schedule and test plan. Going forward, we will seek to iterate on our current planned prototyping tests, working to combine certain subsystems together into single tests until all subsystems are tested in unison. For example, in the coming weeks, we will want to make a test which looks for a zone change, and also sends an alert, in the same experiment.