
Visually Impaired Indoor Navigation System Project Management

Project Plan

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Submitted for:

CPTS 484

Phase 2

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Revision History

Name	Date	Reason for Changes
Preliminary Plan	9/6	Document Creation
Preliminary Plan	9/13	Adjusting Formatting
Preliminary Plan	9/14	Adjusting Formatting
Preliminary Plan	9/16	Adding Managerial Project Plans, Overview, and Project Organization
Preliminary Plan	9/17	Adding Project Organization and Technical Process Plans
Phase I Plan	10/15	Phase I Final Touches
Phase II Plan	11/20	Update to Phase II Plan
Phase II Plan	12/10	Phase II Final Revisions

1. Introduction

1.1. Project Overview

Navigating indoor spaces can be quite a daunting task for individuals with visual impairments, especially in unfamiliar places like a new university building. Things like having to traverse new landscapes or even a familiar one with things being moved around create hazards to what is regularly a hassle-free route. With a whopping 2.2 billion people globally with distance vision impairment(WHO, 2023), recognizing this profound need for assistance is a must. This project is to tackle this exact need and create an app designed to empower the blind on their indoor journeys. Leveraging the capabilities of modern smartphones, this project provides an indispensable tool for seamless indoor navigation. Ensuring confidence in the visually impaired for a guide in indoor travel that prioritizes safety and speed to navigate freely.

The primary goal of this app is to develop an intuitive and accessible mobile application tailored for the visually impaired that helps for seamless indoor navigation. To achieve this our objectives include utilizing auditory and tactile feedback, precise indoor positioning technologies, and ensuring a user-friendly and empowering experience. To maintain the best user experience as a base application, There will be easy integrations with phones' existing accessibility features for the blind. On top of that there will be many different types of user configurations and options such as favorite routes, text to speech, offline mode, and haptic feedback. To ensure quality navigation, the application will rely on the phone's Camera and GPS. Utilizing all things from mapping out spaces using coordinate points, to real time location with the GPS. Leveraging all of these phone's capabilities will ensure a successful and empowering navigation application.

Our project will be split into two main milestones for this class, the Phase I and Phase II submission. The Phase I submission will focus mostly on basic requirements engineering, planning, and problem analysis while Phase II continues these processes with more formal methodologies and the creation of a working demo of the concepts involved in the final goal.

1.2. Project Deliverables

Deliverable	Delivery Date	Delivery Method	Comments
Preliminary Plan Submission	9/17/23	Canvas	
Project Phase I Presentation	10/11/23	Live Presentation	

Project Phase I Submission	10/15/23	GitLab	Includes WRS Document, Revised Phase I Plan, Meeting Records, and Powerpoint Slides
Project Phase II Presentation	12/?/23	Live Presentation	Includes Functional Prototype
Project Phase II Submission	12/10/23	GitLab	Includes Final Project Plan, Process Specification, Vision Document, WRS Document, Final Presentation Slides, Functional Prototype

1.3. Evolution of This Document

Name	Date	Reason for Changes	Version
Draft	09/17/23	Initial Draft	1.0.0
Phase I Revision	10/15/23	Revised Sections for Phase I Submission	1.0.1
Phase II Revision	11/20/23	Revised Sections for Phase II Submission	2.0

1.4. References

“Vision Impairment and Blindness.” World Health Organization, World Health Organization, www.who.int/news-room/fact-sheets/detail/blindness-and-visual-impairment. Accessed 16 Sep. 2023.

1.5. Definitions and Acronyms

Coordinate Points - Specific positions in space defined by numerical values, typically used to pinpoint a location or define a path

GPS - global position system

Haptic - Pertaining to the sense of touch. In this case the technology that provides feedback through physical sensation

Tactile - Relating to the sense of touch or the ability to perceive through touch

2. Project Organization

2.1. Process Model

Our team will use an agile process model to develop this project. Our sprint cycles will last two to three weeks so that we balance clear and decisive development goals with the flexibility of changing requirements that the agile model allows for. Our sprints and our implementations will be documented from story creation to implementation. This method also works well for having complete versions ready at milestone checkpoints which is required for working on a project at the undergraduate level.

2.2. Organizational Structure

The members of this team include: Jared Lustig, Nathanael Ostheller, Peter Wang, Stef Pamboukas, and Tanner Tegman. Our Communication Liaison is Peter Wang. All team members will act as Developers. As such, all team members will also have the role of Documentation Author so they can write their own documentation as they implement their features.

2.3. Organizational Boundaries and Interfaces

All communication between the team and the project mentor and sponsors will happen primarily through the Communication Liaison, Peter Wang. All communications will happen via email with the rest of the team attached to any conversations.

Communications internal to the team will happen via Discord. This internal communication will include text and voice communication. We will host our documentation on Google Drive and GitLab.

2.4. Roles and Responsibilities

Since all team members will act as Developers, each will be responsible for authoring their own documentation and will accordingly have the role of Documentation Author as well. Amidst the members of the team, both Jared Lustig and Tanner Tegman will be given the roles of Documentation Reviewer as well. This way, members of the team will be able to communicate their documentation processes within Discord, like a forum. The Documentation Reviewers will then review any documentation implementations before they are finalized.

Project Role	Owner(s)
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Developer	Jared Lustig, Nathanael Ostheller, Peter Wang, Stef Pamboukas, Tanner Tegman
Documentation Author	Jared Lustig, Nathanael Ostheller, Peter Wang, Stef Pamboukas, Tanner Tegman
Documentation Reviewer	Jared Lustig, Tanner Tegman

3. Managerial Process Plans

3.1. Management Objectives and Priorities

The management philosophy for this project is to effectively distribute tasks by breaking the project into small achievable deliverables. These small deliverables can then be distributed to team members with posted assignments and deadlines through the communication channel our team is using. The team members assigned to specific deliverables will be responsible for completing these deliverables, or informing the team that what they are assigned is unattainable with the deadline, in which case a meeting will be called to reevaluate the deliverables and their assignment.

Ongoing progress will be evaluated as the team progresses, and deadlines for large deliverables will match the deadlines set by the client or be adjusted with joint input at later points once both parties have more information. Communication between members of the team will be primarily text based, with check-ins and meetings scheduled as needed. Communications with the client and meteor will be conducted by our liaison and passed along to the team via our communication channels.

3.2. Assumptions, Dependencies, and Constraints

With assumptions the management of the project is based on, we assume that we will have some way to get layouts of locations for mapping. With this, this also allows us to test that our software correctly maps different types of obstacles that would be seen in these actual locations.

The largest dependency of this project in general will be system hardware. The app that is being produced is highly dependent on system hardware such as cameras and speakers, and any of those hardware pieces being non-functional or causing difficulties when trying to interact with it could cause major issues with the implementation of our software.

Our cost for the project is constrained, and the set schedule is rigid for the most part, so the only place we really have flexibility is the scope. The main priority due to this will be schedule, as we really do not have the option of easily adjusting the schedule.

3.3. Risk Management

No.	Risk	Type	Likelihood	Description
1	Failure of System Hardware	Technical	Unlikely - High Potential Impact	The system hardware relied on for the project does not function as expected or does not integrate cleanly with the software we

				design.
2	Failure to Meet Deadlines	Managerial	Unlikely - High Potential Impact	There is a failure to come up with a deliverable on schedule.
3	Lack of Developer Planning or Follow Through	Managerial	Unlikely - High Potential Impact	A developer fails to deliver work of the quality expected or misses established timelines.
4	Product Failure in Field	Technical	Likely - High Potential Impact	The product fails while in use by a visually impaired user, potentially causing them harm or stranding them in an unfamiliar building.
5	Product Error in Field	Technical	Likely - High Potential Impact	The product has an incorrect map or gives incorrect directions while in use causing inconvenience or injury to the user.

3.4. Monitoring and Controlling Mechanisms

For controlling developer error, our team plans to have regular check-ins to ensure that the project remains on schedule, as well as have group review of completed work to ensure that the quality is up to standard and that recorded details are correct.

To prevent failure of the developed system, we hope to conduct testing to the best of our ability and remove any issues that are found while developing the system.

4. Technical Process Plans

4.1. Methods, Tools, and Techniques

The project will use a user-centered design methodology, working with visually impaired users to understand their needs and requirements, and to test and refine the app throughout the development process. The project will also use an agile development methodology, developing the app in short, iterative cycles to allow for early and frequent feedback from users.

The app will be developed using the programming language JavaScript and using React Native for mobile development.

The app will be developed for iOS 16 and later and Android 13 and later. The project will follow the Apple Human Interface Guidelines and Google Material Design Guidelines to ensure that the app is accessible to visually impaired users and consistent with other iOS and Android apps, respectively. The project will also be managed using the PMI PMBOK Guide to ensure that it is completed on time, within budget, and to the required quality standards.

4.2. Software Documentation

This project will mainly focus on using the WRS template along with Technical Specifications and Requirements for documentation. We will create a system architecture design and component level designs as needed when progressing through the creation and implementation of actual software.

4.3. Project Support Functions

Not Applicable.