TANA
Vision
Version 1.1.5

Revision History

Date	Version	Description	Author
14-Nov-23	1.0	Document Created	Alex, Ambrose, Brennan
29-Nov-23	1.1	Update sections 2.3, 3.2, 3.3	Alex, Ambrose, Brennan
3-Dec-23	1.1.1	Added problem statement	Alex
4-Dec-23	1.1.2	Updated sections 3.1, 3.4, 3.5.2, 3.5.3, 3.5.4, 3.5.5, 3.7, 3.8, 4.1, 4.2, 4.3, 4.5, 5.1 - 5.20, 6.1 - 6.4	Alex
5-Dec-23	1.1.3	Updated section 2.1	Alex
8-Dec-23	1.1.4	Updated problem statement	Ambrose
11-Dec-23	1.1.5	Updated title page	Brennan

Table of Contents

1. Introduction

1.1 Purpose
The purpose of this document is to collect, analyze, and define the high level needs and features of the Theater Arts Navigation Application.

1.2 Scope
This Vision Document applies to the Theater Arts Navigation Application (TANA).

1.3 Definitions, Acronyms, and Abbreviations
TANA - Theater Arts Navigation Application

1.4 References
None

2. Positioning

2.1 Business Opportunity

The Cal Poly Humboldt campus has a reputation of being very inaccessible for blind and disabled students, which prevents a large base of students from attending and thus gaining funding for the school. By installing the TANAV bluetooth system and providing this service to disabled students, Cal Poly Humboldt can increase its government funding and offset the cost of this system, while simultaneously improving its reputation as a University.

2.2 Problem Statement

The problem of	Blindness or impaired vision affecting students ability to navigate to the classroom safely and effectively
affects	Blind or visually impaired Cal Poly Humboldt students
the impact of which is	Inability to safely navigate campus buildings in a timely manner
a successful solution would be	A simple navigation system which could easily be used by blind students. This solution would have internal maps of campus buildings to route the student from their current position to their destination, have a voice-controlled interface to allow hands-free operation, and detect obstacles in the student's path to avoid slowdowns and injury.

2.3 Product Position Statement

For	blind students
Who	cannot navigate the Theater Arts building on campus
The Theater Arts Navigation Application	is an accessibility application
That	provides directions within the TA building to a blind student's class from their location
Unlike	NavCampus and CPH Navi
Our Product	uses bluetooth beacons to provide accurate location data.

3. Stakeholder and User Descriptions

3.1 Market Demographics

The target demographic for this app is blind or visually impaired people who need help navigating the Cal Poly Humboldt campus, specifically students who have the priority of making it to class quickly and on time. While this demographic may be small compared to the overall population of students at Cal Poly Humboldt, it would consistently bring in new members due to the nature of the university.

3.2 Stakeholder Summary

Name	Description	Responsibility
Engineers	Engineers represent the team that designs and develops the TA Nav App.	Design requirements Create documentation and process/product models Develop TANA Provide user manual Deliver presentation
Caretakers	Caretakers represent the people who care for blind students that use TANA.	Understand the individual needs of users Perform first time setup Understand how to use TANA Respond to emergencies
Campus Police	Campus police represent officers who work on campus to respond to student and faculty emergencies.	Respond to emergencies Provide assistance to TANA users
Users	Users of the TA Nav App	Understand how to use TANA Inform caretakers of their intended use of TANA Monitor the project's progress
Campus Disability Resource Center	The CDRC is the University's main office to provide support to disabled students	Approve TANA infrastructure Provide accommodations to students with disabilities

3.3 User Summary

Name	Description	Responsibility	Stakeholder
Blind Students	Students who use the TANA to assist them with navigation	Answer questionnaire	Users
Caretaker	People who care for Blind Students	Provide domain knowledge	Caretakers

3.4 User Environment

A typical interaction with the app would occur shortly before their classes begin, and the user would spend as little time as possible inputting information about their destination, at most 15 seconds. The app would then calculate the most efficient path for them to take in order to reach their destination, and guide them using the built in bluetooth capabilities of their device.

The overall usage of the app would experience peaks shortly before every hour, when classes would begin, and the schedule of each individual student would be tracked in order to suggest frequent destinations when the user is expected to have an upcoming class.

Users will be expected to have a smartphone device with bluetooth technology for navigation, a camera for obstacle detection and avoidance, a microphone and speakers for voice control and detection, and a cane for backup obstacle detection and safety.
Caretakers are expected to have read the user manual and have an understanding of how to set up the app for a blind student.

3.5 Stakeholder Profiles

3.5.1 Engineers

Representative	Alex Georgopoulos
Description	The team that designs and develops the app.
Type	Student
Responsibilities	Design requirements Create documentation and process/product models Develop TANA Provide user manual Deliver presentation
Success Criteria	Getting at least a C-
Involvement	Designer, Implementer, Code Reviewer, Test Designer
Deliverables	Vision Doc, WRS, Questionnaire, Process Specification, Project Management Plan, Presentation, UML (Class, Use Case, Sequence), PIG, SIG
Comments / Issues	None

3.5.2 Caretakers

Representative	None
Description	Caretakers are people who care for blind students that use TANA.
Type	Expert
Responsibilities	Understand the individual needs of users Read user manual Perform first time setup Respond to emergencies
Success Criteria	Safety is provided for the user
Involvement	Any Role
Deliverables	None
Comments / Issues	None

3.5.3 Campus Police

Representative	None
Description	Police officers who work on the Cal Poly Humboldt campus
Type	Public Official
Responsibilities	Respond to emergencies Provide assistance to TANA users
Success Criteria	In the event of an emergency, the user is cared for and brought to a safe location.
Involvement	Any Role
Deliverables	None
Comments / Issues	Campus Police are not expected to have a direct involvement in the development of the application, and would simply respond to emergencies as detected by the app.

3.5.4 Users

Representative	None
Description	Users are primarily blind students who would use the TA Nav App to assist them in reaching their classes on time.
Type	Casual User
Responsibilities	Answer questionnaire Read user manual
Success Criteria	Safely reach their destination on time.
Involvement	Tester
Deliverables	Questionnaire
Comments / Issues	None

3.5.5 Campus Disability Resource Center

Representative	Cris Koczera
Description	The CDRC is an office of Cal Poly Humboldt with the mission to “provide service, support, and resources for students with disabilities to maximize educational opportunities… [and] strive to create an inclusive and accessible environment at Humboldt by educating the campus community on disability-related issues.”
Type	Expert
Responsibilities	Approve app for use on campus Approve implementation of bluetooth infrastructure Provide development input to maximize benefit to disabled users
Success Criteria	The app is deployed throughout the campus and thus the campus becomes more accessible to the disabled population.
Involvement	Deployment Manager, Tester
Deliverables	None
Comments / Issues	None

3.6 User Profiles

See previous section

3.7 Key Stakeholder or User Needs

Need	Priority	Concerns	Current Solution	Proposed Solutions
Specify destination	High	Scalability from building to campus level	Select destination via text entry box	Use voice commands to specify destination
Navigate to destination	High	Accuracy within building	Use bluetooth beacons for navigation	Calculate paths in terms of steps, then count user steps
Specify a schedule	Medium	None	Have the user input their class schedule	Use AI to automatically detect patterns between time and destination
Avoid obstacles	High	Reliability, which in the worst case could lead to a user being injured due to a reliance on the app's obstacle detection	Use the phone's camera and an AI detection algorithm to determine if there are any obstacles directly ahead of the user	Have the user use their cane for obstacle detection
Customize application settings	Low	None	Allow the user to customize speech interval, volume, and language	Allow the caretaker of the user to customize the UI of the app to best suit the needs of the individual user
Emergency contact	High	Requirement of an Alarm Permit to make police calls	Allow the user to override a call to the police and instead have the app call their caretaker	Only call the specified emergency contact

3.8 Alternatives and Competition

- 3.8.1 Nav Campus
- 3.8.2 CPH Navi
- 3.8.3 Using traditional navigation with a cane
- 3.8.4 Be My Eyes
- 3.8.5 BlindSquare
- 3.8.6 Evelity

4. Product Overview

4.1 Product Perspective

The product will be a standalone app, but require bluetooth to interface with the navigation beacons and a phone service in order to make emergency calls.

4.2 Summary of Capabilities

Customer Benefit	Supporting Features
Efficient navigation for blind students	Bluetooth navigation, built-in map of the Theater Arts building
Obstacle avoidance for blind students	AI detection of obstacles in view of camera
Easy scheduling / reminders of classes	Destination prediction / scheduling feature
Assistance in the event of an emergency	Emergency mode
Easy to use / accessible interface	Customizable voice / language settings

4.3 Assumptions and Dependencies

4.3.1 The user will have a caretaker to set up the application for their needs.
4.3.2 The user will specify their caretaker's contact information
4.3.3 The user will have a cane as a backup for detecting obstacles
4.3.4 The user's phone will have at least the following features:
   a) Bluetooth
   b) Camera
   c) Microphone
4.3.5 The CDRC will approve the installation of bluetooth beacons within covered buildings

4.4 Cost and Pricing

TBD

4.5 Licensing and Installation

The bluetooth beacons will need to be approved by the CDRC and have professional installation. The business operating the app will also need to obtain an Alarm permit to make automated phone calls to emergency services.

5. Product Features

5.1 Start system
5.2 Shutdown system
5.3 Change voice volume
5.4 Change voice speed
5.5 Change language
5.6 Designate emergency contact
5.7 Call emergency contact
5.8 Connect to bluetooth beacon
5.9 Calculate route
5.10 Identify hazards
5.11 Give directions
5.12 Cancel navigation
5.13 Create schedule
5.14 Update schedule
5.15 Delete schedule
5.16 Suggest next route
5.17 Initiate emergency mode
5.18 Cancel emergency mode
5.19 Activate alarm
5.20 Deactivate alarm

6. Constraints

6.1 Safety

The system must lead students to their destination while avoiding all obstacles, static or dynamic, that they may encounter
The system must contact an emergency contact or services in the event of a major injury or fall
The system must avoid routes that may be dangerous, such as routes with ongoing construction

6.2 Usability

The system must be accessible to blind students.
The system must be usable by caretakers to perform initial setup

6.3 Availability

The system must be available for use 24 hours per day, 7 days per week

6.4 Responsiveness

The system must inform the user of obstacles within 5 seconds of detection
The system must quickly respond to an emergency, within 15 seconds of a fall