**1.1 Purpose**

The purpose of this document is to give an in depth description of the requirements for a system that will provide individuals with sight-handicaps the ability to navigate around a mapped area for the first time without the assistance of a guide. This paper intends to outline the functional and non-functional requirements for the software and hardware that are necessary in order to implement this application. The basic fundamental requirements and constraints will be provided, along with explanations of how the system is supposed to operate.

**1.2 Scope**

This software product will provide a mobile application for sight-handicapped people so that they will be able to navigate around a new area independently. The interface for this application will be able to function completely relying on non-visual methods. The user will be able to operate the system using only voice-commands and will be able to receive instruction via audio output.

The software will be able to direct an individual to a destination by offering directions that a sight-handicapped person will be able to easily follow. The system will warn the user of any impending obstacles on their route, such as construction or stairs, and will safely guide the person around or through these dangerous areas. The user will also be able to set many preferences on this application according to their level of comfort with traveling alone, and their preferred method of travel.

**1.3 Definitions, Acronyms, and Abbreviations.**

Ground Wire - Laid out in a map, used to give off a precise signal that the hardware of the system will be able to pick up in order to allow the user to know when they are on the right track.

Receiver - A piece of hardware that will be able to pick up a signal given off by a wire placed in the ground with accuracy. Designed to be held close to the ground, clipped on either a shoe, cane, or ankle.

Visually impaired - Any person who feels that they do not have full range of vision necessary for daily function.

Command - Any verbal instruction given to the system to request action.

Direction - An audio instruction output by the system to provide instructions for how the user should reach their destination.

SDRC - Student Disability Resource Center at Florida State University

Cane - The standard cane with which a person with visual handicaps may navigate.

Guide - Any person that a visually impaired individual uses to help them find their way around.

**1.4 References**

* Software Requirements Specification (SRS) Template. (2003, July 10). Retrieved November 27, 2014, from <http://www.ecs.csun.edu/~rlingard/comp480/RequirementsDocument.doc>
* (R. Hamilton, personal communication, November 4, 2014).
* (J. Connolly, personal communication, November 14, 2014).

**2. The Overall Description**

Because of the nature of blindness this application must be concise, clear, and easy to use. The purpose of this application is to make life easier for those individuals who have a sight handicap so that they may be more independent in their daily lives. With a map laid out over a confined space, such as a campus or a theme park, this application would allow users to find their way around without having to be able to see. The interface of this application will be completely audio-operated.

**2.1 Product Perspective**

This product will be combining many different components of existing applications and systems that will be useful to the functionality. The current voice-recognition software that is available on many mobile devices is very efficient, user-friendly and accurate. This voice-recognition software will be implemented to be able to understand a menu of commands given for the program, such as the question “where am I?” or the instruction “take me to the Love building”.

This product will also use features that are available in current mobile applications that are used for directions and maps, such as google maps which is available on the Iphone. While the GPS that is currently available on this product is not accurate enough for the software’s use indoors, it can still be used to assist in outside direction. Another feature of this map software is the calculation of time that it will take to walk to a certain location. This will also be included in our product so that the user will be able to plan their journey accordingly.

This system will be similar to other applications that have been used in the past for directions, but it will be specifically built with the needs of the sight-handicapped in mind. For example, the user interface will first be built to be able to be completely operated through voice commands. This way the user will not have to have any visual capacity in order to be able to operate the system. Also, the directions that will be given to the user will be made with the consideration that the person receiving them will not be able to see their surroundings. Instead of being given directions such as “Turn left on Atkamire Dr” the system will offer directions like “Walk north fifty steps, then turn east”. The user will be able to modify these commands based on their preferences and their level of comfort with traveling alone. For example, some visually-impaired people prefer to use measurements of feet rather than steps, or do not follow north, south, east, west directions. The user will be able to select these options so that they may be able to use this application with ease.

They will also be able to make notes to themselves at certain places on their route that they can be reminded of later. These notes will help with personal preferences for finding their way. For example, if this individual user likes to use their other senses such as smell, or hearing, when they are traveling to find their way then they can leave a note for themselves such as “when you smell coffee turn left”. Finally, perhaps the biggest differentiation from this product when compared to other systems that provide directions is that this application will give warnings of upcoming obstacles to the user. If there are stairs, construction, or any other possible obstacles that could be hazardous to a person with a sight handicap the system will provide warning in advance and will instruct the user of the best way to avoid the obstacle. For example, if there are stairs on the route, the system will give an instruction such as “in fifty feet there will be twelve stairs down”, then when they arrive at the stairs “arriving at stairs, there are twelve stairs going down”. This way the user will be prepared for the upcoming difference in route and will be able to act accordingly.

**2.1.2 Interfaces**

The interface for this system will be for the most part audio and tactile based. This system will be built in such a way that it will be easy for a person with a visual disability to operate. There will be visual components included in the interface so that the system will be versatile enough to be used by people who have 20/20 vision, but they will be limited and the system will not rely on them. The user will be able to open and operate the system entirely using voice commands. The system will give audio instructions that the user will be able to hear either other the mobile phone’s speakers or headphones, depending on the user’s preference.

**2.1.3 Hardware Interfaces**

We will be designing this system to operate on smart phones such as android or apple. There will be a set of wires embedded in the ground to create a map. A receiver that will be connected to the mobile phone via bluetooth will be able to pick up a signal from these wires in order to ensure that the user is following along the path correctly. This receiver will notify the user if they are straying off of the path that the wires lay out.

**2.1.4 Software Interfaces**

We will be using and developing the 4.x series of android OS and Apple IOS 8.1.1 x series for our application.

**2.2 Product Functions**

This system will be able to receive audio commands from the user and provide clear, direct instructions that will guide a person with a visual-impairment around an area that has been mapped with wires. This product will have hardware that will be able to detect these wires that have been laid into the ground in this area in order to provide the most accurate possible route for a person who is not able to see. The user will be able to use this application to safely travel around this area independently. The product will provide warnings of possible upcoming hazards such as stairs, construction, or roads. Ideally the system will be able to warn the user if a certain route will have more pedestrian traffic at a given time if the user wishes to either avoid a lot of people, or be in the presence of a lot of people on a certain route. Along this same idea this product will allow the user to be able to enter their preferences for what kind of directions they wish to be given, and will allow them to bookmark their favorite routes and leave notes for themselves to help them find their way.

**2.3 User Characteristics**

This system will be developed with the idea in mind that the user will have a sight handicap of some form, however this will not be necessary to use this product and a person with complete vision capabilities will also use this system. It is expected that this user will be familiar with mobile phones, especially smart phones, and will have used applications on these phones in the past. It is also assumed that the user will have had experience receiving verbal directions from a guide and will be able to understand the directions that are given by the system. It is expected that the user understands English and is able to hear clearly. The user is also assumed to have no other physical limitations such as being confined to a wheelchair, they should be able to move and walk about independently. A User is any person who accesses this application and uses it to navigate around the campus. While the original intention of the program is to be employed by individuals who have some visual impairment, the application will be available to be easily used by anyone who wishes to. In addition this application was invented with the idea in mind that it would be used by new students who are looking to find their way around the university campus for the first time, but this will not limit the possible identity of the user. The application will be able to assist a user whether they have attended Florida State for many years, or if it is their first day on campus. It will also be able to easily used by someone who is not a student and is even just visiting the university for a period of time. An example of this could be a sporting fan who has come to the campus to watch a football game. In short, while the majority of users are anticipated to be new, visually impaired students, the identity of a user is not limited to this definition.

Create Context Diagram here

**3. System Features**

**3.1 Ask for Directions**

**3.1.1 Description and Priority**

A user of the system may ask for directions to any location that has been recorded in the the campus map on the system. The user will be able to use voice commands to ask the application to direct them to any building on campus. The user will also be able to make decisions regarding their preferred route, such as whether they want to walk in areas of high pedestrian traffic. If at any point the user feels as though they have lost their way or they need confirmation that they are headed in the correct direction, they can ask the system for verification of their route. It will be possible for the user to save notes to themselves along the route to help them find their way at a later date, and they will be able to save certain buildings and routes as their ‘favorites’. If the user changes their mind about the route or wishes to cancel the navigation altogether they will also be able to tell the system to perform that function.

**3.1.2 Stimulus/Response Sequences**

Stimulus: User command “Take me to x building”

Response: System searches for building in directory and begins to give auditory directions to the location for the user.

Stimulus: User command “Where am I?”

Response: System uses nearby RFIDS and GPS signals to tell the user about nearby buildings and landmarks, and notes they have left themselves in the past if applicable, to help them figure out their current location.

Stimulus: User command “Shortest route option”

Response: System searches for shortest route to the building that has already been selected.

Stimulus: User command “Least/most pedestrian traffic”

Response: System checks the system for which route will have the least/most pedestrian traffic at that certain time of day.

Stimulus: User command “Save note here”

Response: System will now record voice memo from the user and save it at that location on the map. When the user walks past this area on the map again at a later time the system will remind the user of the note that they have previously left for themselves in that location.

Stimulus: User command “Save x route as favorite”

Response: System will save this building as one of the user’s favorites and assign a variable to it so that the user can easily access that same route again at a later time without having to re-enter the same list of preferences each time.

Stimulus: User command “Change route to x building”

Response: System will cancel current route and start a new one.

Stimulus: User command “Cancel route”

Response: System will cancel the current route.