

## **Project Title: GuideBlind**

The absence of visual channel (sight) hinders the ability to navigate spaces independently, safely and efficiently. Navigation is a product of motor, sensory and cognitive skills where mental mapping of spaces is imperative. Most of the information required for this mental mapping is gathered through the visual channel (Lynch, 1960) and thus the blind face great difficulties in (Lahav, 2003):

1. Generating efficient mental maps of spaces and therefore
2. Navigating efficiently within these spaces.

These difficulties render blind people dependent on others for continuous aid. However with advent of technology, we provide a plausible solution to the problem of navigation. Thus our objectives are as follows:

1. Develop a user-friendly interface for the blind to assist them navigate through indoor spaces.
2. Further equip them with their surrounding information, which encompasses static as well as dynamic external objects – knowledge about entrances, exits, washrooms, stairs, elevators, and different rooms (static) and near-by objects such as tables, dustbins, and other objects which are subject to changes.
3. Provide the optimal routes for their travel.
4. The model is proposed for Davis Hall – but would have generic architecture and thus scalable and applicable to other architectural structures.

Our target group are the adults with visual impairment who are required to navigate. Children with loss of sight are vulnerable and are guided by people and thus are not our focus. The project would prove as a benefactor for the visually challenged as it would instill independence and confidence to encourage their creativity and help them live their life to the fullest.

The problem requires understanding cognition of blind and research on blind people's mobility in known and unknown spaces indicates that support for the acquisition of spatial mapping and orientation skills should be supplied at two main levels: perceptual and conceptual (Lahav, 2003).

1. Perceptual information refers to the deficiency in visual channel which is compensated with the use of other senses (touch and hearing). Moreover haptic information encompasses touch as well as kinesthetic information. This information is commonly supplied by the cane, palms and fingers. Auditory channel provides information about events, presence of other objects.
2. Conceptual information focuses on providing strategies for generation of navigation paths. The two strategies listed in the literature are Route and Map strategies. Research shows that blind people use mainly rout strategies while recognizing and navigating new spaces (Fletcher, 1980). Although map strategies are holistic in nature, comprising multiple perspectives of the target space (Fletcher, 1980; Kitchin & Jacobson, 1997).

Our focus is to provide perceptual as well as conceptual information to the target group, where we have listed the requirements as follows:

1. Conceptual information requires locating the person, information about the surrounding environment – which includes paths for the desired destinations.
2. Perceptual information to enable a smooth and obstacle free route which includes tables, chairs, people and other dynamic objects.
3. Interface for providing information to the blind and obtaining their feedback.

As a plausible solution for the problem, we propose a design of a smart building, which provides suitable assistance to the visually impaired. This would require the building to communicate with the blind through a suitable interface, such as smart phone. Moreover for dynamic objects, we propose a smart cane which could be used to locate the nearby objects and aid in obstacle detection. Numerous designs have been proposed which involve the use of Global Positioning systems, but our emphasis is on employing the networking standards which play a crucial role in legitimizing and providing a foundation for broad use of networking technologies. Utilizing industry standards such as high range proximity sensors and wireless network standards along with a handheld device with features of accessibility are the areas of our research for the solutions.

Our target is to optimally use the prevalent standards and reduce the cost of production and maintenance of the solution. Our goal is to create a safe and secure environment for the user with due consideration to the following:

1. A proper schematic design of the building for safe and reliable transit.
2. A robust WLAN, so that the user is always connected to the network.
3. Providing the instructions in real time and which are easily comprehended by the target group.

Developing a simple solution is an ardent task and the major challenges for the problem are:

1. Accurately tracking the user within the building,
2. Finding the accurate and shortest path to the user.
3. Ensure safety of the user from dynamic objects.

Our emphasis is on devising a simple and safe solution for the visually impaired and we hope to achieve it in the course of our project.

References:

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### **Team Members -**

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