

# Poster: Context Aware Route Determination Model for Mobile Indoor Navigation Systems for Vision Impaired People

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## ABSTRACT

Way finding abilities of vision impaired (VI) people cannot be expected to be as same as that of people who use the vision as the primary sense so the route determination methods in travel aids for VI people needs to adopted accordingly. This study proposes an indoor route determination model which considers the built environment and user context as the priority factors instead of the distance. It will identify how the elements of a built environment affect the determination of a suitable path which maximizes safety and convenience in an unfamiliar environment and how this path does varies with the individual characteristics of VI people.

## Keywords

Vision Impairment, Indoor Navigation, Path Planning

## 1. INTRODUCTION

With limited capabilities to negotiate with the environment via visual clues, way finding is a significant challenge faced by VI people. They require more support than others to maintaining their orientation and loss of orientation is more prominent in indoor than the outdoor areas [1]. While the orientation and mobility (O & M) training via established guidelines provide VI people the required skills to negotiate with the environment effectively [2], common mobile navigation aids fails to consider them. Further, the majority of VI people may have some form of limited vision remaining while some may be totally blind and use of white cane or guide dogs is also possible so generic solution may be difficult to find. Lack of consideration for user's perspective and how they move around an unknown environment [3][4] and failure to consider the context [4] are identified as two strong factors which limit the practical implementation of navigation tools for VI people. Accordingly, this research proposes an indoor path planning model which considers the convenience and the safety of VI people as the priority factors.

## 2. OUR APPROACH

We assume that the path suitable for indoor navigation of VI people would be better determined considering the individual's capability to negotiate with the indoor environment (user context) and the support and restrictions related to building structures and features for VI people for navigation (building environment context) than only the distance. If the relative benefits, costs and

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risks associated with building structures which contribute to navigation of VI people can be identified based on O&M principles, a relative ranking for each building structure can be derived. A route determination can be derived based on the ranking identified above. The path would be further adjusted according to the users' capabilities.

Built environment context can be elaborated in the three sub domains, building structures (Eg: Corridors), physical environment features ( Eg: aisles in a supermarket) and ambient environment (Eg: Lighting). At this stage, six parameters, visual access, differentiation, layout, lightning, non-visual access and presence of landmarks are identified as factors affecting navigation support of a building structure. Main challenge of the research is deriving the influence of the build environment and the different user capabilities for selecting suitable paths. Two sample studies are being carried out in Sri Lanka and Australia regarding this.

A model which considers the multi-criteria ranking system discussed above and then matches the ranking with the individual characteristics to determine an optimum path will be derived. Mobile navigation tools can use the model as a route determination engine.

## 3. SIGNIFICANCE

This research would provide a ranking system for building structures for their safety and convenience related to navigation of VI people, which is not in exists yet. The planned path would derives based on O & M principles and thereby would represent needs of VI people in a better way. Finally, the route determination model would be adjustable based on characteristics of individual capabilities so would be more convenient for individual users.

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