

A cellphone based indoor wayfinding system for the visually challenged



Roshni is a portable and self-contained system fabricated using the commercially available infra-red sensor-suite. The system consists of a user module and a network of wall-mounted units spaced at distanced intervals. User module is a waist-worn device comprising of receiver for detecting user movement and a user interface in the form of a mobile phone application. Each wall-mounted unit emits a unique identification tag that is associated with a location on the digital map of the building. The detailed map of the interior of the building can either be downloaded from the net or can be downloaded on the mobile phone at the entry to the building. By pressing keys on his/her mobile unit, the user can obtain directions to any desired location on the map from his/her current position. As the user moves in the building, the waist-worn module updates the position of the user. The navigation information is conveyed to the user acoustically using the text-to-speech engine of the phone application. Roshni has been developed to be applicable and available to users in developing countries. The underlying technology has a pending patent and the device is in final stages of development, user demonstration and feedback.





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Need

- Constraints of independent mobility and navigation in an unfamiliar indoor environment is the primary challenge for visually impaired persons
- 87% of visually impaired persons live in the developing countries (WHO, 2009) and hence can't afford expensive technology. Therefore, low cost solution is required.
- Difficulty in navigation especially in GPS denied areas like indoor environment.

Solution

- Roshni is an indoor navigation system based on Infrared (IR) Technology which uses auditory outputs for providing directions to the user.
- The technology involved in Roshni uses mobile application for interaction with user and easily integrates with existing building infrastructure
- Roshni is affordable and convenient to use and is targeted for the users in developing countries with little or no access to affordable assistive technology products.

Current Status

- Based on iterative user testing and feedback, improved Roshni modules have been developed, prototyped and tested.
- System has been installed in a public museum – National Science Center, New Delhi and also in IIT Delhi and is undergoing user evaluation.
- Efforts underway for permanent deployment in several buildings for longer term use.



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User Interaction

User study, with consistent help from Mr. Dipendra Manocha from Saksham Trust, New Delhi and staff and students at National Assosiation for the Blind (NAB), Delhi has been an integral part of the development process. Direct user study at every stage including problem identification, design feedback and prototype validation, has led to the development of an improved Roshni waist module with minimized dimension and improved interface design.

About Us

Dhruv Jain is the core inventor of Roshni Indoor Navigation Technology. He has developed Roshni and has been leading the prototyping of the device, while Akhil Jain and Akhila Komarika have been consistently involved in user-testing activities of the project.

Prof. M. Balakrishnan, Prof. P. V. M. Rao and Dr. Rohan Paul

are mentors and principal investigators at Indian Institute of Technology (IIT) Delhi and are leading the Assistive Technology Group at the institute. They are guiding and supervising the developmental process. Mr. Madan Lal Verma and Mr. S.D. Sharma are the Lab Incharge authorities consistently helping in developing and retrofitting user and wall modules of Roshni. Supriya Das and Satguru Rathi constitute the current Research Staff of Roshni Team

Recognition

- Emerged as winners in Eureka Paper presentation, ٠ Techkriti IIT Kanpur's Technical Festival 2013.
- Selected for Incubation Award in India Innovation Inititative (i3 2013)
- Received Best Paper Award at 13th International Conference on "Mobility and Transport for Elderly and Disabled People" (TRANSED 2012).
- Awarded Best Poster, in the Poster Presentation at 4th IBM Collaberative Academia Research Exchange (I-CARE 2012) held in Indian Institute of Sciences, Bangalore, India.
- Received Media Recognition in Deccan Herald, Indian Express, Mathrubhumi Education and Hindustan Times.

Future Challenges

- Large scale testing with visually impaired individuals under real-life settings.
- Looking for funding partners for translational research towards product realization.

For more information visit: www.roshni.info









ROSHINI: INDOOR NAVIGATION SYSTEM Wall mounted sensors, a smart phone and an infra red receiver can make it much easier for the visually impaired to navigate a building. Students at IIT Delhi have

created a navigation system based on the Global Positioning System that can work well if

System that can work wen in floor plans of building are available. "The buildings will have infrared-enabled wall-mounted units at a distance of every seven metres. The visually impaired person will wear an infrared receiver on his/her waist and can obtain directions by pres ing keys on their smart phone. aid Dhruv Jain, co-creator



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