

Passive RFID Indoor Localisation to Aid the Blind

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ABSTRACT

The ability to navigate effectively in an indoor environment is one that is important to everyone. Blind and Partially Sighted (BPS) people have the additional limitation of not being able to use visual cues such as signs and landmarks to aid their navigation. Tests were conducted into the use of RFID technology for assisting the BPS with indoor positioning and object recognition.

The Nottingham Geospatial Building at the University of Nottingham serves as a test-bed for many dynamic positioning research. Along with its unique roof based test-track facility, the Geodesy Lab and the large open-plan office area are fitted with passive HF (13.56 MHz) tags under the carpet. The tags are located at a 30cm interval spacing in the Geodesy Lab while in the open-plan area, around the outer perimeter the tags are generally located at 30cm intervals and on the inside at 60cm intervals. The tags are 50mm x 80mm in size and have 2K bits of memory.

A survey was conducted where the location, ID and Received Signal Strength Indicator of the tags were recorded. A novel database, and routing algorithm was developed which guided the user (wearing a lightweight Wi-Fi enabled RFID reader with foot-mounted antenna) using voice commands. The voice commands were activated by linking the navigation program with the eSpeak text-to-speech voice synthesis library. In addition, the system was tested for use in identifying objects such as Fire Exits and office furniture. The system was able to guide the user effectively from one location to the next with high accuracy (15 - 30cm). However it had the limitation of requiring a short range – in the order of 20cm between the reader's antenna and the tag. The strengths and limitations of such a system and its application to navigating the blind were explored.

KEYWORDS: Indoor, Blind, Navigation, RFID and Passive