Pedestrian Wayfinding using Mobile Devices:

an investigation of spatial information transactions and interaction

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Abstract

Wayfinding is a fundamental spatial activity that people experience in their daily lives. Human wayfinding is often assisted by external aids. Recent developments in mobile information and telecommunication technologies are stimulating demand for services that can deliver, to individuals on the move, location-specific information to assist wayfinding. Such services are known as Location-Based Services (LBS). This research aims to investigate the interaction and information transactions between individuals, urban environments and mobile technologies for individuals engaged in pedestrian wayfinding. A novel conceptual model is proposed which explicitly focuses on these interactions and transactions. One of the challenges is to objectively record the overt information transactions and behavioural responses when individuals use mobile technologies for wayfinding in urban settings. Therefore, in this research, an immersive virtual reality approach has been proposed and implemented for capturing data in real-time in a dynamic environment. This test environment integrates three main components: urban VR models that allow individuals to 'walk around' at street level, a mobile device as information source which simulates LBS applications, and software for recording participant actions and reactions within the test environment. Multi-source data were collected regarding movement tracking, information accessed through the mobile device and observations of participants' actions using a combination of automated and semi-automated methods. This has provided a rich data source detailing individual overt behaviour in space and time for pedestrian wayfinding tasks. Contrasting urban models were constructed having their own distinctive layouts and mix of architectures. A series of detailed empirical wayfinding experiments have been carried out using this controlled setting and research design. Detailed analyses, both quantitative and qualitative, are performed on the integrated data sets. One key focus has been on establishing patterns of spatial information usage preferences in terms of types of information, frequency of access, and time spent in consulting the information. A classification of spatial information usage groups has been developed. Characteristics of these groups in terms of their spatial abilities and information usage during wayfinding are explored. It has also been possible to confirm certain effects of urban layout on behaviour and has highlighted key spatial loci for information demand and decision making. An integrated picture of participant behaviour and spatial information preferences is thus constructed through the analyses.

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