2012 International Conference on Indoor Positioning and Indoor Navigation, 13-15th November 2012

Route Calculation for Indoor Navigation

Jacek Marciniak
Samsung Electronics Poland R&D Center
Warsaw, Poland
j.marciniak@samsung.com

Miłosz Gnat, Dariusz Gotlib
Faculty of Geodesy and Cartography
Warsaw University of Technology
Warsaw, Poland
m.gnat@gik.pw.edu.pl, d.gotlib@gik.pw.edu.pl

ABSTRACT

The majority of current research on Indoor Navigation systems is focused on positioning engines. Many solutions are intended for navigating users to target destinations, which require further studies on route calculation algorithms and efficient direction display during the navigation.
The route calculation process uses a routing graph representing all the possible positions of a user and their mutual connections. In the case of a building in which possible pathways are clearly defined (eg narrow corridors), the problem of graph representation is relatively simple, even if we take into consideration multi-storey aspects. Open spaces, where people's movement is more chaotic and the grid of probable positions of a tracked user is denser, create new challenges for the design of the graph. The problem becomes even more complex when aspects of accessibility are taken into consideration. Different types of users as well as possible events (including emergency) may affect not only the attributes of the graph's nodes and edges but also its topology.
The choice of the approach for modelling a routing graph plays an important role in the cartographical presentation of a calculated route as well as in turn-by-turn navigation.
The concept of navigation to the shelf is an extension of door-to-door navigation in car systems that implement the idea of seamless and ubiquitous service. The design of indoor navigation systems may utilize the algorithms used for outdoors, however, it must also address specific problems related to psychological aspects of perception of the interior. A new approach must be applied to describe the route and generate graphical and voice directions played during navigation. The user expects a different information message indoors which would reflect the specific conditions of navigation related to many elements such as freedom of movement, accuracy of the positioning system or the user's habits.

KEYWORDS: routing, graph, cartography, navigation, directions