3D Pedestrian Navigation Reality View

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Navigation systems are part of our daily life. Some systems replace the front seat passenger and, apart from route guidance, entertain the user with television and Internet radio. In addition, intelligent maps learn in every journey and can recognize traffic jams just in time. Others generate street tracks realistically and read road signs by means of cameras. All these innovations have a common characteristic: They support exclusively the navigation in vehicles. In the past, the focus of research was placed particularly on vehicle navigation systems. Recently, navigation systems for pedestrians continue the trend.

Unlike with vehicles, the pedestrian movement structure is much more detailed. In addition to streets, paths and other areas such as pelican crossings, parks and squares should be included in the route guidance. Hence, the basic data structure must be newly generated and should be customized to the target group. The advanced object type catalogue includes not only traffic objects such as pedestrian light signals but also lifts and entrances to specific buildings.

Despite a rise in higher resolution the small screen size is still the main restriction in the representation possibilities of cartographic information on mobile devices. As far as map graphic art is concerned this disadvantage becomes apparent with the interpretation by the map user. The relation between the depicted scene and the actual whereabout in particular is what many users find most difficult to establish. Furthermore, the transmission of the information is less intuitive for the navigation and is therefore not adapted to the user.

Hence, many of the devices that are currently on the market for pedestrians are mobile vehicle navigation system, however the description mobile simply refers to the operation period and the weight. The form of representation and, therefore, the navigation is and remains the same as for vehicles. As pedestrians perceive real situations differently, they need a more adequate form of representation of the navigation instruction. This approach is based on combining picture segments and vector instructions and therefore connects topological precision with temporary actuality.

Using an optical camera it is possible to show a live stream of the selected scene directly on the display. Superimposing this real time representation with selected distance guidance from a virtual perspective model results in an advanced reality. With the Reality View of a combination of image data rich in detail and farsighted vector information the user can recognize the currently surroundings and understand the optimal route instructions at the same time.

In addition to a mobile final device with graphic display other components are required for the realization of this method. A conventional GPS receiver with a positioning accuracy of 5-10m is employed. Since this accuracy is not sufficient for orientation, it is combined with a 2-axis compass. Both the positioning and inclination of the device A standing rotation can therefore be registered by the device and be indicated in the camera scene. Finally, camera mode is required for real world representation. An artificial horizon as used in many digital cameras to create panoramic images allows virtual horizon display. The virtual and the real horizon have to match to achieve accurate representation.

This is facilitated by a colored half-transparent selection which also guarantees the congruence of the two horizons.

Contrary to map-based representation forms of systems to date, a real time picture of the real situation (Reality View) takes the centre of this concept. By means of camera sensors inside a mobile device it should be possible to transfer the user's field of vision into the display of the device and therefore to allow for maximum association of the environment. The advantage of this method is that the user has the possibility to choose independently which section he would like to have displayed. Similar to video recordings with cameras, every movement is shown on the display simultaneously. Therefore it is possible to obtain a frontal & direct view on certain decisive points such as crossroads, lifts or entrances.

The information required for the navigation is separated and projected via the digital image. With the help of Reality View the user's detailed view field is linked with farsighted route information and is reproduced as a combination of both as an enlarged reality (ER).