2012 IEEE/ACIS 11th International Conference on Computer and Information Science

Wearable Navigation System for the Visually Impaired and Blind People

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***Abstract*- A wearable navigation system for visually impaired and blind people in unknown indoor and outdoor environments is presented. This system will map and track the position of the pedestrian during the exploration of the unknown environment. In order to build this system the well known Simultaneous Localization and Mapping (SLAM) from mobile robotics will be implemented. Once a map is created the user can be guided efficiently by a route selecting method. The user will be equipped with a short range laser, an inertial measurement unit (IMU), a wearable computer for data processing and an audio bone headphones. This system does not intent to replace the use of the white cane. However, the purpose is to gather contextual information to aid the user in navigating with the white cane.**

***Keywords*—Wearable computing; Pedestrian Navigation; Visually Impaired and Blind People**

I. INTRODUCTION STATE OF THE ART

Computer science researches in recent years have been focusing their work in the area of healthcare. The goal is to assist and aid people with technology in their daily life. The visually impaired and blind people have the need of support for interacting with the world in the same way a seeing person would do. Available solutions support. For a precise indoor independent localization, it is crucial to perform sensor fusion [2].

A precise navigation system intended for visually impaired and blind people in indoor and outdoor environments necessarily needs to integrate the different available localization methods.

To cover all scenarios for outdoor localization a GPS based method in combination with PDR can be used. In an indoor environment the well known approach for mobile robots simultaneous localization and mapping (SLAM) is a possible solution. The required sensor data for SLAM can be provided in this case by a body worn inertial measurement unit (IMU) and a laser scanner.

Blind pedestrians will explore the unknown environment while the system builds a map and simultaneously tracks the position of the person.

The main goal of the system is, once a map is constructed of the unknown environment, to be able to take decisions on choosing safe and effective routes to guide the blind person from a starting point to destinations previously explored. The best way to provide orientation commands to the blind person is via audio. Since blind people rely on external audio information, the use of conventional head phones is not an appropriate