Pedestrian Navigation and Integration with Distributed Smart Signal Traffic Controls - 04/25/2008 Status Update

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Background

The overall objectives are to provide navigation and orientation aid for pedestrians, provide a mechanism for remotely creating a pedestrian walk request, and to change traffic controller operations if the pedestrian is determined to be at risk. Specifically, the objectives are to provide navigation across a traffic intersection while enabling the user to create a pedestrian walk request via a handheld device.

The handheld device solution eliminates the need for a visually impaired user to search for the pedestrian call button. Creating pedestrian requests and providing user navigation requires a closed loop connection with the intersection. The intersection traffic controller receives a request for service and user position, and the traffic controller provides navigation information.

Previously Disclosed Work

An Accessible Pedestrian Assistant (APA) has been prototyped using custom hardware. Fig. 1 is a block diagram of this prototype. The technologies utilized are magnetic compass, GPS position, radio modem communications, and audible user feedback.

The handheld device detects which direction the user intends to travel using the magnetic compass. Remote user position is calculated using GPS. Direction sensing is combined with position data to derive where the user is requesting from and which direction they intend to travel. Position data is also useful for providing navigation. Radio modem communications provide bi-directional communications between the handheld device and the intersection. User feedback in the form of audible tones and frequencies inform the user with navigation and intersection status information without hindering the user’s ability to focus on their surroundings.

Fig. 1. Remote Handheld PED Device Hardware Implementation
**Current and Future Work**

Although designing custom hardware provides a high degree of flexibility, utilizing pre-existing hardware is a preferable option. Integrating APA features into existing hardware, such as PDAs, cellphones, and navigation devices, eliminates the burden of the user carrying yet another device. Utilizing existing hardware also enables the use of the existing infrastructure to provide services and functionality.

Until recently, there were no existing devices that could become an APA with only a software update. The Nokia 6210 Navigator [1] in Fig. 2, a cell phone developed for the purposes of pedestrian navigation, will be available in the United States in May. Equipped with GPS, magnetic compass sensing, and Bluetooth, the Nokia 6210 Navigator is equipped with the necessary hardware to become an APA.

![Nokia 6210 Navigator](image)

*Fig. 2. Nokia 6210 Navigator*

Using the java programming language [2] [3], software can be developed on the cell phone to utilize the hardware. Onboard Bluetooth can be used to communicate between the APA software and the traffic intersection. GPS and magnetic compass can be used the same as the current prototype implementation. GPS provides user position and tracking and the magnetic compass enables the APA to sense the user’s intended direction of travel.

**References**

