Development, Design, and Calibration of the Vulnerable Road User Mobility Assistance Platform (VRU-MAP)

Abstract

Objective:
The objective of this project is to develop a Vulnerable Road User Mobility Assistance Platform (VRU-MAP), a platform designed to assist vulnerable road users (VRUs) in moving through the world. The VRU-MAP will include personalized, proactive, real-time, multimodal information. The personalization and proactivity aspects of the technology are designed to understand and anticipate user needs instead of passively awaiting input. The real-time aspect is designed to provide constant updates about information relevant to user needs, including current weather, traffic, and route considerations. The multimodal aspect is designed to allow whole-trip planning, including information from the internet (e.g. bus schedules and traffic delays), predictive information (e.g. likely future traffic conditions) and local-scale connectivity (e.g. collision warning systems).

Scope:
The increasing miniaturization, computing power, and intercommunication of modern technology provides novel and powerful opportunities to assist the mobility of VRUs. The VRU-MAP will consist of a personalized, integrated platform that will incorporate environmental, infrastructure, and connected information with individual needs, conveyed in a usable, flexible format. While we believe that the foundational technology proposed here could benefit all VRUs, we are particularly focused on pedestrians who by virtue of age and/or disability have an increased likelihood of being involved in an injury or fatal crash.

Method:
***Phase 1: Concept Development*:** Development of the VRU-MAP concept focuses on creating a platform that includes personalized, proactive, real-time, multimodal information. Focus groups will be conducted to determine VRU needs on individual and societal levels while simultaneously examining applicable technology applications. Parameters of the VRU-MAP will be created based on all information gathered. Expert consultation will be included to connect the technologies and parameters together to create a mock-up demonstration of the VRU-MAP to conclude the first phase.

***Phases 2 & 3: Interface Design and System Calibration*:** Phases 2 and 3 will be iterative to support effective system development. Phase 2 will focus on embedding concepts developed in Phase 1 into a platform that transparently incorporates trip information and information about the world into the user's experience. We also anticipate the conceptualization of alternative displays for the visually-impaired, including touch-based or haptic feedback to provide warnings and basic wayfinding information. A key element of Phase 2 is to develop strong system usability and reliability that will enable the user to trust the information being presented. Phase 3 system calibration will provide optimal notifications for VRUs, including exploration of

both system/human response lag and the optimal balance of notifications and human information processing ability.

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