w Cost Outdoor Assistive Navigation System for Blind People

r. Jizhong Xiao, Kevin Ramdath, Manor Iosilevish, Dharmdeo Sigh, Anastasis Tsakas

partment of Electrical Engineering, The City College, The City University of New York

Convent Ave & 140th Street, New York, NY 10031, USA

h over 39 million visually impaired people need for an assistive device that allows the gate freely is crucial. We have developed an tion device that uses 3-D sounds to provide tructions to the user. Our device relays ormation to the user through special Audio nes, which use bone conduction technology. orded and can therefore be selected by the Navigation processing is handled by a We are using a magnetic compass and alculate the direction that the user is facing. of the destination address are geocoded using r-US module and passed to the *MoNav* generate a pedestrian route. Additional the device include speech recognition and for obtaining the user's desired destination ser can input the address by speaking into a he entire system is mounted to a pack that r's waist. It is very light and portable and it de any of the user's senses while it is being

I. Introduction

 there are various technologies the blind community to help them all either limit the freedom of the user, pensive. For example, the Seeing Eye service life of 7 years, costs as much as This figure may not seem substantial, t consider that the average American

Currently, most of the navigation technology revolves around feedback to the user through synthesized speech. Research at Georgia Tech showed that a much better method of providing feedback was through audio-only output, instead of through synthesized speech. Our goal was to improve on this technology and make it more affordable to blind people [13].

The second method of providing feedback to the user is through vibrotactile tactons (tactile icons). By using vibrotactile technology, the user feels a vibration on a certain part of the body whenever they need to navigate. We decided to avoid this methodology because after some period of repeated use, there are adverse effects, such as Vibration White Finger Syndrome, if the vibration is on the fingers through gloves [7].

II. System Architecture

The entire system consists of 5 modules, controlled by a loader program. The entire system does not require the use of the internet in order to operate. The initializer module verifies that all the libraries are installed and all of the data files for the proper operation of the system exist. The user interface obtains the destination address from the user. The Address Query translates the address to geographic coordinates. The Route Query takes the