

WiiCane: An accelerometer-based diagnostic and real-time feedback tool for therapeutic play in mobility training for blind and deaf-blind children

Abstract

This Phase 1 Steppingstones of Technology Innovation for Children with Disabilities project calls for creating a new diagnostic and training tool for use by orientation and mobility specialists and their visually impaired clients ages 2 through 22. The tool, to be known as *WiiCane*, will include a lightweight wireless sensor capable of tracking movement of a long cane during mobility training. As a trainee walks along a route, the sensor will deliver a continuous stream of acceleration event data to a stationary computer. An application running on the computer will compare the trainee's cane technique against a set of pre-established criteria generated from parameters specific to that person's physical characteristics, and then provide real-time feedback to the trainee in the form of audible or vibratory stimulus. Additionally, the application will produce a graphical record of each session, for later analysis and prescriptive evaluation. The work envisioned here builds on outcomes of earlier experiments carried out by two consultants to the current project and others. While the work focuses on the needs of children undergoing mobility training, the results of the proposed research will provide a useful new tool and important new information that will be applicable to orientation and mobility training for any newly blind individual, regardless of age. Furthermore, the technology to be demonstrated may also have applications for other populations of individuals undergoing various forms of physical therapy.

The work of this *Steppingstones* project will be carried out in four stages over the 24-month project duration: conceptualization, verification, implementation and evaluation. Research will take place at Touch Graphics, Inc. offices in New York City and at Western Michigan University in Kalamazoo, MI, and human subject trials with blind or low vision students will be held at four sites: The Jewish Guild for the Blind in New York City (with children enrolled in preschool and early intervention programs); The Overbrook School in Philadelphia (elementary school students); The New York Institute for Special Education (junior high and high school students); and at the Helen Keller National Center in Sands Point, NY (deaf-blind youths and adults).