LET THE FORCE GUIDE YOU

Map Navigation Software for the Blind and Visually Impaired

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ABSTRACT

As technology advances, the resources available to the **blind and visually impaired** struggle to keep up with the pace. Graphics, now a popular and even standard in today's society, continue to excel with little consideration for those unable to use them. This concern is especially apparent with current map reading and creation software.

Recent studies geared toward advances in mobility for the blind and visually impaired explore the prospect of extending the accessibility of maps. Currently, map education and navigation is limited to tools such as hands on maps, printed Braille maps, and audio guides. The implementation of i**nteractive products** such as touch pads and **force feedback mice or joysticks** provide an interactive environment where the user can 'feel' their way through the map.

This project is aimed specifically at **developing software that allows blind and visually impaired users to navigate their way through a map with the help of force feedback sensations of a mouse and audio guides.**

PREVIOUS WORK AT OTHER INSTITUTIONS

- University of North Carolina: Blind Audio Tactile Mapping System (BATS)
- Oregon State University Department of Physics: Research on bitmap and scalable vector graphics for touch and audio feedback
-University of California at Santa Barbara: Communication of spatial information to the blind and visually impaired using multi-modal map interfaces.

PROJECT VISION

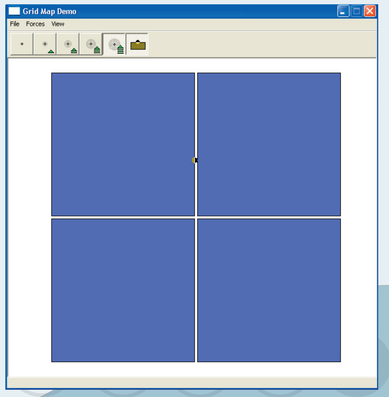
- Create interactive digital maps
- Physically guide the user along designated paths with interactive gaming equipment
- Provide audio guides to aid position awareness

CURRENT ACHIEVEMENTS

- Users feel their way along designated paths of a previously defined grid system
- Attraction points at intersections alert users of their current position
- An underlying grid system provides awareness of distance traveled
- Instantiation of all forces in an interactive graphicsl user interface

GRAPHICAL USER INTERFACE

- Grid system composed of impenetrable boxes
- Invisible attraction points at all intersections for user guidance
- Invisible boundary wall to keep users on track



Core User Interface

USER NEEDS

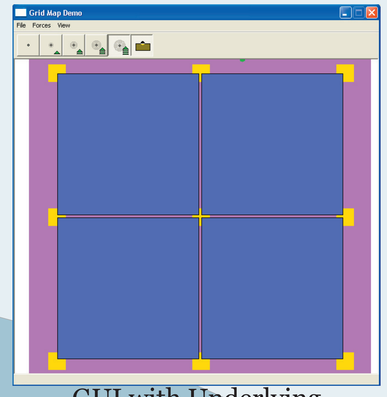
- Area overview and general directions
- Exact routing and specific directions for navigation
- Position awareness at all times

SOFTWARE and HARDWARE

- Logitech Force Feedback Mouse
- Immersion Studio 4.1.1
- Microsoft Visual C++ 6.0
-Immersion Foundation Classes SDK

FORCE FEEDBACK MOUSE FUNCTIONS:

- Spring
- Slope
- Damper
- Friction
- Inertia
- Axis and Angle Wall
- Texture
- Grid
- Enclosure
- Ellipse
- Pulse
- Periodic
- Vector Force
- Ramp



GUI with Underlying Forces Visible

Logitech Force Feedback Mouse

FUTURE WORK

Current progress shows great potential for map navigation software. Future goals include:

- Vector forces that pull and guide users between user defined start and end points

- User instantiated audio commentary to provide additional location information.

- Interface with Scalable Vector Graphics (SVG) and other vectorized graphic standards for map portability

- Automatic translation from Mapquest maps to vectorized input files