The SonoWand

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Advanced Technology for the Severely Visually Impaired

• SonoVision LLC
  – Our goal is to develop technology for visually impaired people to increase their awareness of their surroundings
  – Allow them to confidently maneuver in unfamiliar surroundings
  – Enjoy freedom of movement

Our first product is the SonoWand
The SonoWand
A High Resolution Ultrasonic Sensor

• The SonoWand
  – detects distance and translates it for the visually impaired user via acoustic frequency

• High spatial resolution due to super-high ultrasonic frequency
  • Operates at 20 times maximum of human ear
  • Other ultrasonic devices operate about 5 times less
  • Output beam is very narrow – about 5 inches
SonoWand Spatial Resolution is Superior

Max distance about 6.5 feet

Enables user to:

- Find and identify smaller objects
- Go up and down stairs
- Detect drop-offs and under-hangs
- Distinguish close objects, such as people
  - Moving nearer or farther?
- Quickly orient themselves in unfamiliar environments
Edge Resolution Obtained by Scanning

Distance resolution < 1 inch

Edge detection about 1 inch resolution

Complex shapes can be discerned
Mobility with the SonoWand

User can scan a sphere about 18 feet diameter

User can scan about 3 feet ahead, until no echo from bounce – this means no objects there

User can detect object about 6-7 feet away from secondary bounce
Mobility - continued

User can detect stairs from audio pattern of upward scan
Can navigate up or down stairs

Drop-offs or down stairs

Low-hanging objects

Doors
- open
- closed
- handles
Neuroplasticity and Imaging

• In a sighted person, visual information is used by the brain to form a detailed 3D image
• In the absence of visual information, the brain may use other types of information in a similar manner
  – Tactile, as in Braille reading
  – Audio, as in echolocation
• The SonoWand provides both audio and tactile information
  – The challenge is to teach the user how to understand it
Imaging Pathways in the Brain

• Experiments show that visually impaired people can use similar imaging pathways as sighted, using audio and/or tactile information.

• For late-onset blindness, pathways have been set, can be retrained for audio/tactile.

• For congenital blindness, similar pathways can be activated.

• Best situation is to train very young children.
Our Vision and Goal

• First – the SonoWand is used in conjunction with the white cane
• Next - the SonoWand is used to freely move in unfamiliar environments
• Finally – the second or third generation of children are not aware of blindness as an impediment