



The Sonic Eye: A device for ultrasonic human echolocation

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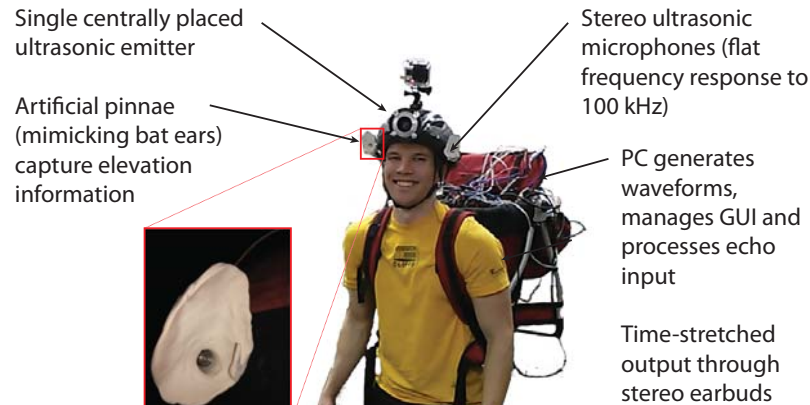
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Introduction: Echolocation

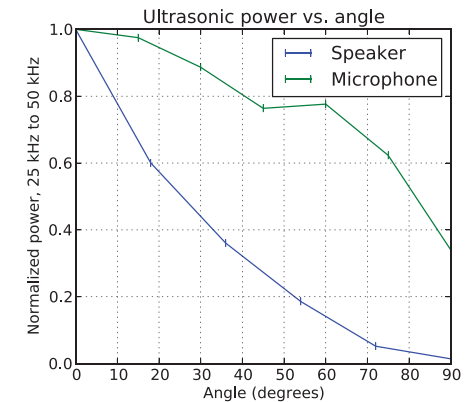
- Many non-human animals, and even some blind humans, use active echolocation vocalizations to aid in navigation and object perception.
- The Sonic Eye** presents users with rich ultrasonic echolocation cues that are not otherwise available to humans, or difficult to control.
- Minimal processing of cues exploits the auditory system's inherent ability to process spatial and object information.

Sonic Eye Prototype

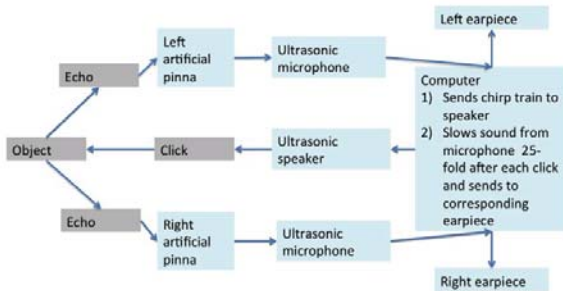


In development: Controller allows customization of pulse type, emission rate, etc.

Emitter/Mic Power Cones

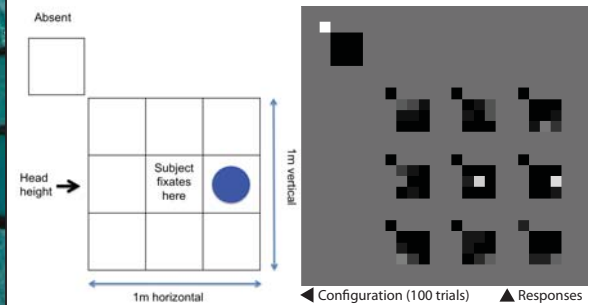


Information Flow Overview



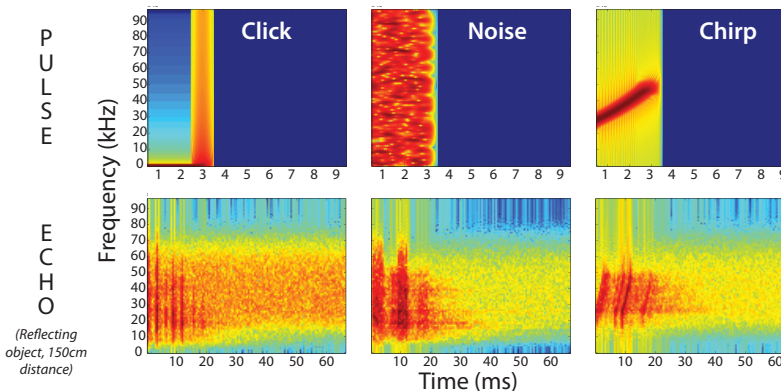
Preliminary Behavioral Data

- One sighted blindfolded volunteer localized a 30cm disk held at various positions at a 1m distance.



- Detection** was perfect (absences always reported).
- Localization** was above chance, with 72% of responses within one sector of the correct location.

Pulse & Echo Spectrograms



Future Directions

We will characterize the envelopes of object detection, localization, discrimination, and navigation; refine the user interface for on-line user customization of echo parameters (e.g. tone, rate, intensity); and move to more robust, compact hardware and software platforms.