

Towards Supporting Situational Awareness using Tactile Feedback

Flynn Wolf, Philip Feldman and Ravi Kuber, UMBC, { flynn.wolf, feld1, rkuber } @umbc.edu

Background

- When engaged with an **attention-demanding** task, it can be difficult concentrating on the wider environment.



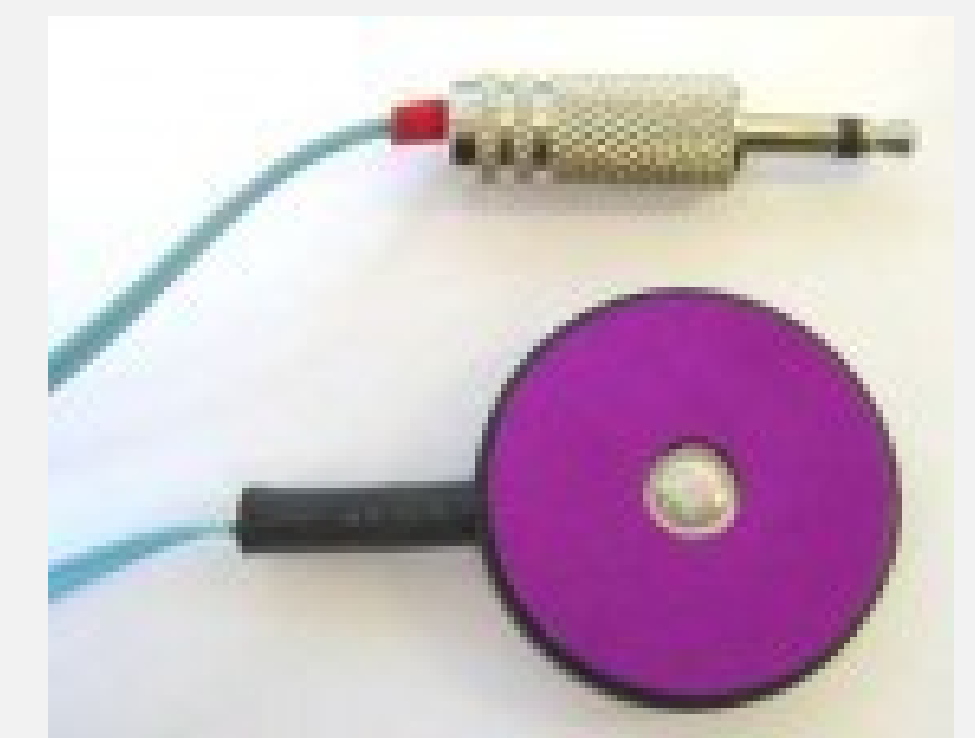
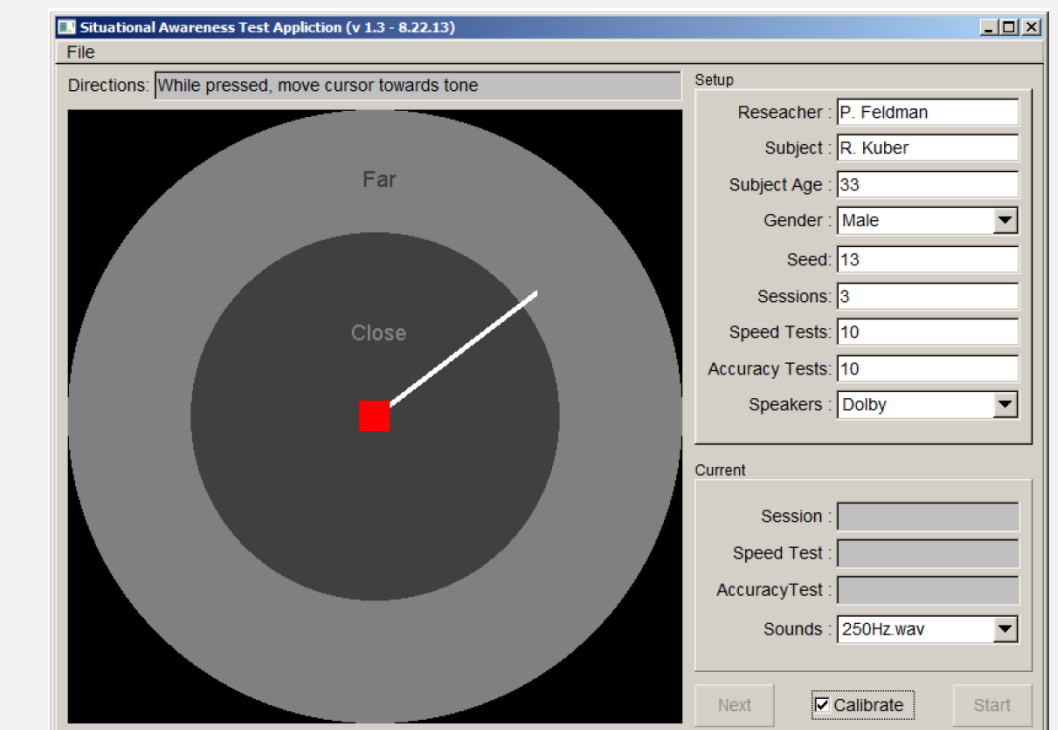
- **Tactile feedback** offer considerable potential, communicating detailed information within a short burst.
- The aim of the research is to determine the ways in which tactile feedback **presented at the head** can **support situational awareness**.
- Interested to see whether **judgment** and **decision-making** processes are supported.

Research Challenges

- **Unexplored territory** of presenting at the head
- Can be challenging to develop feedback which is **expressive**.
- Difficult to describe ways to develop tactile cues, as our tactile **vocabularies are limited**.

Interface Design

- Developed using actuator technologies, auditory controller and a laptop running custom software developed to present cues.
- Can present tactile cues for up to **8 actuators**. These are affixed to a helmet.
- Application presents tactile feedback in a specific sequence.
- Application also **records** responses when performing **localization** study
- After performing pilot studies to better understand perceptual constraints, integrated **C2 tactors** with **skullcap**.



Research Aims and Objectives

- To **communicate** the following to **increase situational awareness** among mobile device users engaged within a task where the eyes are occupied:
 1. The **number** of obstacles within a fixed range of the user;
 2. The **position** of obstacles in relation to the user;
 3. Identify whether the **distance** between the obstacles and the user is narrowing/widening.
- Determine the maximum amount of information which can be conveyed.

Current and Future Work

- Developed **use-cases** where situational awareness is needed through interviews with mobile device users.
- Focus groups are currently being held to enable users to develop meaningful tactile cues, using a **participatory-approach**.
- Cues will be refined through a process of iteration.
- We aim to evaluate resulting tactile cues to **determine their efficacy** under realistic conditions.