Design of Experiment to Determine Effectiveness of Eye Tracking as a Method for Measuring Operator Attention

Michael Steed
Faculty Advisor: Dr. Se Young Yoon

Overview/Objective

- The purpose of this project is to design and run an experiment which tests the effectiveness of eye tracking technology as a method for determining if the operator of a robotic system is attentive.
- The basic design of the experiment involves a single participant navigating a small robot through an obstacle course while playing memory games to simulate distractions.
  - The path of the robot is measured using motion tracking cameras
  - The participants eye movements captured by wearable eye tracking cameras
  - Correlations between data will be explored

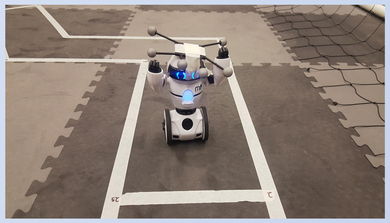
Experiment Outline

- 5-10 Participants
- 3 Trials each
- First Trial: Participant drives robot through obstacle course with no distractions
- Second Trial: Participant drives robot through course while playing visual memory game.
- Third Trial: Participant drives robot through course while playing auditory memory game.

Conclusion

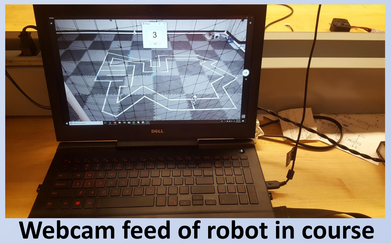
- Experiment has been designed and basic tests have been run to confirm practicality
- It is anticipated that there will be a correlation between eye movements and robot navigation performance.
- Trials have not yet been conducted, pending IRB Approval

Experiment Setup



MiP Robot which will be operated by participants

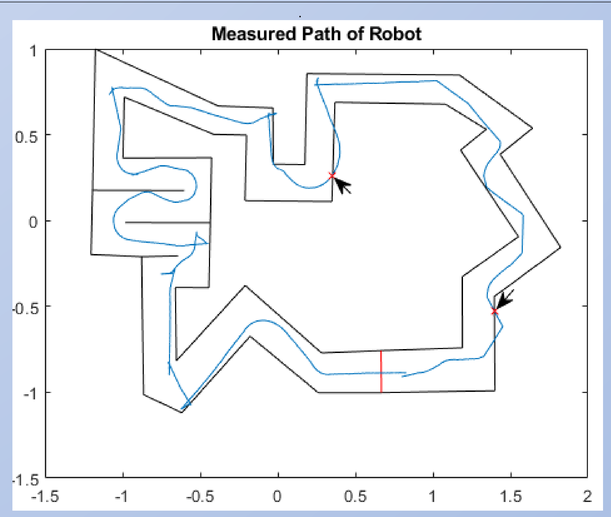
Wearable eye trackers to be worn by participants



Webcam feed of robot in course which participants will utilize

Cameras used to track path of robot

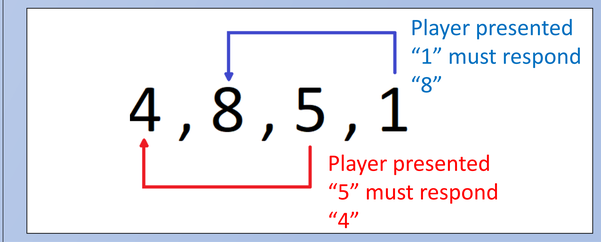
Example Performance Measurements



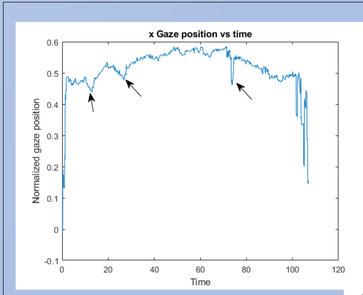
Measured path of robot compared to course boundaries from testing

Memory Games

- Memory games are played during experiment to simulate different levels of distraction
- Game Played know as “n-Back”
  - Player is presented with series of numbers, must repeat the number that they were presented “n” terms prior.
  - The example below outlines a game of “2-Back”



Example Eye Measurements



- Abrupt changes in gaze position can be identified in the data

**** Note: This data is not from running trials of this experiment**