Kyabo

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Research Question

How does a default map combined with either audio or following a robot affect humans' abilities to navigate indoors?

Method -- Hypotheses

1. Participants who follow the robot will have the highest completion success.
2. Participants who only receive directions via audio will have a lowest completion success.
3. Participants who follow the robot will feel comfortable with more complex directions.
4. Participants who only receive audio directions will feel more comfortable with simpler directions.

Method -- Experimental Design

We will be conducting 2 (Mode of Direction: Audio vs Follow the Robot) X 2(Complexity of Directions: Simple - Few Turns vs Complex - More Turns) between group factorial design.

Method -- Procedure

1. Screen for participants
2. A pre-task survey will be administered in order to gain feedback on the participant's inherent ability to navigate indoors.
3. Instruct the participant to meet the experimenter with the robot (a turtlebot/telepresence with iPad attached) at Engineering Center/Norlin
4. The experimenter will begin the task by instructing the participant to reach a specific destination in the first floor Engineering Center/Norlin.
5. A experimenter behind the scenes (wizard of oz) will randomly assign tasks and display the associated map.
6. If audio, a pre-recorded message will direct the user to the location while displaying a map.

Method -- Procedure

6. If follow is selected, the behind the scenes researcher will control the robot, directing the participant to the desired location.
7. Once the participant begins the task, a timer is started and the participant is recorded through go-pros or by the iPad on the robot, allowing us to judge the distance travelled and participant behavior.
8. After the participant finishes the task, they will be met by a researcher at the destination and the timer will be stopped.
9. A post-task survey with 7-point likert scale will be administered to the participant in order to gain feedback on their experience and will be compensated $?
10. The entire process will take around 30 mins for each participant.

Method -- Variables

Independent Variables:

- Mode of Direction: Audio, Follow the Robot
- Complexity of Directions: Simple - Few Turns vs Complex - More Turns

Dependent Variable:

- Completion
- Time to complete
- Distance Travelled

Condition:

- Location with only 2D map without stairs

Method -- Measurements

- Behavioral:
  - Participants' actions viewed through recordings
- Objective:
  - Time
  - Distance
  - Task Completed?
- Subjective:
  - Pre and post surveys (7 point scale)

Method -- Participants

- 30 participants will take part in this study and will be recruited from around campus. Only those who are not familiar with the layout of the Engineering Center/Norlin will be chosen.

Ensuring Validity

- External Validity:
  - This experiment will take place in the “wild” at both Norlin and the Engineering Center
- Internal Validity:
  - Between group study
  - Pre-screening
  - Same researchers will maintain the same jobs throughout the study
  - Gender neutral and consistent audio recordings
  - A set of defined map locations

Implementation

- Installed Robot Operating Systems(ROS) on Turtlebot,
- Implemented the function of using keyboard to tele-operate the Turtlebot .
- Tele-operating the Turtlebot using Wizard of Oz during the experiment is available.

Where are we and what has Changed

- What has changed:
  - Narrowed down scope, removed drone.
  - More detailed plan of action (i.e materials and locations)
  - Added an independent variable of map complexity (distance and turns)
- Where we are:
  - Currently deliberating whether or not to use the turtlebot or telepresence
  - Gathering maps from Norlin/EC
  - Designing pre and post surveys
  - Finalizing measurement variables

Timeline

- Now - March 24th:
  - Get materials ready to use (robot/map/audio recordings)
  - Get pre and post surveys completed
- March 25th - April 6th:
  - Pilot study and iterate
- April 7th - 12th:
  - Start recruiting participants
  - Run study
- April 13th - End:
  - Analyze data
  - Complete report

Questions?