

Feedback on Touch Screen User Interfaces

Primary Research

Study

The primary research consists of two questionnaires and a simple task that is done by the participants in a simulated app on a touch screen device. The main design of the tests involved participants using a touch screen device and observing feedback while doing a particular task. The feedback will be visual, auditory and haptic. The feedback combinations used will be:

Visual, Visual + Auditory, Visual + Haptic and Visual + Auditory + Haptic

- The study consists of three parts:
1. Answering a simple 5 – 10 minute questionnaire
 2. Doing a task on a touch screen user interface device
 3. Answering a second 5 – 10 minute follow-up questionnaire

The task consists of using a hand grip and doing two types of exercises:

- 1) The first exercise is holding the hand grip closed for a length of time while observing the feedback. This is to simulate the swallow hold exercise.
- 2) The second exercise is opening and closing the hand grip a number of times and observing the feedback. This simulates the multiple swallow exercise.

Each participant will do the task for four sessions and will receive four randomized combinations of feedback during each session.

Visual – The visual feedback will be displayed on the device's screen. It will display for each four sessions and be the same each time.

Auditory – The touch screen device will emit sounds during the task. The sound may come from internal speakers in the device or possibly through headphones attached to the device.

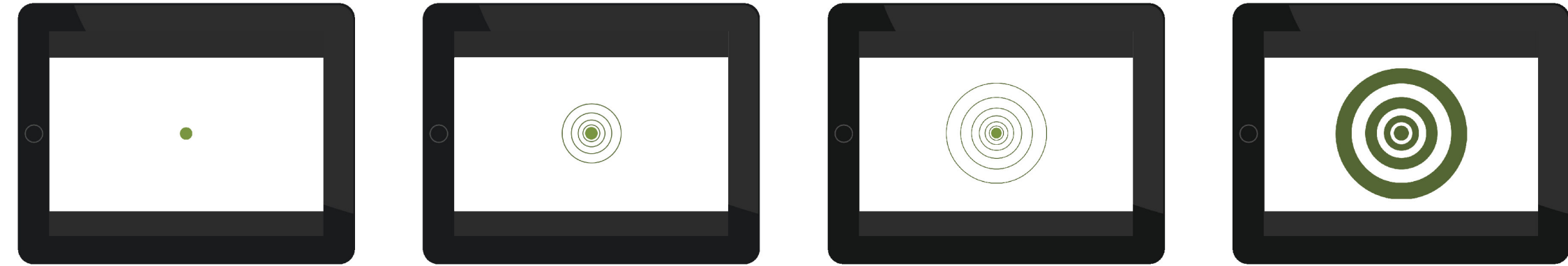
Haptic – The device itself will vibrate during the session and the participant will be holding the device in their hands or placed on their lap.

Questionnaire 1

The questions in the first questionnaire are about the participant's experience with feedback on various types of touch screen user interface devices.

Task

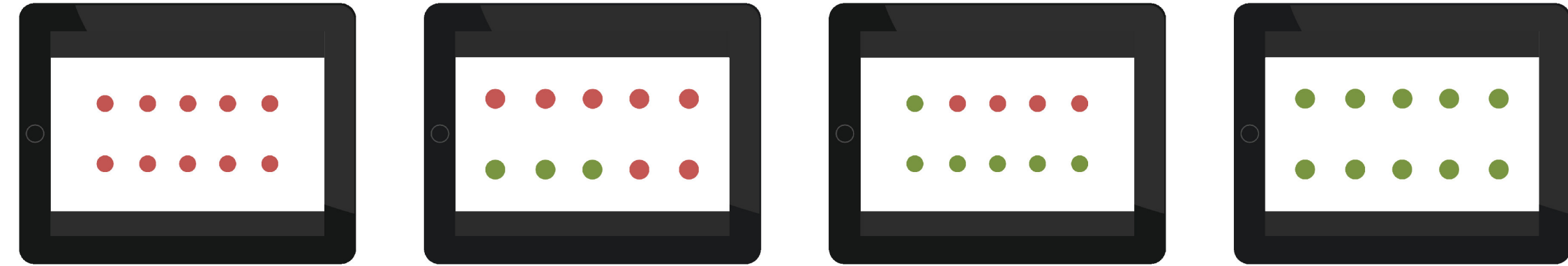
Using a simulated app on an iPad tablet touch screen device, the participant will use the device as directed by the principal investigator. As they use the device, they will receive some feedback. The simulated app run on the iPad version of Power Point. Since the iPad does not have haptic feedback, it will be simulated by attaching a small vibrating disk motor on the back. This will be controlled by the principal investigator to simulate the haptic feedback as needed during the study.



Type of feedback while holding the hand grip closed:

- Visual - The circles expand on the screen
- Auditory - Beep for every time the circle expands
- Haptic - Continuous vibration until the circle fills the screen

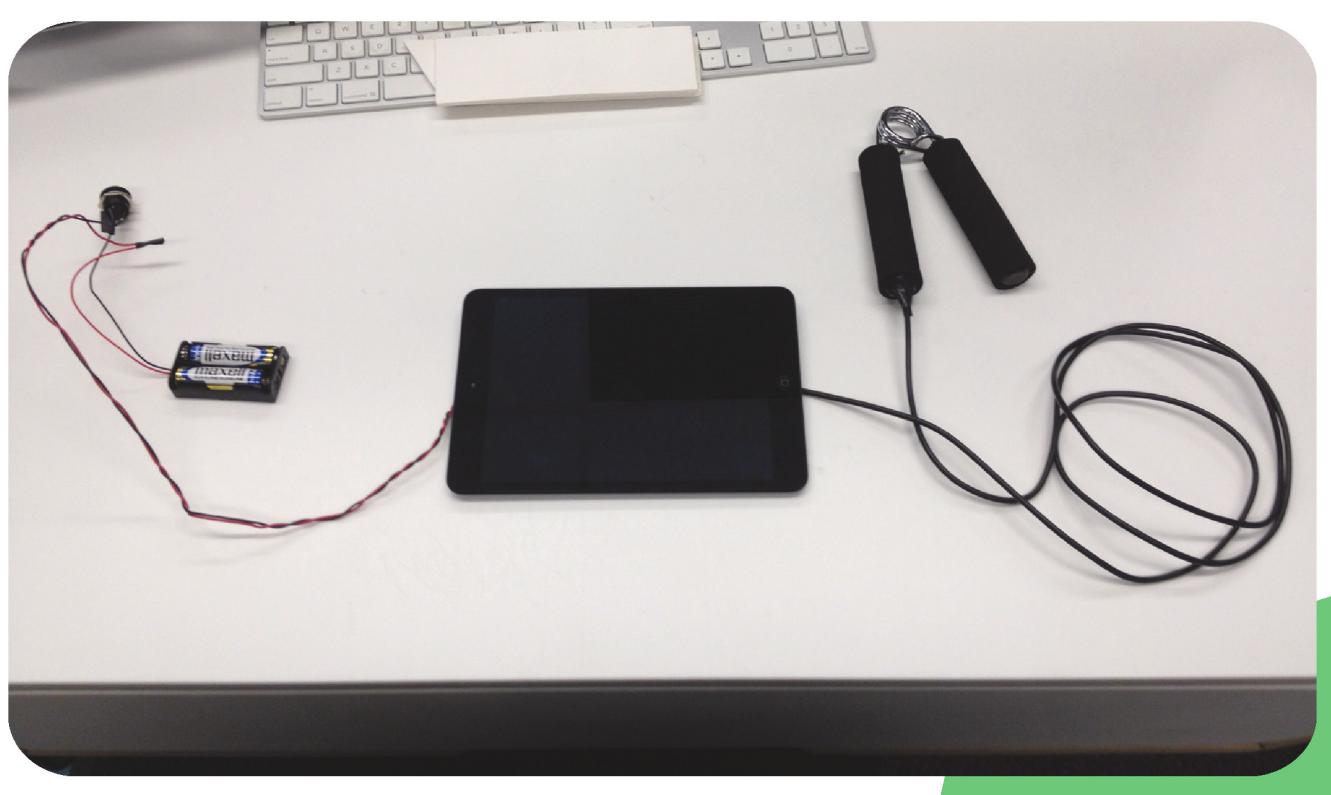
Session ends when the circles expands to the edge of the screen.



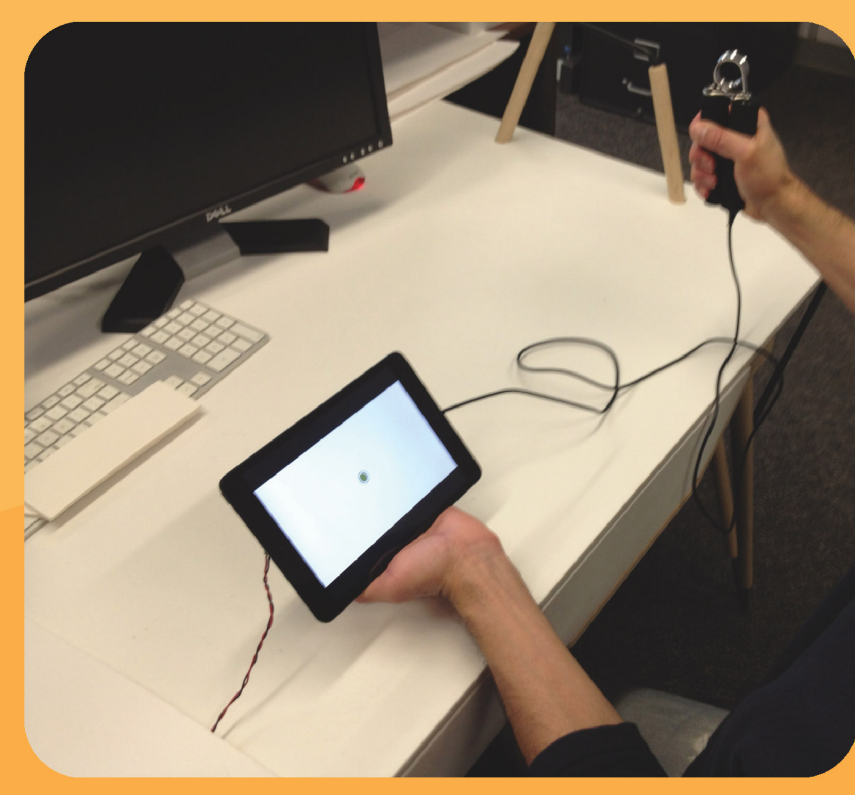
Type of feedback while opening and closing the hand grip:

- Visual - Each red dot becomes green
- Auditory - Beep for every time a red dot changes colour
- Haptic - Short vibration when a dot changes to green

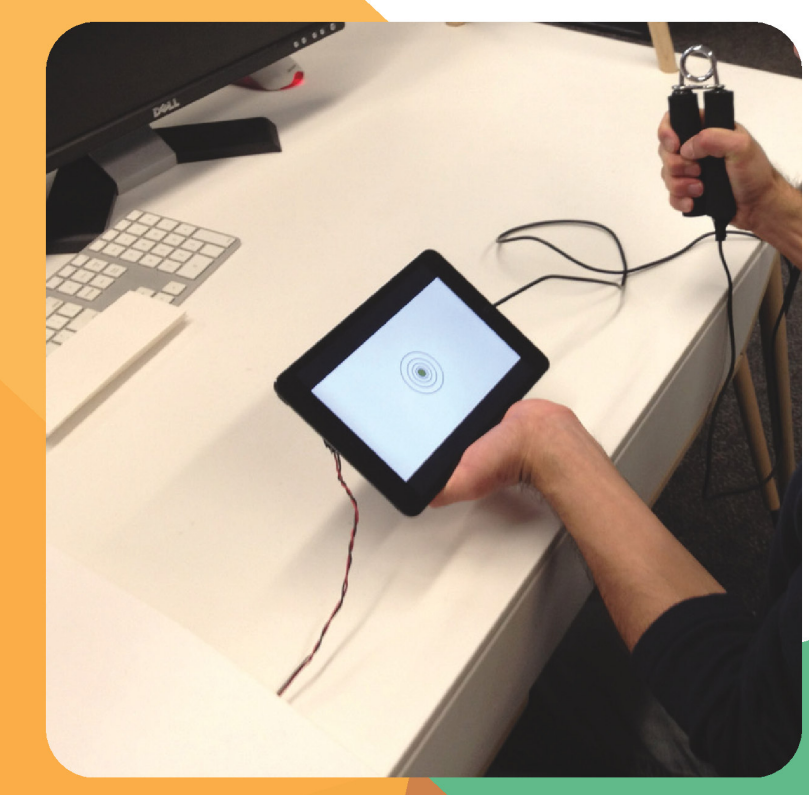
Session ends when all dots have changed colour.



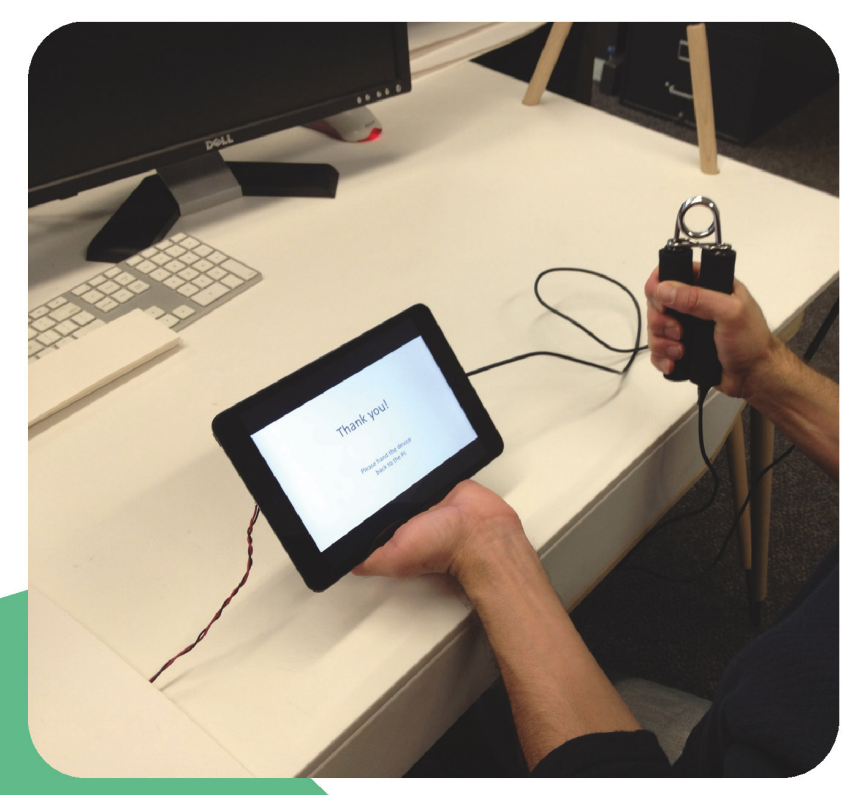
Device with hand grip, iPad and vibrating disk motor attached to the back



Participant starting the task



Holding the hand grip closed



End of current session

Questionnaire 2

The questions in the follow-up questionnaire are to get their personal opinion and experience on the task done in part 2 of the study.

Results

Visual 

Most participants felt it improved their performance. Can focus on one thing.
A few felt they had to pay too much attention.

Visual + Auditory  

Most participants felt V + A helped with their task performance.
A few felt there was a disconnect between the audio and visual feedback.

Visual + Haptic  

Some felt it helped but not as much as other combinations.
Some thought the sound from vibrating disk motor was distracting and was interpreted as sound.

Visual + Auditory + Haptic   

More confirmation and was more robust. Helped but the least number of participants felt it improved performance.
Many felt overwhelmed and that there was too much going on at once.