Information sheet

Area Cursor Control For Virtual Reality Panels

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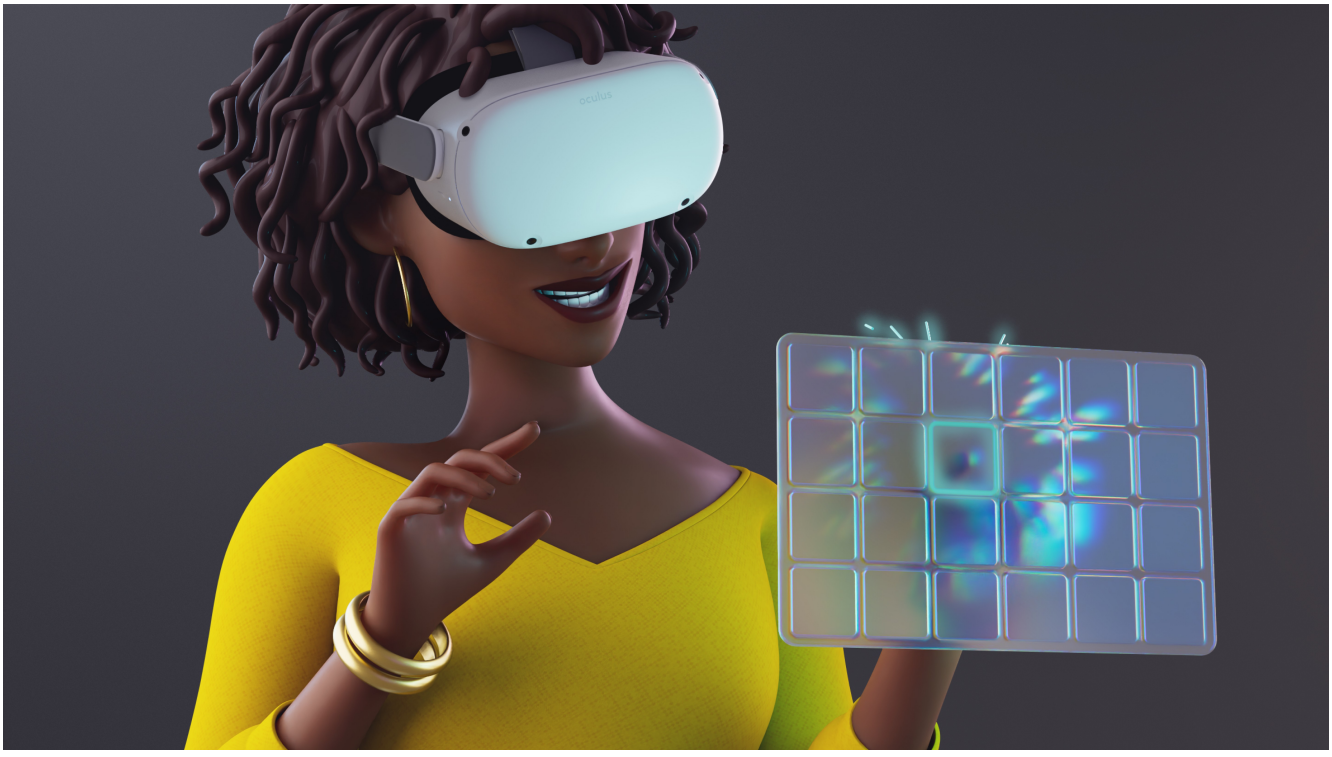
Introduction

Please read the following information so that you understand what you are being asked to do and why this research is being conducted. Please tell me if anything is not clear or if you have any questions.

Our research is evaluating new interaction techniques for **virtual reality** user interfaces, using **hand tracking** sensors for input. These sensors track your hand and finger movements in mid-air so that you can interact with user interfaces and objects in virtual reality without touching anything.



We are evaluating new interaction methods for **selecting** and **moving** content shown on a virtual control panel (e.g., like in the image above). Our interaction methods provide different ways of activating and controlling selection behaviour and we are interested in evaluating how these different designs affect the **usability** of the user interface when more than one item is presented on the panel.

If you agree to take part, you will be given this information sheet to keep and will be asked to sign a consent form. You are free to withdraw at any time without giving a reason. You also have the right to withdraw retrospectively and any data gathered during your session be destroyed. This study should take up to **60 minutes**. You will receive a **£10 Amazon voucher** at the end of the study.

Motion Sickness

During recruitment you completed the *Motion Sickness Susceptibility Questionnaire*. You have been selected as eligible for this experiment because your responses to this questionnaire indicated that you are not overly prone to motion sickness. Despite this, you may still experience feelings of discomfort or mild motion sickness during the experiment due to the use of a virtual reality headset.

During the experiment, you will only wear the virtual reality headset for short periods of time. Between short blocks of tasks (lasting no more than three minutes), you will be asked to remove the headset and complete some short surveys. You can take as much rest as needed between tasks – the experiment will only continue when you indicate that you are ready to put the headset back on for the next block of tasks.

Please give honest answers when the researcher asks you questions about how you are feeling throughout the experiment, as these are intended to help identify potential discomfort so that we can end the experiment, if necessary. If at any point you feel discomfort or uneasiness, please inform the researcher and they will help you remove the headset, sit down safely, and will provide a drink of water and any additional support needed. You are free to withdraw from this experiment *at any time, without giving a reason*, including if you experience feelings of discomfort or nausea.

Virtual Reality Headset

During the experiment, you will wear a **Meta Quest 3** virtual reality headset. This device has soft adjustable straps, which the researcher will help you adjust to find a comfortable fit at the beginning of the session. If you wear glasses, these can be worn at the same time while using the headset.

Experiment Tasks

When wearing the headset, you will be shown an empty virtual environment in which virtual user interface panels will be presented in front of you (similar to the illustration on the first page). Optical sensors in the headset will track your hand movements in mid-air. You will see a silhouette-like representation of your hand and fingers in the virtual environment.

You will be asked to interact with the virtual user interface panel using different interaction techniques. These techniques differ in the ways that your hand movements in the physical environment affect the behaviour of a pointer in the virtual environment. You will use **Raycast** techniques (where you *point at the panel* to control the

cursor), and **Gain** techniques (where you *move your hands* to control the cursor). When the cursor is selecting a user interface element (e.g., a button), you can activate it by pinching your index finger and thumb together.

Tasks involve selecting target objects on the panel, and moving objects by 'dragging' them on the panel.

Procedure

At the beginning of the study, the researcher will demonstrate the interaction techniques and will show examples of the kinds of tasks you will be asked to complete. You will be given the chance to complete several practice tasks to become familiar with the virtual reality headset and the various interaction techniques.

Our goal is to evaluate the usability of these interaction techniques, *not* to evaluate your performance. Each task should be completed as quickly and accurately as possible. Tasks will only begin when you indicate you are ready, so you can proceed at your own pace and are welcome to take breaks when you want.

After a block of tasks, you will be asked to complete a short survey. This survey will ask you to provide numerical scale ratings, e.g., judgements of perceived physical demand, cognitive demand, etc. You will also be asked to provide preference ratings and will be invited to participate in a small interview where we will discuss your thoughts on these interaction techniques. With your consent, this will be audio recorded so that we can transcribe it later; recordings will never be distributed.

If you are unsure about what you are being asked to do, please let me know at any point during the experiment.

Data

All data collected during the study is anonymous—task performance data will be stored with your assigned participant number. Survey data will not contain any personally identifiable information and will be stored with your assigned participant number. Your participant number cannot be connected to you or any personal information. Audio recordings (with your permission) are used to transcribe the interviews and will never be shared. Findings from this study may be published in a PhD thesis and/or research papers, and may be presented at conferences. Anonymised data may be shared in open-access data repositories. Any demographic data (e.g., your VR experience) will only be reported at aggregate-level across the full study.

The University of Glasgow College of Science and Engineering Ethics Committee (ref TBC) has provided ethics approval.

Contact

Please get in touch if you have any questions about this experiment.

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Version 1 - August 20, 2025