Risk Assessment

Summary

Reference: **RA090209/1** **Sign-off Status:** **Awaiting Approval**

Date Created:	11/03/2024	**Confidential?**	No

Assessment Title:	Immersive Display Use in conjunction with Wizdish ROVR in 169 Euston Road
Assessment Outline:	Proposed extended activity: user studies, demonstrations and student use of VR laboratories in B08 in 169 Euston Road. The laboratories support use of immersive displays, such as virtual reality display, augmented reality system, motion capture and other displays. These can be used in connjunction with the Wizdish ROVR. The ROVR is an omnidirectional treadmill that simulates walking in virtual reality when used alongside a head-mounted display. It does not have moving parts. The ROVR consists of a concave dish (approx 0.9m diameter with a low firction surface. The user wears low-friction overshoes and slides their feet back and forth to simulate a walking movement without actually moving. Participants in studies will undertake tasks in the systems and then complete questionnaires and interviews.

Area Responsible (for management of risks)	
Division, School, Faculty, Institute:	Faculty of Engineering Sciences
Department:	Dept of Computer Science
Group/Unit:	All Groups/Units

Location of Risks	On-Site
Building:	Euston Road, 169
Area:	Basement
Sub Area:	Laboratory

Further Location Information:	B08 is in the basement area of 169 Euston Road
Is additional GM or HG approval required? Only relevant to specialist biological risk assessments (GMM2, GMM3, HG2, HG3, GM animals, GM plants) except GMM class 1.:	**Click SELECT to change <u>ONLY</u> if this is a GMM Class 2, GMM Class 3, HG2, HG3, GM animals or GM plants risk assessment**

Assessment Start Date:	11/03/2024	**Review or End Date:**	11/03/2025

Relevant Attachments:

Description of attachments:

Location of non-electronic documents:

Assessor(s):	SWAPP, DAVID
Approver(s):	ANTHONY STEED
Signed Off:	

PEOPLE AT RISK (from the Activities covered by this Risk Assessment) *

CATEGORY
Employees
Post-Graduates
Members of the Public
Visitors

Reference: **RA090209/1**

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1. Immersive Display Usage

Description of Activity:	This assessment covers general health and safety risks in the B08 lab in 169 Euston Road. It does not cover the use of specific physical, chemical or biological agents/substances. It has been covers the specific issues present in this laboratory environment, and the general risks inherent in virtual reality experiments, including the use of the Wizdish ROVR navigation platform.

Hazard 1. Eye strain

Participant experiences discomfort due to visual exposure	**Existing Control Measures** Monitoring of participant Limiting exposure time and brightness intensity Ensuring participant is aware they can stop at any time

Hazard 2. Dizziness

Participant experiences dizziness as a result of exposure to virtual reality visual equipment	**Existing Control Measures** Limit exposure time Supply participant with written and aural information about dizziness and simulator sickness before experiment begins Monitor participant Ensuring participant is aware they can stop at any time Ensure participant has not consumed alcohol within the 6 hours before beginning the experiment

Hazard 3. Epilepsy

Visual display systems that flash at a visible rate can induce seizures in sufferers of photosensitive epilepsy	**Existing Control Measures** Ensure participants have not previously suffered an epileptic episode Monitor participant

Hazard 4. COVID Transmission	
Risk of COVID transmission between users and visitors to the space	**Existing Control Measures** All laboratory access follows any in-place building restrictions on access, mask-wearing, hand sanitation, etc. Any equipment that is re-used between participants or visitors will be wiped with cleaning wipes before use. Equipment that can be fitted with wipeable covers will have them installed. Alternatively, and when appropriate, disposable face masks will be used. Social distancing will apply within laboratories, including any supervisor of a demonstration or experiment keeping their distrance from the participant or visitor.
Hazard 5. Electricity	
Electrical shock from equipment	**Existing Control Measures** Equipment is compatible with supply Equipment maintained Equipment checked regularly for damage/deterioration Damaged equipment reported and taken out-of-use No unauthorised alterations or repairs allowed
Hazard 6. Manual handling	
Injury arising from handling heavy, bulky, awkward loads, reaching/stooping to access storage in high /low places.	**Existing Control Measures** Use porters or devices eg trollies, lift trucks to move heavy objects Heavy/awkward items stored appropriately Training in lifting techniques provided for anyone who undertakes the lifting of heavy loads. Staff aware of ways to safely move objects that are too heavy to lift by hand

Hazard 7. Repetitive movements	
Prolonged, repetitive movements leading to muscle fatigue/strain	**Existing Control Measures** Limit exposure by time spent Monitor participant Ensuring participant is aware they can stop at any time
Hazard 8. Slippery surface of Wizdish platform	
The Wizdish ROVR is an omnidirectional treadmill that simulates walking in virtual reality when used alongside a head-mounted display. It does not have moving parts. The ROVR consists of a concave dish (approx 0.9m diameter with a low friction surface. The user wears low-friction overshoes and slides their feet back and forth (without lifting them from the surface) to simulate a walking movement. The device has an enclosing guard rail at waist-height.	**Existing Control Measures** Prior to sessons: - Check Wizdish device for damage and stability of guardrail setup at start of each session Provide a brief training session on how to use the WizDish safely. Specifically demonstrate to participants: - the sliding motion of feet, and to not lift feet from the surface as per normal walking - no requirement or benefit to vigourous movements - holding onto guard rail with both hands for added stability During sessions - Supervise participants stepping onto and off the dish. - One experimenter/research staff to supervise participant at all times

Hazard 9. Tripping	
Injury arising from tripping over objects. Participants who are locomoting (walking) whilst wearing a head mounted display (HMD).	**Existing Control Measures** Adequate lighting levels during participant locomotion Management of trailing leads and cables Travel routes within workspace kept clear of obstructions Flooring checked regularly for damage/deterioration Damaged flooring reported Ensuring researcher familiarity with lab layout HMDs have a properly configured virtual guardian system to warns the user when they reach physical boundaries. Participant made aware of any trip hazards. Visitors to the laboratory or experimental participants are monitored by experienced laboratory users to ensure they don't collide with furniture or other users.
Hazard 10. Lone working	
Not being able to summon assistance in the event of an emergency or a requirment for more than one person to operate emergency stop controls	**Existing Control Measures** Non-routine lone working is avoided where possible Lone worker understands the risks and precautions involved in their work Lone worker has information to deal with emergencies. Procedure in place to ensure on-going monitoring of the safety of the lone worker eg a start/finish time has been agreed, the lone worker informs their supervisor that work has started / finished or periodic checks by the supervisor are made at agreed intervals
Hazard 11. Environmental conditions	
Injury or ill health arising from inadequate ventilation, extremes of temperature or lack of space within the workspace	**Existing Control Measures** Environmental conditions monitored Problems with environmental conditions reported

Hazard 12. Laboratory equipment	
General hazards associated with the use of incorrect equipment or poorly maintained/damaged equipment	**Existing Control Measures** All new equipment checked before first use Users trained in use of equipment where necessary Equipment checked regularly for damage/deterioration Damaged equipment reported and taken out-of-use Service contracts in place where appropriate
Hazard 13. Unauthorised access	
Potential exposure to hazards by untrained persons	**Existing Control Measures** Access to areas is restricted to authorised persons only

Risk Level

With Existing Controls:

Risk Level **A - Very Low / Trivial**

Actions

Reference: **RA090209/1**

Sign-off Status: **Awaiting Approval**

Actions associated with this Risk Assessment
*** No Actions have been recorded***

Participant Information Sheet

UCL Computer Science Research Ethics Committee Approval ID Number: UCL/CSREC/R/16

YOU WILL BE GIVEN A COPY OF THIS INFORMATION SHEET

Title of Study:
Virtual Reality Experiments
Department:
Computer Science
Name and Contact Details of the Researcher(s):

Gauri Desai – gauri.desai.21@ucl.ac.uk

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Nandini Chavda - nandini.chavda.21@ucl.ac.uk

Taha Chowdhury - taha.chowdhury.21@ucl.ac.uk

Name and Contact Details of the Principal Researcher:
Anthony Steed, a.steed@ucl.ac.uk

1. **Invitation Paragraph**
   You are being invited to take part in a research project. Before you decide it is important for you to understand why the research is being done and what participation will involve. Please take time to read the following information carefully and discuss it with others if you wish. Ask us if there is anything that is not clear or if you would like more information. Take time to decide whether or not you wish to take part. If there is anything that is not clear or if you would like more information please ask the experimenter. Thank you for reading this.

2. **What is the project's purpose?**
   The purpose of the study is to investigate the user experience of current virtual reality systems.

3. **Why have I been chosen?**
   We require that participants can see, hear and walk unaided for the duration of the study, that users do not consume alcohol within 6 hours of the start of the experiment and that users are not sensitive to photosensitive epilepsy. Additionally, we require that participants have normal or corrected-to-normal vision and inform us if they experience any other severe health conditions.

4. Do I have to take part?

It is up to you to decide whether to take part. If you do decide to take part, you will be given this information sheet to keep and be asked to sign a consent form. You can withdraw at any time without giving a reason and without affecting any benefits that you are entitled to. if you decide to withdraw you will be asked what you wish to happen to the data you have provided up to that point.

5. What will happen to me if I take part?

You will be asked to switch off your mobile phones and to complete a pre-experiment questionnaire. You will then be asked to complete the following tasks:

1. Experience a Virtual Maze: You will be immersed in a virtual reality environment using the Meta Quest 3 headset, entering a specially designed virtual maze. You will be standing on a dish with a support rail (a WizDish) allowing you to walk around the maze.
2. Navigate Using Sensory Cues: Depending on the assigned group, you will use either audio cues or haptic feedback (vibrations at your waist) from a custom-made belt to find your way through the maze.
3. Find Your Partner: Your primary objective is to locate another participant in the maze using the sensory cues provided. How quickly and effectively you do this will contribute valuable data to our study.

You will be compensated with a £12 Amazon voucher per hour and the whole experiment should take approximately 60 minutes.

6. **Will I be recorded and how will the recorded media be used?**

Data such as tracking information from virtual reality equipment may be recorded. Additionally, your spoken responses during the experiment and answers during the interview may be audio recorded. Any audio recordings will be transcribed and deleted within 14 days. Data recorded during the experiment may be used for analysis, demonstration and further research. All data will be collected and stored per the UK Data Protection Act 2018 and GDPR.

7. What are the possible disadvantages and risks of taking part?

Users of virtual reality sometimes experience some degree of nausea. If at any time you wish to stop taking part in the study for this or any reason, please tell the researcher who will immediately end the experiment. As a safety precaution, we advise any participant not to operate heavy machinery (including driving) for two hours after the study.

Some users report 'flashbacks' and other side effects of using virtual reality equipment. Research suggests using virtual reality may cause short-term disturbances in vision.

Virtual reality can be a trigger for photosensitive epilepsy. You will be asked to confirm that you do not have photosensitive epilepsy.

8. **What are the possible benefits of taking part?**

You will be compensated with a £12 Amazon voucher per hour for your participation. You will get to experience a novel virtual reality experience. Additionally, it is hoped that this work will improve understanding of how users interact with virtual reality. The ultimate goal is to make virtual reality more successful as a technology.

9. **What if something goes wrong?**
   Should you wish to raise a complaint, please contact principal researcher Anthony Steed using the contact details above. If your complaint is not handled to your satisfaction, you can contact the Chair of the UCL Research Ethics Committee at ethics@ucl.ac.uk.

10. **Will my taking part in this project be kept confidential?**
    All the information that we collect about you during the research will be kept strictly confidential. You will not be able to be identified in any ensuing reports, publications, or other dissemination. Data such as tracking information from display equipment and other sensors may be recorded and stored with a unique participant number. It will not be possible to identify participants through this data. Any audio recordings will be transcribed and deleted within 14 days.

    To facilitate the removal of your data from the project, should you wish to withdraw, a record matching your name and participant number will be made on a piece of paper separate from all other data collected and kept in a locked cabinet. The record will be destroyed by shredding the relevant paper seven days after the completion of the data collection. Once the record is shredded, the collected experimental data will be completely anonymous.

11. **Limits to confidentiality**
    Please note that assurances on confidentiality will be strictly adhered to unless evidence of wrongdoing or potential harm is uncovered. In such cases, the University may be obliged to contact relevant statutory bodies/agencies.

12. **Use of Deception**
    Research designs often require that the full intent of the study not be explained before participation. Although we have described the general nature of the tasks that you will be asked to perform, the full intent of the study will not be explained to you until after the completion of the study, at which point you may withdraw your data if you wish.

13. **What will happen to the results of the research project?**
    We aim to publish the results of the research as part of research papers in relevant journals or conferences. Should you wish to obtain a copy of the published results, please contact the researchers using the contact details above. Any published results will be available as open access in the UCL library. You will not be personally identified in any report or publication, and it will not be possible to personally identify participants from any data presented.

    Anonymised data may be stored for subsequent research.

14. **Data Protection Privacy Notice**

    Notice:
    The data controller for this project will be University College London (UCL). The UCL Data Protection Office provides oversight of UCL activities involving the processing of personal data and can be contacted at dataprotection@ucl.ac.uk.

    Your personal data will be processed for the purposes outlined in this notice.

Further information on how UCL uses participant information can be found in our 'general' privacy notice for participants in research5 studies: https://www.ucl.ac.uk/legal-services/privacy/ucl-general-researchparticipant-privacy-notice.
All of your personal information will be treated under the data protection legislation (GDPR and UK Data Protection Act 2018).

The categories of personal data used will be as follows: Name, age, and gender.

The lawful basis that would be used to process your *personal data* will be the performance of a task in the public interest.

Your personal data will be processed so long as it is required for the research project. If we can anonymise or pseudonymise the personal data you provide we will undertake this and will endeavour to minimise the processing of personal data wherever possible.

If you are concerned about how your personal data is being processed, or if you would like to contact us about your rights, please contact UCL in the first instance at data-protection@ucl.ac.uk. If you remain unsatisfied, you may wish to contact the Information Commissioner's Office (ICO). Contact details, and details of data subject rights, are available on the ICO website at: https://ico.org.uk/for-organisations/data-protection- reform/overviewof-the-gdpr/individuals-rights/

15. **Who is organising and funding the research?**
    The research is funded by University College London
16. **Contact for further information**
    Anthony Steed
    Office: 169 Euston Road, room 4.10, NW1 2AE.
    Phone: +44 (0)20 3108 7112

Should you wish to take part, you will be given a copy of this information sheet and a signed copy of your consent form to keep. Thank you for reading this information sheet and for considering taking part in this research study.

Sign up and pre-experiment survey

Hi! To take part in our user testing, please complete this form. It would be great if you can submit your response by 23 March 2024. Thank you!

* Required

Notice

Please note that you will not be able to participate in this study if you have previously suffered an epileptic episode, if you have any type of colour blindness or if you have consumed alcohol within the last 6 hours before the sessions. If you take part in the study we will advise you not to operate heavy machinery (including driving) for two hours after completing the study.
You will be randomly allocated to 1 of 2 experiments. If you get allocated to the haptic experiment, you would need to wear a custom made belt which will have small motors attached on the inside which will vibrate during the experiment. These motors cannot be in direct contact with your skin, but we ask you to only have a thin clothing in between the belt and your skin to ensure you can feel the vibrations.

Please read the Participation Information Sheet for more information: vr_cs_inlab-Participant+Information-final.docx [old - https://tinyurl.com/ytytdv4s]

Consent form: vr_cs_inlab-Consent+Form-final.docx

1. Email

2. Have you chosen a time slot: https://forms.office.com/e/xDK8ZNTQS9 *

- ◯ Yes
- ◯ No

3. Age (years) *

- ◯ < 18
- ◯ 18 - 25
- ◯ 25 - 50
- ◯ > 50

4. Occupation

5. Do you have any health conditions that might affect your participation in a virtual reality experiment? (e.g., epilepsy, severe motion sickness)

6. Are you currently taking any medication that could influence your balance or perception?

7. Do you have any physical disabilities or limitations that we should be aware of? (e.g., difficulty standing or walking for extended periods)

8. How would you rate your familiarity with virtual reality technology? *

- ◯ 1 (I do not know)
- ◯ 2
- ◯ 3
- ◯ 4
- ◯ 5 (very experienced)

9. Have you previously participated in any VR experiments or games? *

- ◯ No
- ◯ Yes

10. Do you have any sensory impairments that might affect your experience with audio or haptic feedback (vibrations felt at your waist)?

11. Do you understand that your data will be used anonymously for research purposes? *

- ◯ Yes

12. Do you specifically want to opt out of one of the 2 experiments? *

- ◯ I want to opt out of audio
- ◯ I want to opt out of haptic
- ◯ I do not mind either

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Microsoft Forms

Post-experiment survey

Thank you for taking part in our experiment! Please fill-in the survey after you complete the experiment.

* Required

Pair ID

1. Please fill in your pair ID provided by our researcher *

Spatial Audio survey

2. Did you participate in spatial audio VR experiment? *

- ◯ Yes
- ◯ No

Spatial Audio VR experiment

3. How easy did you find navigating the virtual maze with spatial audio? *

- ◯ 1 (extremely difficult)
- ◯ 2
- ◯ 3
- ◯ 4
- ◯ 5 (extremely easy)

4. How confident did you feel about the direction you were going based on the sensory cues provided by the spatial audio? *

- ◯ 1 (extremely not confident)
- ◯ 2
- ◯ 3
- ◯ 4
- ◯ 5 (extremely confident)

5. How intuitive did you find the controls and navigation within the virtual environment using spatial audio? *

- ◯ 1 (very confusing)
- ◯ 2
- ◯ 3
- ◯ 4
- ◯ 5 (very intuitive)

6. Did you experience any discomfort or motion sickness for using spatial audio during the experiment? *

7. How comfortable was the intensity of the audio feedback? *

- ◯ 1 (very uncomfortable)
- ◯ 2
- ◯ 3
- ◯ 4
- ◯ 5 (very comfortable)

8. How helpful was the audio feedback in solving the task of finding the other participant? *

- ◯ 1 (very unhelpful)
- ◯ 2
- ◯ 3
- ◯ 4
- ◯ 5 (very helpful)

9. The audio feedback made you feel like you were in the same physical space as the other participant. *

- ◯ 1 (strongly disagree)
- ◯ 2
- ◯ 3
- ◯ 4
- ◯ 5 (strongly agree)

Haptic Belt survey

10. Did you participate in haptic belt VR experiment? *

- ◯ Yes
- ◯ No

Haptic Belt VR experiment

11. How easy did you find navigating the virtual maze with haptic belt? *

- ◯ 1 (extremely difficult)
- ◯ 2
- ◯ 3
- ◯ 4
- ◯ 5 (extremely easy)

12. How confident did you feel about the direction you were going based on the sensory cues provided by the haptic belt? *

- ◯ 1 (extremely not confident)
- ◯ 2
- ◯ 3
- ◯ 4
- ◯ 5 (extremely confident)

13. How intuitive did you find the controls and navigation within the virtual environment using haptic belt? *

- ◯ 1 (very confusing)
- ◯ 2
- ◯ 3
- ◯ 4
- ◯ 5 (very intuitive)

14. Did you experience any discomfort or motion sickness for using haptic belt during the experiment? *

15. How comfortable was the intensity of the haptic feedback? *

- ◯ 1 (very uncomfortable)
- ◯ 2
- ◯ 3
- ◯ 4
- ◯ 5 (very comfortable)

16. How helpful was the haptic feedback in solving the task of finding the other participant? *

- ◯ 1 (very unhelpful)
- ◯ 2
- ◯ 3
- ◯ 4
- ◯ 5 (very helpful)

17. The haptic feedback made you feel like you were in the same physical space as the other participant. *

- ◯ 1 (strongly disagree)
- ◯ 2
- ◯ 3
- ◯ 4
- ◯ 5 (strongly agree)

Overall experience

18. Which sensory cue(s) do you prefer to use? *

- ◯ Spatial Audio
- ◯ Haptic Belt
- ◯ Both the same
- ◯ I only participate in one sensory experiment

19. How easy did you find navigating the virtual maze? *

- ◯ 1 (extremely difficult)
- ◯ 2
- ◯ 3
- ◯ 4
- ◯ 5 (extremely easy)

20. How would you describe your overall experience with the VR system? *

21. Did you encounter any difficulties while using the system? *

22. Do you have any questions?

23. Would you be interested in participating in future VR studies?

- ◯ Yes
- ◯ No

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