

ENGINEERING

Virtual Reality research during COVID-19 Pandemic

An increasing number of virtual reality (VR) environments are in development and consequently, the need to evaluate these safely and systematically has arisen. However, evaluating these applications in the midst of a global pandemic poses challenges for researchers. To our knowledge, no systematic methods for evaluating VR environments exist which address both the safety and methodological issues related to this type of research. To address this gap, we propose a protocol for researching VR environments that aims to reduce participant and researcher risk of COVID-19 infections, and reduce inaccuracies in data collection which could result in misleading findings. This protocol adopts safety recommendations from the World Health Organisation, the German Government's central scientific institution in the field of biomedicine, the Robert Koch Institute and the health and safety guidelines of a major science and technology company invested in evaluating VR environments.

The protocol offers guidance for organizing the physical environment to minimise the risk of infection. For example, only one participant and one researcher should be present in the same room at the same time and should maintain a distance of at least 1.5 meters, the room should meet the minimum size requirements suggested by local regulations, and the room should be well ventilated. Furthermore, the protocol stipulates the need to divide the research room into pre-defined areas with safety markings on the floor. This precaution aims to reduce the risk of contamination through proximity between researcher and participant. In addition to physical environment guidelines, guidance for personal safety behaviour is also included. For example, FFP2 class face masks must be always worn by both researcher and

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European Training Network for Chemical Engineering Immersive Learning
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Our motivation
An increasing number of virtual reality (VR) environments are in development and consequently, the need to evaluate these safely and systematically has arisen. However, evaluating these applications in the midst of a global pandemic poses challenges for researchers. We propose a protocol for researching VR environments which aims to reduce participant and researcher risk of COVID-19 infections and reduce inaccuracies in data collection which could result in misleading findings. This protocol adopts safety recommendations from the World Health Organization, the Robert Koch Institute (Germany) and the health and safety guidelines of a major science and technology company invested in evaluating VR environments.

Our proposed protocol
The protocol offers guidance for organizing the physical environment to minimize the risk of infection. The activities of a testing day will be divided in different rooms: one room for questionnaires and evaluations; one room for VR experience.

Main guidance against COVID-19
Only 1 researcher and 1 participant per room
10 m² per person per room → minimum room size
Well ventilated room: every 20 minutes open completely for 5 minutes (if can not be open all the time)

Researcher protection
Disinfect hands
Wear face mask
Wear face shield
Use extra set of controllers and VR headset to demonstrate
Go to Green area

VR equipment disinfection
Clean table for VR headset
Take off VR headset
Disinfect hands
Clean VR headset
Clean controllers
Clean VR headset
Turn on VR and set up simulation
Disinfect hands
Optional: hand cream

VR Experience
Go to Red area
Grab clean VR headset and controllers
Sit on chair
Wear controller straps
Wear VR headset
Experience VR
Disinfect hands
Optional: hand cream

Participant protection
Take off old face mask
Disinfect hands
Wear new clean face mask
Go to Green area

Pre-room
Disinfect hands
Wear face mask
Wear face shield
Use extra set of controllers and VR headset to demonstrate
Go to Green area

VR room
The VR room will be divided in clear delimited zones, in which a specific protocol for the participant and researcher will be followed to minimize the risk of infection. These sites are listed in the flowchart.

Pre-Event
Process information
Detail time appointment
Do not come with positive contact

Post-Event
Disinfect hands
Wear face mask
Wear face shield
Use extra set of controllers and VR headset to demonstrate
Go to Green area

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participant, they must sanitise their hands at crucial stages of the research, and the researcher must ensure that the VR head-mounted display and controllers are clean for the participant prior to use.

