Using virtual reality to improve safety

In November 2017, the first virtual reality (VR) safety experiment took place at CERN, giving more than 100 participants the opportunity to experience the Future Circular Collider (FCC) tunnel through a virtual model. For one week, a team of researchers from Lund University were on site, working closely with CERN’s HSE unit to conduct the VR tests as part of the FCC study. A conceptual particle accelerator housed in a new 100 km tunnel offers a unique opportunity to rethink current approaches to safety and to come up with novel concepts, such as the use of virtual reality tools to assess safety. The stereoscopic 3D and motion-tracking capabilities of virtual reality headsets create an immersive and interactive 360° environment, where different safety features and scenarios can be easily tested.

The aim of this VR experiment was twofold. Firstly, to assess how virtual reality can be used to understand human behaviour in a simulated environment, and secondly, as safety is a top priority for CERN, to test some of the safety measures currently planned for the FCC. The VR experiment was designed to test how those present in the tunnel would interpret different way-finding systems guiding them to evacuation routes. Quick identification is vital since it minimises the evacuation time. In addition, the experiment allows the concept of compartmentalisation, an option that is being actively explored for the FCC tunnel, to be tested.

“Is the proposed flashing light signal effective? Can we use robots similar to the overhead monorail inspection system currently operating in the LHC to correctly deliver the message and reduce evacuation times while improving safety? These are just two of the questions the VR experiments will help us answer,” explains Oriol Rios from the HSE unit, who is involved in the FCC study.

The results of CERN’s VR experiment are valuable not only for the FCC. They can also be applied to other large-scale research facilities and extended to other scenarios. “The high immersion level obtained allows different emergency situations to be simulated in a safe, economical and efficient way,” explains Rios.

In the coming months, the team will analyse the results and draw conclusions about the
feasibility of the VR approach with a view to refining it for both the FCC study and the existing research infrastructure. The results will also be used on further studies in the framework of the FCC fire safety collaboration, a global network including experts from Fermilab, DESY, MAX IV, the ESS and Lund University, led by Saverio La Mendola of CERN’s HSE unit.

by Panagiotis Charitos