

New construction training lab perches students on 100-metre-high skyscrapers in the classroom



A pioneering project that will see Edinburgh College construction students suspended 100 metres in the air without even leaving the classroom has been launched.

Heriot-Watt University and Edinburgh College have joined forces to develop mixed reality and motion tracking technology for the construction industry. This allows construction students and workers to experience realistic site conditions in a safe environment, including simulating the feeling of being hundreds of feet up in the air. The wearable motion tracking technology will also provide feedback on how trainees are working.

The prototype technologies are part of the new Immersive and Controlled Environment (ICE) Lab, based at Edinburgh College using technology developed at Heriot-Watt University. These technologies have not yet been used for manual construction training and could enhance training standards, particularly in productivity and health and safety.

The first stage of the mixed reality part of the project has been developed and immerses users – who wear a virtual reality headset – in simulations of challenging working conditions such as working at heights above 10metres, which is not currently possible in further education. The second stage of this is in development and will eventually allow users to manually interact with objects in both the real and virtual world at the same time. For example, mixed reality will enable

trainees to construct a real brick wall in the college workshop while being immersed in the simulation.

The other part of the ICE Lab project involves creating wearable technology that tracks the motion of users. This will provide data to assess construction trainees and professionals' performance. For example, it could provide information about how students conform to training standards and how this could potentially affect their health. Early testing of this is underway and has shown encouraging results.



The project has been developed by a multi-disciplinary team at Heriot-Watt University covering construction IT and training, health, computer science and engineering. The team believes the ICE Lab, which is funded by the Construction Industry Training Board (CITB) and developed with the support of the college, is the first of its kind in the world aimed specifically at the construction trade. It is hoped that the lab will help raise industry standards and develop an innovative way of training the next generation of construction workers. As well as being a technological advance, the equipment is portable and much lower cost than alternative methods such as turning entire classrooms into immersive environments.

Edinburgh College students will be the first to trial the lab's technology, which has the potential eventually to be used in the college's construction curriculum for specific training scenarios.

Dr Mohamed Abdel-Wahab, a lecturer in construction management and technology at Heriot-Watt University and co-principal investigator of the project, said: "The construction industry has been traditionally slow at embracing new technologies. The ICE Lab presents an opportunity for the industry to demonstrate leadership in innovation by pushing the boundaries

of mixed reality and motion tracking technologies.”

Dr Frédéric Bosché, the project’s co-principal investigator and lecturer in construction IT at Heriot-Watt University, added: “From a technological viewpoint, we are using state-of-the-art sensing and data-processing solutions and aim to integrate them in a unique way. This project is thus world leading not just by its focus on construction manual trade training, but also by the technological advancements it is attempting to make. Our team is really excited about this opportunity.”

John Laing, head of the Institute of Construction and Building Crafts at Edinburgh College, said: “We are thrilled to be part of the ICE Lab project. Our students will be the first to use the technology, which means they are at the forefront of the latest training.

“The project represents partnership working at its very best. It brings together the vision of two educational organisations as well as industry expertise to create pioneering training methods. The college realises the vital importance of keeping abreast of the latest technology and discovering new ways to engage our students and further enhance the industry, and it’s partnerships like these that give our students the vital experience and skills to succeed in a highly competitive industry.”

Phil Ford, skills strategy manager at CITB, said: “CITB is delighted to support the soft launch of the ICE Lab at Edinburgh College, which is an important step in developing a new ground-breaking approach to addressing health and safety in construction through the innovative application of cutting-edge technology.

“As the project continues to develop, it will be great to see more colleges taking advantage of the opportunities that this

new approach can offer.”

The project team includes the university’s Dr Ivy Shiue (health), Dr Ludovico Carozza and Aparajithan Sivanathan (both computer science and engineering).