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EXOSUIT: A TRAINING SYSTEM FOR FUTURE ASTRONAUTS BASED ON AN EXOSKELETON  
AND MIXED REALITY

**Abstract**

The number of space travellers is expected to dramatically increase in the next few decades. However, current tools for astronauts are not well-adapted to the needs of mass training for microgravity environments. This work describes a training system that requires a low level of supervision while also allowing high flexibility, scalability, customization, safety and immersion. It is based on an upper-body exoskeleton and a Virtual Reality environment that work seamlessly to replicate the movements of the trainees while also allowing force feedback. With this bilateral communication, the movements of the trainees are replicated in the virtual world in real time, and the users are able to feel the forces involved in different activities such as grabbing, pushing, pulling, drilling or even feeling the constraints of the Extravehicular Mobility Unit. Actually, astronauts usually reported the importance of feeling these dynamic interactions and constraints to accurately simulate the tasks in microgravity. Experimental tests will be carried out in Spring 2021 with members from the European Astronaut Centre (EAC).