

Lessons learned

Virtual Reality in general improves the results of distance learning by adding a visual component for more realistic trainings and exercises.

3D panoramas suit well for teaching. They will keep the student's interest on the content itself without being eventually defocussed by moving around on the virtual playground. The development effort is comparably small but still remarkable.

Gamification enables realistic exercises where students can alter the virtual environment according to their skills and immediately check the results of their action. The development effort is very high compared to panoramas.

What we can do for you

ISS is able to adjust both solutions according to your particular needs. The virtual environment as well as the system's behavior can be adjusted to any type of facility, plant, office and to any purpose you may think of, e.g. supporting

- Training classes
- Security exercises
- Awareness campaigns
- Preliminary tests of planned changes
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Please do not hesitate to contact us for a discussion of your requirements or ideas!



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Virtual Reality

for Education & Training

Introduction

High-end knowledge about physical protection and cyber security for nuclear facilities, institutions and materials is very rare and focused on a few geographical spots whereas people urgently seeking for it are widely spread all-over the world. Bringing the students into places where the skills reside is costly and in many cases unaffordable. New methods and technologies are required to transport the know-how without moving teachers or students in order to set-up and maintain a huge community of experts being able to protect the respective nuclear assets in their countries.

Crossing the chasm

For that reason the Institute for Security and Safety (ISS) at the Technische Hochschule Brandenburg launched its MiNS (Master in Nuclear Security) program, supported by international cooperation partners and the IAEA. MiNS addresses international students wanting to add nuclear security to their skillset, approved by a recognized master degree. The program is based on digital distance learning, currently deployed on a Moodle elearning system. Moodle will provide static contents enriched by a few dialog elements, e.g. interactive tests.

Practice is key

The success of teaching physical protection depends to a very high degree on practical exercises. This requires a real environment or an environment of which the characteristics get close to those of the real world. Only in this case students will be able to perform exercises with persistent learning effects. Training facilities for physical protection suffer from the same problem as the respective knowledge itself – too few and widely spread. On the other hand, a standard elearning system made for static text content can hardly provide the requested level of learning experience.

At this stage VIRTUAL REALITY enters the playground.

Virtual Reality has different flavors

Having noticed this, ISS started to investigate computer aided virtual reality technologies, which are much more flexible than e.g. a representational plastic model discussed during a classroom training and which are more suitable for digital distance learning.



As a result of the investigations the decision was made to follow-up two distinct VR technologies offering different approaches for teaching and training:

- 3D panorama
- gamification

3D Panorama

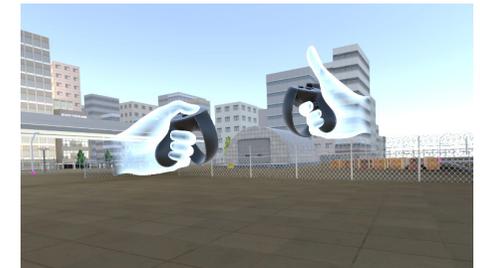
3D panoramas provide a semi-dynamic view to the virtual environment. By using professional 3D modeling and virtualization tools, ISS created a hypothetical model of a nuclear facility with interactive capabilities. Now students can get a 3D view to the object, change their viewpoint to several predefined locations, look around 360 degrees and cause events that may pop-up learning content, play a video, perform a quiz or switch to a new panorama to continue the exercise.



More action required: gamification

3D panoramas have their limitations. Although the view can dynamically be influenced by the student, the model itself always stays unchanged. Learning successes do not have any immediate effect on the environment. Gaming technologies are able to overcome this issue.

ISS decided to use UNITY, a very popular game development platform, publically available and taught at many universities. With the UNITY approach the students get the full freedom of moving around on the playground, of changing the facility, e.g. putting in barriers and immediately experience the effect of their actions. As well, the output can be redirected to virtual reality headsets, integrated sensors may be used to detect user interaction.



A competitive approach

Excitement creates interest and memorable teaching results. It comes by itself when students work together and compete against each other in teams. A networked multiplayer team exercise as currently developed at ISS on the existing UNITY platform will enable students in distinct locations to come together in a virtual facility, perform tasks to implement or improve physical protection systems and immediately rate the efficiency while being under attack by members of an opposing team.

Future developments might encompass augmented reality parts (3D models of existing facilities combined with generic information converged on the display) or the consideration of real life signals e.g. of alarm systems, cameras, controllers....