Mini-Cave Automatic Virtual Environment Application in Security, Safety, and Defence Studies

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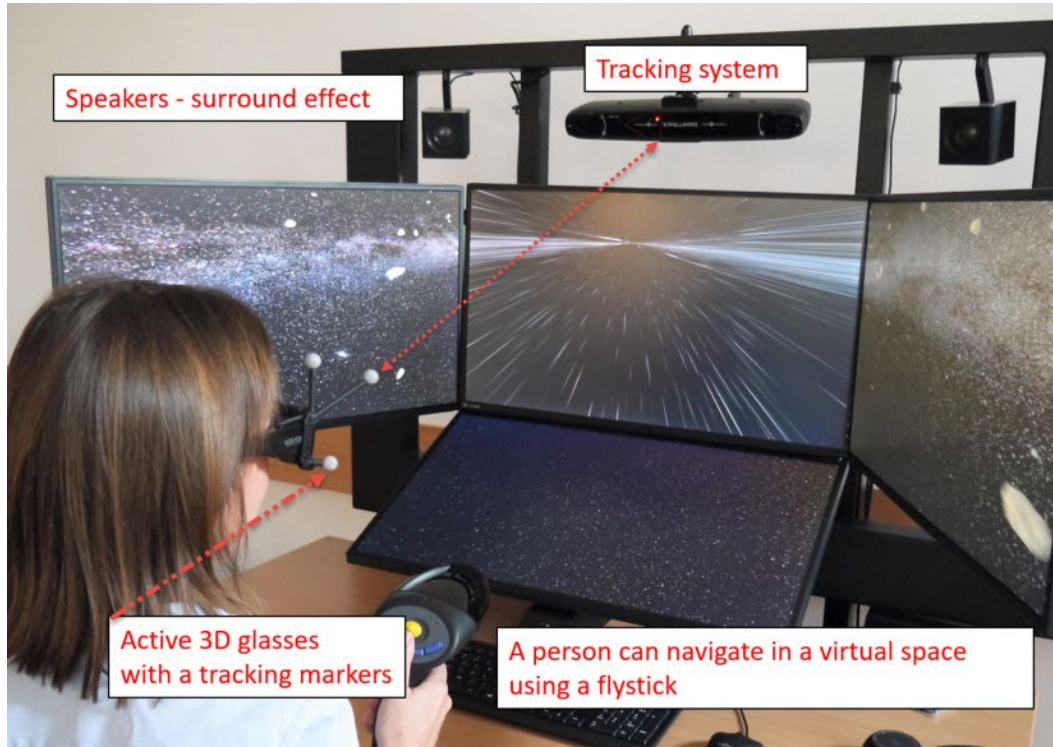
Aim

to analyse the use of mini-Cave Automatic Virtual Reality Environment (mini-CAVE) in academic studies on security, safety, and defence, specifically to recognize its wider application

Cave Automatic Virtual Environment (CAVE) is *a 3D, video and auditory environment. Usually, it comprises four or six walls on which images are displayed. The device provides an illusion of being surrounded by a fictional world with a fully interactive, scientific visualization.*

S. Manjrekar, S. Sandilya, D. Bhosale, S. Kanchi, A. Pitkar, and M. Gondhalekar, "CAVE: An Emerging Immersive Technology - A Review," UKSim International Conference on Computer Modelling and Simulation. pp. 131-136, 2014.



Case study

“Study of the parameters determining training in the area of security and defense in a 3D environment” financed by the Ministry of National Defense of the Republic of Poland.

Project Partner: Immersive 3D Visualization Lab (I3DVLab), Faculty of Electronics, Telecommunication, and Informatics, Gdańsk University of Technology, Prof. Jacek Lebiedź, PhD Eng.

Contractor: Integra AV

Scenarios: (1) solar system (2) how to behave when a military vehicle is disposed? (3) personal data protection

Technical parameters of the mini-CAVE:

- Number of monitors: 4 (27"), resolution: 2560x1440
- Number of computers: 1 (with the required extensions - glasses synchronization, 3D display)
- Active 3D glasses
- Manipulator (Flystick)
- Tracking system: Infrared (smart track - cameras that track the trackers are placed in glasses and a manipulator to control)
- Environment: Unity3D
- Position: Single

Qualitative results

The mini-CAVE could be used for
(1) scenarios development

(2) prototyping, or research/testing (user experience tests)

* therapy (PTSD)

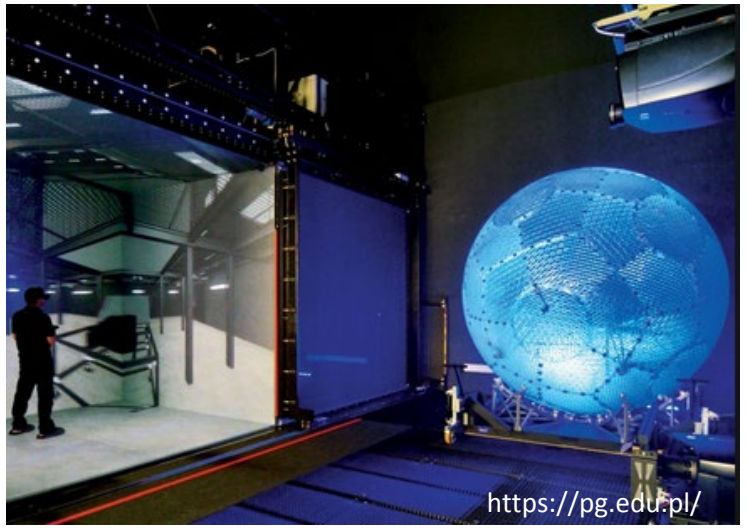
Some specifications for using the mini-CAVE as a didactic and research tool:

- individual training can be performed for minimization of learning gaps; in case of a group training an individual may not be effective or comfortable;
- regarding a single-user usage, the cost of the tool used for training purposes only can be perceived as unjustified;
- if performed in a group, short training sessions in the CAVE can be implemented in the training (one person does an exercise and the peers observe and contribute to an overall evaluation);
- in the case of several connected mini-CAVEs (or additionally other VR devices), the training can also be performed in a team according to the distributed interactive systems model;
- detailed objects can be presented, assembled or reassembled; decision-making tasks, habits can be reinforced and learned;
- different topics can be introduced depending on the teacher's ideas;
- for security, safety, and defence areas of study, different didactic forms can be used; for instance, simulation, experiment, presentation.

Conclusions

The application of the mini-CAVE supports didactic and research activities, specifically in creating 3D scenarios for teaching concepts and processes, and simulating situations related to saving life and health.

In the future interfaces can affect almost all human senses; their widespread use in science and didactics remains a matter of time



Thank you

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