UNIVERSITÉ Clermont Auvergne

Subject: Virtual Reality and artificial Intelligence as an aide to decision making in natural risk.

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Abstract (up to 10 lines): The thesis will develop Virtual Reality tools to allow multiple users to be immersed in a hazard prone topography, to simulate large-scale natural phenomena in order to minimize socio-economic vulnerabilities. The PhD student will take these simulation codes to Virtual Reality and optimize the simulation for real-time visualization. He/she will then have to study human behavior and reactions to this type of event, using distributed artificial intelligence (multi-agent system or rule engine), integrating visual and auditory perception. The analysis of data (topography, meteorology, anthropic activity, customs, ethics...) at the input of a machine learning algorithm will allow to establish rules for decision support and prevention of natural risks.

Skills: Computer scientist, engineer, knowledge of virtual reality tools

Keywords: Virtual Reality, Natural Risks

Description (up to 1 page):

The ERASMUS+ 3DTeLC project (http://3dtelc.lmv.uca.fr/) has shown the contribution of virtual reality to the communication of natural hazards. The prospects are to allow several users to be immersed in a hazard-prone topography and to simulate large-scale natural phenomena in order to minimise socio-economic vulnerabilities. LMV staff and their colleagues at the Clermont Challenge 4 'risks' are specialized in natural hazards and develop codes to simulate pyroclastic flows, lava flows, landslides, tsunamis. Our international partners are involved in the machine learning, ontology and semantics of natural hazard data representation.

Initially, the PhD student will carry these simulation codes into virtual reality and optimize the simulation for real-time visualization. The methodology will have to be adaptable to devastating geological and meteorological phenomena. Then he/she will have to study human behaviour and reactions to this type of event, using distributed artificial intelligence (multi-agent system or rule engine), integrating visual and auditory perception. The analysis of data (topography, meteorology, anthropic activity, customs, ethics...) at the input of a machine learning algorithm will allow to establish rules for decision support and prevention of natural risks. The project is a logical continuation of

the 3DTeLC ERASMUS+ project, and we will aim at an international co-tutorship with our several university partners, or Canadian/Italian or British private partners.

References

Alessandro Tibaldi, Fabio Luca Bonali, Emanuel Delage, Pareskevi Nomikou, Varvara Antoniou, Ugo Becciani, Benjamin van Wyk de Vries, Dr Mel Krokos & Dr Malcolm Whitworth, Real world-based immersive Virtual Reality for research, teaching and communication in volcanology, 28 Apr 2020, In : Bulletin of Volcanology. 82, 38.

How to candidate?

Contact the supervisor