

Virtual Environments 2007 IPT-EGVE 2007

**13th Eurographics Symposium on Virtual Environments
10th Immersive Projection Technology Workshop**

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July 15th–18th, 2007**

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Preface

IPT-EGVE 2007 is a joint international event consisting of the tenth Immersive Projection Technology Workshop and the 13th Eurographics Virtual Environments Symposium. This forum fosters the exchange of the latest research results as well as experience and knowledge among researchers, developers and users concerned with virtual reality, augmented reality, mixed reality and 3D user interfaces. This year the symposium is held in conjunction with the 4th VR/AR Workshop of the Gesellschaft für Informatik e.V. (GI), the German Informatics Society, in order to allow young researchers and students to participate in both events.

The symposium has an interesting and high-quality program this year, including thirteen full papers, eighteen short papers, ten posters, a keynote talk, and two panels. These proceedings contain the thirteen full papers. The short papers and posters are printed in the accompanying short paper and poster proceedings. Each submission was reviewed by two members of the program committee and two external reviewers. The IPT-EGVE Symposium program consists of six paper sessions on the following topics: Display Technology, Tracking and Measuring, Studies, Interaction, Image Generation and VR/AR Systems and Techniques. The keynote is given by Professor Dr. Gert Pfurtscheller from the Laboratory of Brain-Computer Interfaces at Graz University of Technology. He will introduce the components of a Brain-Computer interface and discuss the feasibility of virtual wheelchair control by thought.

We wish to thank the members of the international program committee and the external reviewers for their thorough reviews of the submitted papers in a very short review cycle. We are especially grateful to Stefanie Behnke, who compiled the proceedings and directed us through the submission and proceedings production process with great experience and foresight. We would also like to acknowledge the sponsorship of the Eurographics Association and ACM Siggraph as well as the companies and organizations who helped us by sponsoring the event: EST - Engineering Systems Technologies, Intersense Inc., Virtools, and the INTUITION Network of Excellence. We are particularly thankful to our local host Bauhaus-Universität Weimar and its many involved people. Special thanks to Brigitte Höser for local arrangements and logistics, Alexander Kulik for enormous help throughout, Weimar's Virtual Reality Systems Group PhD students Jan Hochstrate, André Kunert, Christopher Lux, Hans Pabst, and Jan Springer for their invaluable support, Christin Gläser and the many local students who helped to make this a successful event.

IPT-EGVE 2007 will be held in Weimar, Germany. Weimar is a great yet small historic town of culture with its beautiful old centre, impressive museums and picturesque parks and gardens. We invite you to join us for four exciting days of presentations, panels, exhibits, special events, and cultural experiences.

Bernd Fröhlich, Bauhaus-Universität Weimar, Germany
Roland Blach, Fraunhofer IAO Stuttgart, Germany
Robert van Liere, CWI Amsterdam, Netherlands
IPT-EGVE 2007 Symposium Co-Chairs

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Keynote

Wheelchair Control from Thought: Simulation in an Immersive Virtual Environment

Prof. Dr. Gert Pfurtscheller

Laboratory of Brain-Computer Interfaces,
Graz University of Technology, Austria



Abstract

Wheelchair control from thought by a tetraplegic patient can be realized, either in reality or in immersive virtual environments (VE). The advantage of VE is that they can be used for rehearsal of scenarios that are in the real world too dangerous or costly or even impossible. The prerequisite for such a control is a Brain-Computer Interface (BCI), whereby the output controls the VE. Such a BCI is able to record, detect and classify changes in brain signals during different mental activities as e.g. imagination of foot movement (motor imagery).

Within the lecture the components of a BCI are introduced and the feasibility of wheelchair control is demonstrated. In detail, invasive and non-invasive signal recording methods (multiunit activity, ECoG, EEG and metabolic activity), mental strategies (visual attention, motor imagery), modes of operation (synchronous vs. asynchronous BCI) and impact of visual feedback are discussed.

References:

Pfurtscheller, G. et al.: Walking from thought. *Brain Res.* (2006)

Pfurtscheller, G. et al.: 15 years of BCI research at Graz University of Technology: Current projects. *IEEE Trans Neural Sys. Rehab. Eng.* (2006)

Pfurtscheller, G. et al.: Viewing Moving Objects in Virtual Reality Can Change the Dynamics of Sensorimotor EEG Rhythms. *Presence: Teleoperators and Virtual Environments*, MIT Press, Cambridge, (2007)

Short Biography

Gert Pfurtscheller received his MS and Ph.D degrees in Electrical Engineering from the Graz University of Technology, Graz, Austria. He has been visiting Professor at Cape Town University and Vancouver University, Full Professor of Medical Informatics, Professor of Brain Computer Interfaces at the Graz University of Technology (TUG) and is Adjunct Professor since October 2006 at TUG. He was Head of the Institute of Biomedical Engineering, Director of the Ludwig Boltzmann Institute for Medical Informatics and Neuroinformatics and is Founding Director of the Brain-Computer Interface Laboratory (BCI-Lab) at the TUG.

Gert Pfurtscheller published the first article on Event-Related Desynchronization (ERD) in 1977, is involved in Brain-Computer Interface (BCI) research since 1992, partner of a number of NIH/USA and European projects and since January 2006 responsible for working packages in two European projects related to BCI research. He has authored more than 300 publications in peer-reviewed journals and published 4 books. He was honoured by election as a member of the Austrian Academy of Science.