Predslov / Editorial

This special ITA journal issue is a selection of papers from visual computing research at Comenius University in Bratislava – top research group in the field of visual computing in Slovakia. This group has a close connection to the Faculty of Informatics at the Paneuropean University (FI PEVŠ) and several professors were and are still involved in the common activities. One of them is organization of the Spring Conference on Computer Graphics (SCCG) conferences, the oldest annual computer graphics event in Central Europe. Approaching the celebration of 30th anniversary soon, in 2014, it was established by an initiative of ITA Editorial board member Eugen Ružický (now dean of FI PEVŠ) and Peter Mederly in mid 80s. Thanks to computer graphics boom in recent decades the group attracted tens of excellent students, among whom are now many internationally recognized scientists and successful software specialists. Three group members succeded to publish even at ACM SIGGRAPH, the world leading conference in the field: Miloš Šrámek (tutorial on volume rendering), Roman Ďurikovič (mouse embryo visualization), and Ján Žižka (CATRA system for eye disease diagnostics). The most popular initiatives of the group seem to be a Virtual Bratislava, growing in multiple projects, education of hundreds of students a year, international student conference Central European Seminar on Computer Graphics (CESCG), and, recently, a scientific exhibition Virtuálny svet (Virtual World) 2012.

We perceive reality and process information given by both media and our sensory system. Human visual system is not completely understood and the same holds for light distribution in the scene. Both computer vision and graphics research communities manage the problem solutions by employing approximations. However, any approximate solution involves an error. The intermediate goal of visual information processing is to keep the errors bounded. The papers represent recent results in all three phases of computer graphics and vision methodology: geometry processing, rendering, and application specific visual computing. One can see that the unifying idea of all papers can be formulated as discovering the tricky solutions between speeding-up and rendering quality criteria.

In geometry processing, the universal tool for data representation are curves, but there appear complications with their singular points. Selected novel methods how to deal with specific real and complex cases describes the paper SINGULAR POINT OF CURVES - STRUCTURE, VISUALIZATION AND APPLICATION IN GEOMETRIC MODELING, co-authored by Martina Bátorová, Pavel Chalmovianský, Barbora Pokorná, and Miroslava Valíková.

For rendering research, there are two contributions. MODELING SEVERAL FLUIDS WITH PRESERVED VOLUME ON AN OCTREE DATA STRUCTURE, written by Roman Ďurikovič reports on a study of Volume-of-Fluid (VOF). Values of VOF are actually used to tract the fluid surface for visualization purposes and to calculate the surface tension forces acting on the fluid interfaces. This works well for multiple mixed fluids. In the second rendering paper VALIDATION OF THE VIRTUAL GONIO-SPECTROPHOTOMETER BASED ON THE REAL MEASUREMENTS, Andrej Mihalik and Roman Ďurikovič propose and implement a virtual gonio-spectrophotometer, which can be customized to allow measurements obeying industrial standards. The contribution is verified by a set of validation experiments.

The application section is opened by a structured report by Stanislav Stanek et al. surveying a VEGA project named SPINKLAR-3D: Motion Capture, Interaction and Cooperation between People and Avatars in 3D Augmented reality and virtual reality.

The interaction research using near infrared light is presented by Pavel Fabo and Roman Ďurikovič TOWARDS THE TABLETOP INTERACTION WITH FINGERS AND HAND. A SHORT INTRODUCTION INTO SEARCHING FOR BEST VIEWS for virtual heritage application wrote Ivana Varhaníková to discuss, finally, the importance of this approach to reduce authoring and visiting overload. A similar interest, addressed from the computer vision perspective, introduces a paper MODERN METHODS OF SEMANTICS EXTRACTION by Zuzana Černeková, Zuzana Haladová, Júlia Kučerová, Elena Šikudová. For making virtual space alive the CROWD SIMULATION PROBLEM EXAMPLES are described and evaluated by Jana Dadová, Roman Franta, Petra Gottlieberová, Dominik Kapišinský, and Ján Ruhalovský. Last but not least, Matej Novotný et al. co-authored a paper entitled MUVIS: A PUBLIC PARTICIPATORY URBAN PLANNING AND MULTIDIMENSIONAL VISUALIZATION ONLINE SYSTEM. This is currently a leading application project among Comenius University visual computing research achievements.

Combining geometric modeling, computer graphics, and computer vision methods develop the confluence of these research lines into a fertile research ground for contemporary visual computing

For conclusion, I have to recall the beautiful and clever words from Alexander Pasko, SCCG 2003 chair: "Dear ITA readers, this issue provides selected ideas and results, especially for those who are not only hypnotized by the visual quality of modern computer graphics works in modeling, rendering, and animation. We all know that such a work still requires tedious manual labor hampered by errorneous models and algorithms. Let us hope that the next spiral of development will make our work in computer graphics more close to a joyful mind game."

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