

## Report on Eurographics 2006

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### I. INTRODUCTION

The annual main conference of the European Association for Computer Graphics, Eurographics 2006, takes place from the 4th to the 8th of September 2006 in Vienna, Austria. It is co-organized by the Vienna University of Technology and the Austrian Academy of Sciences.

This year the conference site is split into two places: the Tutorials on Monday and Tuesday take place in a building of the Vienna University of Technology, the main conference Wednesday to Friday are held at the Austrian Academy of Sciences.

Together with the Eurographics 2006 main conference there will be several workshops:

- Sunday Sep. 3rd - Monday Sep 4th: Workshop on Graphics Hardware.
- Saturday Sep. 2nd - Monday Sep 4th: Symposium on Computer Animation.
- Sunday Sep. 3rd - Monday Sep. 4th: Workshop on Sketch-Based Interfaces and Modeling.
- Tuesday Sep. 5th: Workshop on Natural Phenomena.
- Saturday Sep. 9th: Workshop on Graphics Education.

### II. OPENING OF THE CONFERENCE



Fig.1. Opening of the conference

On Wednesday, 6<sup>th</sup> September, the opening of the Eurographics 2006 is held accompanying with Mozart's music at the Austrian Academy of Sciences.

Subsequently, Eurographics awards ceremony is presented. Eurographics currently presents three awards: The Distinguished Career Award, the Outstanding Technical Contributions Award, and the Young Researcher Award.



Fig.2. The left is Werner Purgathofer. The right is Thomas Ertl.

This year, the recipient of the Distinguished Career Award is Werner Purgathofer.

Werner Purgathofer did his PhD work at TU Vienna under the guidance of Wilhelm Barth and completed his PhD with a thesis titled "Identifikation und verzerrende Skalierung für eine höhere graphische Programmiersprache" in 1984. After his Habilitation in 1987 he was appointed as a University Professor at TU Vienna in 1988.

Purgathofer's initial contributions focused on stochastic sampling and its applications in ray tracing and radiosity algorithms. Later on he broadened the scope of the Vienna group and, together with Michael Gervautz, Eduard Gröller, Dieter Schmalstieg, Helwig Hauser, and many others, also reached out to application domains such as augmented reality and scientific visualization. These activities eventually culminated in the establishment of the Vienna Competence Center for Virtual Reality and Visualisation (VRVis), co-founded and chaired by him. During his career, Werner Purgathofer has established himself as one of the most prolific European researchers in Computer Graphics, and he has co-authored more than a hundred papers in the field.

Thomas Ertl is the recipient of the Outstanding Technical Contributions Award.

Thomas Ertl received a master's degree in computer science from the University of Colorado at Boulder and a PhD in theoretical astrophysics from the University of Tübingen. After his PhD, he became a professor of computer graphics and visualization at the University of Erlangen where he lead the scientific visualization group. Currently, he is a full professor of computer science at the University of Stuttgart, Germany and the head of the Visualization and Interactive Systems Institute (VIS) and the newly founded Visualization Center of the University of Stuttgart (VISUS).

The work of Thomas Ertl has had a profound impact with contributions on vortex extraction in turbulent flows (in IEEE Visualization 2005), on point-based visualization for

astrophysical datasets (in IEEE CG&A 2004), on GPU-based cell projection (IEEE TVCG 2003), on transparency in technical illustrations (Eurographics 2002), on pre-integrated volume rendering (Graphics Hardware 2001), on interactive remote visualization for medical applications (VisSym 2000), on 3D line integral convolution (IEEE Visualization 1999), and the pioneering work on the use of graphics hardware in volume rendering (SIGGRAPH 1998).

The recipients of the Young Researcher Career Award are Mark Pauly and Marco Tarini.

Mark received his Ph.D. in 2003 at ETH Zurich under the supervision of Markus Gross. From 2003-2005 he was a postdoctoral scholar at Stanford University. Since 2005, he holds a junior faculty position at ETH and directs the newly established Applied Geometry Group. Mark Pauly started his career in the field of point based modeling.

Mark Pauly started his career in the field of point based modeling. In his Ph.D. thesis he devised several novel methods for digital processing, filtering, and editing of point clouds which combined the simplicity of image-based editing with the power of more complex 3D modeling. In addition, Pauly designed various powerful algorithms for the interactive modeling and deformation of point sampled representations. He was one of the key researchers who developed Pointshop3D, a widely used Open Source software package. In addition, Mark Pauly worked successfully on problems related to physically-based simulation of deformable objects, fracture, contact and fluids and he investigated the problems of shape completion and symmetry.

Marco received his Ph.D. in Computer Science from the University of Pisa in 2003. As a Marie Curie fellow he joined the MPI for Computer Science in 2002. Since 2005, he holds a junior faculty position at the University of Insubria (Varese, Italy), while still collaborating with the Visual Computer Lab at ISTI-CNR (Pisa, Italy).

Marco is a prolific researcher who contributed to several areas within graphics, such as real time rendering, 3D acquisition techniques and visualization. Many of his works concern texture mapping, focusing on the seamless parameterization of shapes with arbitrary topology, the embedding of infinite precision vectorial features into 2D textures, or the synthesis and rendering of detail textures produced from huge geometric models. In the field of 3D acquisition, he presented innovative ideas for the reconstruction of mirroring surfaces, a volumetric data structure for shape from silhouettes acquisition, and a solution for the acquisition of facial features from pictures. More recently he contributed to molecular visualization, specializing advanced rendering techniques - both realistic and illustrative - to the case of huge molecular structures. A common denominator of much of his work is the capability to design solutions that stress "GPU-friendliness".

### III. FULLPAPER & EDUCATION PAPER & ANIMATIONS



Fig.3. The left is Mark Pauly. The right is Marco Tarini.

There are 42 full papers were accepted for Euro graphics 2006. Papers are sought in all areas of Computer Graphics: rendering, modeling, animation, interactive techniques, virtual reality, visualization, and other relevant topic areas.

There is a Papers Fast Forward Session at the beginning of the conference. On Wednesday immediately after the first invited talk there will be a 30 minutes session in which all 42 paper authors get the chance to advertise their paper in 40 seconds. The full papers are presented by the authors on Wednesday through Friday. They are divided into 14 sessions.

- 1) Geometry
- 2) Rendering
- 3) Geometry Compression and Decompression
- 4) Photorealistic and Image Based Rendering
- 5) Geometry Reconstruction
- 6) Images and Tone Mapping
- 7) Animation
- 8) Deformations
- 9) Animation Rendering
- 10) Mesh Processing
- 11) Matting and Compositing
- 12) Visualization
- 13) Modelling I
- 14) Modelling II

There are 11 education papers were accepted for Euro graphics 2006. These papers are presented by the authors on Wednesday through Friday. They are divided into 4 sessions.

- 1) Teaching Computer Graphics
- 2) Using Computer Graphics in Education
- 3) Teaching Advanced Concepts in Computer Graphics
- 4) Computer Graphics Education: Prerequisites and Assessment

Animation & Interactive Media has only one session. It includes:

- 1) State-of-the-art Real-Time Shading Effects in ATI's Toyshop Demo
- 2) Detail Preserving Fluid Control
- 3) Beyond Communication: The Evolution of Machinima (Machine Cinema)

### IV. INVITED KEYNOTE SPEECH

These are 3 invited speakers for Euro graphics 2006. The

invited talk 1 “A primer on topological persistence” is given by Herbert Edelsbrunner, Arts and Sciences Professor of Computer Science and Mathematics, Duke University.



Fig.4. The first is Herbert Edelsbrunner. The second is Jos Stam. The last is Reinhard Klein.

This talk recalls the relatively short history of persistence and some of its older roots; introduces the concept intuitively while pointing out where algebra is needed to solidify the more difficult steps; discusses a few applications to give a feeling of the potential of the method in dealing with noise and scale. Besides the initial concept, the talk touches upon recent extensions and their motivation.

Jos Stam gives the invited talk 2 “Towards a Unified Dynamical Solver for Computer Graphics”. In this talk he presents some research he has done over the past few years in developing a unified dynamical solver for computer graphics. He propose to model all matter, such as fluid flow, cloth, rigid bodies, hair, etc, as a linked particle system having the topology of a simplicial complex.

The last invited talk “Data preparation for real-time high quality rendering of complex models” is given by Reinhard Klein. In this talk he presents some of the research they did in their graphics group over the past years motivated by industrial partners in order to automate the data preparation step and allow for real-time high quality rendering e.g. in the context of VR-applications. Strength and limitations of the different techniques are discussed and future challenges are identified.

## V. STATE OF THE ART REPORTS

STARs are 90 minute presentations giving an overview of recent developments in carefully selected rather narrow areas by active researchers in that field. STARs take place on Wednesday through Friday (6-8 Sept). The STARs include 6 reports.

### 1) Computational Photography

This report describes the latest computational methods in digital imaging that overcome the traditional limitations of a camera and enable novel imaging applications. It gives an overview of papers at computer vision conferences and topics in scientific imaging beyond photography.

### 2) Camera Control

Camera control encompasses interactive approaches, semi-automatic camera positioning, and fully declarative approaches to the management of a user's viewpoint on a scene. The report describes the issues, technical challenges, recent advances and perspectives related to automated camera control

in computer graphics.

### 3) Rendering Plasma Phenomena: Challenges and Applications

This report describes the state of art of such simulations, and examines practical issues often overlooked in the literature. Their applications in education and entertainment are also discussed. The report closes with a discussion of further avenues of research involving the simulation of plasma phenomena.

### 4) Segmentation and Shape Extraction of 3D Boundary Meshes

This report presents the state of the art on segmentation, or partitioning techniques used on boundary meshes. It formulates the segmentation problem as an optimization problem and identifies two primarily distinct types of mesh segmentation, namely parts segmentation and patch segmentation. It also presents generic algorithms for the major techniques of segmentation.

### 5) Interactive Volume Rendering with Ray Tracing

This report provides an overview of techniques for extending realtime ray tracing also to interactive volume rendering. It provides fast rendering techniques for different volume representations and rendering modes in a variety of computing environments. It also presents optimized implementations and discusses upcoming high-performance processors and their use for volume ray tracing.

### 6) Building Expression into Virtual Characters

This report gives an overview of work on expressive virtual characters. In particular, it assumes that a virtual character representation is already available, and is describes a variety of models and methods that are used to give the characters more "depth" so that they are less wooden and more plausible. It covers models of individual characters' emotion and personality, models of interpersonal behaviour and methods for generating expression.

## VI. GRAPHICS MEETS GAMES TALKS

There are 6 games talks presented by the authors on Wednesday through Friday.

### 1) Collada

COLLADA is a royalty free standard 3D asset exchange format. This talk provides all the information needed to take advantage of this technology, and provides some insights on its usage on the PS3.

### 2) Gelato: Film Rendering on Game Hardware

Film frames take minutes or hours, while game frames render at over 30 Hz. However, the first frame of a game takes much longer. The problem is that every film frame is a first frame. This talk presents one solution for accelerating relighting.

### 3) Introduction to the graphics pipeline of the PS3

This presentation is intended to be an overview of the PS3 hardware architecture with a focus on the graphics pipeline as well as an introduction to the related software APIs and tools.

### 4) Using Direct3D10

This talk discusses the latest version of the shading model (4.0), new pipeline stages like the geometry shader and other changes to pipeline and API that have occurred. It also covers some of the techniques that leverage these features and ship in the DirectX SDK: GPU Accelerated sparse morph targets, particle systems and procedural geometry.

#### 5) Modern computer and video games rendering techniques and how they can be used besides games in other fields of computer graphics such as cinematic rendering

The talk addresses current rendering techniques used in games, and future trends in this area. Furthermore, different techniques used for facing the increasing complexity of game technology are discussed. A second aspect of the talk is the usage of such techniques in other areas of computer graphics. The experiences at Spinor on the value, advantages and disadvantages of the different techniques in such areas are presented.

#### 6) Discrepancy between research world and what actually works in games

Interactive physics is still an open research field. While the visual quality might not be as compelling, interactivity brings a completely new dimension to simulation. This talk would like to encourage researchers to advance into this new and exciting direction.



Fig.7. The left is Vienna City Hall. The right is Viennese Ball.

On Wednesday, 6<sup>th</sup> September, the presentation of the posters(short papers) are accompanied by a Cheese&Wine reception in the poster exhibition area. The authors of all short papers wait in front of their posters to discuss it with participants. There are cheese and wine for all participants.

The main Social Event is a ball at Parkhotel Schönbrunn on Thursday, 7<sup>th</sup> September.

## IX. CLOSING

On Friday afternoon, the closing session is held at the Austrian Academy of Sciences. In a word, Eurographics 2006 is a successful event.

Eurographics 2007 will take place from the 3rd to the 7th September 2007 in Prague, Czech Republic.

## VII. COFFEE BREAK & EXHIBITION



Fig.5. Coffee break

From Wednesday to Friday, the coffee break takes place in Hall 1 where participants will find some exhibitors. There are many interesting graphics production and books exhibited at the coffee break. Such as “Edit Photo”, “Cube 3D<sup>2</sup>”, etc.



Fig.6. Exhibition

## VIII. SOCIAL EVENTS

On Tuesday, 5<sup>th</sup> September, the Mayor of the City of Vienna invites the conference participants to a welcome reception in the historic Vienna Town Hall. This reception features a full buffet dinner and a live performance of classical music.