



Smart Tools and Applications in computer Graphics

—

Eurographics Italian Chapter Conference

Online Event
November 12 – 13, 2020

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Preface

The Smart Tools and Applications in Graphics (STAG) conference is the annual international event organized by the Italian Chapter of the Eurographics Association. In 2020, due to the COVID-19 pandemic, STAG is held as a fully online event on November 12-13. STAG 2020 is organized by the University of Florence.

The aim of the conference is the dissemination of research activities and novel ideas on both theoretical and application oriented aspects of Computer Graphics, bringing together researchers and practitioners from both national and international scientific communities to share their latest developments.

We have received 20 full paper submissions. Each paper underwent extensive review by an International Program Committee, consisting of 41 experts from around the world having broad and deep expertise in Computer Graphics and Computer Vision, and related disciplines. Each contribution was independently reviewed by at least four IPC members, selected by the chairs according to their preferences, expertise, and conflicts. Final decisions have been made based on the reviewers' recommendations, the individual reviews, the online discussions, and after a thorough deliberation by the program co-chairs. Fifteen papers have been accepted as full papers, four have been accepted as short papers and one was withdrawn. Six papers have been clearly identified by the reviewing scores and reviewers' comments as natural nominees for the best paper award.

STAG 2020 accepted full papers contributions that cover new ways to solve real problems, clever solutions to optimize or otherwise improve known techniques and algorithms for real-world applications, and system, library and workflow papers with documented impact on real-world applications. Short papers include preliminary works that present recent results and work in progress, which may be of interest to the community. The general aim has been to create a good opportunity for displaying and discussing ideas, and to foster research activities in all areas of Computer Graphics, Computer Vision, Visual Computing, and related disciplines.

The STAG 2020 technical program hosts two high-class invited presentations: Dr. Michael Wimmer, Associate Professor at the Institute of Visual Computing and Human-Centered Technology at TU Wien, where he heads the Rendering and Modeling Group and directs the interdisciplinary Center for Geometry and Computational Design, and Dr. Julie Digne, CNRS Researcher at LIRIS (équipe Origami).

The technical paper program consists of five sessions of full and short papers and the "Matteo Dellepiane" Award session for the best master and PhD theses in computer graphics for the year 2020.

This STAG would not have been possible without contributions by many persons. We thank all authors for submitting their work to STAG 2020 for review, and the members of the STAG 2020 International Program Committee, who provided high quality reviews and useful comments for authors to improve their contributions. We also thank all the chairs. These proceedings would not have been possible without the great help of Stefanie Behnke of Eurographics, who tirelessly worked with the program co-chairs on the proceedings production.

Stefano Berretti, Event Chair
Silvia Biasotti, Program co-Chair
Ruggero Pintus, Program co-Chair

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Invited Talk

Applications of Smart Graphics

Prof. Michael Wimmer

TU Wien, Research Unit of Computer Graphics

Abstract

For a long period of time, the focus of computer graphics was mostly the quality and speed of image generation. Meanwhile, commercial rendering engines leave little to be desired, but computer graphics research has expanded to solve application problems through so-called “smart graphics”. In this talk, I will present some of our latest advances in “smart” computer graphics in simulation, rendering and content generation. I will show how we can now simulate visual impairments in virtual reality, which could be used to create empathy for people affected by these impairments. I will describe how we have advanced point-based rendering techniques to allow incorporating real environments into rendering applications with basically no preprocessing. On the other hand, virtual environments could be created efficiently by collaborative crowd-sourced procedural modeling. Finally, efficient simulations of floods and heavy rainfall may help experts and increase public awareness of natural disasters and the effects of climate change.

Short Biography

Michael Wimmer is currently an Associate Professor at the Institute of Visual Computing and Human-Centered Technology at TU Wien, where he heads the Rendering and Modeling Group and directs the interdisciplinary Center for Geometry and Computational Design. His academic career started with his M.Sc. in 1997 at TU Wien, where he also obtained his Ph.D. in 2001.

His research interests are real-time rendering, computer games, real-time visualization of urban environments, point-based rendering, reconstruction of urban models, procedural modeling and shape modeling.

He has coauthored over 145 papers in these fields. He also coauthored the book *Real-Time Shadows*. He regularly serves on program committees of the important conferences in the field, including ACM SIGGRAPH and SIGGRAPH Asia, Eurographics, IEEE VR, Eurographics Symposium on Rendering, ACM I3D, SGP, SMI, HPG, etc. He is currently associate editor of *ACM Transactions on Graphics*, *CGF*, and *Computers & Graphics*. He was papers co-chair of EGSR 2008, Pacific Graphics 2012, Eurographics 2015, Eurographics GCH 2018 and VMV 2019.

Invited Talk

Self Similarity for Shape Analysis and Synthesis

Dr. Julie Digne

CNRS LIRIS, Université Claude Bernard Lyon 1

Abstract

In this talk I will describe ways of taking into account shape self-similarity for improving analysis and synthesis tasks. Indeed shape acquisitions produce a possible sampling of a shape but by identifying similar parts of the shapes, one can enhance the local sampling and improve the shape locally.

In the second part of this talk, I'll discuss an issue common to many computational sciences fields: research reproducibility. I'll take the example of computer graphics for which we ran a thorough analysis studying the availability and the proper functioning of research codes over three years of papers published at SIGGRAPH (2014,2016,2018). Our analysis shows an improvement in reproducibility with variations with respect to the subfield.

Related work

1. Similarity based filtering of point clouds, J. Digne, 2012
2. Self-similarity for accurate compression of point sampled surfaces, J. Digne, R. Chaine, S. Valette, 2014
3. Sparse Geometric Representation Through Local Shape Probing J. Digne, S. Valette, R. Chaine, 2018
4. Super-resolution of Point Set Surfaces using Local Similarities, A. Hamdi-Cherif, J. Digne, R. Chaine, 2018
5. Code Replicability in Computer Graphics, N. Bonneel, D. Coeurjolly, J. Digne, N. Mellado, 2020.

Short Biography

Julie Digne is currently a CNRS Researcher at LIRIS (équipe Origami). She obtained a PhD in Applied Mathematics from École Normale Supérieure de Cachan in 2010 with Jean-Michel Morel. She graduated from both ENS Cachan (master MVA) and Télécom ParisTech (engineering degree). In 2018 she defended her Habilitation à Diriger des Recherches. Julie research interests lie in the field of surface processing and surface analysis, in particular when the surfaces are represented as point clouds. It includes surface denoising, meshing, scan merging and surface segmentation. Julie is particularly interested in developing machine learning approaches for geometric data.