



Smart Tools and Applications in Graphics

—

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Preface

These are the proceedings of the 8th edition of the Smart Tools and Applications in Graphics (STAG) conference, which is the annual international conference organized by the Italian Chapter of the Eurographics association. STAG aims at the dissemination of research activities and novel ideas on both theoretical and application-oriented aspects of Computer Graphics. The conference brings together researchers and practitioners from both national and international scientific communities to share their latest developments. Organized by La Sapienza University and originally planned in Rome, STAG 2021 has been held as a remote event on October 28-29, 2021, due to the coronavirus pandemic.

This year, we received 27 submissions: 18 full papers and 9 short papers. Each paper was peer-reviewed by at least three members from the International Program Committee. The IPC included 37 members from different countries, and having valuable expertise in Computer Graphics, Computer Vision, and related disciplines. For each submission, the reviewers were selected by the chairs according to their expertise and conflicts. Three additional reviewers participated in the review process. The final decision about acceptance has been made by the program co-chairs after on-line discussions, based on the reviewers' recommendations and the individual reviews.

14 papers have been accepted as full papers, and 4 have been rejected. 7 papers have been accepted as short papers, and 1 has been rejected, 1 as an oral presentation, not included in the present proceedings. STAG2021 accepted 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. 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 technical paper program consisted of four full-paper sessions and two short-paper sessions. The full-paper sessions covered four general topics (i.e., "Geometry", "Modeling, Reconstruction and Applications", "Augmented and Virtual Reality", "Visualization"). The first short-paper sessions was devoted to "Rendering and Visualization", while the second session covered miscellanea topics.

The STAG 2021 technical program included two invited presentations by Bernd Bickel, head of the Computer Graphics and Digital Fabrication Group at the Institute of Science and Technology Austria (IST Austria), and Duygu Ceylan, senior research scientist at Adobe Research London. Bernd Bickel gave a keynote talk titled "Computational and Data-driven Design Spaces: From designing shells and elastic curves to appearance editing of human faces in GAN space", which described recent progress in engineering design, toward novel concepts for modeling, designing, and reproducing objects with nontrivial shapes, topologies, and functionalities, from architected materials to planar elastic rods, up to head portraits. Duygu Ceylan gave a keynote talk titled "Machine Learning for Smart Characters", on the development of smart algorithms to create plausible and dynamic 3D characters with rich garment details, vivid secondary dynamics, and physically plausible animation.

STAG 2021 would not have been possible without contributions by many people. We thank all the submitters, and the members of the International Program Committee, who provided high-quality reviews and precious comments for authors to improve their contributions. We also thank all the session chairs and the local organizers.

Last but not least, these proceedings result from the invaluable contribution of Stefanie Behnke from Eurographics, who tirelessly worked with the paper co-chairs on the proceedings production.

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Keynote

Computational and Data-driven Design Spaces: From Designing Shells and Elastic Curves to Appearance Editing of Human Faces in GAN Space

Bernd Bickel

IST Austria

Abstract

In this talk, I will first describe recent progress in engineering design toward novel concepts for modeling, designing, and reproducing objects with nontrivial shapes, topologies, and functionalities. I will start by highlighting how data-driven techniques can enable the interactive design of cold-bent glass façades that can be seamlessly integrated into a typical architectural design pipeline. Making a step towards robotic materials, I will then introduce novel approaches for discovering and designing architected materials and demonstrate their applicability for encoding temporal shape evolution in architected shells that assume complex shapes and doubly curved geometries. Switching gears, I will also touch on the appearance editing of head portraits. I will demonstrate an approach that operates in the generative model space and learns transformations in the latent space of StyleGAN. This combines the best of supervised learning and generative adversarial modeling, produces high-quality photorealistic results for in-the-wild images, can edit the illumination and pose simultaneously, and runs at interactive rates. Finally, I will reflect on the successes and challenges of data-driven design, contrast this approach with our most recent work on the rigorous geometric characterization of the planar elastic rods' design space, and discuss opportunities for further work in this area.

Short Biography

Bernd Bickel is heading the Computer Graphics and Digital Fabrication Group at the Institute of Science and Technology Austria (IST Austria). He is a computer scientist interested in visual computing and computational design. His main objective is to develop new techniques for efficient design, simulation, and physical reproduction of digital content. Bernd graduated with a PhD in computer science from ETH Zurich in 2010. From 2011 to 2012, Bernd was a visiting professor at the Technical University of Berlin, and in 2012, he became a research scientist and research group leader at Disney Research. In early 2015, Bernd joined IST Austria. He received the ETH Medal for Outstanding Doctoral Thesis in 2011, the Eurographics Best PhD Award in 2012, the Microsoft Visual Computing Award in 2015, an ERC Starting Grant in 2016, the ACM SIGGRAPH Significant New Researcher Award in 2017, and a technical achievement award from the Academy of Motion Picture Arts and Sciences in 2019.

Keynote

Machine Learning for Smart Characters

Duygu Ceylan

Abstract

We are living in an era where the digital world is becoming an inevitable part of our professional and daily lives. Digital creation tools are essential for many professions including design, entertainment, gaming etc. In our daily lives, we all take many pictures or capture many videos each day to record and share our memories. There is a stronger demand to transform such digital workflows into life-like experiences. My research focuses on enabling such a transformation by developing computational 3D perception tools to reason about the physical environment, people, objects, and how they interact with each other. In this talk, I will focus on some of my recent work in the context of developing smart algorithms to create plausible and dynamic 3D characters with rich garment details, vivid secondary dynamics, and physically plausible animation.

Short Biography

Duygu Ceylan is a senior research scientist at Adobe Research. Prior to joining Adobe in 2014, she obtained her PhD degree from EPFL where she worked with Prof. Mark Pauly. Her research interests include using machine learning techniques to infer and analyze 3D information from images and videos, focusing specifically on humans. She is excited to work at the intersection of computer vision and graphics where she looks for new methods to bridge the gap between 2D & 3D.