Pacific Graphics 2022

The 30th Pacific Conference on Computer Graphics and Applications

Kyoto, Japan
October 5 – 8, 2022

Conference Chairs

Shigeo Morishima, Waseda University
Demetri Terzopoulos, UCLA
Hubert Shum, Durham University

Conference Executive Chair

Kaisei Sakurai, Dwango Co. Ltd.

Program Chairs

Nobuyuki Umetani, The University of Tokyo
Chris Wojtan, Institute of Science and Technology Austria (ISTA)
Etienne Vouga, UT Austin

Conference Program Chairs

Yin Yang, Clemson University, The University of Utah
Amal D. Parakkat, Institut Polytechnique de Paris
Bailin Deng, Cardiff University
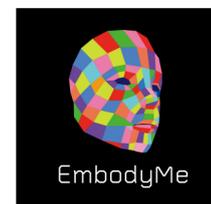Seung-Tak Noh, Tokyo University of Technology

Sponsors

Platinum

Gold

Silver

Bronze

Preface

The 30th Pacific Conference on Computer Graphics and Applications (Pacific Graphics 2022) was hosted in Kyoto, Japan. As a highly successful conference series, Pacific Graphics provides a premium forum for researchers, developers, and practitioners from around the world to present and discuss new problems, solutions, and technologies in computer graphics and related areas. Due to the COVID-19 pandemic, there has been no physical conference for two years. This year, Pacific Graphics will be held as an onsite/online hybrid conference providing a place for active academic discussion while ensuring the safety of the participants.

Pacific Graphics 2022 offered two submission tracks: a journal tack and conference track. The journal track accepts full paper submissions that are intended to be published in Computer Graphics Forum once accepted. The journal track received 145 valid submissions. With the help of 81 International Program Committee members and 52 external reviewers, each submission was evaluated during a rigorous review process. First, the program co-chairs matched the submitted paper's topic to the expertise and preferences of International Program Committee members and assigned each submission to the members as a primary and a secondary reviewer. Then, the external reviewers were invited by the primary reviewers to ensure there are at least three reviews for each paper. After all reviews and individual recommendation scores had been collected, we gave the authors a chance to write a rebuttal based on the reviews. The rebuttals are used to clarify questions raised in the reviews in the following discussion phase. Each recommendation was based on a consensus among all the reviewers after discussion. Some of the full paper submissions were asked to shorten the paper into a short paper to match the paper length to the amount of contribution. Finally, conditionally accepted full/short papers underwent a second review cycle to include the revisions required in the review summary.

Out of 145 submissions, 56 full papers (acceptance rate: 38.6%) and 4 short papers were finally accepted. Their authors were offered the chance to present their work in Pacific Graphics 2022 either remotely or in-person at the conference venue in Kyoto. The accepted full papers are published in this special issue of Computer Graphics Forum. Another 11 papers were referred to the regular submission process of Computer Graphics Forum due to required major revisions.

Aside from the journal track program, Pacific Graphics 2022 offered a conference track program that accepted short papers, work-in-progress papers, and posters. The conference track program provides an opportunity for authors to display late-breaking technical achievements that are not yet ready for full publication. We accepted submissions of 19 short papers, 3 posters, and 1 work-in-progress paper. After the reviews by the international committee members and external reviewers, 5 short papers, 3 posters, and 1 work-in-progress paper were accepted to the conference track program. These papers are also invited to present their work at Kyoto during PG2022. All accepted full papers, short papers, posters, and work-in-progress papers are published electronically through the EG Digital Library.

We are deeply grateful to all the people that have contributed their time and hard work to the evaluation process, including the members of the International Program Committees and all the external reviewers. We thank conference track program chairs Yin Yang, Amal D. Parakkat, Bailin Deng, and Seung-Tak Noh for managing the evaluation process of the conference track submissions. We also thank Stefanie Behnke for her efforts with the submission management system, Pierre Alliez for his help on referrals to CGF, and Yoshinori Dobashi, Sangyoung Lee, and Takeo Igarashi for their valuable advice. Finally, we would like to thank all the authors who were involved in the submission process for supporting the Pacific Graphics 2022 conference, and congratulate them on their high quality work.

Thank you very much and we hope to see you soon in Kyoto.

Program Co-Chairs Nobuyuki Umetani, Etienne Vouga, Chris Wojtan

International Program Committee

Aanjaneya, Mridul - Rutgers University
Aigerman, Noam - Adobe
Arora, Rahul - Meta Reality Labs
Bao, Hujun - Zhejiang University
Benes, Bedrich - Purdue University
Bessmeltsev, Mikhail - Université de Montréal
Cadik, Martin - Brno University of Technology
Chen, Bing-Yu - National Taiwan University
Chen, Renjie - University of Science and Technology of China
Choi, Byungkuk - Weta Digital
Dachsbacher, Carsten - Karlsruhe Institute of Technology
Didyk, Piotr - University of Lugano
Dong, Yue - Microsoft Research Asia
Du, Tao - MIT
Frisvad, Jeppe Revall - Technical University of Denmark
Fu, Xiaoming - University of Science and Technology of China
Galin, Eric - LIRIS
Gao, Lin - Institute of Computing Technology, Chinese Academy of Sciences
Gao, Xifeng - Tencent America
Gobbetti, Enrico - CRS4
Gu, Xianfeng - State University of New York at Stony Brook
Havran, Vlastimil - Czech Technical University in Prague
He, Ying - Nanyang Technological University
Hildebrandt, Klaus - TU Delft
Huang, Xiangru - MIT
Iwasaki, Kei - Wakayama University
Kanamori, Yoshihiro - University of Tsukuba
Kellnhofer, Petr - TU Delft
Kim, Young Min - Seoul National University
Klein, Reinhard - University of Bonn
Kobbelt, Leif - RWTH Aachen University
Kosinka, Jiri - Bernoulli Institute, University of Groningen
Koyama, Yuki - National Institute of Advanced Industrial Science and Technology (AIST)
Kuffner dos Anjos, Rafael - University of Leeds
Kwon, Taesoo - Hanyang University
Lau, Manfred - City University of Hong Kong
Lee, Seungyong - POSTECH
Lee, Sungkil - Sungkyunkwan University
Lensch, Hendrik - University of Tübingen
Li, Minchen - University of California, Los Angeles
Liu, Libin - Peking University
Liu, Lingjie - Max Planck Institute for Informatics, Saarbrücken
Liu, Tiantian - Taichi Graphics

International Program Committee

Liu, Xiaopei - ShanghaiTech University
Lu, Shao-Ping - Nankai University
Magnor, Marcus - TU Braunschweig
Moon, Bochang - Gwangju Institute of Science and Technology
Ohrhallinger, Stefan - TU Wien
Okabe, Makoto - Shizuoka University
Pan, Hao - Microsoft Research Asia
Parakkat, Amal Dev - Telecom Paris, Institut Polytechnique de Paris
Patney, Anjul - NVIDIA
Qin, Hong - Stony Brook University (SUNY Stony Brook)
Ren, Jing - ETH Zurich
Roessl, Christian - University of Magdeburg
Rushmeier, Holly - Yale
Schreck, Camille - Inria Nancy
Schroeder, Craig - UC Riverside
Sharp, Nicholas - The University of Toronto
Singh, Gurprit - Max-Planck Institute for Informatics, Saarbrücken
Sun, Qi - New York University
Sýkora, Daniel - CTU in Prague, FEE
Takayama, Kenshi - CyberAgent
Tan, Jianchao - George Mason University
Tang, Min - Zhejiang University
Wang, Bohan - MIT
Wang, He - University of Leeds
Wang, Miao - Beihang University
Wang, Yunhai - Shandong University
Wu, Hsiang-Yun - TU Wien, The St. Pölten University of Applied Sciences
Xiao, Chunxia - Wuhan University
Xie, Haoran - Japan Advanced Institute of Science and Technology
Xu, Feng - Tsinghua University
Xu, Kai - National University of Defense Technology
Xu, Weiwei - Zhejiang University
Yan, Ling-Qi - UC Santa Barbara
Yue, Yonghao - Aoyama Gakuin University
Zhang, Meng - University College London
Zhang, Yun - Zhejiang University of Media and Communications
Zhao, Shuang - University of California, Irvine
Zhu, Zhe - Duke University

External Reviewers

Arriola, Marriane
Bernard, Jürgen
Bernasconi, Michael
Bessmeltsev, Mikhail
Bitterli, Benedikt
Chai, Menglei
Chen, Minchan
Chu, Lei
Cui, Li
Fu, Chi-Wing
Gal, Rinon
Garces, Elena
Guo, Jianwei
Hachisuka, Toshiya
Hanocka, Rana
Iwamoto, Naoya
Kim, Suzi
Kwak, Suha
Lee, Won-Jong
Liao, Wentao
Liu, Dongyu
Matsui, Yusuke
Mech, Radomir
Mistelbauer, Gabriel
Mo, Haoran
Muralikrishnan, Sanjeev

Muthuganapathy, Ramanathan
Myszkowski, Karol
Quan, Yuhui
Raidou, Renata Georgia
Sattler, Torsten
Schied, Christoph
Schilling, Andreas
Sharma, Abhishek
Shen, I-Chao
Son, Hyeongseok
Takikawa, Towaki
Tan, Zhentao
Tang, Jingwei
Tojo, Kenji
van Kaick, Oliver
Wang, Beibei
Wang, Zhibo
Weinmann, Michael
Wilkie, Alexander
Xu, Kun
Yenemandra, Tarun
Yu, Lingyun
Yuchi, Huo
Zhang, Lvmin
Zhang, Qing
Zhu, Junqiu

Author Index

Author Index

Author Index

TABLE OF CONTENTS

TABLE OF CONTENTS

TABLE OF CONTENTS

TABLE OF CONTENTS

Invited Talk

Material-driven Realization of 3D Surfaces

Mirela Ben-Chen

Abstract

Many applications of geometry processing involve realizing, or fabricating, a 3D model designed using a modeling software. While the realization mechanisms are quite varied, many of the underlying mathematical constraints that allow a seamless transition from modeling to the realization of 3D models are similar across domains. Often, these mechanisms involve meshing, where an idealized smooth surface is sampled using discrete building blocks, such as planar panels, thin wires, or yarn stitches. In this talk we will survey the challenges of mesh realization using different materials, present solutions using discrete tangent vector fields, and demonstrate them in different applications.

Short Biography

Prof. Ben-Chen is an Associate Professor at the Center for Graphics and Geometric Computing of the CS Department at the Technion. She has received her Ph.D. from the Technion in 2009, was a Fulbright postdoc at Stanford from 2009-2012, and then started as an Assistant Prof. at the Technion in 2012.

Invited Talk

AI Synthesis for Metaverse Capabilities & Nextgen AI VFX

Hao Li

Abstract

As the world is getting ready for the metaverse, the need for 3D content is growing rapidly, AR/VR will become mainstream, and next era of the web will be spatial. A digital and immersive future is unthinkable without telepresence, lifelike digital humans, and photorealistic virtual worlds. Existing computer graphics pipelines and technologies rely on production studios and a content creation process that is time consuming and expensive. My research is about developing novel 3D deep learning-based techniques for generating photorealistic digital humans, objects, and scenes and democratizing the process by making such capability accessible to anyone and automatic. In this talk, I will present state-of-the-art technology for digitizing an entire virtual 3D avatar from a single photo developed at Pinscreen, and give a live demo. I will also showcase a high-end neural rendering technology used in next generation virtual assistant solutions and real-time virtual production pipelines. I will also present a real-time teleportation system that only uses a single webcam as input for digitizing entire bodies using 3D deep learning. Furthermore, I will present our work with UC Berkeley on real-time AI synthesis of entire scenes using NeRF representations and Plenoctrees. Finally, I will showcase our latest work in AI-VFX where we developed a neural rendering pipeline for facial reenactment and visual dubbing. In particular, we were the first to complete an entire feature film that is lip synced from German/Polish to English. My goal is to enable new capabilities and applications at the intersection of AI, vision, and graphics and impact the future of communication, human-machine interaction, and content creation. At the same time, we must also prioritize the safety and well-being of everyone while architecting this future.

Short Biography

Dr. Hao Li is an associate professor of computer vision at MBZUAI and the CEO of Pinscreen. Li's area of expertise lies at the intersection of computer vision, computer graphics, and machine learning, with a focus on virtual humans, reality capture, and AI synthesis. His goal is to enable new AI and immersive technologies that can make the concept of the metaverse possible and enhance our lives with digital experiences that are otherwise not possible in the physical world.

Invited Talk

Data-Driven Geometry Processing - without 3D Data

Rana Hanocka

Abstract

Much of the current success of deep learning has been driven by massive amounts of curated data, whether annotated and unannotated. Compared to image datasets, developing large-scale 3D datasets is either prohibitively expensive or impractical. In this talk, I will present several works which harness the power of data-driven deep learning for tasks in geometry processing, without any 3D datasets. I will discuss works which reconstruct surfaces from noisy point cloud data without any 3D datasets. In addition, I will demonstrate that it is possible to learn to edit 3D geometry using large image datasets.

Short Biography

Dr. Rana is an Assistant Professor of Computer Science at the University of Chicago. She founded and direct 3DL (threedle!), a group of enthusiastic researchers passionate about 3D, machine learning, and visual computing. She obtained my Ph.D. in 2021 from Tel Aviv University under the supervision of Daniel Cohen-Or and Raja Giryes.