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CAD/Graphics 2019

The 16th International Conference on
Computer-Aided Design and Graphics

Program

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CAD&Graphics 2019



山东大学交叉研究中心



山东大学-青岛虚拟现实研究院

May 5-6, 2019@Qingdao, China



About CAD/Graphics 2019

We welcome you to participate in CAD/Graphics 2019, which will be held in Qingdao, China, May 5-6, 2019. The International Conference on Computer-Aided Design and Computer Graphics (CAD/Graphics) is a biannual international conference since 1989, which is affiliated with the Chinese Computer Federation (CCF). It provides an ideal forum for international researchers and developers to exchange new ideas on computer-aided design and computer graphics, electronic design automation and visualization to explore new ideas and trends. CAD/Graphics 2019 is the 16th CAD/Graphics conference. The previous CAD/Graphics conferences were held in Zhangjiajie (2017), Xi'an (2015), Hong Kong (2013), Jinan (2011), and Hangzhou (2009), etc., with great success.

Program Overview

Saturday, May. 4, 2019

08:30 – 18:00	Registration & GAMES 2019
19:00 – 20:00	Reception
19:30 – 22:00	CCF-CADCG Committee Meeting

Sunday, May. 5, 2019

08:30 – 08:45	Opening	
08:45 – 09:45	Chair: Jin Huang	Keynote 1: Mathieu Desbrun
09:45 – 10:10	Group Photograph & Coffee Break	
10:10 – 11:50	Session Chair: Prof. Gang Xu	Paper Session: Geometry
12:00 – 13:30	Lunch	
13:30 – 14:30	Chair: Karol Myszkowski	Keynote 2: Wenzel Jakob
14:30 – 16:30	Session Chair: Prof. Zhonggui Chen	Invited Paper Session
16:30 – 16:40	Coffee Break	
16:40 – 17:50	Session Chair: Dr. Xiaowei Zhou	Paper Session: Learning and Recognition
18:30 – 20:30	Banquet	

Monday, May. 6, 2019

08:30 – 09:30	Chair: Xin Tong	Keynote 3: Min Kim
09:30 – 11:10	Session Chair: Prof. Jieqing Feng	Paper Session: Human Body and Face
11:10 – 12:10	Session Chair: Dr. Lin Lu	Paper Session: CG and Visualization
12:10 – 13:30	Lunch	
13:30 – 14:30	Chair: Qunsheng Peng	Keynote 4: Nobuyuki Umetani
14:30 – 16:10	Session Chair: Prof. Chunxia Xiao	Paper Session: Vision and Image
16:10 – 16:20	Coffee Break	
16:20 – 18:00	Session Chair: Prof. Yunhai Wang	Paper Session: Laws in nature
18:00 – 18:10	Closing	
18:30 – 20:00	Dinner	

Program Details

Paper Session: Geometry (20mins/talk)

Session Chair: Prof. Gang Xu (Hangzhou Dianzi University)

- GPU-based Efficient Computation of Power Diagram
Liping Zheng, Zhiqiang Gui, Ruiwen Cai, Yue Fei, Gaofeng Zhang and Benzhu Xu
- A Dimensional Reduction Guiding Deep Learning Architecture for 3D Shape Retrieval
Zihao Wang, Hongwei Lin, Xiaofeng Yu and Yusuf Fatihu Hamza
- Autoencoder-based Classification of Segmented CAD Models for Part-in-whole Retrieval
Lakshmi Priya Muraleedharan, Shyam Sundar Kannan and Ramanathan Muthuganapathy
- Fast and Robust Computation of the Hausdorff Distance between Triangle Mesh and Quad Mesh for Near-Zero Cases
Yunku Kang, Seung-Hyun Yoon, Min-Ho Kyung and Myung-Soo Kim
- 3D Printed Perforated QR Codes
Jingru Yang, Hao Peng, Lin Liu and Lin Lu

Invited Paper Session (20mins/talk)

Session Chair: Prof. Zhonggui Chen (Xiamen University)

- InteractionFusion: Real-time Reconstruction of Hand Poses and Deformable Objects in Hand-object Interactions
Hao Zhang, Zihao Bo, Junhai Yong, Feng Xu
- Efficient and Conservative Fluids Using Bidirectional Mapping
Ziyin Qu, Xinxin Zhang, Ming Gao, Chenfanfu Jiang, Baoquan Chen
- Multi-Robot Collaborative Dense Scene Reconstruction
Siyan Dong, Kai Xu, Qiang Zhou, Andrea Tagliasacchi, Shiqing Xin, Matthias Nießner, Baoquan Chen
- Atlas Refinement with Bounded Packing Efficiency
Haoyu Liu, Xiaoming Fu, Chunyang Ye, Shuangming Chai, Ligang Liu
- Computational Peeling Art Design
Hao Liu, Xiaoteng Zhang, Xiaoming Fu, Zhichao Dong, Ligang Liu
- Learning Character-Agnostic Motion for Motion Retargeting in 2D
Kfir Aberman, Rundi Wu, Dani Lischinski, Baoquan Chen, Daniel Cohen-Or

Paper Session: Learning and Recognition (10mins/talk)

Session Chair: Dr. Xiaowei Zhou (Zhejiang University)

- Automatic Diabetic Retinopathy Screening via Cascaded Classifier Framework Based on Image and lesion-level features fusion
Chengzhang Zhu, Rong Hu, Beiji Zou, Rongchang Zhao, Changlong Chen and Yalong Xiao
- Irregular Cigarette Code Recognition Based on Convolutional Neural Networks
Zhifeng Xie, Shuhan Zhang, Peng Wu, Shaojun Xie and Lizhuang Ma
- Learning Group-Level Emotion Prediction combining Faces, Skeletons and Sentiment Cues
Hanchao Li, Miaopeng Li, Tuxun Lu, Penglei Ji and Xinguo Liu
- Dual Pattern Learning Image Emotion Recognition Based on Multi-Features Representation
Yang Wenwu and Pu Yuanyuan
- Robust and Customized Methods for Real-time Hand Tracking and Recognition under Occlusion
Zhishuai Han, Xiaokun Wang, Xiaojuan Ban, Di Wu, Xiaoying Zhang and Jingu Yang
- A Multi-stage Framework for Pose Estimation of Zebrafish Head using Deep Learning
Xiangxiang He, Zhangjin Huang and Fangjun Wang
- Deep Face Illumination Transfer
Wang Lipeng and Pu Yuanyuan

Paper Session: Human Body and Face (20mins/talk)

Session Chair: Prof. Jieqing Feng (Zhejiang University)

- Parametric Modeling of 3D Symmetric Human Body
Yin Chen, Zhan Song, Weiwei Xu, Ralph Martin and Zhi-Quan Cheng
- Deep Coupling Neural Network for Robust Facial Landmark Detection
Wenyan Wu, Xingzhe Wu, Yici Cai and Qiang Zhou
- Data-driven 3D Human Head Reconstruction
Huayun He, Guiqing Li, Zehao Ye, Guodong Wei, Aihua Mao and Chuhua Xian

Program Details

- **Bi-directional Recurrent Auto-encoder for 3D Skeleton Motion Data Refinement**
Shujie Li, Yang Zhou, Haisheng Zhu, Wenjun Xie, Yang Zhao and Xiaoping Liu
- **PortraitNet: Real-time Portrait Segmentation Network for Mobile Device**
Songhai Zhang, Xin Dong, Hui Li and Shimin Hu

Paper Session: CG and Visualization (10mins/talk)

Session Chair: Dr. Lin Lu (Shandong University)

- **Artistic Augmentation of Photographs with Droplets**
Mohan Zhang, Jinhui Yu, Kang Zhang and Junsong Zhang
- **A Novel AR Remote Collaborative Platform Sharing 2.5D Gestures + Gaze**
Peng Wang, Shusheng Zhang, Xiaoliang Bai, Weiping He, Dechuan Han, Shuxia Wang, Shu Han and Guangyao Xu
- **Cognition-driven Traffic Simulation for Unstructured Road Networks**
Hua Wang, Xiaoyu He and Mingliang Xu
- **Progressive Furniture Model Decimation with Texture Preservation**
Zhiguang Pan, Chuhua Xian, Shuo Jin and Guiqing Li
- **Visual Analysis Method for Abnormal Passenger Flow on Urban Metro Network**
He Shi, Yong Zhang, Yongli Hu, Yanfeng Sun and Baocai Yin

Paper Session: Vision and Image (20mins/talk)

Session Chair: Prof. Chunxia Xiao (Wuhan University)

- **Superpixel Alpha-Expansion and Normal Adjustment for Stereo Matching**
Jie Li

- **Scribble-based Colorization for Creating Smooth-shaded Vector Graphics**
Bin Bao and Hongbo Fu
- **Illumination Animating and Editing in a Single Picture Using Scene Structure Estimation**
Liao Bin, Yao Zhu and Chunxia Xiao
- **Image Generation from Bounding Box-represented Semantic Labels**
Congying Liu, Zexi Yang, Feng Xu and Junhai Yong
- **Intrinsic Color Correction for Stereo Matching**
Qing Ran, Wenjing Zhao and Jieqing Feng

Paper Session: Laws in Nature (20mins/talk)

Session Chair: Prof. Yunhai Wang (Shandong University)

- **A Two-Layer Microfacet Model with Diffraction**
Yufei Chai, Yanning Xu, Lu Wang and Maopu Xu
- **New Haptic Syringe Device for Virtual Angiography Training**
Dongjin Huang, Pengbin Tang, Xianglong Wang, Tao Wan and Wen Tang
- **A Task and Data Balanced Distributed Photon Mapping Method**
Zeng Zheng (Shandong University)
- **Modeling Fractures and Cracks on Tree Branches**
Liuming Yang, Meng Yang and Gang Yang
- **Versatile Numerical Fractures Removal for SPH-based Free Surface Liquids**
Weixin Si, Xiangyun Liao, Yinling Qian and Qiong Wang

Keynote Details

Voronoi Diagrams, Delaunay Triangulations, and Beyond: the Power of Simple Geometric Notions

Mathieu Desbrun, Professor, California Institute of Technology, USA

Abstract

The notion of Voronoi diagram (and its dual, Delaunay triangulation) involves a very simple and intuitive geometric construction. Yet, these simple partitions have found applications in a variety of scientific fields for several centuries. In this talk I will discuss an extension (called power diagram) that has recently been shown particularly relevant in Computer Graphics. A number of applications, from the design of sampling patterns, to generalized barycentric coordinates, fluid dynamics, and even self-supporting masonry structures will be used to illustrate the generality of this rich geometric notion.

Bio

Mathieu Desbrun is the Carl F. Braun Professor at the California Institute of Technology (Caltech), where he leads the Applied Geometry lab, focusing on discrete differential modeling (i.e., the development of differential, yet readily discretizable foundations for computational modeling) and a wide spectrum of applications, ranging from discrete geometry processing and high-dimensional data analysis, to solid and fluid mechanics as well as field theory. He is the recipient of an ACM SIGGRAPH New Significant Researcher award and of a NSF CAREER award, and is the founding chair of the the Computing + Mathematical Sciences department at Caltech. Most recently, he chaired the Technical Papers program for ACM SIGGRAPH 2018.



Capturing and Rendering the World of Materials

Wenzel Jakob, Assistant Professor, Ecole Polytechnique Fédérale de Lausanne (EPFL), Switzerland

Abstract

One of the key ingredients of any realistic rendering system is a description of the way in which light interacts with objects, typically modeled via the Bidirectional Reflectance Distribution Function (BRDF). Unfortunately, real-world BRDF data remains extremely scarce due to the difficulty of acquiring it: a BRDF measurement requires scanning a four-dimensional domain at high resolution- an infeasibly time-consuming process. In this talk, I'll showcase our ongoing work on assembling a large library of materials including including metals, fabrics, organic substances like wood or plant leaves, etc. The key idea to work around the curse of dimensionality is an adaptive parameterization, which automatically warps the 4D space so that most of the volume maps to "interesting" regions. Starting with a review of BRDF models and microfacet theory, I'll explain the new model, as well as the optical measurement apparatus that we used to conduct the measurements.

Bio

Wenzel Jakob is an assistant professor at EPFL's School of Computer and Communication Sciences, where he leads the Realistic Graphics Lab (<https://rgl.epfl.ch/>). His research interests revolve around material appearance modeling, rendering algorithms, and the high-dimensional geometry of light paths. Wenzel Jakob is also the lead developer of the Mitsuba renderer, a research-oriented rendering system, and one of the authors of the third edition of "Physically Based Rendering: From Theory To Implementation". (<http://pbrt.org/>)



Beyond Human Vision - Seeing More with Camera

Min H. Kim, Chair Professor, KAIST, Korea

Abstract

Since the introduction of conventional color cameras to the world, a variety of color imaging technologies have been developed to record as faithful human color perception as possible. Recent advances in computational imaging have expanded the range of camera functions, enabling us to capture information beyond human vision, such as spectra. Hyperspectral imaging extends the range of imaging applications by enabling physically meaningful image acquisition with a camera. This talk discusses the foundations of compressive spectral imaging and introduces recent advances in the development of hyperspectral imaging technology that has been developed to make spectral imaging more accurate and smaller for practical applications in our daily life. Finally, we will discuss future challenges.

Bio

Min H. Kim is a KAIST-Endowed Chair Professor of Computer Science at KAIST, Korea, leading the Visual Computing Laboratory (VCLAB). Before coming to KAIST, he had been a postdoctoral researcher at Yale University, working on hyperspectral 3D imaging. He received his Ph.D. in computer science from University College London (UCL) in 2010, with a focus on HDR color reproduction for high-fidelity computer graphics. In addition to serving on international program committees, e.g., ACM SIGGRAPH Asia, Eurographics (EG), Pacific Graphics (PG), and IEEE ICCV, he has worked as an associate editor of ACM Transactions on Graphics (TOG), ACM Transactions on Applied Perception (TAP), and Elsevier Computers and Graphics (CAG). His recent research interests include a wide variety of computational imaging in the field of computational photography, hyperspectral imaging, BRDF acquisition, and 3D imaging.



Interactive Design Optimization in Computational Fabrication

Nobuyuki Umetani, Project Lecturer, The University of Tokyo, Japan

Abstract

Designing functional 3D objects today continue to be a time-consuming task. The designer needs to carefully optimize the objects' performance, which often can be evaluated through the expensive simulation. Leveraging the power of machine learning, we can now drastically accelerate various kinds of simulations for 3D shape designs. Based on the prior real-world or simulation examples for various various existing shapes, machine learning can instantly synthesize simulation results for a novel input shape. In this talk, I describe several interactive approaches to integrate physical simulation into geometric modeling to actively support creative design processes. Importance of interactivity in the design system will be discussed in various practical contexts including structurally robust design, musical instrument design, garment design, electric circuit design, and aerodynamic design.

Bio

Nobuyuki Umetani is a project lecturer at the University of Tokyo. Previously, he was a research scientist at Autodesk Research, leading the Design and Fabrication group. He was a postdoctoral researcher at Autodesk Research and Disney Research Zurich. He received his Ph.D. degree in 2012 from The University of Tokyo under the supervision of Takeo Igarashi. He also spent one year at Columbia University and in TU Delft, and spent three months in Microsoft Research Asia and in UCL. He won the Microsoft Research Asia fellowship in 2011 and AsiaGraphics Young Researcher Award in 2018. The principal research question he addresses through his studies is: how to integrate real-time physical simulation into an interactive geometric modeling procedure to facilitate creativity. He is broadly interested in physics simulation, especially the finite element method, applied for computer animation, biomechanics, and mechanical engineering. He serves as an associate editor of the Visual Computer journal.

