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## Eurographics Distinguished Career Award 2018: Markus Gross



Markus Gross obtained his PhD in 1989 from the Saarland University, and then spent a few years in Darmstadt before moving to Zurich where he founded the Computer Graphics Laboratory in 1994. He is now a Professor of Computer Science at ETH Zurich. In 2008 he became the founding director of Disney Research Zurich (DRZ). Currently he is Vice President for Global Research and Development at Disney Research, being responsible for all of Disney's research labs globally.

The research interests of Markus Gross include computer graphics, image generation, geometric modelling, scientific visualization, physically based modeling, computer animation, immersive displays, and video technology. Some of his most highly cited work is on point-based graphics (an idea he personally introduced), as well as particle-based fluid simulation. He has published more than 400 papers in graphics and vision. He has graduated more than 56 PhD students, many of which have become highly successful researchers in their own right, not to mention the supervision of dozens of PostDocs at ETH and Disney who are now faculty.

Markus Gross is a member of the Berlin-Brandenburg Akademie der Wissenschaften, the German Academy of Sciences Leopoldina, the Schweizerische Akademie der Technischen Wissenschaften (SATW), and a member of the National Academy of Engineering of Korea. He has received a multitude of awards, including the 2015 IEEE Visualization Distinguished Career Award, and the Karl Heinz Beckurts Prize for outstanding technological innovations with strong practical relevance. Also in 2013, Gross received

the Konrad Zuse Medal of the German Association of Computer Science (GI), the highest award for scientific achievements in computer sciences in Germany. From the Academy of Motion Picture Arts and Sciences Markus Gross received the Technical Achievement Award together with Nils Thuerey, Theo Kim, and Doug James for the development of a procedure to simulate smoke and explosions more efficiently. From Eurographics he received the Outstanding Technical Contributions Award in 2010 after becoming a Fellow of the Association in 2006.

His service of to the community includes being paper chair of IEEE Visualization already in 1999 and 2002, being paper chair of Eurographics in 2000, general co-chair of Eurographics 2015, and being the first European paper chair of Siggraph in 2005. He was the founding Chair of the Symposium on Point Based Graphics in 2004 in Zurich.

The strong leadership of Markus Gross is beyond doubt. He has created one of the strongest and most successful Centres in Computer Graphics in Europe, and his group is among the very best worldwide leading research groups in Computer Graphics and Visual Computing. He is one of the most globally visible European Graphics researchers.

Markus Gross has maintained numerous collaborations with industry. These companies include UBS, Hewlett-Packard, NVIDIA, Sirona, Mitsubishi Electric, Samsung, the Walt Disney Company, and Schlumberger. Together with his former students and collaborators, he has founded various start-up companies such as Cyfex, Novodex (now Nvidia PhysX), LiberoVision, Dybuster and Gimalon.

Eurographics is extremely pleased to recognize Markus Gross with the 2018 Distinguished Career Award.

## Eurographics Outstanding Technical Contributions Award 2018: Helmut Pottmann



Helmut Pottmann joined the Technical University of Vienna in 1986 as assistant professor. After visiting the Universities of Purdue and Kaiserslautern from 1989 to 1991, he became Associate professor in Mathematics in Hamburg and then full Professor in Vienna since 1992. He has also been Adjunct Professor at UC Davis since 1999. He was the founding director of the Center for Geometric Modeling and Scientific Visualization at KAUST, Saudi-Arabia from 2009 to 2013.

Helmut Pottmann is probably best known as the founder of Architectural Geometry, a new research field at the interface of Mathematics, Computer Science, Structural Engineering and Architecture. He has launched and nurtured the bi-annual Symposium on Architectural Geometry, and has co-authored the seminal textbook on the subject. He is extremely well regarded not only in the graphics community, but also in architecture-related fields and has successfully transferred his research into architectural practice (including a number of internationally renowned architectural projects) and to the Evolute company that, since 2008, enables building projects featuring complex geometries by solving involved geometric problems.

His research work combines mathematical depth and elegance, effective algorithmic solutions, and high practical relevance. Helmut has deep knowledge in all facets of geometry and an extraordinary skill to identify important connections between mathematical theory and applied problems in geometry processing and architectural design. Any of his papers includes new and non-trivial material, having being influential and having inspired new ideas. They are an example of synthesis among exemplary scope, magnitude of the scientific contributions, and clarity of the exposition.

Helmut has also made significant contributions in Geometry Registration, Interactive Geometric Modelling, Freeform Surface Rationalization, and applications of Geometry in Manufacturing,

and Robot Kinematics. His work has contributed to improve ICP registration between points and surfaces by using a locally quadratic approximation to the squared distance, with other key robust solutions to problems including parametric surface fitting and rigid registration. He has contributed new insights in the domain of discrete differential geometry and its application to discrete surface modelling. His work has opened up a whole new research area and inspired many to follow his lead.

As a scientist, Helmut Pottmann always puts the highest standards on his work. His authorship is always a sign of significant scientific personal contribution in the project. He is able to find original solutions to problems in geometry processing which often are more elegant than heuristic approaches that have been applied before. He has helped to bridge the gap between significantly different research cultures in Maths/Computer Science and Architecture/Engineering.

Helmut Pottmann was invited to give the 2017 Gauss Lectureship, annually awarded by the German Mathematical Society.

Eurographics is extremely pleased to recognize Helmut Pottmann with the 2018 Outstanding Technical Contributions Award.



## Eurographics Young Researcher Award 2018: Sofien Bouaziz



Sofien Bouaziz completed his thesis work at EPFL in 2015. His thesis results lead him to co-found the EPFL spin-off *faceshift AG*, a company that brought high-quality markerless facial motion capture to the consumer market. Their software was able to analyze face motions, and to describe them as a combination of basic expressions, plus head orientation and gaze. This description could then be used to animate virtual characters for use in movies or games. The company was finally acquired in 2015 by Apple. Sofien got then a research scientist position at Apple where he developed and productized the real-time face tracking algorithm powering the iPhone X Animojis and also available to third-party developers through ARKit.

His thesis on real-time face tracking and animation was awarded the 2016 SIGGRAPH outstanding doctoral dissertation award honorable mention, the 2015 ETHZ Fritz Kutter PhD thesis award, and the honorable mention of the 2015 EPFL Patrick Denantes PhD award. His current research interests include machine learning, computer vision, and computer graphics.

Sofien has a very strong publication record with many SIGGRAPH and EG papers. His work is influential and well cited, with a steeply increasing rate. His 2011 paper on real-time performance-based facial animation precomputes a blendshape model of the user's facial expression space and then allows real-time tracking of expression from noisy RGBD data by solving for the most likely parameters given the observed 2D and 3D data. Then, his paper on modelling for real-time facial animation, published in 2013, presents a real-time facial expression capture system from RGBD data, which, unlike their earlier work, requires no user-specific

training or calibration. In it, a dynamic blend-shape expression model is continuously refined as tracking progresses. His 2015 paper on real-time fitting of a 3D articulated hand model to depth images uses depth, silhouette, temporal information, and priors including a database of realistic hand poses to obtain a suitable fitting.

Apart from face and hand tracking, Sofien Bouaziz has explored numerous other topics. His 2013 paper on sparse iterative closest points, proposes a nice principled approach for ignoring outliers and missing data. His 2012 work on shaping discrete geometry with projections allows efficient manipulation of geometric shapes described by points, triangle meshes, quad meshes, or tetrahedral meshes in a unified setting. The key idea is to use two concepts: a shape proximity function and shape projection operators resulting in a fast local-global solver. His 2014 Projective Dynamics paper extended this approach to real-time simulation of deformable materials building a bridge between nodal Finite Element methods and Position Based Dynamics.

Sofien Bouaziz has published an extremely impressive set of research papers proposing algorithms that have had strong academic impact and that are now featured prominently in consumer products. He has a recognized level of competence, curiosity, and creativity that stands out above many other researchers.

Eurographics is pleased to recognize Sofien Bouaziz with the 2018 Young Researcher Award.

## Eurographics Young Researcher Award 2017: Thabo Beeler



Thabo Beeler started his academic career as a PhD student at ETH and Disney Research in 2009, already focusing on capturing human faces. Three years later he completed his PhD, for which he received the Eurographics PhD award, and started to build up his own group at Disney Research to continue his work.

Thabo has been a pioneer in high-quality human acquisition and modeling. His thesis work significantly advanced the state of the art in human face capture. His first two SIGGRAPH papers on High-quality Single-Shot Capture of Facial Geometry and High-quality Passive Facial Performance Capture Using Anchor Frames have set new quality standards in static and dynamic human face capture. He has since then systematically expanded the scope of acquisition, including capturing of skin wrinkles, facial hair, eyes and eyelids, lips, and teeth. Driven by the goal to improve realism as well as simplifying capture and animation, Thabo's work combines novel acquisition system designs with algorithmic solutions that are innovative and yield results of very high quality. He has persisted to continuously improve reconstruction accuracy by optimizing both the hardware setups, as well as the underlying geometry and appearance representations and algorithms.

His research has substantially influenced the field of digital humans in general and facial capture in particular. He has demonstrated that it is possible to capture the human face at high fidelity purely from images without the need to augment the face with makeup or resort to structured illumination.

Thabo has now an impressive portfolio of over 25 publications in top-tier venues, including Eurographics, CVPR and ACM TOG. More than half of these publications have been published at SIGGRAPH, averaging at two SIGGRAPH publications per year since his first publication in 2010.

Thabo's work is not only inspiring researchers around the world, but has also had a significant impact on the visual effects industry. Much of his research has been combined into a large system known as the Medusa Performance Capture Technology. This facial performance capture system has already been used to capture over one hundred actors for more than a dozen Hollywood feature films, such as StarWars, JungleBook, or Warcraft. Medusa is by now the de-facto standard in the visual effects industry for high quality facial performance capture and has also been used for computer games and deployed in theme parks.

Thabo is an avid collaborator who has been able to start and complete joint projects with the leading people in his field. His work is solid and influential, and has had an important impact both in academia and the creative industries. He has gained a strong and indubitable recognition in our community as a world-leading expert in the area of digital humans.

Eurographics is pleased to recognize Thabo Beeler with the 2018 Young Researcher Award.

# Challenges in Visual Analytics

Jarke J. van Wijk

Department of Mathematics and Computer Science of Eindhoven University of Technology (TU/e)



He joined Eindhoven University of Technology in 1998, where he became a full professor of visualization in 2001. His main research interests are information visualization and visual analytics, with a focus on the development of new methods for the interactive exploration of large data-sets. The work of his group has led to two start-up companies: MagnaView BV and SynerScope BV. He has (co-)authored more than 150 papers in visualization and computer graphics and received six best paper awards. He received the IEEE Visualization Technical Achievement Award in 2007 and the Eurographics 2013 Outstanding Technical Contributions Award.

## Abstract

Visual Analytics aims at the integration of automated analysis (statistics, machine learning, data mining) with interactive visualization, thereby exploiting the strengths of humans and computers. The concept is great, but there are many challenges ahead. In my talk I will reflect on this. Size, complexity, dynamics of data are major challenges, but also dealing with strengths and limitations of human perception and cognition are. A special challenge is to provide trust and transparency of complex models and their results, which is an important societal issue. I will illustrate these challenges using examples of our work in Eindhoven, for a variety of applications.

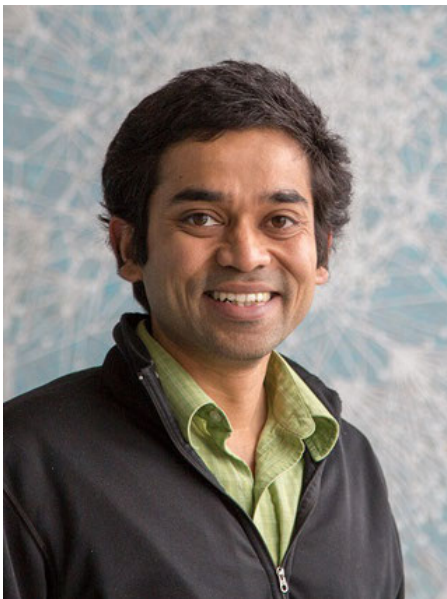
## Biography

Jack van Wijk is full professor in visualization at the Department of Mathematics and Computer Science of Eindhoven University of Technology (TU/e). He received a MSc degree in industrial design engineering in 1982 and a PhD degree in computer science in 1986, both from Delft University of Technology. He has worked for ten years at the Netherlands Energy Research Foundation ECN.

# Semantic Scene Factorization via Multimodal Analysis

Niloy J. Mitra

University College London



He received his PhD degree from Stanford University under the guidance of Leonidas Guibas. His research interests include shape analysis, computational design and fabrication, and geometry processing. Niloy received the ACM Siggraph Significant New Researcher Award in 2013 and the BCS Roger Needham award in 2015. His work has twice been featured as research highlights in the Communications of the ACM, received best paper award at ACM Symposium on Geometry Processing 2014, and Honourable Mention at Eurographics 2014. Besides research, Niloy is an active DIYer and loves reading, bouldering, and cooking.

## Abstract

Obtaining massive volumes of image, video, or scans is now possible. This provides unprecedented opportunities to perform scene analysis and understanding at large-scale. However, there are several fundamental challenges to overcome – the raw data is often incomplete (e.g., due to occlusion), records complex interactions (e.g., between humans and objects), and lacks suitable annotations. In our research, we have studied the use of various regularizers in the form of transformation groups (e.g., symmetry types), data priors (e.g., database shapes), functional priors (e.g., object affordance), etc. to regularize the problem. More recently, we have been investigating the utility of non-geometric priors (e.g., physics-based) to simultaneously perform scene completion and scene understanding. In this talk, I will discuss our recent results and highlight the opportunities ahead.

## Biography

Niloy J. Mitra leads the Smart Geometry Processing group in the Department of Computer Science at University College London.

# RGB+: Improving the Visible with the Invisible

Sabine Süstrunk

Ecole Polytechnique Fédérale de Lausanne (EPFL), Switzerland



de Lausanne (EPFL), Switzerland, where she leads the Images and Visual Representation Lab (IVRL) since 1999 and the Digital Humanities Institute since 2015. Her research areas are in computational photography, color computer vision and color image processing, image quality, and computational aesthetics. She has published over 150 scientific papers, of which 7 have received best paper/demos awards, and holds 10 patents. She received the IS&T/SPIE 2013 Electronic Imaging Scientist of the Year Award and IS&T's 2018 Raymond C. Bowman Award. She is a Fellow of IEEE and IS&T.

## Abstract

Conventional digital cameras exhibit a number of limitations that computational photography systems try to overcome. For example, the disambiguation of how much the illuminant(s) and the object reflectance contribute to a pixel value is mathematically ill-posed. Given how most modern cameras capture images, blur and limited depth-of-field may also introduce noise and unwanted artifacts. To solve this problem, experts have proposed modified hardware, smart algorithms using priors, and (deep) machine learning approaches. In our research, we use “extra information” in the form of near-infrared (NIR), the wavelength range adjacent to the visible spectrum and easily captured by conventional silicon sensors. Capturing NIR can improve computational photography tasks such as dehazing, white-balancing, shadow detection, deblurring, and depth-of-field extension, as well as computer vision applications such as detection and classification.

## Biography

Sabine Süstrunk is full professor in the School of Computer and Communication Sciences (IC) at the Ecole Polytechnique Fédérale