

# Special Section on the 2011 Joint Symposium on Computational Aesthetics (CAe), Non-Photorealistic Animation and Rendering (NPAR), and Sketch-Based Interfaces and Modeling (SBIM)

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# Preface: Special Section on the 2011 Joint Symposium on Computational Aesthetics (CAe), Non-Photorealistic Animation and Rendering (NPAR), and Sketch-Based Interfaces and Modeling (SBIM)

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The year 2011 marked the first year that the conferences CAe, NPAR, and SBIM all combined forces and in August organized a joint symposium in Vancouver, Canada, colocated with ACM SIGGRAPH. All fields share a strong interest in expressiveness—CAe with respect to the expressiveness of aesthetics, NPAR with respect to creating expressive imagery, and SBIM with respect to expressive interaction and modeling. The joint symposium including the associated art show thus was a tremendous success, attracting 161 participants from all over the world.

In this special section we are pleased to present extended versions of the best research papers from this 2011 conference. We therefore continue the tradition started a year ago with the special section in this journal on Non-Photorealistic Animation and Rendering [1] and include 10 papers, covering a broad range of topics associated with expressive aesthetics, depiction, interaction, and modeling. These papers were selected from the best papers accepted to the conference and their authors submitted a revised journal version. These manuscripts were extended from the conference versions with additional material in the form of new research results, additional study results, new and extended techniques, and/or additional detail and examples on the original approach. The journal submissions underwent at least one thorough journal review cycle, in addition to the previous conference reviewing. Where it was possible, we asked the reviewers from the previous conference review cycle to also review the journal version, but we also asked additional expert reviewers to ensure the high quality of this special section.

From the proceedings of CAe 2011, four extended papers are included in this special issue. The first of them is authored by Alexa and Matusik [2] and addresses the topic of creating dithered images by physically placing small drill holes into a carrier material. Through self-occlusion these cylindrical holes create the appearance of different gray values, an observation that the authors use to com-

pute an optimal placement of holes to represent a given input image while specifically taking image features into account. The topic of creating images by manipulating a certain carrier structure is also the topic of the paper by Inglis and Kaplan [3] who present an approach that allows users to produce images in the style of Op Art which create a very interesting aesthetic. In this technique the bending of a set of parallel lines in the background of the image is used to encode virtual features, which in turn can be used to represent two-color source images. The authors describe a technique that minimizes potential artifacts and extend the approach to also encode 3-color images, create the illusion of 3D shapes, and thus to use curves instead of straight lines as a carrier. The paper by Lynch et al. [4] analyzes the use of color by artists over time. They sample the histogram of colors used in different paintings, classify them into different color ranges, and then create a visualization from this data as inspired by parallel coordinates and stacked line graphs. The resulting images facilitate the analysis not only of how color usage changed over time for a specific artist or a whole artistic direction but also allow to compare different artists/art directions with each other. Finally, the extended version of the best paper of the CAe 2011 conference was authored by Lockyer et al. [5] and approaches the topic of communicating emotion or creating affect through motion textures. The authors present a tool for motion brushing to influence affective impressions and report on on-going qualitative evaluations with visual effects design professionals about how such a tool can enhance their every-day work.

Four papers were selected from the NPAR 2011 for extension and presentation in this special issue. The first paper “XDoG: An eXtended Difference-of-Gaussians Compendium including Advanced Image Stylization” [6] responds to the growing volume of the NPR literature adopting edge enhancing filtering operators to emphasize and stylize edges to create a variety of artistic effects in images. For the first time, the paper draws together the many works in this area to present both a

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comprehensive overview of these techniques, and a new formulation of edge enhancing filtering—the extended Difference of Gaussian (XDoG). The XDoG formulation both envelopes many of the previously presented edge stylization effects, and enables a gamut of new stylization effects. “Towards Automatic and Flexible Concept Transfer” [7] contrasts the low-level operators of XDog with a high level semantic analysis of color distribution in images. Images may be automatically classified into concepts like “romantic,” “luscious,” “spicy,” or concepts may be transferred to new images. The parameterization of the stylization process at a high conceptual level contrasts many earlier approaches that require many low-level user parameters to be set to control a rendering, and so may improve usability and adoption of NPR techniques. The third paper in the issue, “Emotional Response and Visual Attention to Non-Photorealistic Images” [8] complements this automated technique with a 42 participant evaluation of the perceived emotional context attached by users to particular stylization effects. The final extended paper within the NPAR section of this issue is unusual among those commonly appearing at these symposia, given the focus on maintaining photorealism in rendering. “Ray Prioritization Using Stylization and Visual Saliency” [9] presents a new approach for maintaining photorealistic detail in scene rendering, to achieve a guaranteed frame rate when rendering complex scenes. This is achievable through their exploitation of non-photorealistic cues in the rendering process. This final paper won the best paper prize at NPAR 2011—which, as with the selection all four extended papers presented here, was determined through the double-blind review process of NPAR 2011.

This year, four papers from the SBIM track were invited to this special section. Of these papers, two made it past a rigorous review process and are included here. These papers not only introduce sketch-based interfaces, but also spend considerable space discussing potential real-use scenarios. The first article by Applegate et al. [10] describes a sketch-based system for highway design. The highway design process is little known to the non-practitioners, but it is a good example of the kinds of processes that can benefit from free-hand sketch-based interaction. In this paper, the authors describe automated techniques for generating road networks efficiently. Their tool allows the designer to specify a number of task dependent constraints efficiently through a sketch-based interface. The second paper from the SBIM track introduces Sketch Express—a sketching interface for creating facial animations [11]. Here, Miranda et al. describe a system that allows animators to construct facial animations by sketching on either a 3D mesh, a 2.5D canvas or a 2D canvas. In each case, the pen input collected from the animators is used to modify the underlying animation rig. The authors also report two applications of their system—one in an artistic design context, and the other in an educational game context for people with autism spectrum disorders.

This special section would, of course, not have been

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 CAe/NPAR/SBIM 2011.*

April 2012.

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**Tobias Isenberg** is an assistant professor for computer graphics and interactive systems at the University of Groningen, the Netherlands. Since September 2010, he also holds a Digiteo Chair of Excellence in collaboration with the French research institutions CNRS and INRIA in Orsay. He works on topics in computational aesthetics as well as non-photorealistic and illustrative rendering and explores applications, for example, in scientific visualization. He also investigates interaction approaches for non-photorealistic and illustrative visualization, in particular, using large, touch-sensitive displays.



**Paul Asente** is a member of the Visual Computing Lab at Adobe Systems. His major interests include vector graphics and stylization, and many of his research results have appeared as features in Adobe's creative applications. He received his PhD from Stanford University in 1987.



**John Collomosse** is a lecturer within the Centre for Vision Speech and Signal Processing (CVSSP) at the University of Surrey. His research explores the relationships between artistic depiction and real-world imagery. Applications focus on non-photorealistic rendering of images and video, and the use of sketches to drive visual search of multimedia collections. He holds PhD in Computer Science from the University of Bath (2004) and is a Chartered Engineer.



**T. Metin Sezgin** graduated summa cum laude with Honors from Syracuse University in 1999. He completed his MS in the Artificial Intelligence Laboratory at Massachusetts Institute of Technology in 2001. He received his PhD in 2006 from Massachusetts Institute of Technology. He subsequently moved to University of Cambridge, and joined the Rainbow group at the University of Cambridge Computer Laboratory as a Postdoctoral Research Associate. Dr. Sezgin is currently an Assistant Professor in the College of Engineering at Ko University, Istanbul. His research interests include intelligent human-computer interfaces, multimodal sensor fusion, and HCI applications of machine learning. Dr. Sezgin is particularly interested in applications of these technologies in building intelligent pen-based interfaces. Dr. Sezgin's research has been

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