Guest editorial – High Dynamic Range Imaging

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High Dynamic Range (HDR) imagery is a step-change in imaging technology that is not limited to the 8-bits per pixel for each color channel that traditional or low-dynamic range digital images have been constrained to. These restrictions have meant that the current and relatively novel imaging technologies including stereoscopic, HD and ultraHD imaging do not provide an accurate representation of the lighting available in a real world environment. HDR technology has enabled the capture, storage, handling and display of content that supports real world luminance and facilitated the use of rendering methods in special effects, video games and advertising via novel rendering methods such as image-based lighting; it is also compatible with the other imaging methods and will certainly be a requirement of future high-fidelity imaging format specifications. However, HDR still has challenges to overcome before it can become a fully-fledged commercially successful technology. This special issue goes someway into rectify any limitations and also shines a light on future potential uses and directions of HDR.

As mobile computing has become ubiquitous screens of all types and dimensions are used in all sorts of environment and lighting. While a vast number of publications have dealt with making HDR content viewable on traditional low-dynamic range displays, very little attention has been given to the plethora of mobile displays and the particulars of displaying HDR content on such devices. Akyuz, Eskert and Aydin [1] present a detailed user study comparing tone mapping operators and exposure fusion methods on traditional displays and small screen displays in the paper entitled "An Eval-

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uation of Image Reproduction Algorithms for High Contrast Scenes on Large and Small Screen Display Devices". Akyuz et al. found that, in general tone mappers better reproduce the original scene than exposure fusion and that more straightforward methods for small screen displays may be sufficient.

Image-based lighting entails capturing and using real world lighting as a source of illumination for virtual scenes and allows for a dramatic increase in rendering realism. However, capturing the full 5D spatial and angular dimensionality of the real world illumination has been constrained to small scenes with controlled environments and requires extensive manual processing. In "Spatially Varying Image Based Lighting using HDR-video" [2], Unger et al. present a set of novel algorithms and data structures for visualization, processing and rendering with real world lighting conditions captured using HDR video. The proposed framework enables general and editable representations of the lighting environment, efficiently capturing the full dimensionality of the illumination in large environments exhibiting both complex spatial and angular variations. The authors illustrate the robustness of their approach with highly realistic renderings.

In "A Reality Check for Radiometric Camera Response Recovery Algorithms" [3], Akyuz and Genctav present a detailed analysis of the various algorithms used to recover the camera response function which is used to define the relationship between the light incident on the camera sensor and the resultant values in the image. The various camera response recovery algorithms are used as the foundation of a wide variety of HDR techniques to recover the original real-world luminance of a scene. This is the first paper to present a detailed study that compares and contrasts the accuracy, consistency and robustness of the four most popular camera response recovery methods. The results provide an insightful understanding of the distinct algorithms and highlight limitations that could lead to novel future methods.

Finally, we would like to express our gratitude to all the reviewers without whom we would have been unable to evaluate these papers in a timely manner.

Short Bios

Luis Paulo Santos is an Auxiliar Professor at the Department of Informatics, Universidade do Minho, Portugal. His research interests are in interactive high fidelity rendering and parallel processing. He received his PhD in 2001 from Universidade do Minho in Scheduling under Conditions of Uncertainty.

Luis Paulo published several papers on both computer graphics and parallel processing on international conferences and journals. He has been a member of several international program committees, acted as program co-chair of the 2007 EGPGV symposium and EuroPar 2005 conference and organized EGPGV 2006, VAST 2008 and VSGames 2010 in Braga, Portugal. He manages several nationally funded graphics R&D projects and participates in several European projects with both academia and industry. He is a member of the Direction Board of the Portuguese chapter of Eurographics since 2008, and was Joint Director of the Department of Informatics, Universidade do Minho, from 2010 to 2012.

Kurt Debattista is an Associate Professor at the University of Warwick. He received his PhD degree in Computer Science from the University of Bristol in 2006. His research interests include physically-based rendering, interactive global illumination, high dynamic range imaging, and parallel computing.

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