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In the last ten years stereoscopic displays have metamorphosed from specialist devices in research laboratories and high-end entertainment to mainstream consumer devices in the home and cinema. As a consequence, the science of stereoscopic displays and their applications are in extensive demand as developers strive to create the best viewing experience possible, both from the optical devices and the content production systems.

Underlying the rapid progress of the field is a set of research challenges in stereoscopic displays and applications including:

- Novel optical devices for improved image display and capture.
- 3D display designs with improved perceived quality and viewing freedom.
- Application demonstrators: new applications where 3D displays can be shown to create an entertainment or task performance advantage.
- Knowledge of the human perception of stereoscopic images: what is it that makes a high-quality stereoscopic 3D viewing experience?
- The theoretical foundations of stereoscopic imaging, in the context of the fundamental limits of optical devices and the human visual system.

The articles in this special section on stereoscopic displays and applications, and the special section of our sister publication *Optical Engineering* on 3D and 4D imaging techniques (February 2012), address all these themes. This special section of JEI includes articles on visual comfort and viewing experience, stereoscopic display design, image processing, camera design, and cinematography. The authors collectively describe substantial advances that will have lasting technical and theoretical impact on the field.

The papers in this special section were selected from the best presentations at the annual SPIE/IS&T conference on Stereoscopic Displays and Applications, held in January 2011. The authors of those top-ranked presentations were invited to submit to this special section, with an expanded version of their conference presentation. We are delighted that the majority of those invited agreed.

Neil Dodgson is professor of graphics and imaging at the University of Cambridge, UK. He has worked in stereoscopic display technology since 1991. His research has encompassed software, cameras, optics, design and theory for autostereoscopic 3D displays. He has served on the committee of the annual IS&T/SPIE conference on stereoscopic displays and applications since 2001, co-chairing the conference four times. His other research interests are in subdivision surfaces for 3D modeling and the aesthetics of image processing. He holds an undergraduate degree in physics and computer science from Massey University, New Zealand, and two doctorates from the University of Cambridge, UK. He is a Fellow of the Institution of Engineering & Technology (IET) and of the Institute of Mathematics & its Applications (IMA).

Nick Holliman is a reader in Computer Science at Durham University, UK and is best known internationally for his work over the last sixteen years investigating the fundamental challenges of stereoscopic 3D visualization. This work has included working with psychologists to understand how the human visual system processes binocular information, geometrically modeling binocular vision to capture empirical comfort limits, developing new computational algorithms for the control of binocular image disparity, and demonstrating how these algorithms work in practice in software tools and 3D visualizations. Prior to joining Durham University in 2001, he was principal researcher at Sharp Laboratories of Europe, in Oxford, England where he led the software team in the 3D imaging technology group. He filed patents on stereoscopic image generation, 3D displays, 3D cameras, and high performance head tracking systems. At Durham he has worked closely with leading astronomers and cosmologists, resulting in two award winning stereoscopic 3D films produced for exhibits at the Royal Society Summer Science Exhibitions of 2005, 2009, and 2010.