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Three-Dimensional Imaging Metrology

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Introduction

This is the first conference on 3D Imaging Metrology under the auspices of The Society for Imaging Science (IS&T) and SPIE. It provides a unique forum for researchers, developers, users and policy makers to present the latest advances in 3D imaging and modeling of existing objects and sites along with the most recent National Measurement Institutes (NMI) activities and work on standard definitions.

3D Imaging Metrology is one of 24 technical conferences that are featured at the joint annual symposium of IS&T and SPIE, known as IS&T/SPIE Electronic Imaging Science and Technology. The symposium covers all aspects of electronic imaging, from image sensing to display and hardcopy. The topics include sensors, digital photography, color hardcopy, human vision, image processing and compression, image quality, image security, and multimedia imaging systems. The sub-group of conferences in the 3D Imaging, Interaction and Measurement track, include Stereoscopic Displays and Applications, The Engineering Reality of Virtual Reality, and 3D Imaging Metrology.

3D Imaging Metrology is new in 2009 and was developed in response to the rapidly growing interest in 3D imaging technology. This technology provides high speed, non-contact dense 3D surface data. Three-dimensional imaging methods include coded-light projection systems, triangulation and time-of-flight systems for distances from a few centimeters to several kilometers. Three-dimensional imaging systems are now widely available, but standards, best practices and comparative data are limited. The need for standards is mainly driven by users and product developers who are concerned with: 1) the applicability of a given system to the task at hand (fit-for-purpose), 2) the ability to fairly compare across instruments, 3) instrument performance issues, and 4) costs savings through 3D imaging.

This conference focuses on two topics. The first topic is the performance of 3D imaging sensors and algorithms where the performance of a system is usually evaluated using quality parameters such as resolution, uncertainty, accuracy and complexity. Performance metrics provide a framework to assess and characterize the overall performance of a system and a way of reporting the assessment and characterization. The second topic focuses on the development of the much needed metrology artifacts and documented standards for 3D imaging systems. Applications and disciplines requiring 3D imaging metrology include 3D modeling (e.g., structures, human body), rapid product development, manufacturing, construction, forensics, medicine, and exploration of remote and hazardous sites, to name a few.

We invited submissions of original research contributions, state-of-art summaries, as well as demonstrations of successful and less successful applications in the following technical areas: performance evaluation of 3D sensing methods; sensor calibration; data processing; surface modeling; and, emerging and new standards for 3D imaging systems. The accepted papers were divided in the following categories: Theory and New Methods for 3D Surface Sensing, Measurement Uncertainty, Measurement Standards and Calibration, Coordinate Metrology, Artifact-based Characterization, and Applications.

The chairs and the scientific committee of 3D Imaging Metrology conference welcome and acknowledge the efforts of the authors, presenters and audience in contributing to the success of this meeting. We hope to have fostered a series of presentations and papers dedicated to this important topic.

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