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Contents

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William E. Thompson, New Mexico Institute of Mining and Technology (United States)

2 Target Detection and Tracking
Steven L. Chodos, Boeing-SVS, Inc. (United States)
William E. Thompson, New Mexico Institute of Mining and Technology (United States)

Introduction

The SPIE Acquisition, Tracking, and Pointing, and Laser System Technologies conference continues a tradition of providing a well-documented annual assessment of on-going, practical acquisition, tracking, and pointing technology. The conference has focused on both theory and practice – and has spanned all aspects of design, analysis, simulation, development, and testing. As a result, the last twenty-plus years of Proceedings from this conference provide a comprehensive history of the major technical developments within this field. This year also represents the fourth year of an expansion in the conference's scope, as the result of merging with the SPIE Laser Systems Technologies conference in 2006. This increased scope now includes other optics and beam control technologies, such as adaptive optics and precision line-of-sight stabilization, which are needed for many implementations of laser-based acquisition, tracking, and pointing systems in the field.

Locating, identifying, locking onto, and maintaining track on dynamic targets is absolutely essential for precision photonic and optical systems to be able to achieve their performance goals. Indeed, if the line-of-sight orientation of an optical sensor cannot be maintained toward its target – or in some applications, if a laser cannot provide continuous illumination of its target – then the whole purpose of the entire optical system is lost. As technical improvements are realized for optical sensors and laser sources, similar progress for acquisition, tracking, and optical control are necessary to fully exploit these technical advances in fieldable optical systems. Such progress requires advancements in active and passive imaging sensors, optics, gimbal-pedestal and mirror mechanisms, control systems, sensor stabilization, real-time imaging, signal processing, target tracking, and sensor fusion, as well as other related sensor and control tasks. Additionally, a frequent theme in the development of optical systems is the requirement to operate in an environment and/or on a platform that significantly stresses the state of the art for optical control, because of platform dynamics, difficult propagation conditions between the optical system and the intended target, complex target and target scene phenomenology, and constraints on the optical system's weight, volume, power consumption, platform interfaces, etc. Successfully meeting these requirements takes creativity and innovation, leading to new hardware designs, control architectures, processing algorithms, and other advances in the state of the art that can often be used to an advantage in other optical system designs and applications.

The specific advancements included in the 2009 conference reported in these Proceedings include: target acquisition, recognition, and tracking algorithms; gimbal/pointing mechanism designs and control algorithms; the evaluation of deformable mirror performance in a high power solid-state laser resonator; and

new techniques for the simulation and evaluation of optical tracking system performance.

The two-decade-long running success of this SPIE Conference is clearly dependent on many authors and their sponsoring organizations who freely share their work with others. We extend a sincere appreciation to each of these contributors, as well as our fellow conference organizers who actively encourage their colleagues and professional associates to be a part of this event. We also recognize and appreciate the excellent SPIE staff that makes organizing these conferences such a pleasant experience.

Watch for the Call for Papers for the 2010 conference – Acquisition, Tracking, Pointing, and Laser Systems Technologies XXIV. We expect to continue the present scope of the conference with only minor changes.

Steven L. Chodos
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