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Acquisition, Tracking, Pointing, and Laser Systems Technologies XXIII

**Steven L. Chodos
William E. Thompson**
Editors

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Contents

v	<i>Conference Committee</i>
vii	<i>Introduction</i>

SESSION 1 CONTROL SYSTEMS AND COMPONENTS

- 7338 02 **Adaptive filter techniques for optical beam jitter control** [7338-01]
M. J. Beerer, H. Yoon, B. N. Agrawal, Naval Postgraduate School (United States)
- 7338 03 **Development of mirror stabilization line-of-sight rate equations for an unconventional sensor-to-gimbal orientation** [7338-02]
J. M. Hilkert, Alpha-Theta Technologies (United States); S. Cohen, Atlantic Positioning Systems (United States)
- 7338 04 **Line-of-sight kinematics for a two-axis head mirror: equations for predicting and controlling mirrored LOS pointing** [7338-03]
J. M. B. Royalty, Harris Corp. (United States)
- 7338 05 **Performance of a deformable mirror in a high-energy Nd:YAG laser** [7338-04]
J. Beedell, I. Elder, SELEX GALILEO (United Kingdom); D. Hand, Heriot-Watt Univ. (United Kingdom)

SESSION 2 TARGET DETECTION AND TRACKING

- 7338 07 **Adaptive processing for enhanced target acquisition** [7338-06]
S. F. Page, M. I. Smith, D. Hickman, M. Bernhardt, W. Oxford, Waterfall Solutions Ltd. (United Kingdom); N. Watson, F. Beath, SELEX GALILEO (United Kingdom)
- 7338 08 **Adaptive detection and enhancement pre-processor for tracking** [7338-07]
D. Scott, O. Mise, GE Fanuc Intelligent Platforms (United Kingdom)
- 7338 09 **Shadow detection using 2D cepstrum** [7338-08]
B. U. Toreyin, A. E. Cetin, Bilkent Univ. (Turkey)
- 7338 0A **Spatial multimodal mean background model for real-time MTI** [7338-09]
J. Williford, C. Dalal, M. Shim, General Dynamics Robotic Systems (United States)

SESSION 3 TRACKER ALGORITHMS

- 7338 0B **Relating image, shape, position, and velocity in visual tracking** [7338-10]
S. Wong, Defence Science and Technology Organisation (Australia) and Univ. of South Australia (Australia); D. Kearney, Univ. of South Australia (Australia)

- 7338 0C **Image domain moving target tracking with advanced image registration and time-differencing techniques** [7338-11]
H.-W. Chen, D. Braunreiter, Science Applications International Corp. (United States)
- 7338 0E **Motion detection with camera shake** [7338-13]
M. Kazui, M. Itoh, Hitachi, Ltd. (Japan); H. Yaemori, H. Takauji, S. Kaneko, Hokkaido Univ. (Japan)
- 7338 0F **Color-augmented target tracking using a liquid crystal tunable filter camera** [7338-14]
M. L. Gran, Space Computer Corp. (United States)
- 7338 0G **The extended preferred ordering theorem for precision acquisition tracking and pointing** [7338-15]
D. M. Leskiw, H. Wang, Syracuse Univ. (United States)
- 7338 0H **A judicious multiple hypothesis tracker with interacting feature extraction** [7338-16]
J. G. McAnanama, L-3 Wescam (Canada); T. Kirubarajan, McMaster Univ. (Canada)

SESSION 4 SYSTEM LEVEL APPLICATIONS, EVALUATION, AND TEST

- 7338 0I **Design of an optical system for a 5th generation multi-spectral air-to-air missile considering the imaging performance degradation due to the aerodynamic heating** [7338-21]
P. R. Leite, Jr., M. da Silva, The Brazilian Air Force (South Africa); E. T. Paoli, Mectron S.A. (South Africa)
- 7338 0J **State space representation of optical systems** [7338-17]
C. Jones, Boeing, Inc. (United States); S. Griffin, Boeing, SVS (United States)
- 7338 0K **A comparative evaluation of visual tracking systems** [7338-19]
A. Gatt, Univ. of South Australia (Australia); S. Wong, Defence Science and Technology Organisation (Australia); D. Kearney, Univ. of South Australia (Australia); E. Watts, Defence Science and Technology Organisation (Australia)

SESSION 5 TRACKING AND CLUTTER

- 7338 0M **Robust image-domain target tracking and recognition process under heavy urban background clutter conditions** [7338-23]
H.-W. Chen, D. Braunreiter, Science Applications International Corp. (United States)

Author Index

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

- 3 Tracker Algorithms
William E. Thompson, New Mexico Institute of Mining and Technology
(United States)
Steven L. Chodos, Boeing-SVS, Inc. (United States)
- 4 System Level Applications, Evaluation, and Test
William E. Thompson, New Mexico Institute of Mining and Technology
(United States)
Ali T. Alouani, Tennessee Technological University (United States)
- 5 Tracking and Clutter
Steven L. Chodos, Boeing-SVS, Inc. (United States)
William E. Thompson, New Mexico Institute of Mining and Technology
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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
William E. Thompson