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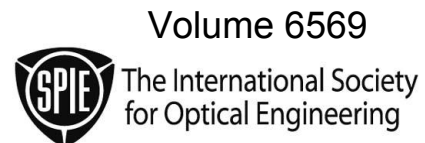
PROCEEDINGS OF SPIE

# ***Acquisition, Tracking, Pointing, and Laser Systems Technologies XXI***

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

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# Contents

vii	<i>Conference Committee</i>
ix	<i>Introduction</i>
xi	<i>Dedication to Larry A. Stockum</i>

---

## SESSION 1 SIGNAL PROCESSING

---

- 656902 **Characterization of polar to Cartesian coordinates transformation and its effect on target track quality** [6569-01]  
J. E. Gray, Naval Surface Warfare Ctr. (USA); A. T. Alouani, Tennessee Technological Univ. (USA)
- 656904 **Alternative switching logic designs for multiple model filters** [6569-03]  
A. S. Smith-Carroll, D. H. McCabe, J. E. Gray, Naval Surface Warfare Ctr. (USA)
- 656905 **Impact point prediction of small ballistic munitions with an interacting multiple model estimator** [6569-05]  
S. Conover, J. C. Kerce, G. Brown, L. Ehrman, Georgia Tech Research Institute (USA);  
D. Hardiman, Aviation and Missile RDEC (USA)
- 656906 **Collaborative multimodel Rao-Blackwellised particle filter for target tracking in acoustic sensor networks** [6569-06]  
Z. Yu, J. Wei, J. Zhao, H. Liu, Shanghai Institute of Microsystem and Information Technology (China)

---

## SESSION 2 STABILIZATION AND LINE-OF-SIGHT CONTROL

---

- 656907 **Acquisition, tracking, and pointing technology development for bifocal relay mirror spacecraft** [6569-07]  
J. J. Kim, T. Sands, B. N. Agrawal, Naval Postgraduate School (USA)

---

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The CID number appears on each page of the manuscript. The complete citation is used on the first page, and an abbreviated version on subsequent pages.

- 656908 **Friction effects on large gimbaled EO directors** [6569-08]  
C. A. Lagunowich, R. Sobek, M. McEver, G. D. Danyo, L-3 Communications (USA)
- 656909 **Laser beam director system monitoring the alignment state with a null reflector** [6569-35]  
Y. S. Kim, H. S. Kim, Y. C. Park, E. C. Kang, Agency for Defense Development (South Korea);  
S. S. Lee, J. J. Kim, H. D. Eom, S. U. Park, Doosan Infracore Ltd. (South Korea)

---

### SESSION 3 IMAGE PROCESSING FOR TRACKING

---

- 65690A **Tunable wavelet target extraction preprocessor** [6569-12]  
D. Yonovitz, Complex Data Systems (USA)
- 65690B **Target tracking based on spatio-temporal fractal error** [6569-13]  
B. S. Allen, L-3 Communications Cincinnati Electronics (USA)
- 65690D **A novel segmentation method for object tracking and recognition** [6569-16]  
C. Witte, K. Jäger, M. Hebel, W. Armbruster, FGAN-FOM Research Institute for Optronics and  
Pattern Recognition (Germany)
- 65690E **Video surveillance of pedestrians and vehicles** [6569-17]  
D. Gutchess, Charles River Analytics (USA); V. Ablavsky, A. Thangali, S. Sclaroff, Boston Univ.  
(USA); M. Snorrason, Charles River Analytics (USA)
- 65690F **Zoom techniques for achieving scale invariant object tracking in real-time active vision  
systems** [6569-18]  
E. D. Nelson, J. C. Cockburn, Rochester Institute of Technology (USA)
- 65690G **Passive ranging of boost-phase missiles** [6569-19]  
M. Hawks, G. Perram, Air Force Institute of Technology (USA)
- 65690H **Results from precision tracking tests against distant objects** [6569-20]  
J. F. Riker, Air Force Research Lab. (USA)
- 65690I **Optimization of the tomographic scanning (TOSCA) imager** [6569-21]  
H. Hovland, Norwegian Defence Research Institute (Norway)
- 65690J **IR and CCD-based object tracking using active shape model** [6569-22]  
J. Lee, C. Park, Samsung Thales Co. Ltd. (South Korea)

---

### SESSION 4 SYSTEM LEVEL APPLICATIONS

---

- 65690K **A real-time open-source video tracking system** [6569-23]  
B. R. Secrest, J. R. Vasquez, T. F. Fulton, Air Force Institute of Technology (USA);  
D. A. Summers-Stay, Air Force Research Lab. (USA)
- 65690L **Comprehensive evaluation of tracking systems by non-photorealistic simulation** [6569-25]  
C. Dubreu, Cedip Infrared Systems (France) and École Nationale Supérieure de Techniques  
Avancées (France); A. Manzanera, École Nationale Supérieure de Techniques Avancées  
(France); E. Bohain, Cedip Infrared Systems (France)

- 65690M **Tuning Linux to meet real time requirements** [6569-26]  
R. S. Herbel, D. N. Le, Thales Raytheon Systems (USA)
- 65690N **IRLOOK: an advanced mobile infrared signature measurement, data reduction, and analysis system** [6569-27]  
T. Cukur, Y. Altug, C. Uzunoglu, K. Kilic, E. Emir, ASELSAN A.Ş. (Turkey)
- 65690O **Practical to tactical: an evolution of the dual line-of-sight experiment** [6569-28]  
D. J. Riedle, C. D. Stargardt, A. A. Lazzaro, F. B. Zoltowski, K. J. Warden, Boeing-SVS, Inc. (USA)
- 65690P **Image seeker simulation for short-range surface-to-surface missile** [6569-36]  
S.-H. Jin, H.-G. Kang, LIG NEX1 Co., Ltd. (South Korea)

---

**SESSION 5 VIBRATION CONTROL AND STABILIZATION IN EO EQUIPMENT: JOINT SESSION WITH CONFERENCE 6561**

---

- 65690Q **Adaptive filtering and feed-forward control for suppression of vibration and jitter** [6569-29]  
E. H. Anderson, R. L. Blankinship, L. P. Fowler, R. M. Glaese, P. C. Janzen, CSA Engineering, Inc. (USA)
- 65690R **Real-time optimal sensing strategies for active control of optical systems** [6569-30]  
S.-M. Moon, Duke Univ. (USA); L. P. Fowler, CSA Engineering, Inc. (USA); R. L. Clark, Duke Univ. (USA); E. H. Anderson, CSA Engineering, Inc. (USA)
- 65690U **Vibration evaluation of a precision inertial reference unit** [6569-33]  
J. Friel, B. Spanbauer, P. Merritt, Air Force Research Lab. (USA); R. Sturdevant, R. Bradford, N. Tekell, Holloman AFB (USA); R. Walter, J. Donaldson, Boeing-SVS (USA)
- 65690V **Adaptive suppression of optical jitter with a new liquid crystal beam steering device** [6569-34]  
P. K. Orzechowski, S. Gibson, T.-C. Tsao, Univ. of California, Los Angeles (USA); D. Herrick, Air Force Research Lab. (USA); M. Mahajan, B. Wen, Teledyne Scientific Co. (USA)

*Author Index*



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**Steven L. Chodos**, Boeing-SVS, Inc. (USA)
- 5 Vibration Control and Stabilization in EO Equipment: Joint Session  
with Conference 6561  
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**Dan C. Herrick**, Air Force Research Laboratory (USA)

## Introduction

The SPIE Acquisition, Tracking, and Pointing and Laser System Technologies Conference continues a 21-year 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 years of proceedings from this conference provide a comprehensive history of the major technical developments within this field. This year also represents the second 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 line-of-sight stabilization, which are needed for many implementations of laser-based acquisition, tracking, and pointing systems in the field.

This year, the conference also sponsored a joint session, with the Infrared Technology and Applications XXXIII Conference on Vibration Control and Stabilization in EO Equipment, representing a common interest in the image and line-of-sight stabilization for both passive and active EO systems.

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 can not be maintained toward its target, or in some applications, if a laser can not 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 lasers, similar progress for acquisition and tracking must accompany the sensor advancements. Such progress requires advancements in active and passive imaging sensors, lasers, 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. The specific advancements included in the 2007 conference reported in these proceedings include: advanced track processing algorithms, theory and test results for active (laser-illuminated) target tracking, bifocal relay mirror beam control technologies, control algorithms for the suppression of vibration and optical jitter, precision optical inertial reference units, and new techniques for the simulation of optical tracking systems 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

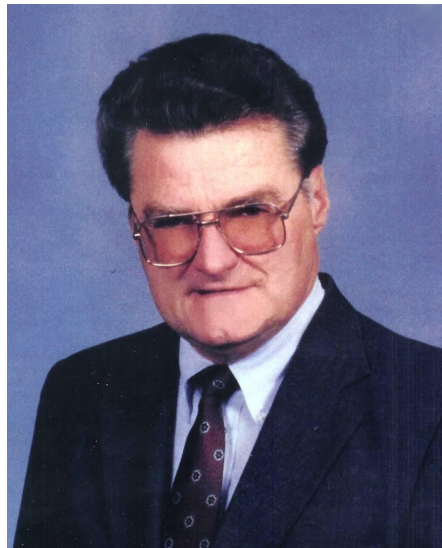
recognize and appreciate the excellent SPIE staff that makes organizing these conferences such a pleasant experience.

Watch for the call for papers for the 2008 Conference Acquisition, Tracking, Pointing, and Laser Systems Technologies XXII. We expect to continue the present scope of the conference with only minor changes, to include consideration of continuing the joint session, so successful this year, on Vibration Control and Stabilization in EO Equipment.

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

# 2007 SPIE Acquisition, Tracking, Pointing, and Laser System Technologies Conference

Dedicated to  
**Larry A. Stockum**



**Passed August 9, 2006**

The 2007 SPIE Acquisition, Tracking, Pointing, and Laser System Technologies Conference is dedicated to **Larry A. Stockum**, who served as co-chair for this conference for 16 years (1991–2006). In addition, Larry was co-editor of the “*Precision Stabilization and Tracking Systems for Acquisition, Pointing, and Control Systems*” SPIE Milestone Series. He was also author of nine SPIE papers (1990–2005) which covered all aspects of electro-optical sensors used for target acquisition and tracking. Dr. Stockum co-taught the SPIE Short Course “*Precision Stabilization and Laser Pointing Systems*” for many years at several major SPIE conference venues.

Larry A. Stockum was born in East Palestine, Ohio, grew up around Plainfield, Ohio, and attended The Ohio State University where he earned B.S., M.S., and PhD degrees in electrical engineering. He worked on weapons guidance at Rockwell International (Columbus, Ohio) where he was once recognized as Engineer of the Year for his work on the Hellfire missile at Battelle Institute (Ohio), and at The Boeing Company (Alabama). He was granted the patent, “*High-Speed Video Instrumentation System*” while at Battelle. At Boeing, he was elected Technical Fellow in 1999, and was Chief Engineer for Land Combat

Weapons Advanced Tactical Missiles. Larry was recognized by his peers as an expert in virtually all technologies of target acquisition and tracking including control, stabilization, target detection/identification/tracking, video trackers, optical sensors, weapon systems, image/signal processing, optics, and electronics.