PROCEEDINGS OF SPIE

SPIDigitalLibrary.org/conference-proceedings-of-spie

Front Matter: Volume 8345

, "Front Matter: Volume 8345," Proc. SPIE 8345, Sensors and Smart Structures Technologies for Civil, Mechanical, and Aerospace Systems 2012, 834501 (9 May 2012); doi: 10.1117/12.966864

SPIE.

Event: SPIE Smart Structures and Materials + Nondestructive Evaluation and Health Monitoring, 2012, San Diego, California, United States

PROCEEDINGS OF SPIE

Sensors and Smart Structures Technologies for Civil, Mechanical, and Aerospace Systems 2012

**Masayoshi Tomizuka
Chung-Bang Yun
Jerome P. Lynch**
Editors

**12–15 March 2012
San Diego, California, United States**

Sponsored by
SPIE

Cosponsored by
American Society of Mechanical Engineers (United States)

Cooperating Organizations
Intelligent Materials Forum (Japan)
Jet Propulsion Laboratory (United States)
National Science Foundation (United States)

Published by
SPIE

Part One of Two Parts

Volume 8345

Proceedings of SPIE, 0277-786X, v. 8345

SPIE is an international society advancing an interdisciplinary approach to the science and application of light.

The papers included in this volume were part of the technical conference cited on the cover and title page. Papers were selected and subject to review by the editors and conference program committee. Some conference presentations may not be available for publication. The papers published in these proceedings reflect the work and thoughts of the authors and are published herein as submitted. The publisher is not responsible for the validity of the information or for any outcomes resulting from reliance thereon.

Please use the following format to cite material from this book:

Author(s), "Title of Paper," in *Sensors and Smart Structures Technologies for Civil, Mechanical, and Aerospace Systems 2012*, edited by Masayoshi Tomizuka, Chung-Bang Yun, Jerome P. Lynch, Proceedings of SPIE Vol. 8345 (SPIE, Bellingham, WA, 2012) Article CID Number.

ISSN 0277-786X

ISBN 9780819490025

Published by

SPIE

P.O. Box 10, Bellingham, Washington 98227-0010 USA

Telephone +1 360 676 3290 (Pacific Time) · Fax +1 360 647 1445

SPIE.org

Copyright © 2012, Society of Photo-Optical Instrumentation Engineers

Copying of material in this book for internal or personal use, or for the internal or personal use of specific clients, beyond the fair use provisions granted by the U.S. Copyright Law is authorized by SPIE subject to payment of copying fees. The Transactional Reporting Service base fee for this volume is \$18.00 per article (or portion thereof), which should be paid directly to the Copyright Clearance Center (CCC), 222 Rosewood Drive, Danvers, MA 01923. Payment may also be made electronically through CCC Online at copyright.com. Other copying for republication, resale, advertising or promotion, or any form of systematic or multiple reproduction of any material in this book is prohibited except with permission in writing from the publisher. The CCC fee code is 0277-786X/12/\$18.00.

Printed in the United States of America.

Publication of record for individual papers is online in the SPIE Digital Library.

SPIDigitalLibrary.org

Paper Numbering: Proceedings of SPIE follow an e-First publication model, with papers published first online and then in print and on CD-ROM. Papers are published as they are submitted and meet publication criteria. A unique, consistent, permanent citation identifier (CID) number is assigned to each article at the time of the first publication. Utilization of CIDs allows articles to be fully citable as soon as they are published online, and connects the same identifier to all online, print, and electronic versions of the publication. SPIE uses a six-digit CID article numbering system in which:

- The first four digits correspond to the SPIE volume number.
- The last two digits indicate publication order within the volume using a Base 36 numbering system employing both numerals and letters. These two-number sets start with 00, 01, 02, 03, 04, 05, 06, 07, 08, 09, 0A, 0B ... 0Z, followed by 10-1Z, 20-2Z, etc.

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. Numbers in the index correspond to the last two digits of the six-digit CID number.

Contents

Part One

xix	Conference Committee
xxv	Introduction

SESSION 1 KEYNOTE SESSION

8345 02	Laser based structural health monitoring for civil, mechanical, and aerospace systems (Keynote Paper) [8345-01] H. Sohn, KAIST (Korea, Republic of)
---------	---

SESSION 2A SYSTEM IDENTIFICATIONS FOR CIVIL STRUCTURES

8345 04	Stochastic subspace identification for operational modal analysis of an arch bridge [8345-03] C.-H. Loh, M.-C. Chen, S.-H. Chao, National Taiwan Univ. (Taiwan)
8345 05	Prediction of stress waves propagation in progressively loaded seven wire strands [8345-04] I. Bartoli, Drexel Univ. (United States); G. Castellazzi, A. Marzani, Univ. of Bologna (Italy); S. Salamone, Univ. at Buffalo (United States)
8345 07	Damage diagnosis algorithm using a sequential change point detection method with an unknown distribution for damage [8345-111] H. Y. Noh, R. Rajagopal, A. S. Kiremidjian, Stanford Univ. (United States)
8345 09	Estimation of load redistribution on a cable-stayed bridge using a combination of sensing techniques [8345-07] D. Zonta, P. Esposito, M. Molognoni, M. Pozzi, R. Zandonini, Univ. of Trento (Italy); M. Wang, Northeastern Univ. (United States); Y. Zhao, Intelligent Instrument System, Inc. (United States); D. Inaudi, D. Posenato, Smartec S.A. (Switzerland); B. Glisic, Univ. of Princeton (United States)

SESSION 2B ADVANCES IN GUIDED WAVES

8345 0A	The use of exact Lamb waves modes for modeling the power and energy transduction of structurally bonded piezoelectric wafer active sensors [8345-08] B. Lin, V. Giurgiutiu, A. M. Kamal, Univ. of South Carolina (United States)
8345 0B	Ultrasonic monitoring of a pipe under operating conditions [8345-09] C. Liu, J. Harley, N. O'Donoghue, Y. Ying, M. H. Altschul, J. H. Garrett, Jr., J. M. F. Moura, I. J. Oppenheim, Carnegie Mellon Univ. (United States); L. Soibelman, Univ. of Southern California (United States)

8345 0C **Finite element simulation of guided waves generated by laser pulses** [8345-10]
W. Liu, Michigan State Univ. (United States); J.-W. Hong, Michigan State Univ. (United States)
and KAIST (Korea, Republic of)

8345 0E **Recent advancement on the NDE of structures by means of highly nonlinear solitary waves**
[8345-12]
X. Ni, P. Rizzo, Univ. of Pittsburgh (United States)

SESSION 3A NEXT-GENERATION SENSING SYSTEMS FOR SHM: WIRELESS AND MICROCONTROLLER-BASED SENSORS

8345 0F **Thermal effects on a passive wireless antenna sensor for strain and crack sensing** [8345-13]
X. Yi, R. Vyas, C. Cho, C.-H. Fang, J. Cooper, Y. Wang, Georgia Institute of Technology
(United States); R. T. Leon, Virginia Polytechnic Institute and State Univ. (United States);
M. M. Tentzeris, Georgia Institute of Technology (United States)

8345 0H **Network architecture design of an agile sensing system with sandwich wireless sensor
nodes** [8345-15]
S. Dorvash, X. Li, S. Pakzad, L. Cheng, Lehigh Univ. (United States)

8345 0I **A radar-based sensor network for bridge displacement measurements** [8345-16]
J. A. Rice, Univ. of Florida (United States); C. Gu, C. Li, Texas Tech Univ. (United States);
S. Guan, Univ. of Florida (United States)

8345 0J **Percussive augments of rotary drills (PARoD)** [8345-121]
M. Badescu, Y. Bar-Cohen, S. Sherit, X. Bao, Z. Chang, C. Donnelly, J. Aldrich, Jet Propulsion
Lab. (United States)

SESSION 3B WIRELESS SENSOR NETWORKS FOR SHM I

8345 0K **Challenges of subsurface geo-sensing and monitoring using wireless signal networks**
[8345-17]
E. Ghazanfari, S.-U. Yoon, S. Pamukcu, M. T. Suleiman, L. Cheng, Lehigh Univ. (United States)

8345 0L **Sandwich node architecture for agile wireless sensor networks for real-time structural health
monitoring applications** [8345-18]
Z. Wang, S. Pakzad, L. Cheng, Lehigh Univ. (United States)

8345 0M **Long-term monitoring of a cable stayed bridge using a SCADA system** [8345-19]
M. Torbol, S. Kim, M. Shinozuka, Univ. of California, Irvine (United States)

8345 0N **Heterogeneous wireless sensor networks for computational partitioning of Markov
parameter-based system identification** [8345-20]
J. D. Bergman, Univ. of Michigan (United States); J. Kim, KAIST (Korea, Republic of);
J. P. Lynch, Univ. of Michigan (United States)

- 8345 0O **Decentralized system identification using stochastic subspace identification on wireless smart sensor networks** [8345-21]
S.-H. Sim, Ulsan National Institute of Science and Technology (Korea, Republic of);
B. F. Spencer, Jr., Univ. of Illinois at Urbana-Champaign (United States); J. Park, H. Jung, KAIST (Korea, Republic of)

SESSION 4A INTELLIGENT SYSTEMS FOR DISASTER MITIGATION

- 8345 0Q **Experimental validation of finite element model analysis of a steel frame in simulated post-earthquake fire environments** [8345-23]
Y. Huang, W. J. Bevens, H. Xiao, Missouri Univ. of Science and Technology (United States);
Z. Zhou, Dalian Univ. of Technology (China); G. Chen, Missouri Univ. of Science and Technology (United States)
- 8345 0R **A novel landslide warning solution using single mode telecom fiber embedded in geo-textile** [8345-24]
P. Kung, L. Wang, QPS Photonics Inc. (Canada); M. I. Comanici, McGill Univ. (Canada)

SESSION 4B WIRELESS SENSOR NETWORKS FOR SHM II

- 8345 0S **Recent enhancements to and applications of the SmartBrick structural health monitoring platform** [8345-25]
A. Gunasekaran, S. Cross, N. Patel, S. Sedigh, Missouri Univ. of Science and Technology (United States)
- 8345 0T **Wireless structural health monitoring of cable-stayed bridge using Imote2-platformed smart sensors** [8345-26]
D.-D. Ho, K.-D. Nguyen, P.-Y. Lee, D.-S. Hong, S.-Y. Lee, J.-T. Kim, S.-W. Shin, Pukyong National Univ. (Korea, Republic of); C.-B. Yun, KAIST (Korea, Republic of); M. Shinozuka, Univ. of California, Irvine (United States)
- 8345 0U **Efficient campaign-type structural health monitoring using wireless smart sensors** [8345-27]
J. Li, Univ. of Illinois at Urbana-Champaign (United States); T. Nagayama, The Univ. of Tokyo (Japan); K. A. Mechitov, B. F. Spencer, Jr., Univ. of Illinois at Urbana-Champaign (United States)

SESSION 5A CRACK DETECTION IN STRUCTURES

- 8345 0W **Comparative study of electromechanical impedance and Lamb wave techniques for fatigue crack detection and monitoring in metallic structures** [8345-29]
S. I. Lim, Y. Liu, C. K. Soh, Nanyang Technological Univ. (Singapore)
- 8345 0Y **Impact localization on a cylindrical plate by near-field beamforming analysis** [8345-31]
H. Nakatani, Tokyo Univ. of Science (Japan); T. Hajzargarbashi, The Univ. of Arizona (United States); K. Ito, The Univ. of Tokyo (Japan); T. Kundu, The Univ. of Arizona (United States);
N. Takeda, The Univ. of Tokyo (Japan)

SESSION 5B ACOUSTIC EMISSION AND ACTIVE SENSING

- 8345 12 **PWAS-based wireless acoustic emission sensor** [8345-35]
H. Huang, M. Islam, The Univ. of Texas at Arlington (United States)

SESSION 6A NEXT-GENERATION SENSING SYSTEMS FOR SHM: NANOTECHNOLOGY

- 8345 13 **Finite element model updating of a space frame bridge with mobile sensing data** [8345-36]
D. Zhu, C.-H. Fang, C. Cho, J. Guo, Y. Wang, K.-M. Lee, Georgia Institute of Technology (United States)
- 8345 15 **Enhancing the piezoelectric performance of PVDF-TrFE thin films using zinc oxide nanoparticles** [8345-38]
J. S. Dodds, F. N. Meyers, K. J. Loh, Univ. of California, Davis (United States)

SESSION 6B SMART SENSORS FOR SHM

- 8345 18 **Design and validation of high-precision wireless strain sensors for structural health monitoring of steel structures** [8345-41]
H. Jo, Univ. of Illinois at Urbana-Champaign (United States); J. Park, KAIST (Korea, Republic of); B. F. Spencer, Jr., Univ. of Illinois at Urbana-Champaign (United States); H.-J. Jung, KAIST (Korea, Republic of)
- 8345 19 **Smart PZT-interface for SHM in tendon-anchorage of cable-stayed bridge** [8345-42]
K.-D. Nguyen, P.-Y. Lee, J.-T. Kim, Pukyong National Univ. (Korea, Republic of)
- 8345 1A **Preliminary study of low-cost GPS receivers for time synchronization of wireless sensors** [8345-43]
R. Kim, Univ. of Illinois at Urbana-Champaign (United States); T. Nagayama, The Univ. of Tokyo (Japan); H. Jo, B. F. Spencer, Jr., Univ. of Illinois at Urbana-Champaign (United States)
- 8345 1B **Enhanced resolution of passive wireless conductivity sensors** [8345-44]
J. Kim, P. Pasupathy, S. L. Wood, D. P. Neikirk, The Univ. of Texas at Austin (United States)
- 8345 1C **Experimental validation of energy harvesting device for civil engineering applications** [8345-45]
H.-J. Jung, I.-H. Kim, J. Park, KAIST (Korea, Republic of)

SESSION 7 DISTRIBUTED SENSING AND CONTROLS FOR SHM AND HUMAN-SYSTEM INTERACTION

- 8345 1D **Pressure and shear sensing based on microstrip antennas** [8345-46]
I. Mohammad, H. Huang, The Univ. of Texas at Arlington (United States)
- 8345 1E **Mutual synchronization between structure and central pattern generator** [8345-47]
J. Hongu, D. Iba, Kyoto Institute of Technology (Japan)

- 8345 1F **Simultaneous localization and mapping with consideration of robot system dynamics** [8345-48]
R. Jaai, N. Chopra, B. Balachandran, Univ. of Maryland, College Park (United States);
H. Karki, The Petroleum Institute (United Arab Emirates)

SESSION 8A STRAIN SENSORS FOR SHM

- 8345 1H **Numerical demonstration of MEMS strain sensor** [8345-49]
H. Saboonchi, D. Ozevin, Univ. of Illinois at Chicago (United States)
- 8345 1I **Measurement of longitudinal strain and estimation of peel stress in adhesive-bonded single-lap joint of CFRP adherend using embedded FBG sensor** [8345-50]
X. Ning, H. Murayama, K. Kageyama, K. Uzawa, D. Wada, The Univ. of Tokyo (Japan)
- 8345 1J **Wireless interrogation of antenna sensors for strain monitoring** [8345-51]
X. Xu, H. Huang, The Univ. of Texas at Arlington (United States)

SESSION 8B BIO-INSPIRED TECHNOLOGY

- 8345 1K **Self-healing sandwich composite structures** [8345-52]
D. Fugon, North Carolina State Univ. (United States); C. Chen, North Carolina State Univ. (United States) and Northwestern Polytechnical Univ. (China); K. Peters, North Carolina State Univ. (United States)

SESSION 9A SENSING TECHNOLOGIES FOR WIND TURBINES

- 8345 1N **Probabilistic characterization of wind turbine blades via aeroelasticity and spinning finite element formulation** [8345-55]
A. Velazquez, R. A. Swartz, Michigan Technological Univ. (United States)
- 8345 1O **Localization of defects in wind turbine blades and defect depth estimation using infrared thermography** [8345-56]
A. Manohar, J. Tippmann, F. Lanza di Scalea, Univ. of California, San Diego (United States)
- 8345 1Q **Wind turbine inspection tests at UCSD** [8345-58]
J. D. Tippmann, A. Manohar, F. Lanza di Scalea, Univ. of California, San Diego (United States)

SESSION 9B NANO-ENGINEERED SENSORS FOR SHM

- 8345 1S **Smart photonic coating as a new visualization technique of strain deformation of metal plates** [8345-60]
H. Fudouzi, T. Sawada, National Institute for Materials Science (Japan); Y. Tanaka, I. Ario, Hiroshima Univ. (Japan); T. Hyakutake, I. Nishizaki, Public Works Research Institute (Japan)
- 8345 1T **Wireless sensor array based on DNA decorated single-walled carbon nanotubes for gas monitoring** [8345-61]
Y. Liu, Y. Zhang, M. R. Dokmeci, M. L. Wang, Northeastern Univ. (United States)

SESSION 10A INTELLIGENT SENSING AND NDE

- 8345 1W **Magnetic flux leakage-based steel cable NDE and damage visualization on a cable climbing robot** [8345-64]
J.-W. Kim, C. Lee, S. Park, Sungkyunkwan Univ. (Korea, Republic of); J. J. Lee, Sejong Univ. (Korea, Republic of)
- 8345 1X **Structural behavior of concrete box bridge using embedded FBG sensors** [8345-65]
W. Chung, Kyung Hee Univ. (Korea, Republic of); D. Kang, Korea Railroad Research Institute (Korea, Republic of)
- 8345 1Y **Hybrid structural health monitoring for in-service highway bridges using wireless multiscale sensors** [8345-66]
S. Jang, S. Dahal, G. K. Contreras, J. Fitch, J. Karamavros, R. Bansal, Univ. of Connecticut (United States)
- 8345 1Z **Application of three dimensional electromechanical impedance model for damage assessment of plate** [8345-67]
V. G. M. Annamdas, Y. Yang, Nanyang Technological Univ. (Singapore); S. Park, Sungkyunkwan Univ. (Korea, Republic of)

SESSION 10B ADVANCE SENSING SYSTEMS FOR CIVIL STRUCTURES

- 8345 20 **A novel system for road surface monitoring using an inexpensive infrared laser sensor** [8345-68]
M. R. Jahanshahi, F. Jazizadeh, S. F. Masri, B. Becerik-Gerber, The Univ. of Southern California (United States)
- 8345 21 **An interferometric radar for displacement measurement and its application in civil engineering structures** [8345-69]
D. Su, T. Nagayama, Z. Sun, Y. Fujino, The Univ. of Tokyo (Japan)
- 8345 23 **Ultra low-power corrosion-enabled sensor node** [8345-71]
S. A. Ouellette, M. D. Todd, Univ. of California, San Diego (United States)
- 8345 24 **Piezoelectric impedance-based strength gain monitoring in concrete** [8345-72]
Z. Guo, Z. Sun, Tongji Univ. (China)

SESSION 11A NEXT-GENERATION SENSING SYSTEMS FOR SHM: ALGORITHMS

- 8345 25 **Application of higher order SVD to vibration-based system identification and damage detection** [8345-73]
S.-H. Chao, C.-H. Loh, J.-H. Weng, National Taiwan Univ. (Taiwan)
- 8345 26 **Vision-based 6-DOF displacement measurement of structures with a planar marker** [8345-74]
D. Lee, H. Jeon, H. Myung, KAIST (Korea, Republic of)

- 8345 27 **Numerical modeling of guided waves in pipe-like structures** [8345-75]
J. Shen, Michigan State Univ. (United States); J.-W. Hong, Michigan State Univ. (United States) and KAIST (Korea, Republic of)
- 8345 28 **ViSP: visually servoed paired structured light system for measuring structural displacement** [8345-76]
H. Jeon, J. U. Shin, H. Kim, H. Myung, KAIST (Korea, Republic of)

SESSION 11B SMART STRUCTURE TECHNOLOGY FOR AEROSPACE SYSTEMS

- 8345 2A **Deep drilling and sampling via the wireline auto-gopher driven by piezoelectric percussive actuator and EM rotary motor** [8345-78]
Y. Bar-Cohen, M. Badescu, S. Sherit, Jet Propulsion Lab. (United States); K. Zacny, G. L. Paulsen, Honeybee Robotics Spacecraft Mechanisms Corp. (United States); L. Beegle, X. Bao, Jet Propulsion Lab. (United States)
- 8345 2B **Single piezo-actuator rotary-hammering (SPaRH) drill** [8345-79]
S. Sherit, L. Domm, X. Bao, Y. Bar-Cohen, Z. Chang, M. Badescu, Jet Propulsion Lab. (United States)
- 8345 2C **Miniaturization of planar horn motors** [8345-80]
S. Sherit, P. N. Ostlund, Z. Chang, X. Bao, Y. Bar-Cohen, S. E. Widholm, M. Badescu, Jet Propulsion Lab. (United States)
- 8345 2D **High temperature piezoelectric drill** [8345-81]
X. Bao, Y. Bar-Cohen, S. Sherit, M. Badescu, Jet Propulsion Lab. (United States); T. Shrout, The Pennsylvania State Univ. (United States)
- 8345 2E **Sensor applications for structural diagnostics and prognostics in aerospace systems** [8345-82]
A. Ghoshal, J. T. Ayers, M. Haile, M. Shiao, D. D. Le, U.S. Army Research Lab. (United States)

SESSION 12A EMBEDDED SENSING IN BLADES

- 8345 2G **Optimal topology and experimental evaluation of PE materials for actively shunted GE polymer matrix fiber composite blades** [8345-84]
B. B. Choi, NASA Glenn Research Ctr. (United States); K. Duffy, The Univ. of Toledo (United States); J. L. Kauffman, The Pennsylvania State Univ. (United States); N. Kray, GE Aviation (United States)
- 8345 2H **Optimal placement of piezoelectric plates for active vibration control of gas turbine blades: experimental results** [8345-85]
F. Botta, Univ. degli Studi di Roma Tre (Italy); N. Marx, Imperial College London (United Kingdom); S. Gentili, Univ. degli Studi di Roma Tre (Italy); C. W. Schwingshackl, L. Di Mare, Imperial College London (United Kingdom); G. Cerri, Univ. degli Studi di Roma Tre (Italy); D. Dini, Imperial College London (United Kingdom)

SESSION 12B SMART STRUCTURES AND MONITORING I

- 8345 2I **The impact of monitoring on decision making** [8345-86]
B. Glisic, S. Adriaenssens, Princeton Univ. (United States); D. Zonta, Univ. of Trento (Italy)
- 8345 2K **Application of Cu-Al-Mn superelastic alloy bars as reinforcement elements in concrete beams** [8345-88]
K. C. Shrestha, Y. Araki, Kyoto Univ. (Japan); T. Nagae, National Research Institute for Earth Science and Disaster Prevention (Japan); H. Yano, Y. Koetaka, Kyoto Univ. (Japan); T. Omori, Y. Sutou, R. Kainuma, K. Ishida, Tohoku Univ. (Japan)

SESSION 13A STRUCTURAL VIBRATION CONTROL

- 8345 2L **Tunable tuned liquid column dampers with multi-cells for wind vibration control of tall buildings** [8345-89]
D.-I. Kim, K.-W. Min, Dankook Univ. (Korea, Republic of); J.-H. Park, Univ. of Incheon (Korea, Republic of); H.-R. Lee, I'ST Co. Ltd. (Korea, Republic of); J.-K. Kim, K.-S. Hwang, Y.-S. Gil, Hyundai Engineering and Construction Co., Ltd. (Korea, Republic of)

Part Two

- 8345 2M **Exploring efficiencies of SISO, multi-SISO, and MIMO AVC schemes for floor vibration control** [8345-90]
D. S. Nyawako, The Univ. of Sheffield (United Kingdom); P. Reynolds, The Univ. of Sheffield (United Kingdom) and Full Scale Dynamics Ltd. (United Kingdom); M. J. Hudson, The Univ. of Sheffield (United Kingdom)
- 8345 2N **Development and testing of a newly proposed continuously variable stiffness/damping device for vibration control** [8345-91]
K. K. Walsh, K. D. Grupenhof, Ohio Univ. (United States); K. L. Little, A. Martin, C. A. Moore, Jr., FAMU-FSU College of Engineering (United States)
- 8345 2O **A framework for advanced methods of control of human-induced vibrations** [8345-92]
P. Reynolds, The Univ. of Sheffield (United Kingdom) and Full Scale Dynamics Ltd. (United Kingdom)

SESSION 13B SMART STRUCTURES AND MONITORING II

- 8345 2P **Assessment of dynamic and long-term performance of an innovative multi-story timber building via structural monitoring and dynamic testing** [8345-93]
P. Omenzetter, H. Morris, M. Worth, A. Gaul, S. Jager, Y. Desgeorges, The Univ. of Auckland (New Zealand)
- 8345 2Q **Sensor agent robot with servo-accelerometer for structural health monitoring** [8345-94]
N. Lee, A. Mita, Keio Univ. (Japan)
- 8345 2R **Active evacuation guidance using sensor agent robot** [8345-95]
D. Ise, A. Mita, Keio Univ. (Japan)

- 8345 2S **Estimation of uncomfortable feeling based on observation of unconscious behavior of residents for homeostasis control** [8345-96]
M. Takase, A. Mita, Keio Univ. (Japan)

SESSION 14A MULTIFUNCTIONAL MATERIALS FOR SMART STRUCTURES

- 8345 2T **Sensing of electrically conductive textiles and capacitance sensor-embedded fabrics for parachutes** [8345-97]
M. Damplo, C. Niezrecki, D. Willis, J. Chen, E. Niemi, S. Agnihotra, S. K. Manohar, Univ. of Massachusetts Lowell (United States); K. Desabrais, C. Charette, U.S. Army Natick Soldier Research, Development and Engineering Ctr. (United States)
- 8345 2U **MEMS-based spectral decomposition of acoustic signals** [8345-98]
M. Kranz, EngeniusMicro, LLC. (United States); M. G. Allen, Georgia Institute of Technology (United States); T. Hudson, U.S. Army AMRDEC (United States)
- 8345 2V **In situ damage detection in SMA reinforced CFRP** [8345-99]
F. Pinto, F. Ciampa, U. Polimeno, M. Meo, Univ. of Bath (United Kingdom)
- 8345 2W **Characterization of damping in microfibrinous material** [8345-100]
P. Soobramaney, G. T. Flowers, R. N. Dean, Auburn Univ. (United States)

SESSION 14B ADVANCES IN FIBER OPTIC TECHNOLOGY

- 8345 2X **The connection technology based on high temperature silica fiber optic sensor** [8345-101]
C. Du, W. Xie, S. Meng, Y. Yin, L. Jiao, L. Song, Harbin Institute of Technology (China)
- 8345 2Y **Fiber optic shape sensing for monitoring of flexible structures** [8345-102]
E. M. Lally, M. Reaves, E. Horrell, S. Klute, M. E. Froggatt, Luna Innovations Inc. (United States)
- 8345 2Z **Coaxial cable Bragg grating sensors for large strain measurement with high accuracy** [8345-103]
J. Huang, T. Wei, X. Lan, J. Fan, H. Xiao, Missouri Univ. of Science and Technology (United States)
- 8345 30 **Enhancing active vibration control performances in a smart structure by using fiber Bragg gratings sensors** [8345-104]
G. Cazzulani, S. Cinquemani, L. Comolli, Politecnico di Milano (Italy)
- 8345 31 **Structural health monitoring of CFRP airframe structures using fiber-optic-based strain mapping** [8345-105]
I. Takahashi, K. Sekine, M. Kume, H. Takeya, Mitsubishi Electric Corp. (Japan); Y. Iwahori, Japan Aerospace Exploration Agency (Japan); S. Minakuchi, N. Takeda, The Univ. of Tokyo (Japan); K. Enomoto, The Materials Process Technology Ctr. (Japan)

SESSION 15A NEXT-GENERATION SENSING SYSTEMS FOR SHM: APPLICATIONS

- 8345 32 **A preliminary study on the use of optical navigation sensor for two dimensional crack propagation monitoring** [8345-106]
C.-C. Chang, S.-H. Man, C. Z. Ng, M. Hassan, A. Bermak, Hong Kong Univ. of Science and Technology (Hong Kong, China)
- 8345 33 **Experimental study on impact force identification of ship-bridge collision using smart piezoelectric sensors** [8345-107]
X. W. Ye, Z. G. Guo, Y. Q. Ni, Y. Chen, The Hong Kong Polytechnic Univ. (Hong Kong, China)
- 8345 34 **Structural health monitoring of wind turbine blade using fiber Bragg grating sensors and fiber optic rotary joint** [8345-108]
Y. Chen, Y. Q. Ni, X. W. Ye, H. X. Yang, S. Zhu, The Hong Kong Polytechnic Univ. (Hong Kong, China)
- 8345 35 **Real-time monitoring of bridge scouring using ultrasonic sensing technology** [8345-109]
B. Wu, W. Chen, H. Li, Harbin Institute of Technology (China)
- 8345 36 **Dense vibration measurement of an arch bridge before and after its seismic retrofit using wireless smart sensors** [8345-110]
T. Nagayama, The Univ. of Tokyo (Japan); A. Urushima, Taisei Corp. (Japan); Y. Fujino, The Univ. of Tokyo (Japan); T. Miyashita, Nagaoka Univ. of Technology (Japan); T. Yoshioka, Nippon Engineering Consultants Co. Ltd. (Japan); M. Ieiri, JIP Techno Science Corp. (Japan)

SESSION 15B DAMAGE ASSESSMENT AND MONITORING

- 8345 37 **A damage detection technique for reinforced concrete structures** [8345-122]
A.-L. Wu, J. N. Yang, Univ. of California, Irvine (United States); C.-H. Loh, National Taiwan Univ. (Taiwan)
- 8345 38 **Triboluminescence multifunctional cementitious composites with in situ damage sensing capability** [8345-112]
D. O. Olawale, T. Dickens, M. J. Uddin, O. I. Okoli, FAMU-FSU College of Engineering (United States)
- 8345 39 **Development of damage assessment package for building with isolation system and its application to 2011 Tohoku earthquake** [8345-113]
A. Mita, K. Ichimura, Keio Univ. (Japan)
- 8345 3A **Bridge scour monitoring system based on active thermometry** [8345-114]
Q. Ba, X.-F. Zhao, L. Li, Dalian Univ. of Technology (China)

POSTER SESSION

- 8345 3C **A new control approach for the design and implementation of low frequency large band mechanical suspensions and inertial platforms** [8345-116]
F. Acernese, Univ. degli Studi di Salerno (Italy) and INFN, Univ. degli Studi di Napoli (Italy); R. De Rosa, INFN, Univ. degli Studi di Napoli (Italy) and Univ. degli Studi di Napoli Federico II (Italy); G. Giordano, Univ. degli Studi di Salerno (Italy); R. Romano, F. Barone, Univ. degli Studi di Salerno (Italy) and INFN, Univ. degli Studi di Napoli (Italy)
- 8345 3D **Long term seismic noise acquisition and analysis with tunable monolithic horizontal sensors at the INFN Gran Sasso National Laboratory** [8345-117]
F. Acernese, Univ. degli Studi di Salerno (Italy) and INFN, Sezione di Napoli (Italy); R. De Rosa, INFN, Sezione di Napoli (Italy) and Univ. degli Studi di Napoli Federico II (Italy); G. Giordano, Univ. degli Studi di Salerno (Italy); R. Romano, F. Barone, Univ. degli Studi di Salerno (Italy) and INFN, Sezione di Napoli (Italy)
- 8345 3E **Mechanical monolithic tiltmeter for low frequency measurements** [8345-118]
F. Acernese, Univ. degli Studi di Salerno (Italy) and INFN, Sezione di Napoli (Italy); R. De Rosa, INFN, Sezione di Napoli (Italy) and Univ. degli Studi di Napoli Federico II (Italy); G. Giordano, Univ. degli Studi di Salerno (Italy); R. Romano, F. Barone, Univ. degli Studi di Salerno (Italy) and INFN, Sezione di Napoli (Italy)
- 8345 3F **Low frequency/high sensitivity horizontal monolithic sensor** [8345-119]
F. Acernese, Univ. degli Studi di Salerno (Italy) and INFN, Sezione di Napoli (Italy); R. De Rosa, INFN, Sezione di Napoli (Italy) and Univ. degli Studi di Napoli Federico II (Italy); G. Giordano, Univ. degli Studi di Salerno (Italy); R. Romano, F. Barone, Univ. degli Studi di Salerno (Italy) and INFN, Sezione di Napoli (Italy)
- 8345 3G **State of the art of IT-based high precision patch/implant system technology development for building/large structure safety management in Korea** [8345-120]
K.-T. Park, Y.-J. Yu, B. Lee, J.-H. Lee, Korea Institute of Construction Technology (Korea, Republic of)
- 8345 3I **Applicability of mode-based damage assessment methods to severely damaged steel building** [8345-124]
H. HoThu, A. Mita, Keio Univ. (Japan)
- 8345 3J **Research of a real-time overload monitoring and response system of bridges and roads** [8345-125]
Y. Yu, Y. Shi, X. Zhao, J. Ou, Dalian Univ. of Technology (China)
- 8345 3K **Homeostasis control of building environment using sensor agent robot** [8345-126]
E. Nagahama, A. Mita, Keio Univ. (Japan)
- 8345 3L **Concept and design of a fiber-optic and an I²C hybrid sensor bus system for telecommunication satellites** [8345-127]
P. Putzer, Technische Univ. München (Germany); A. Hurni, M. Manhart, C. Tiefenbeck, M. Plattner, Kayser-Threde GmbH (Germany); A. W. Koch, Technische Univ. München (Germany)

- 8345 3M **Music recommendation system for biofied building considering multiple residents** [8345-128]
T. Ito, A. Mita, Keio Univ. (Japan)
- 8345 3O **Distributed multifunctional sensor network for composite structural state sensing** [8345-130]
X. P. Qing, Beijing Aeronautical Science and Technology Research Institute (China);
Y. Wang, Beijing Aeronautical Science and Technology Research Institute (China) and
Dalian Univ. of Technology (China); L. Gao, Beijing Aeronautical Science and Technology
Research Institute (China); A. Kumar, Acellent Technologies, Inc. (United States)
- 8345 3P **A statistical approach of fatigue crack detection for a structural hotspot** [8345-131]
P. Jin, L. Zhou, Nanjing Univ. of Aeronautics and Astronautics (China)
- 8345 3Q **Genetic mechanism for designing new generation of buildings from data obtained by
sensor agent robots** [8345-132]
C. Ono, A. Mita, Keio Univ. (Japan)
- 8345 3R **Frequency response analysis of multi-degree-of-freedom system with harmonically varying
damping** [8345-133]
S. Hirohata, D. Iba, Kyoto Institute of Technology (Japan)
- 8345 3S **Optimal sensor placement based on substructure sensitivity** [8345-135]
S. Zhou, Y. Bao, H. Li, Harbin Institute of Technology (China)
- 8345 3T **Development of the damage assessment methodology for ceiling elements** [8345-136]
Y. Nitta, A. Iwasaki, Ashikaga Institute of Technology (Japan); A. Nishitani, Waseda Univ.
(Japan); M. Wakatabe, S. Inai, Toda Corp. (Japan); I. Ohdomari, Waseda Univ. (Japan);
H. Tsutsumi, Maebashi Institute of Technology (Japan)
- 8345 3V **Large substructure identification using substructure isolation method** [8345-138]
J. Hou, Dalian Univ. of Technology (China); Ł. Jankowski, Institute of Fundamental
Technological Research (Poland); J. Ou, Dalian Univ. of Technology (China) and Harbin
Institute of Technology (China)
- 8345 3X **Damage identification using substructural virtual distortion method** [8345-140]
Q. Zhang, Dalian Nationalities Univ. (China) and Institute of Fundamental Technological
Research (Poland); Ł. Jankowski, Institute of Fundamental Technological Research (Poland);
Z. Duan, Harbin Institute of Technology (China)
- 8345 3Y **Acoustic emission characterization of the onset of corrosion in reinforced concrete**
[8345-141]
M. Di Benedetti, E. De Cais, Z. Karim, G. Loreto, Univ. of Miami (United States); F. Presuel,
Florida Atlantic Univ. (United States); A. Nanni, Univ. of Miami (United States)
- 8345 3Z **Study of the compact fiber optic photoacoustic ultrasonic transducer** [8345-142]
N. Wu, Y. Tian, X. Zou, X. Wang, Univ. of Massachusetts Lowell (United States)
- 8345 40 **New regulations on railroad bridge safety: opportunities and challenges for railroad bridge
monitoring** [8345-143]
F. Moreu, J. M. LaFave, B. F. Spencer, Univ. of Illinois at Urbana-Champaign (United States)

- 8345 41 **Self-sensing tracking control for piezoelectric actuators based on sensor fusion** [8345-144]
M. N. Islam, R. J. Seethaler, The Univ. of British Columbia (Canada)
- 8345 42 **Computer-vision based crack detection and analysis** [8345-145]
P. Prasanna, K. Dana, N. Gucunski, B. Basily, Rutgers, The State Univ. of New Jersey (United States)
- 8345 43 **Characterization of corrosion damage in prestressed concrete using acoustic emission** [8345-146]
J. Mangual, M. K. ElBatanouny, W. Vélez, P. Ziehl, F. Matta, Univ. of South Carolina (United States); M. González, MISTRAS Group, Inc. (United States)
- 8345 44 **Failure study of SnO₂ room temperature gas sensors fabricated on nanospike substrates** [8345-147]
P. Wang, H. Ren, H. Huo, M. Shen, H. Sun, M. Ruths, Univ. of Massachusetts Lowell (United States)
- 8345 46 **Damage assessment of small-scale wind turbine blade using piezoelectric sensors** [8345-149]
M.-S. Rim, S.-W. Kim, E.-H. Kim, I. Lee, KAIST (Korea, Republic of)
- 8345 47 **Multiscale model updating of a curved highway bridge** [8345-150]
P. Mensah-Bonsu, S. Jang, Univ. of Connecticut (United States)
- 8345 48 **Decision support system for integrating remote sensing in bridge condition assessment and preservation** [8345-151]
A. Endsley, C. Brooks, Michigan Tech Research Institute (United States); D. Harris, T. Ahlborn, K. Vaghefi, Michigan Technological Univ. (United States)
- 8345 49 **A study on Q-factor of CCBG sensors by coupled mode theory** [8345-152]
S. Wu, T. Wei, J. Huang, H. Xiao, J. Fan, Missouri Univ. of Science and Technology (United States)
- 8345 4A **Comparison of passive and active mass dampers for control of floor vibrations** [8345-153]
M. J. Hudson, The Univ. of Sheffield (United Kingdom); P. Reynolds, The Univ. of Sheffield (United Kingdom) and Full Scale Dynamics Ltd. (United Kingdom); D. S. Nyawako, The Univ. of Sheffield (United Kingdom)
- 8345 4C **An innovating method to measure bridge deflection using interference-based sensors** [8345-156]
P. Kung, L. Wang, QPS Photonics Inc. (Canada); M. I. Comanici, McGill Univ. (Canada)
- 8345 4F **Real-time vision-based modal parameters estimation at 10000 fps** [8345-159]
H. Yang, I. Ishii, T. Takaki, Hiroshima Univ. (Japan)
- 8345 4G **Seismic performance of RC shear wall structure with novel shape memory alloy dampers in coupling beams** [8345-160]
C. Mao, China Earthquake Administration (China) and Harbin Institute of Technology (China); J. Dong, Tongji Univ. (China); H. Li, Harbin Institute of Technology (China); J. Ou, Dalian Univ. of Technology (China)

- 8345 4H **Integrated dynamic and static tactile sensor: focus on static force sensing** [8345-161]
N. Wettels, Univ. of Southern California (United States); B. Pletner, IPTRADE, Inc. (United States)
- 8345 4J **Hybrid SHM of cable-anchorage system in cable-stayed bridge using smart sensor and interface** [8345-164]
K.-D. Nguyen, D.-D. Ho, D.-S. Hong, J.-T. Kim, Pukyong National Univ. (Korea, Republic of)
- 8345 4K **Wireless vibration-based SHM of caisson-type breakwater under foundation damage** [8345-165]
S.-Y. Lee, K.-D. Nguyen, J.-T. Kim, Pukyong National Univ. (Korea, Republic of); J.-H. Yi, Korea Ocean Research Institute (Korea, Republic of)
- 8345 4L **Full-scale laboratory validation of a wireless MEMS-based technology for damage assessment of concrete structures** [8345-166]
D. Trapani, D. Zonta, M. Molinari, Univ. of Trento (Italy); A. Amditis, M. Bimpas, Institute of Communication and Computer Systems (Greece); N. Bertsch, MEMSCAP SA (France); V. Spiering, C2V (Netherlands); J. Santana, IMEC-NL (Netherlands); T. Sterken, T. Torfs, IMEC Belgium (Belgium); D. Bairaktaris, M. Bairaktaris, D. Bairaktaris and Associates Ltd, (Greece); S. Camarinopoulos, M. Frondistou-Yannas, RISA Sicherheitsanalysen GmbH (Germany); D. Ulieru, SITEX 45 SRL (Romania)
- 8345 4N **Mechanical design of a Langmuir probe for a QuadSat PnP satellite** [8345-168]
J. Klepper, A. Zagrai, A. Jorgensen, New Mexico Institute of Mining and Technology (United States)
- 8345 4O **Electromechanical impedance-based health diagnosis for tendon and anchorage zone in a nuclear containment structure** [8345-169]
J. Min, H. Shim, C.-B. Yun, KAIST (Korea, Republic of)
- 8345 4P **Inductively coupled corrosion potential sensor for steel reinforced concrete with time domain gating interrogation** [8345-171]
D. J. Thomson, K. Perveen, G. E. Bridges, S. Bhadra, Univ. of Manitoba (Canada)
- 8345 4R **Dispersion monitoring of carbon nanotube modified epoxy systems** [8345-174]
G. Gkikas, Ch. Saganas, S. A. Grammatikos, Univ. of Ioannina (Greece); G. M. Maistros, ADVISE E.E. (Greece); N.-M. Barkoula, A. S. Paipetis, Univ. of Ioannina (Greece)
- 8345 4S **Comprehensive property retrieval and measurement of concrete spalling using machine vision for post-earthquake safety assessments** [8345-175]
S. German, I. Brilakis, R. DesRoches, Georgia Institute of Technology (United States)
- 8345 4T **Effects of surface electric field on SnO₂ room temperature gas sensors fabricated on nanospike substrates** [8345-176]
H. Ren, P. Wang, H. Huo, M. Shen, M. Ruths, H. Sun, Univ. of Massachusetts Lowell (United States)
- 8345 4U **Ultrasonic gas accumulation detection and evaluation in nuclear cooling pipes** [8345-177]
L. Yu, B. Lin, Y.-J. Shin, J. Wang, Z. Tian, Univ. of South Carolina (United States)

- 8345 4V **Miniature fiber optic temperature sensor for concrete structural health monitoring** [8345-178]
X. Zou, A. Chao, N. Wu, Y. Tian, T.-Y. Yu, X. Wang, Univ. of Massachusetts Lowell (United States)
- 8345 4X **Experimental and theoretical characterization of non-bending ionic polymer transducer sensing** [8345-181]
B. Kocer, U. T. Zangrilli, L. M. Weiland, Univ. of Pittsburgh (United States)
- 8345 4Y **Swell-based in situ oxide removal methods for PDMS-copper particle composite corrosion sensing elements** [8345-182]
T. Yang, F. Pan, J. Hutson, K. Srinivas, J. King, D. Spearot, A. Huang, Univ. of Arkansas (United States)

Author Index

Conference Committee

Symposium Chairs

Norbert G. Meyendorf, Fraunhofer-Institut für Zerstörungsfreie Prüfverfahren (Germany) and University of Dayton (United States)
Norman M. Wereley, University of Maryland, College Park (United States)

Symposium Cochairs

Victor Giurgiutiu, University of South Carolina (United States)
Christopher S. Lynch, University of California, Los Angeles (United States)

Conference Chairs

Masayoshi Tomizuka, University of California, Berkeley (United States)

Conference Cochairs

Chung-Bang Yun, UNIST, Ulsan National Institute of Science and Technology (Korea, Republic of)
Jerome P. Lynch, University of Michigan (United States)

Program Committee

Yoshio Akimune, National Institute of Advanced Industrial Science and Technology (Japan)
Amr M. Baz, University of Maryland, College Park (United States)
Dumitru Caruntu, The University of Texas-Pan American (United States)
Fabio Casciati, Università degli Studi di Pavia (Italy)
Chih-Chen Chang, Hong Kong University of Science and Technology (Hong Kong, China)
Genda Chen, Missouri University of Science and Technology (United States)
Shirley J. Dyke, Washington University in St. Louis (United States)
Alison B. Flatau, University of Maryland, College Park (United States)
Yozo Fujino, The University of Tokyo (Japan)
Robert X. Gao, University of Connecticut (United States)
Victor Giurgiutiu, University of South Carolina (United States)
Steven D. Glaser, University of California, Berkeley (United States)
Faramarz Gordaninejad, University of Nevada, Reno (United States)
Xiaoyan Han, Wayne State University (United States)

Benjamin Kyle Henderson, Air Force Research Laboratory (United States)
Haiying Huang, The University of Texas at Arlington (United States)
Jerry Q. Huang, The Boeing Company (United States)
Kumar V. Jata, Asian Office of Aerospace Research and Development (United States)
Jeong-Tae Kim, Pukyong National University (Korea, Republic of)
Ki-Soo Kim, Hongik University (Korea, Republic of)
Jan-Ming Ko, The Hong Kong Polytechnic University (Hong Kong, China)
Francesco Lanza di Scalea, University of California, San Diego (United States)
Yingzi Lin, Northeastern University (United States)
Chin-Hsiung Loh, National Taiwan University (Taiwan)
Kenneth J. Loh, University of California, Davis (United States)
Sami F. Masri, The University of Southern California (United States)
Eduardo Misawa, National Science Foundation (United States)
Akira Mita, Keio University (Japan)
Satish Nagarajaiah, Rice University (United States)
Yiqing Ni, The Hong Kong Polytechnic University (Hong Kong, China)
Irving J. Oppenheim, Carnegie Mellon University (United States)
Jinping Ou, Dalian University of Technology (China)
Jin-Song Pei, The University of Oklahoma (United States)
Ser-Tong Quek, National University of Singapore (Singapore)
Jennifer A. Rice, Texas Tech University (United States)
Rahmat A. Shoureshi, University of Denver (United States)
Sung-Han Sim, University of Illinois at Urbana-Champaign (United States)
Hoon Sohn, KAIST (Korea, Republic of)
Gangbing Song, University of Houston (United States)
Billie F. Spencer, Jr., University of Illinois at Urbana-Champaign (United States)
Lizhi Sun, University of California, Irvine (United States)
Raymond A. Swartz, Michigan Technological University (United States)
Tsu-Chin Tsao, University of California, Los Angeles (United States)
Ming L. Wang, Northeastern University (United States)
Yang Wang, Georgia Institute of Technology (United States)
Zhishen Wu, Ibaraki University (Japan)
Chengying Xu, University of Central Florida (United States)
Lingyu Yu, University of South Carolina (United States)
Hong S. Zhou, Worcester Polytechnic Institute (United States)
Li Zhou, Nanjing University of Aeronautics and Astronautics (China)

Session Chairs

System Identifications for Civil Structures

Chin-Hsiung Loh, National Taiwan University (Taiwan)

Daniele Zonta, University degli Studi di Trento (Italy)

Advances in Guided Waves

Piervincenzo Rizzo, University of Pittsburgh (United States)

Sung-Han Sim, University of Illinois at Urbana-Champaign (United States)

Marco Torbol, University of California, Irvine (United States)

Next-Generation Sensing Systems for SHM: Wireless and Microcontroller-Based Sensors

Shamim N. Pakzad, Lehigh University (United States)

Yang Wang, Georgia Institute of Technology (United States)

Wireless Sensor Networks for SHM I

Sung-Han Sim, University of Illinois at Urbana-Champaign (United States)

Marco Torbol, University of California, Irvine (United States)

Intelligent Systems for Disaster Mitigation

Peter Kung, QPS Photonics Inc. (Canada)

Wireless Sensor Networks for SHM II

Jeong-Tae Kim, Pukyong National University (Korea, Republic of)

Sung-Han Sim, University of Illinois at Urbana-Champaign (United States)

Crack Detection in Structures

Li Zhou, Nanjing University of Aeronautics and Astronautics (China)

Alison B. Flatau, University of Maryland, College Park (United States)

Acoustic Emission and Active Sensing

Haiying Huang, The University of Texas at Arlington (United States)

Victor Giurgiutiu, University of South Carolina (United States)

Next-Generation Sensing Systems for SHM: Nanotechnology

Kenneth J. Loh, University of California, Davis (United States)

Ying Zhang, Georgia Institute of Technology (United States)

Smart Sensors for SHM

Hyung-Jo Jung, KAIST (Korea, Republic of)

Sung-Han Sim, University of Illinois at Urbana-Champaign (United States)

Distributed Sensing and Controls for SHM and Human-System Interaction

Masayoshi Tomizuka, University of California, Berkeley (United States)

Jung-Wuk Hong, KAIST (Korea, Republic of)

Strain Sensors for SHM

Il-Bum Kwon, Korea Research Institute of Standards and Science
(Korea, Republic of)

Hae Young Noh, Stanford University (United States)

Bio-inspired Technology

Xiong Yu, Case Western Reserve University (United States)

Kenneth J. Loh, University of California, Davis (United States)

Sensing Technologies for Wind Turbines

R. Andrew Swartz, Michigan Technological University (United States)

Francesco Lanza di Scalea, University of California, San Diego (United States)

Nano-engineered Sensors for SHM

Fuh-Gwo Yuan, North Carolina State University (United States)

Ming Wang, Northeastern University (United States)

Intelligent Sensing and NDE

Gun-Jin Yun, The University of Akron (United States)

Seunghye Park, Sungkyunkwan University (Korea, Republic of)

Advance Sensing Systems for Civil Structures

Ki-Soo Kim, Hongik University (Korea, Republic of)

Mohammad Reza Jahanshahi, The University of Southern California
(United States)

Next-Generation Sensing Systems for SHM: Algorithms

Kenneth J. Loh, University of California, Davis (United States)

Yang Wang, Georgia Institute of Technology (United States)

Smart Structure Technology for Aerospace Systems

Yoseph Bar-Cohen, Jet Propulsion Laboratory (United States)

Amr M. Baz, University of Maryland, College Park (United States)

Embedded Sensing In Blades

Hae Young Noh, Stanford University (United States)

Chengying Xu, University of Central Florida (United States)

Smart Structures and Monitoring I

Matteo Pozzi, University of California, Berkeley (United States)

Kenneth K. Walsh, The University of Ohio (United States)

Structural Vibration Control

Paul Reynolds, The University of Sheffield (United Kingdom)

Kenneth K. Walsh, The University of Ohio (United States)

Smart Structures and Monitoring II

Akira Mita, Keio University (Japan)

Piotr Omenzetter, The University of Auckland (New Zealand)

Multifunctional Materials for Smart Structures

Hong S. Zhou, Worcester Polytechnic Institute (United States)

Chung-Bang Yun, UNIST, Ulsan National Institute of Science and Technology (Korea, Republic of)

Alison B. Flatau, University of Maryland, College Park (United States)

Advances in Fiber Optic Technology

Shinae Jane, University of Connecticut (United States)

Branko Glisic, Princeton University (United States)

Next-Generation Sensing Systems for SHM: Applications

Tomonori Nagayama, The University of Tokyo (Japan)

Xiong Yu, Case Western Reserve University (United States)

Damage Assessment and Monitoring

Akira Mita, Keio University (Japan)

Xuefeng Zhao, Dalian University of Technology (China)

Introduction

This volume is a collection of technical papers presented at the 2012 SPIE Conference held in San Diego, California, on Sensors and Smart Structures Technologies for Civil, Mechanical, and Aerospace Systems. This conference is unique in the emerging area of sensors and smart structures technologies because of its multidisciplinary representations from the aerospace, civil, and mechanical engineering communities. Participants were from more than 20 countries around the globe. The conference also served as the de facto grantees' conference of the Sensors and Sensing Systems (SSS) program of the Civil, Mechanical and Manufacturing Innovation (CMMI) Division of the National Science Foundation (NSF). The participation of the Asian-Pacific Network of Centers for Research in Smart Structure Technology (ANCRiSST) as the conference co-sponsor strengthened international participations. As you find in the roster of the program committee, members of the program committee represented almost all the sub-disciplines of the engineering field. The conference showed growth over the past few years; this year, over 180 papers were submitted to the conference.

The conference started with a keynote session with two excellent keynote presentations: "Laser based structural health monitoring for civil, mechanical, and aerospace systems" by Professor Hoon Sohn, Korea Advanced Institute of Science and Technology (KAIST), and "Magnetostriuctive sensors for civil, mechanical, and aerospace systems" by Professor Alison Flatau, University of Maryland. The opening plenary session was followed by 28 topical sessions and one poster session. The papers in these sessions covered a wide range of topics in: fiber optics and other novel sensors, structural health monitoring, signal processing, damage detection and assessment, wireless technologies, modeling and analysis of smart systems and applications to civil, mechanical, and aerospace systems. Research papers supported by the NSF SSS program were presented at both respective topical sessions and the NSF poster session. Lively discussions among SSS principal investigators and other participants took place during the poster session.

In conjunction with the broad technical base of the current conference program and its objectives, it is apparent that we must continue to develop and build a large, diverse constituency. In light of the increased number of submissions to this conference that we witnessed in recent years, we are optimistic in this regard. We would like to thank authors and presenters of this year's conference for their contributions. The outstanding conference program was put together by the fine efforts of the program committee, and we are thankful to the members of the program committee for their unyielding commitment to making the conference a great success.

Dr. S. C. Liu, the champion of the conference over the past decade, retired from the National Science Foundation in December 2011. On behalf of the entire conference, we would like to thank Dr. Liu for his intrepid leadership of the international advanced sensor technology and smart systems community—we will forever be indebted to him. This conference lives on as a monument to his countless contributions to our field.

**Masayoshi Tomizuka
Chung-Bang Yun
Jerome P. Lynch**