

Questex Media Group, Inc.

Sensors Expo and Conference 2007

June 11-13, 2007
Rosemont, Illinois, USA

Volume 1 of 3

Printed from e-media with permission by:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571
www.proceedings.com

ISBN: 978-1-60560-690-3

Some format issues inherent in the e-media version may also appear in this print version.

Copyright© (2007) by the Questex Media Group, Inc.
All rights reserved.

For permission requests, please contact the Questex Media Group, Inc.
at the address below.

Questex Media Group, Inc.
275 Newton Street
Suite 2-130
Newton, Massachusetts 02466

PHONE: 888-552-4346
FAX: 617-219-8310

www.questex.com

TABLE OF CONTENTS

Volume 1

| | |
|---|-----|
| Industrial Temperature Measurement | 1 |
| <i>Bill Schuh</i> | |
| The Nuts and Bolts of Pushing Mote Technology to the Edge | 19 |
| <i>Jim Moore</i> | |
| Time Deterministic Wireless Smart Sensor Network in Harsh Airborne Environments | 37 |
| <i>Mark McNerney</i> | |
| RF Sensor Technology Measures Speed and Distance at High Temperatures and Real Time Fluid Condition | 59 |
| <i>Ross Walker</i> | |
| Increasing Reliability and Protection of Sensors in Harsh Environment | 83 |
| <i>Rakesh Kumar</i> | |
| ETA7: A Breakthrough IR-to-Digital Sensing Monolithic IC Combining ADC, Die Temperature Sensing and Optics | 123 |
| <i>Bill Lane, Claire Leahy</i> | |
| 10-Gram Optical Ice Detector Probe Tested at NASA Glenn | 161 |
| <i>Richard Hackmeister</i> | |
| Introduction to VCSELs for Optical Sensing Applications | 270 |
| <i>Jim Tatum</i> | |
| Energy Harvesting: A Solution for Self Powered Wireless Sensor Networks | 311 |
| <i>Omar Abed</i> | |
| Novel Battery Architecture for Powering Sensors and Sensor Networks | 334 |
| <i>Steve Simon</i> | |
| Develop & Deploy Wireless Sensors Powered By Energy Harvesting | 359 |
| <i>Armin Anders</i> | |
| Enabling Integrated Solutions for Industrial Wireless | 389 |
| <i>Khanh Tuan Le</i> | |
| Variable Reactance Digital Sensor Technology | 422 |
| <i>Derek Weber, G. Brandt Taylor</i> | |
| Displacement Sensors | 481 |
| <i>Roman Budek</i> | |
| A High Precision Silicon Piezo Resistive SMART Pressure Sensor | 501 |
| <i>Rod Brown</i> | |
| Comprehensive Tutorial on Magnetoresistive Sensors: How to Use them, and Limitations | 523 |
| <i>Perry Holman</i> | |
| Full-field 3D Optical Measurements from the Test Lab to the Field & Extreme Environments | 588 |
| <i>John Tyson, Tim Schmidt</i> | |

Volume 2

| | |
|--|-----|
| Ultrasonic Sensor Fundamentals and Applications | 718 |
| <i>Swapnil Padhye</i> | |

| | |
|--|------|
| Ultrasonic Temperature and Heat Flux Sensor Technology | 747 |
| <i>Mark Mutton, Donald Yuhas, D. Greg Walker, Peter Schmidt</i> | |
| Novel Solid State Gas Sensor Systems for Combustion, Environmental and Toxic Gases | 766 |
| <i>Patricia Morris</i> | |
| Cutting Edge Vibration Measurement Technology Immune to EMI | 801 |
| <i>N/A</i> | |
| Digital Data Acquisition and Analysis | 842 |
| <i>Strether Smith</i> | |
| More Than Just Motion Sensing – Acceleration Sensing on a Higher Level | 918 |
| <i>Oliver Schatz</i> | |
| Trends in Inertial and Seismic Sensing in Defense and Aerospace Applications: How Far Will MEMS Succeed in Meeting These Demands? | 932 |
| <i>N/A</i> | |
| Harsh Environment Microsystems | 958 |
| <i>Jeffrey Melzak</i> | |
| Design for Reliability: Prediction Methodology for Hermeticity Lifetime in MEMS Packaging | 974 |
| <i>Allyson Hartzell, Mark daSilva</i> | |
| MEMS-Based Viscosity and Density Meter | 992 |
| <i>V. Cruz, D. Sparks, N. Tran, D. Riley, R. Smith, N. Najafi</i> | |
| Status of Micro and Nanotechnology in Taiwan | 1008 |
| <i>M.S. Lin</i> | |
| Quartz MEMS Gyroscope for Automotive Applications | 1044 |
| <i>M. Layton, L. Costlow, M. Smith, M. Collins</i> | |
| Barriers to the Commercialization of Micro and Nanotechnology: The 2006 Industry Report Card...Lessons Learned | 1061 |
| <i>Roger Grace</i> | |
| Micro-Energy Scavengers Technology and Market | 1077 |
| <i>J r mie Bouchard</i> | |
| Self-Powered Wireless Sensor Nodes with MEMS Based Energy | 1099 |
| <i>Philippe Mattelaer</i> | |
| Pressure Sensor Packaging for Extreme Applications | 1120 |
| <i>Karmjit Sidhu</i> | |
| Surface Engineering Solutions for Micro & Nanotechnology Devices | 1131 |
| <i>Jeff Chinn</i> | |
| Highly Integrated Tire Pressure Monitoring System Solution for Reduced Power, Cost and Development Time | 1166 |
| <i>Eric Caron</i> | |
| Tuning Fork Sensors for In Situ Oil Condition Monitoring | 1189 |
| <i>Mark Uhrich</i> | |
| Wafer Level Vacuum/hermetic Packaging of MEMS Devices | 1205 |
| <i>Jay Mitchell, Sang Woo Lee, Joe Giachino, Khalil Najafi</i> | |
| Wafer-Prober – Platform for Wafer Level Reliability Tests | 1223 |
| <i>Frank-Michael Werner, Dan Ouellette</i> | |
| Cost Reduction in Automotive Pressure Sensors Through High Level Integration of MEMS and Signal Conditioning | 1257 |
| <i>Michel Bourdon</i> | |

| | |
|---|------|
| Tire Pressure Monitoring System in a Single Package with Tire Localization Capability using Capacitive Sensor Technology | 1307 |
| <i>Eric Caron</i> | |
| The Automobile: A Platform for Emerging Sensor Technology | 1328 |
| <i>N/A</i> | |
| Sensing Technologies in Collision Avoidance Systems | 1359 |
| <i>Randy Frank</i> | |
| The Future of Wireless Sensing in Vehicles | 1387 |
| <i>Joseph Giachino</i> | |
| Current And Future High Volume Automotive Applications for MEMS/MST | 1407 |
| <i>Roger Grace</i> | |

Volume 3

| | |
|---|------|
| Measuring Cylinder Pressure for Controlling Diesel Engines | 1435 |
| <i>Marek Wodarczyk</i> | |
| SAW (Surface Acoustic Wave) Sensors in Automotive Applications | 1462 |
| <i>Javvad Qasimi</i> | |
| Vision Sensing Based Driver Assistance Systems | 1477 |
| <i>S. Rangachari</i> | |
| Advanced Digital Accelerometers for Automotive Safety Systems | 1496 |
| <i>N/A</i> | |
| Enhanced Vehicle Sensing Solutions through Integrated GMR Technology - An Applications and Principals Review | 1524 |
| <i>James Sterling</i> | |
| An Overview of Backup Alarm Technology | 1544 |
| <i>Heward Williams</i> | |
| Making the Case for Plug & SenseSM Networks | 1566 |
| <i>Mark Jakusovszky, David Kerwin</i> | |
| How to Design Intelligent Sensor Systems and Networks | 1577 |
| <i>Rishi Vasuki</i> | |
| SEI5: Developing ZigBee Networks with Confidence | 1618 |
| <i>Andrew Wheeler</i> | |
| Service Oriented Device Architecture (SODA) | 1653 |
| <i>Jeffrey Ricker</i> | |
| Leveraging Wireless for Always-On, Real –Time, Remote Sensor Management | 1714 |
| <i>Alex Brisbane</i> | |
| MachineTalker, Inc. Presentation | 1734 |
| <i>Gerry Nadler</i> | |
| Requirements and Applications of Wireless Sensor Networks | 1775 |
| <i>Sokwoo Rhee</i> | |
| Sensors to Revolutionize Manufacturing | 1806 |
| <i>Gideon Varga</i> | |
| Robotically Enhanced Advanced Manufacturing Concepts to Optimize Energy, Productivity, and Environmental Performance | 1818 |
| <i>Joseph Pack</i> | |
| Imaging Based Surface Quality Improvement for Hot Rolled Steel Bars | 1836 |
| <i>T-S. Chang, H. Huang, A. Keresztes, S. Zhou, J. Shi</i> | |

| | |
|--|-------------|
| PHASED: Micro Gas Analyzer on NeSSI for Processing Industries Applications | 1851 |
| <i>Fouad Nusseibeh</i> | |
| Distributed Wireless Multi-Sensor Technologies | 1867 |
| <i>Daniel Sexton</i> | |
| Industrial Wireless is Here: Moving Forward: DOE’s Wireless Program Tackles the Hard Problems | 1884 |
| <i>Wayne Manges</i> | |
| Industrial Wireless is Here: Wireless Network for Secure Industrial Applications..... | 1894 |
| <i>Rama Budampati, Pat Gonia</i> | |
| Industrial Wireless is Here: Low-cost Vibration Power Harvesting for Industrial Wireless Sensors | 1900 |
| <i>Jeremy Frank</i> | |
| Industrial Wireless is Here: Eaton Wireless Sensor Network for Advanced Energy Management Solutions Phase 2: Advanced Pervasive Wireless Energy Sensing | 1906 |
| <i>Peter Theisen</i> | |
| The ROI of Wireless Sensor Networking | 1912 |
| <i>Rob Conant</i> | |
| The Bluetooth Wireless Umbrella..... | 1946 |
| <i>Peter Hauser</i> | |
| Wireless Instrumentation: Applications, Networks, Protocols, Standards and the Importance of Interoperability and Coexistence | 1973 |
| <i>N/A</i> | |
| Real-world Deployments of Wireless Sensor Network Technology | 2015 |
| <i>Mike Dierks</i> | |
| Efficiently Deploying Wireless Applications | 2038 |
| <i>Steve Thomas, Tim Reilly</i> | |
| Building Sensor Applications as Wireless Web Services: Wireless Sensor Networks Move onto the Internet | 2058 |
| <i>David Culler</i> | |
| WS7: Mixing Multiple Wireless Technologies on a Sensor Network..... | 2099 |
| <i>Joel Young</i> | |
| Wireless Mesh Networks: Real Solutions and Real Benefits | 2129 |
| <i>Geoff Nass, Jeff Raimo</i> | |

Author Index