

Sensors Expo & Conference 2015

**Sensing Technologies Driving
Tomorrow's Solutions**

**Long Beach, California, USA
9-11 June 2015**

Volume 1 of 2

ISBN: 978-1-5108-1290-1

Printed from e-media with permission by:

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



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

Copyright© (2015) by Questex Media Group, Inc.
All rights reserved.

Printed by Curran Associates, Inc. (2015)

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

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

Phone: (617) 219-8300
Fax: (617) 219-8310

info@questex.com

Additional copies of this publication are available from:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: 845-758-0400
Fax: 845-758-2634
Email: curran@proceedings.com
Web: www.proceedings.com

TABLE OF CONTENTS

VOLUME 1

EH1: Energy Harvesting with ZigBee and NFC	1
<i>R. Budek</i>	
The Five Most Practical Techniques Needed to Implement a 1uA Sensor Sampling System.....	34
<i>M. Buccini</i>	
Enabling Extremely Low Power Communications For The IoT	55
<i>J. Tolleson</i>	
Energy Harvesting With Solar Strips: A Review Of Potential Applications	69
<i>C. France</i>	
Thermoelectric Generators: Expanding Applications For Energy Harvesting.....	82
<i>G. Chansin, H. Zervos</i>	
Low Power, Reliable Wireless Sensor Networks And Energy Harvesting.....	98
<i>R. Yu</i>	
How Bluetooth 4.2 Enables A Practical Energy-Harvested Internet Of Things.....	115
<i>M. Jakusovszky</i>	
Advances In Battery-Free Wireless RFID Sensors Expand Applications.....	134
<i>S. Dalglish</i>	
Energy Harvesting For Powering Wireless Sensors In The IoT - Tutorials	149
<i>R. Frank</i>	
Energy Management Strategies And Solutions For Wireless Sensors	159
<i>S. Nork</i>	
Ultra-Low Power Sensor Sampling Solutions For Energy Harvesting Applications	175
<i>M. Buccini</i>	
Function, Flexibility & Efficiency - Key Success Factors For Energy Harvested Wearables	189
<i>M. Jakusovszky</i>	
Non-Contact Energy Harvesting (From The Motion Of Conductive Surfaces)	205
<i>N. Atherton</i>	
Successful Applications Of Thermal Energy Harvesting	213
<i>M. Deatherage</i>	
The New Intelligent Sensor/Actuator To Network Standard For The IoT And Industry 4.0	221
<i>L. Porombka</i>	
Minimize Motion Design Using Production-Ready Building Blocks	235
<i>J. Wilson</i>	
Using Real-Time Ethernet To Optimize Embedded Systems Performance.....	247
<i>S. Germanos</i>	
Temperature Sensing Solutions For Embedded Systems	266
<i>E. Haile</i>	
Wireless Technologies Connecting Tomorrow's Solutions.....	281
<i>D. Ewing</i>	
Bridging The Digital And Physical Worlds	293
<i>S. Ghoshal</i>	
Raising Medication Compliance Through M2M And IoT	309
<i>K. Conner</i>	
Sensors-As-A-Service	313
<i>S. Nelson</i>	
Furthering IoT And The Smart City Vision With Smart Parking Sensing	324
<i>M. Noworolski</i>	
When IT Meets OT - The Practical Application Of Overlay Networks.....	345
<i>M. Fahrion</i>	
YUNEEC Electric Aviation - Drone Attack	358
<i>S. Phillips</i>	
ARM - Final Thoughts	365
<i>N/A</i>	
Full Stack Sensor Processing: The Importance Of Context In IoT	370
<i>S. Scheirey</i>	
Future Of Connectivity, From Tiny Sensors To Cloud	390
<i>K. Arimi</i>	

Introduction To ARM	402
<i>W. Tu</i>	
The Internet of Things That See: Bringing Visual Intelligence To Embedded Devices	406
<i>J. Bier</i>	
Sensors For The Internet Of Things	421
<i>G. Girardin</i>	
Microphones Hearing The Future Of IoT	440
<i>K. Shaw, W. Tu</i>	
Scalable Standards-Based Sensor Software	452
<i>B. Curtis</i>	
The Future Of Electronic Noses	474
<i>T. Rousselle</i>	
Dynamic Angle Estimation With Inertial MEMS	487
<i>B. Scannell, M. Looney</i>	
Using Time To Measure Capacitance - Advantages Of A System On A Chip	502
<i>J. Monteith</i>	
Adding Flexibility To A Sensor Module While Minimizing Cost	519
<i>T. White</i>	
QVLA - Quantum Volumetric Light Absorption	524
<i>B. Engstrand</i>	
What Your Pressure Sensor Can't Tell You: Seeking Understanding In Long Term Drift Specifications	536
<i>R. Puccio</i>	
Inclination Sensing In High Vibration Environments	557
<i>J. Fennelly</i>	

VOLUME 2

Inductive Position Sensing With Single Coil Elements Using Time Discrimination	572
<i>P. Cain</i>	
MD8: Novel Gap Measurement Technology For Aerospace Structures	589
<i>B. Manning</i>	
Shrinkage Of NIR Spectrometer To Fit Into Mobile Phone	608
<i>H. Gruger</i>	
Sensors Technologies For The Internet Of Things	622
<i>J.-P. Polizzi</i>	
Challenges In Designing Low-Cost Media-Isolated MEMS Pressure Transducers For HVAC/R Applications	646
<i>T. Kwa</i>	
The Challenges Of Testing In Harsh Aerospace And Industrial Environments	659
<i>R. Martin</i>	
Hardware Development In The Age Of Mobile Apps	679
<i>P. Himes</i>	
Mobilizing The MEMS/Sensors And Adjacent Ecosystems For The Next Decade Of Growth	689
<i>S. Whalley</i>	
MEMS7: Design And Modeling Issues For Sensors Designers Wishing To Utilize MEMS Technology	704
<i>M.-A. Maher</i>	
MEMS Sensor Packaging	721
<i>D. Sparks</i>	
Powering The IoT With MEMS Piezoelectric Vibrational Energy Harvesters	745
<i>M.-A. Maher</i>	
Contextual Awareness: What Do We Do With All This Data?	763
<i>M. Feibus, I. Chen, L. Hard, G. Meiri, E. Pinheiro</i>	
Best Practice Recommendations For Utilizing Open Source Software	766
<i>D. McLoughlin</i>	
Beyond Fusion: Deeper Context 24/7	780
<i>P. Kimelman</i>	
Building Business In IoT Through Quadruple Trust	786
<i>O. Logvinov</i>	
How To Optimize System Cost, Performance, And Reliability With Semi-Custom MEMS Sensors	795
<i>C. Chung</i>	

INVN/SiLabs Wearable Opps.....	803
<i>S. Massih</i>	
Sensor Fusion & Environmental Sensors	810
<i>M. Gemelli</i>	
Sensors and Sensibility - Improving Digital Health With Sensors And Sensor Fusion	825
<i>D. Wolfgram</i>	
The Disruptive Technology Of Optical Sensors And Image Sensors In Plastic Electronics For Industry 4.0	833
<i>L. Jamet</i>	
Mems Based Acoustic And Optical Sensors For Physical And Chemical Characterization Of Fluids	854
<i>A. Unamuno</i>	
Fiber Optic Position Sensors: Applications & Lessons Learned	871
<i>R. Rickenbach</i>	
Smart Radar Sensor Applications For Vertical Markets	891
<i>D. Jones</i>	
Designing Smart Medical Devices With Force Sensing Technology.....	900
<i>M. Lowe</i>	
Natatometer™ The Swimming Velocity Monitor	917
<i>A. Boutov, A. Krylov</i>	
Emerging Applications Of Hyperspectral Image Sensing In Transportation	928
<i>R. Bridgelall, J. Rafert, D. Tolliver</i>	
Solving The Challenge Of Stray Field Immunity For Safety-Critical Applications.....	939
<i>H. Oyrer</i>	
Efficacy And Safety: Check....By Using The Right Sensor Solution.....	956
<i>B. Stelt</i>	
Motion Sensing And Data Acquisition In High Temperature Environments.....	971
<i>J. Watson</i>	
Sensors For Next-Generation Home Appliances.....	997
<i>A. Von Bieren</i>	
Wireless Sensors: The Future Of M2M Technology.....	1010
<i>R. Montrose</i>	
Sensor Applications For 1KM Long Range Bluetooth 40 Module.....	1022
<i>M. Meiller</i>	
Systems Integration: Sensors, Cellular Modems, Networks, The Cloud.....	1027
<i>K. Larson</i>	
Research Trend And Protocol Development Of Wireless Sensor Networks.....	1046
<i>M. Salam</i>	
Methods For Communication And Magnetic Powering Of Wireless Sensors	1072
<i>P. Troyk</i>	
Medical Device Product Development Involving Sensors	1107
<i>M. Pereira</i>	
Sensor Hubs: The Secret To MEMS Navigation Solutions	1132
<i>D. Karlin</i>	
Sensor Placement For Wearable Electronics	1141
<i>J. Gammel</i>	
Building Sensor Subsystems For Wearables And The IoTs	1149
<i>F. Beauchaud</i>	
Author Index	