MEMS and Sensors Trends
Enabling a Truly Interactive and Connected World
Today’s Presentation

• Introduction to MEMS Industry Group (MIG) and Upcoming Events

• MEMS and Sensors Market Trends

• MEMS and Sensors Technology Trends

• Challenges and Opportunities
About MEMS Industry Group

- **Formed in in the US in 2001 with five companies** - outgrowth of MEMS industry executive meetings at Defense Advanced Research Projects Agency (DARPA)

- MIG is an industry trade association incorporated as a not-for-profit organization, based in Pittsburgh, Pennsylvania, USA

- MIG is international, with over 160 member companies and partners worldwide

- MIG managed by Executive Director Karen Lightman, with Governing Council composed of representatives from member companies
MEMS Industry Group is the trade association advancing MEMS and sensors across global markets.

- MIG **Connects** the MEMS and sensors supply chain
- MIG **Champions** MEMS and sensors in established and emerging markets
- MIG **Commercializes** MEMS and sensors
MIG is the MEMS Supply Chain

Connecting the MEMS & Sensors Supply Chain

- Designers
- Materials & Equipment Suppliers
- Device Producers
- Foundries
- End-Users/Integrators
For a complete list of members and partners, please visit www.memsindustrygroup.org.
Come Celebrate our 10th Anniversary

MEMS Executive Congress® US 2014

November 5-7, 2014
Scottsdale, AZ
Looking for new products and new ideas in MEMS and sensors!

Call for DEMOS!

- Access the MEMS & Sensors community – at MEMS Congress to do business, make acquisitions, develop partnerships
- Network with users and integrators to promote your product

Submit your Pitch!

- Get coaching from MEMS & sensor industry executives, investors, luminaries
- Be eligible for innovation grant worth $160,000
- Promote your idea to potential investors in MEMS & sensors community

http://us2014.memscongress.com/call-for-demos/

Join MIG in 2015

2015 International CES - Las Vegas
Sands Convention Center; January 6-9, 2015
- Full day conference track on Wearables, IoT and Machine-to-Machine on January 6
- Join MIG on the show floor in our MEMS Technology Showcase
  - Booth #72032 - Space is limited – sign up now!

MEMS Executive Congress Europe 2015
Sofitel - Munich, Germany
March 4-5, 2015
What’s our vision?
MEMS and Sensors EVERYWHERE

Where does MIG add value?
By acting as a partner and facilitator to bring the diverse MEMS supply chain together to tackle the tough issues like standardization and new MEMS product development

Why is this important?
To speed MEMS commercialization and reduce $costs$

What’s Next?
Capturing innovation potential of MEMS and Sensors and addressing global MEMS/sensor supply chain challenges
Top 30 MEMS Players - 2013 Sales
(Source: Status of the MEMS Industry report, Yole Développement, to be released Q3, 2014)
MEMS Adding $1B/Year

- 2013 another record year
- MEMS growth 2x as fast as semiconductors in next 5 years
- Consumer market reigns supreme
- After smartphones and tablets, wearables are third wave in CE

MEMS market, 2006–2017

Source: IHS
MEMS and Sensor Trends

Biggest technology trends:

• Sensor Fusion

• Integration

• Energy and Wireless Sensor Networks

All Enabling a smarter Internet of Things/Everything and Everything!
MEMS Sensor Fusion

- Combination of software and hardware
- Intelligent, complex and integrated
- Promises increased power and performance while reducing cost
- Often sensor-agnostic
Integration – Creating a Winning Combination

Combo vs. discrete motion sensor market in value, 2006–2017

- Combo: accelero, gyro, and mag shipping as part of 6-axis IMU, 6-axis compass, or 9-axis IMU
- Discrete accelero, gyro and mag

Source: IHS

© 2013 IHS Consumer & Mobile MEMS market Tracker, H1 2013
Energy

Conserving and Harvesting all in One!

Imec’s Autonomous TPMS System ('unity') with Integrated Piezo-electric Energy Harvester

MicroGen Systems’ Micro-Power Product Line for Wireless Sensor Applications
Wireless Sensor Networks (WSN)
MEMS and Sensors Paving Way for a Smart Internet of Things

Proteus Ingestible Pill

Vuzix Smartglasses and SAP

Streetline’s ParkSight

DairyMaster’s “MooMonitor”

Nest Thermostat

Air Quality Egg Pollution Sensor
Requirements for a *Smart* IoT

By 2020, the IoT is estimated to help drive 22 times as much data traffic as exists today.

Enabling Smart Productivity/Grids/Cities/World/(Life) requires:

- Sensor/MEMS-enabled multifunction devices – always on and “at the ready”
- Sensor fusion
- Wireless everywhere
- Appropriate privacy/security
- Better energy harvesting/saving technology; low-power technology
Potential Impact of Smart IoT

- We are just on the edge of a true and smart IoT
- Cisco predicts the Internet of Things will create $19 trillion in value across the next decade
- GE expects $15 trillion to be added to global GDP by 2030 by IoT “smart machines”
- China is a clear leader in IoT (creation of IoT City, Jiading)
- Strong MEMS/sensor supply chain is critical to success

*Infographic courtesy of Jabil*
## Standardization (and lack thereof)

### Commonly Requested Sensor Vendors

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18+ Vendors

26+ Sensor Product Lines

### MEMS/Sensor Industry response:

- **MIG-led creation of historic Standardized Performance Definitions (SPD)**

### Up next: API Standardization

Courtesy of Qualcomm, used with permission
MEMS/Sensors + Innovation = Opportunity

- Wearables!!
- Smart mobile anything
- Smart Homes, Smart Farms!
- Smart Health and Medical Care

*Smart Everything creating a truly intelligent Internet of Things*

Where will MEMS take you?
Contact MIG - www.memsindustrygroup.org

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