

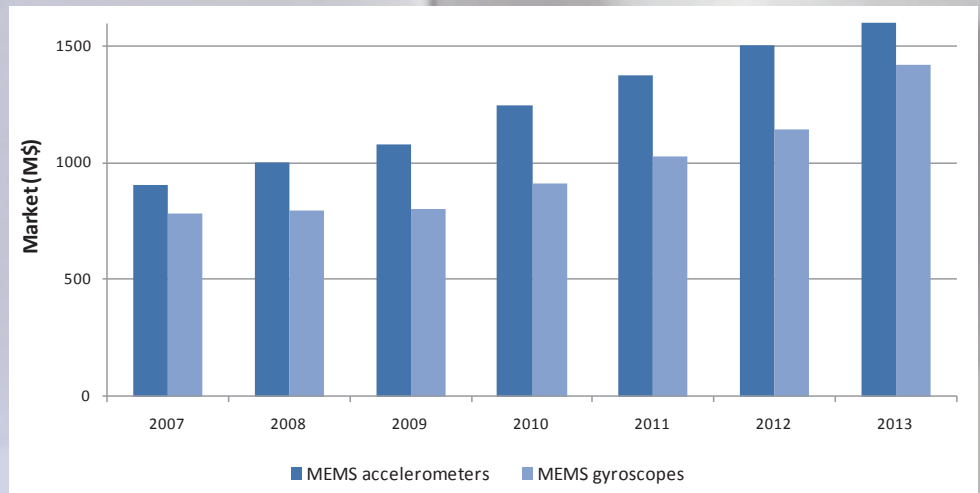
# MEMS Accelerometer, Gyroscope and IMU Market 2008-2013

*Automotive levels, consumer surges, market to reach \$3 billion*

## MARKET TRENDS

**The motion sensing industry is huge and still growing. Some applications are already mature, while others are just emerging. Successful MEMS providers will be the ones able to deal with this changing economic landscape.**

Some devices now integrate MEMS sensors as a commodity product. In other cases, integration of MEMS is driven by regulation and the user is not willing to pay a price premium for additional sensors and pressure on cost is enormous. Successful players are the ones able to decrease manufacturing costs.



*Global 2007-2013 market for MEMS accelerometers and gyroscopes*

One strategy is to produce on 8" infrastructure. Signal processing is also driving the development of future product generations. Being able to add intelligence to the sensor is a means to offer strong product differentiators. From supplying only a component, many players are now supplying a solution. Algorithms are commonly integrated at the chip level: for screen rotation, drop detection...

Another hot trend is the emergence of «clusters» integrating several types of MEMS sensors: this is on the roadmap of inertial MEMS makers. An overall difficulty here is to be able to fuse several types of inputs: highly complex algorithms will be required. Inertial Measurement Units (IMUs) which offer 5 or 6 DOF by combining accelerometers and gyroscopes are commonly used in the defense & aerospace industry. Now that MEMS accelerometers are cheap and that the level of integration of MEMS gyroscopes has increased, it would not be surprising to see MEMS IMUs integrated into our mobile phones. This report highlights why MEMS IMUs will be a very hot topic in just a few months.

## REPORT OUTLINE

- 18 key applications are described in detail:
  - Motivation to use inertial sensors
  - Market dynamics
  - Technical and business trends
  - Penetration of inertial sensors
  - Market in value and in units, ASP
  - Key players
- Overview of 11+ other applications
- Global market shares by type of component
  - Market shares in the consumer field
  - Market shares in the automotive field
- For 28+ players: inertial sales & market served
- Global overview across 4 fields : Consumer, Automotive, Industrial & Medical, Aerospace & Defense
- PowerPoint presentation of 240+ slides
- Excel datasheets are included

## REPORT HIGHLIGHTS

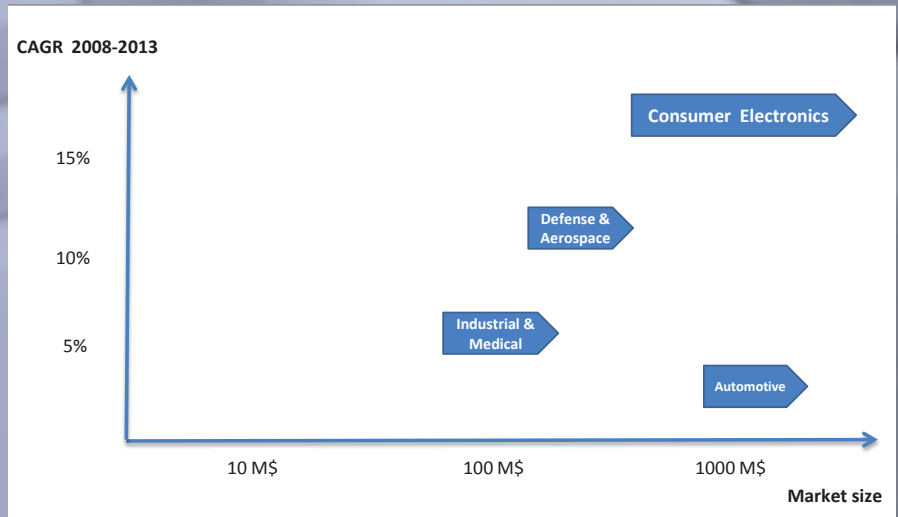
**M**otion sensing devices are not new. They have been used since the 50s in the aerospace & defense field for navigation functions. MEMS versions of accelerometers and gyroscopes have only been developed more recently, bringing 2 key advantages: cost and size reduction.

While not as accurate as the devices used for military applications, MEMS-type accelerometers and gyroscopes are well adapted to be integrated into cars and many consumer electronic products.

MEMS accelerometers have been extensively used since the 90s in light vehicle airbags, as crash sensors. Since then many other devices have benefited from the use of motion sensors. The latest and most striking examples are their use in Nintendo Wii game controllers and in Apple iPhone and iPod devices.

### This report deals with the following points:

- How is the consumer electronics changing the MEMS motion sensor industry?
- How the automotive downturn will impact the inertial MEMS suppliers? Will regulation ensure a bright future in this landscape?
- Which applications are the most promising in the very fragmented industrial & medical field?
- Will MEMS IMUs be accurate enough to replace traditional inertial technologies in the aerospace & defense area? Which new applications will it enable to appear?
- What are the biggest opportunities for inertial sensors and combination of inertial sensors for the future?
- Which players are successful? Why Invensense is becoming a leading player in the consumer area? How will ST Microelectronics change the gyroscope competitive landscape? Who are the newcomers? Which companies have difficulties?
- What are the key technical trends and challenges to overcome?



2008-2013 market evolution for MEMS inertial sensors per field of application - Beginning of arrow: is 2008. End of arrow is 2013

## MARKET METRICS

**MEMS inertial sensors now represent a serious business: 752M units of MEMS accelerometers and gyroscopes were produced worldwide in 2008, corresponding to a \$1.80B market already!**

The major part of this market still comes from automotive applications; however consumer applications should overtake this by 2011. In the automotive world, massive use of accelerometers and gyroscopes is likely to stay limited to current established applications such as airbag, ESC and TPMS. The annual growth rate will be limited to 3.6% up to 2013, compared to 21.1% for the consumer area. Indeed the adoption rate of motion

sensors on many consumer electronics products is rising faster than ever.

Bosch and ST Microelectronics are leading the global MEMS accelerometer market with about 35% market share together. Challengers are numerous (Kionix, Freescale, ADI...) and new players continue to enter the market. From the gyroscope side, the competition is now clearly between Bosch and Panasonic for the automotive market. In the consumer area, multi-axis devices (InvenSense...) are gaining market shares over single axis devices. ST Microelectronics expects to be as successful as in the accelerometer side with its recently introduced 2-axis gyroscope.

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## COMPANY CITED IN THE REPORT

Alps, Analog Devices, Bosch Sensortec, Bosch, Colibrys, Crossbow, Denso, Endevco, Epson Toyocom, Freescale, Fujitsu, Gladiator Technologies, HDK Hokuriku, Hitachi Metals America, Honeywell, Infineon, Invensense, Kionix, Kongsberg, L-3 Com/IEC, LKD Aerospace, Lumedyne Technologies, LV Sensors, Melexis, MEMSense, MEMSIC, Microcomponents SA, Microinfinity, MSI, Murata, Panasonic, PCB Piezotronics, Rohm, Seagate, Senodia, SensorDynamics, Silicon Designs, Silicon Sensing, SMI, Sony, ST Microelectronics, Systems / AIS, Systron Donner, Tronics, VTI, Wacoh...

## BIO



**Laurent Robin** works at Yole Développement on marketing & technology analysis in the fields of MEMS and advanced packaging. He earned a master degree of marketing and technology management and a science master degree in physics, with a specialization in micro-technologies.

## WHO SHOULD BUY THIS REPORT

- Inertial sensor suppliers (accelerometers, gyroscopes, IMU modules)
- Integrators of motion sensors
- Equipment & material manufacturers
- Financial & strategic investors
- R&D centers

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## ABOUT YOLE DÉVELOPPEMENT

Our commitment is to facilitate market access for innovative technology, devices, equipment and materials in the disruptive semiconductor businesses. Founded in 1998, Yole Développement is involved in the following fields, with strong leadership worldwide:

- MEMS Devices and Equipment & Materials for MEMS manufacturing
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- Photovoltaic
- Microfluidics
- 3D IC/TSV & Advanced Packaging

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- Technology analysis
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- Market reports & Database

Yole Développement is the world leader in the analysis of disruptive semiconductor applications and markets. Each day, Yole Développement's team of 20 market analysts is in contact with industrial companies, R&D institutes and investors worldwide in order to help them understand the market and technology trends. In its analysis, Yole Développement takes into account the complete value chain including materials, equipment suppliers, device & system manufacturers and end users.

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Definitions: "Acceptance": Action by which the Buyer accepts the terms and conditions of sale in their entirety. It is done by ticking the box "I accept the conditions".

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1.1 The Contracting Parties undertake to observe the following general conditions when agreed by the Buyer and the Seller. ANY ADDITIONAL, DIFFERENT, OR CONFLICTING TERMS AND CONDITIONS IN ANY OTHER DOCUMENTS ISSUED BY THE BUYER AT ANY TIME ARE HEREBY OBJECTED TO BY THE SELLER, SHALL BE WHOLLY INAPPLICABLE TO ANY SALE MADE HEREUNDER AND SHALL NOT BE BINDING IN ANY WAY ON THE SELLER.

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3.2 Yole may offer a pre release discount for the companies willing to acquire in the future the specific report and agreeing on the fact that the report may be release later than the anticipated release date. In exchange to this uncertainty, the company will get a discount that can vary from 15% to 10%.

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