

Micro-Electro-Mechanical Systems

Room D.1.1, Building 25

Politecnico di Milano

Via Golgi 40, 20133 Milano

With the aim of supporting and aggregating education and research activities, Polifab organizes periodically short workshops on themes related to micro and nanofabrication technologies. The last event of the spring series will be focused on micro- and nano-electromechanical devices (MEMS). Four lectures will give an overview of the technological, mechanical and electronic aspects relevant in this research field and will outline the emerging trends and the application in Internet of Things (IoT) systems.

Programme

- 14.30 **G. Allegato**, STMicroelectronics
Overview of MEMS technologies and new trends: an industrial perspective
- 15.05 **A. Corigliano**, Politecnico di Milano
MEMS: a mechanical perspective
- 15.40 **G. Langfelder**, Politecnico di Milano
Hide the “nano” into the “micro”: the next wave for MEMS inertial sensors?
- 16.15 **L. Mottola**, Politecnico di Milano
Building IoT systems with MEMS: a tale of distant languages

Registration

The participation is free but subject to registration.
If not already registered, please follow the link below:

<http://tinyurl.com/Polifab-workshop>

Contact: infopolifab@polimi.it, Phone: +39 0223998980

How to reach the conference room:

<http://home.deib.polimi.it/ferrari/D11.pdf>



Overview of MEMS technologies and new trends: an industrial perspective

G. Allegato

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An overview of MEMS product families for sensors and actuators is presented, with some examples of technological platforms and their evolution to address product performances improvement requirements. Beyond classical sensor devices, examples of emerging technologies for MEMS actuators and their applications are presented.

Giorgio Allegato is MEMS Sensors Technology Development Team Leader at STMicroelectronics. STMicroelectronics is the world's top MEMS manufacturer and the leading supplier of MEMS for consumer and mobile applications, with a wide products portfolio ranging from sensors to actuators.

MEMS: a mechanical perspective

A. Corigliano

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The great versatility and the reduced unit cost of MEMS have been the basic ingredients for their large diffusion in various fields like the consumer and automotive markets. Behind the single MEMS there is a complex multi-physics world that must be mastered to fabricate devices that can really find their place in practical applications.

The lecture will give a glance to the microsystems complexity as seen from a mechanical perspective. The focus will be on specific issues studied in strict collaboration with a major industrial partner during 14 years of experience. Starting from real cases, the presentation will deal in particular with the dynamics of resonant devices, the study of dissipative and multi physics phenomena, the study of key reliability issues such as fracture, fatigue and spontaneous adhesion (or stiction).

Hide the “nano” into the “micro”: the next wave for MEMS inertial sensors?

G. Langfelder

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A tremendous number of new applications could be delivered in your pockets if gyroscopes could improve their performance in terms of noise vs area trade-off and in terms of vibration rejection capability. As conventional capacitive MEMS gyroscopes, by now, see only small incremental improvements in their performance, a technological breakthrough is demanded to boost the applicability of gyroscopes in new fields, as we enter the era of the Internet of Things.

The lecture will give an overview of the state of the art for MEMS gyroscopes, and will discuss how the combination of standard MEMS technology with nanometric NEMS elements, together with low-power, low-noise electronics, enables terrific improvements in gyroscopes parameters in ultra-low footprint, including new applications in geolocalization, virtual reality, and vestibular implants.

Building IoT systems with MEMS: a tale of distant languages

L. Mottola

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MEMS technology provides an effective stepping stone to cater for sensing and actuation needs in Internet of Things (IoT) systems. Unfortunately, IoT developers are often oblivious to the unique features and trade-offs of MEMS devices. This may result in making design choices based on wrong assumptions or in developing systems unable to work at their full potential. Such a state of affairs is essentially due to a lack of mutual communication and proper abstractions at the interface between MEMS developers, who work in the design of individual MEMS devices, and IoT developers, who work towards realising full-fledged systems out of individual devices.

The talk will report on our experience in this regard, based on two real-world deployments of sharply different IoT applications. In both cases, we learned “the hard way” what is (perhaps) to understand behind MEMS technology for those who are not MEMS developers.