



Lecture by Dr. Franz Laermer
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Microsensors from BOSCH - Invented for Life

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Abstract:

Microsystems or MEMS have revolutionized automotive safety, comfort and engine control systems. Today 100...150 microsensors can be found in a modern car. High accuracy, reliability, scalability of production technologies to high volumes and low manufacturing costs have enabled many new applications. Examples for “invented for life” are the life-saving airbag and anti-skidding systems as well as engine control and exhaust treatment.

The automotive field was the door-opener to the success of the new microsensors, providing sufficient market size and economies-of-scales, combined with appreciation of high quality, reliability and product performance.

Today the consumer MEMS field is adding extremely high volumes on top of the automotive MEMS sensor business, with the Internet-of-Things-and-Services (IoTS) firing expectations towards even higher volumes. Experts are predicting a “trillion sensors future”. With a production volume of about 4.5 mio microsensors per day, Bosch has reached the leading position as the largest MEMS-supplier in the world.

Beyond mechanical sensors, microtechnologies and microfluidics are opening new options for diagnostics and therapy monitoring at the point-of-care in the form of so-called Lab-on-Chip solutions. Bridging the gap between microfluidics made from plastics, and silicon-based intelligence eg. for the conversion of diagnostic information into electrical signals will boost their wide-spread use even further.

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Dr. Franz Laermer joined the Corporate Research and Technology Center of Robert Bosch GmbH, Stuttgart, Germany, in 1990, where he started the development of key technologies and functions for the upcoming field of Micro-Electro-Mechanical Systems (MEMS) at Bosch. Activities were mainly focused on new microstructuring technologies for silicon surface-micromachining and sacrificial layer etching, as well as micro-accelerometers, gyroscopes and pressure sensors for the automotive and later on the consumer electronics areas.

Since 2003, he is Project Director for top-level innovation projects in new application fields beyond automotive, including the biomedical area. Since 2009, he is covering the role of Senior Chief Expert for Microsystems and Microfluidics as well, working mainly on Lab-on-Chip solutions for molecular diagnostics.

Dr. Franz Laermer is the co-inventor of the "Bosch Deep Reactive Ion Etching Process" ("BOSCH-DRIE"), the key microstructuring technology for all silicon MEMS. He holds more than 150 patents.

Dr. Franz Laermer was awarded with the prize "European Inventor of the Year 2007 – Category Industry" by the European Commission and the European Patent Office (together with co-inventor Andrea Urban), for the invention, development and sustainable success of the "BOSCH-DRIE"-process. In 2014 he received the "2014 IEEE Jun-ichi Nishizawa Medal Award" from the Institute of Electrical and Electronics Engineers (IEEE), USA.