

Smart Sensors in Automotive and Healthcare - A NEREID Perspective on Technology and Applications

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Abstract:

Smart sensors form a domain of convergence of many different technologies, including the sensing element together with the readout and signal processing electronics, power management, energy harvesting and wireless communications. Smart sensors are key components of Internet of Things (IoT) and, by the big data collected, future enablers of Artificial Intelligence applications. Hence, they are one of the subjects of the NEREID project (“NanoElectronics Roadmap for Europe: Identification and Dissemination”), which is dedicated to map the future of European Nanoelectronics. Concerning sensors, the NEREID roadmap is focusing on long term aspects of two domains of IoT smart sensors, both strategic for Europe: automotive and healthcare sensors.

We will present the long term vision concerning the varieties of sensors and the priorities for R&D in these two domains. In the automotive field, sensors should address a diversity of well defined challenges related to the smart interaction between driver and car, enabling high security in traffic and comfort for the driver, but also enabling more intelligence in the optimization of various car functionalities and control/monitoring of the pollution. Reliability and robustness of adopted smart sensors are very big concern. At long term, the sensors will form the artificial senses of the intelligent self-driven cars and answer to all related challenges. In the healthcare domain, multiparameter monitoring of human activities and biomarkers is the basis for future personalized and preventive medicine. We will report about sensor roadmaps including wearables and implantables. A particular field where the work on roadmaps and future efforts are needed is the field of biosensors and their applications in Lab On Chip and Organs on Chip.

Curriculum Vitae



Emanuele Casu is a scientist in Nanoelectronics device laboratory in EPFL, Switzerland. He received his Bachelor's degree in Electronic Engineering from Politecnico di Torino in 2010 with a project on rail safety-critical embedded systems done in EULEGO srl. In 2012, after completing his Master's project on Oxides growth and characterization on Graphene in IBM Thomas J. Watson Research Center, he received his M.Sc. degree in Micro and Nano Technologies for Integrated Systems from EPFL, Grenoble INP and Politecnico di Torino. He obtained his PhD degree in EPFL Nanolab group where he has been working on MEMS resonators for communication and sensing applications, Steep-Slope switches and reconfigurable RF functions based on Vanadium Dioxide insulator to metal transition.