Panel: The Future of Electronics, Semiconductors, and Design In Europe

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Abstract

For more than a decade, Europe has been the wireless continent; today, wireless has almost completely shifted to the U.S. and Asia. This shift has had a profound impact on the electronic, semiconductor, and design ecosystem: long-time leaders have disappeared, or have abandoned the wireless business/market. Europe needs to re-invent itself once again. Is there a future for electronics, and IC design and manufacturing in Europe? If so, what are the applications, and the technologies that will bring Europe back to the top of the world leadership? This panel session, moderated by EPFL Professor Giovanni De Micheli, will gather executives from the semiconductor, IP, and R&D sectors to discuss the prospects of our industry in Europe.

Panel Moderator's Introduction

Prof. Giovanni De Micheli, EPFL, Switzerland

Predicting the future of technology and its impact on economics is difficult on a multi-year horizon, and it has limited value when talking about few quarters ahead. Trends are often indicators of possible growth and decline. A symposium on emerging trends in electronics was recently held in Montreux, Switzerland, with scientific and business leaders in electronics. The content is available on line [Nano-Tera].

Roughly speaking, Europe's production of digital components has declined, while a strong position has been retained in analog and mixed-signal parts. Micromechanical (i.e., MEMS) components are a thriving market for Europe, even though competition will be harder. Europe's presence in system electronics has declined in the telecom area, but has remained strong in medical and embedded systems. The Internet of Things (IoT) will bring intelligence to trillions of objects around us, thus requiring yet more effective components and systems.

It is well recognized that significant revenues are often associated with systems and services. Thus the balancing act for a far-sighted R&D politics in Europe is to determine the system boundary as an ideal line in such a way that: i) systems above such a line are complex enough to embody creativity, cultural identity and uniqueness that cannot be copied without an extraordinary effort; ii) subsystems below this line consist of ensembles of components that can be easily acquired, produced and/or replaced with low effort. The systems above such a "lifeline" are often called "systems of systems" and they represent both a challenge and an opportunity for Europe. Examples range from next generation self-driving vehicles to automated services for health monitoring.

Specific characteristics of these complex systems are the multiple objectives that need to be mediated in real time, the safety and security features that must be natively implanted in the hardware components and transparently managed by the software layers, and the cultural aspects in the human machine interaction that are important reach out to a wide customer base. Indeed, while components – such as processors and memories – are universal – systems will compete, distinguish and establish themselves in the way they are germane to users and customers. In this way, a strongly connected and competitive world will provide space for innovation and market penetration to multiple poles of competence. Europe has a strong tradition in engineering and must retain its market presence by fostering innovation at all levels, from education to job insertion, and by creating a strong notion of value in engineering objectives, prototypes and products.

[Nano-Tera] http://www.nano-tera.ch/

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Panelists' Position Statements

Dr. Jalal Bagherli, Dialog Semiconductor, Germany

Not available

Dr. Thierry Collette, LETI, France

After the success of Europe in wireless design and technologies, in Europe we must take into account new applications in order to sustain and push the European microelectronic environment. A big investment is under progress in Europe concerning the Key Enabling Technologies (KETs) with first success (FDSOI as an example). In order to complete this first investment, Europe needs to push many initiatives in order to be able inside Europe to take into account future applications, especially the IoT, mainly supported by SMEs, and integrate them inside advanced components manufactured inside Europe.

Key domains for the next decade will be the smart embedded systems and Cyber Physical Systems (CPS) which up to now are key drivers for the innovation capacity of European industries, large and small, generating economic growth and supporting meaningful jobs for citizens. They offer solutions to some of the difficult societal challenges for 2020 and beyond. For both reasons, it is vital that investments are made to assure European collaboration and the access to technologies, know-how and capacities, which guarantee growth potential and strategic independence in the face of increased globalisation.

Besides, SMEs play a key role in economies; they constitute the largest business block and provide the bulk of employment. They generate most of innovative ideas in ICT areas and CPS-enabled IoT products. Together, these create an inflection point for innovators and industry in Europe.

In order to address this challenge, as an example Europe supports EuroCPS, which is an ambitious and holistic project aimed at arming Europe with a network of design centers boosting and initiating synergies between SMEs, major CPS-platforms and -competency providers to capture the emerging markets of IoT products. The goal of the EuroCPS project is to create synergies between emerging and established organizations operating in the CPS sector. The SME players entering new market segments generally lack a sufficient knowledge of the value chain and the required skills to master the whole design process from ideas to products. In order to succeed, these innovators will need coaching to understand the innovation ecosystem, access to the technologies of established players and capacity to accelerate technology transfer.

With such an initiative, Europe will leverage on existing regional ecosystem to bring the full value chain (from micro-electronics, smart systems, CPS to high value added products and services) and put all the necessary expertise and competencies to provide SMEs from any sector with an easy path to build innovative CPS-enabled systems. In Europe, it will be mandatory to link SW, system and nano-electronic industries along the full CPS value chain to build a state of the art design ecosystem in Europe able to sustain microelectronic in Europe which must be strongly connected to the applications.

Dr. Antun Domic, Synopsys, USA

I started my career when the number of computers was in the order of magnitude of one million, worldwide. Wireless phones did not exist, and the entire Internet – then Arpanet – could be sketched on a single US letter size page. Looking backwards may be interesting, but looking forward is more exciting.

As of today, there are an estimated 1.5 trillion "things" out there, out of which 25 billion are connected, 4 connected "things" per human being on planet Earth. By the end of this decade, the number of connected "things" will exceed fifty billions, eight connected "things" per human being [Elfrink14], and this number will double every five years, approximately [Zhang08]. Industry forecasts estimate that more than hundred "things" per human being are connectable, and will be eventually connected.

The implications are huge: by the end of this decade, annual IP traffic will exceed two zettabytes (1 zettabyte = 1 billion terabytes), with mobile accounting for more than two thirds of the total; more than 90% of IP traffic will be video; hundred times more data will be generated in 2020 than in the past 5,000 years, and 40% of data generated in 2020 will come from sensors. Smart cars, homes, cities will join smart phones. The aerospace, automotive, energy, and healthcare sectors – to name just a few – will be revolutionized; embedded processing – ubiquitous CPU and GPU – and power "management" will be more important than ever – most "things" should be extremely power savvy !

Europe does already have a world leadership in aerospace – Airbus and Boeing fight head to head for the top rank; automotive – two out of the top three car manufacturers are European, and the same thing is true for components manufacturers; Europe does lead in smart energy – grid, lightning, metering – and healthcare, and is the home of the leading embedded CPU/GPU IP companies, as well as of the leading power management and smart power companies; finally, Europe undisputedly leads the world in MEMS and sensors.

The matter is not if Europe can regain the world leadership but, rather, how Europe can maintain its leadership. Competition is fierce, electronic product differentiation by semiconductor process technology is more and more difficult and even platforms are getting increasingly standardized. I do believe that differentiation by advanced design is the most viable, if not the only viable solution.

Thanks to advanced design tools, methodologies and flows, it is possible to address and mitigate the complexity challenges of "cloud" and "edge" applications, as well as to improve the efficiency, flexibility, versatility, and productivity of most "things" applications. Advanced EDA delivers multiple competitive advantages, and represent a critical differentiation enabler at the rise of the Internet of "Things" era.

[Elfrink14] W. Elfrink, "The Internet of Things: Capturing the Accelerated Opportunity", IoT World Forum, 2014

[Zhang08] G.-Q. Zhang, et al., "Evolution of the Internet and its Cores", New Journal of Physics, Vol. 10/123027, 2008

Dr. Horst Symanzik, Bosch Sensortec, Germany

Semiconductor revenue in Europe sits for years on single digit percentages of the global market; reaching an ambitious goal of 20% market share seams inaccessible; moreover there is an ongoing change in our semiconductor industry that less optimistic minds interpret as a creeping downturn to insignificance. On the manufacturing side of semiconductor it is a fact that the number of fabs in Europe is steadily decreasing. New investments into fabs are rare, leading to a situation where no ultra-modern process technology node with feature site <32nm is in production or being developed here. This is even more true for foundries than for ODM facilities and also includes an European gap for high capacity Test- and Packaging Houses. On the design and development side the number of large SoC design teams in Europe is decreasing and newly founded start-up companies in semiconductor electronics are hard to find. The number of publications on conferences and in journals in this field that come from European teams is not representative for the amount of highly educated graduates and experienced specialists that are still available.

On the other hand semiconductor technology is one of the key drivers and enabling technologies for the European economy and exportation capability. What can be the way to go for Europe to keep and strengthen this driver role?

I think we should enforce our efforts in the direction of new technologies outside the Moore treadmill. This has to go along with higher customization and faster development time. Let's think about new concepts of smart factory and agile development in an Industry 4.0 era that is the heavy computerization of manufacturing based on cyber-physical systems and the internet of things. The final goal would be faster and higher customized electronic and semiconductor products that are closely defined with our customers. These products can particularly support application areas where semiconductor customers are big in Europe. Luckily there is a not too short list of product fields where Europe can play it's cards: Automotive, Sensors, Mixed-Signal ASICs, Industrial applications, applications for saving energy and natural resources, Medical & Healthcare, power electronics, just to name some important ones.

The future of electronics, semiconductor and design in Europe will come from tailor made customer solutions not from commoditized one-size-fits-all strategies.

Sir Hossein Yassaie, Imagination Technologies, UK

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