

Electronics

In the world of Electronic products, there is overwhelming pressure for companies to produce complex integrated circuit devices with first-time success, in order to accommodate shortening product life cycles that are typical of consumer products. Competitiveness is dependent upon supplying the market with devices that provide the right functions at the right price, as consumers continue to demand increasingly sophisticated and smaller electronic products with greater functionality and power.

In order to achieve this, electronics companies are looking to re-use elements of existing designs (known as Intellectual Property (IP) blocks) and then integrating them together with novel design elements onto single silicon chips known as System-on-Chip (SoC). Such chips may contain elements for computing, memory, graphics processing or wireless communications. Designing systems at this very low level of integration produces chips with millions and millions of transistors. The SoC industry's efforts to satisfy the consumers' insatiable demand for sophisticated products powered by SoCs is also driving the emergence of a new generation of design technologies and methodologies. These include the 'fast track' development of circuits as 'soft', re-usable IP cores using high level description languages as opposed to low level, manual design of transistor layouts and schematics. These novel design technologies also permit the integration of analogue and mixed signal elements into a largely digital platform, as well as the verification of the design to prove that it will carry out its intended functions through the use of rapid prototyping of circuits on programmable logic devices.

These novel design methodologies provide ample room for collaborative work and research partnerships and hence ties in quite well with European research programmes such as those supported by Marie Curie mobility schemes. For example, each partner in the research network may focus on a particular aspect of the SoC under development, and hence the end result is a collection of IP cores that can be integrated on the same silicon chip.

The contribution of the Electronics panel demonstrates the benefits of putting these novel techniques into practice. Titled "*On the Feasibility of Miniaturised Vision Systems*", the paper reports on two case studies of SoC architectures that integrate processing, memory and light sensing elements. The first vision SoC, *VISoc*, illustrates the state-of-the-art in SoC design using current mixed-signal technology and re-usable IP cores. The second vision SoC, *SmartPupilla*, extends these design paradigms to account for emerging technologies that will help develop the next generation SoCs, such as the use of nanotechnology, multi-chip modules and embedded high speed memory cores. The paper highlights the challenges and trade-offs associated with the design of vision SoCs, and concludes with a very optimistic view on the future direction of SoC development which is tending towards the convergence with the consumer demand for "increasingly sophisticated and smaller electronic products with greater functionality and power".

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