Ultra-Low-Voltage SoC for Medical, Wireless Sensor Networks and Mobile Applications

Posted by Janine E. Mooney, Associate Editor

STMicroelectronics (NYSE:STM), a global semiconductor leader serving customers across the spectrum of electronics applications, and the Microsystems Technology Laboratories (MTL) of Massachusetts Institute of Technology presented the results of an advance R&D project targeting a low-power microprocessor technology at this year's European Solid-State Circuits Conference in Helsinki, Finland. The voltage-scalable 32-bit microprocessor System-on-Chip (SoC) combines excellent peak performance with extreme energy efficiency to address applications with limited power budget and time-varying processing loads in the medical, wireless sensor networks and mobile fields.

"This breakthrough technology can enable the development of an entirely new generation of microprocessors for wireless sensors and implantable medical devices, where minimized power consumption and long battery life are absolutely critical," said Alessandro Cremonesi, Strategy and System Technology Group Vice President and Advanced System Technology General Manager, STMicroelectronics." Our work with MIT aspires to play a key role in expanding the industry's horizons in ultra-low-power technologies."

"We are excited that our collaborative project with STMicroelectronics has resulted in an ultra-low-power microprocessor SoC. MIT researchers and STMicroelectronics engineers worked together to develop and implement a number of architectural and circuit technique to reduce power consumption. The energy-efficient processor will enable a number of exciting sensor network applications such as embedded bio-medical systems" said Prof. Anantha Chandrakasan, Department Head of EECS at MIT.

Implemented in ST's 65 nm CMOS process, the ST-MIT microprocessor SoC reduces power consumption to10.2 pJ/cycle at 0.54 V, while the SRAM memory cells can operate at 0.4 V. Memory-access power consumption is further reduced through the use of a small latch-based instruction and data caches at the first level of the hierarchy. Additional features that make this SoC a compact and self-contained system include on-chip ultra low power clock generation and analog-to-digital conversion, as well as a set of peripherals, such as timers and serial interfaces able to work at the minimum voltage supply.

ST is a member of the Microsystems Industrial Group (MIG) at MIT's Microsystems Technology Laboratories (MTL), an exclusive industry consortium that supports MTL's infrastructure and provides direction to its research and educational objectives in consultation with the faculty. ST has a long history in working with leading educational and research establishments around the world, combining industry experience and knowledge with academic research strengths and rich

talent pool.

Further information on ST can be found at www.st.com [1].

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