PROJECT RESULT

Technology platform for next-generation core CMOS process

MEDEA+

2A708: Low-power expertise for mobile & multimedia system applications (LoMoSA+)

Developing new low-power chip-design methods for mobile applications

Worldwide market pressure for mobile devices to be ever smaller as well as more powerful has delivered major challenges to system designers, in particular on how to prevent the heat generated from destabilising the system-on-chip technology that forms the basis of most mobile devices. Partners in the MEDEA+ LoMoSA+ project achieved an overall reduction of 30 to 40% in power consumption and developed new low-power system design capabilities for mobile applications from phones to multimedia equipment. Some of the project innovations are already helping in the development of world-beating products.

Consumers expect each new generation of mobile electronic devices to perform even better than the last. Whether it is a mobile phone, MP3 player, personal digital assistant (PDA) or laptop computer, a new device has to be physically smaller, yet offer more power, more user-friendly applications and longer battery life.

Such expectations place great pressure on the electronic system designers. More powerful processors usually generate more heat, and do not tend to be good for battery life. And, as the physical envelope gets smaller, problems of power leakage and overall system temperature become ever greater.

Now that system designers are already working at submicron levels, they have estimated that with the present rate of miniaturisation, system temperatures could rise over the next decade from the equivalent of a warm dinner plate to that of the surface of the sun! They need to find innovative solutions therefore if static and dynamic power consumption is to be controlled and the heat penalty does result in total meltdown.

Low-power expertise

The MEDEA+ 2A708 LoMoSA+ project therefore set out to develop new and innovative solutions to low-power design, especially for mobile applications. With low-power methods seen as critical to the success of future mobile devices, the project partners aimed to develop new, Europe-wide low-power expertise for mobile and multimedia applications.

A key objective was to reduce overall system power consumption for both active and stand-by power. To meet this, participants worked in five main areas: defining platform architectures, examining hardware platform components, checking the compatibility of hardware-dependent software (HdS) and real-time operating systems, looking at design methodologies and developing suitable mobile and multimedia demonstrators.

As well as investigating low-power solutions for bus-controlled system-on-chip (SoC) designs, the work of the consortium, which included chipmakers, systems manufacturers, research laboratories and a silicon design house, embraced the impact on power, scalability and performance of future multiprocessor SoC infrastructures that make use of novel on-chip communications solutions.

LoMoSA+ developed technological innovations in several areas, including:

- A new integrated low-power platform architecture;
- Power-aware design methodologies;
- New reusable, power-efficient digital and analogue hardware components to form the building blocks of the platform;
- Development of HdS technology for applica-

tion-driven design of network-on-chip (NoC) architectures – HdS is a key enabler of 65 nm technology platforms for European SoC applications.

Fast-changing environment

Despite a series of changes in status among a number of the partners, including important reorganisations within NXP, Thomson and STMicroelectronics and the entry of the newly formed STMicroelectronics-NXP Wireless joint venture that became ST Ericsson in 2009, most of the project milestones and deliverables were realised.

In particular, the partners managed to achieve a 30 to 40% overall reduction in power consumption, an advance particularly relevant for mobile phone components, as well as significant reductions in backlight consumption for LCD screens. In certain application areas, they were able to meet or even extend the original 70% power-reduction target.

Work in the project has enabled one partner, STMicroelectronics, to promote and demonstrate the feasibility of power-aware multiprocessors and associated NoC solutions within the company, with the goal of embedding such solutions into the next generation of chips.

Another partner, Thomson, has been able to develop two SoC designs for use in the video/audio coding/decoding domain. One of these designs is intended for set-top box products. The other, for professional broadcast equipment, has underpinned the development of a number of professional coders, decoders and transcoders, some of which are already on the market.

Contributing to innovation

A third partner, DS2, has released a new tool – SCoPE – that aims to assist designers in engineering low-power, real-time components for multicore systems – the MPCORE platform. SCoPE is a C++ library that extends the SystemC standard language without modifying it to perform co-simulation.

SCoPE was released in the first half of 2008 under the GNU GPL free software license through the web page http://www.teisa.unican.es/scope, including the project packets, documentation and user manual. The tool has generated a great deal of interest, with more than 350 accesses per month to the web page. Companies such as SidSA and VistaSilicon in Spain, NXP in The Netherlands and Thales and EADS in France have also shown interest in it.

Finally, LoMoSA+ has resulted in at least one new patent, as well as a number of contributions to industry workshops, exhibitions and conferences. The LoMoSA+ partners have been involved in organising a number of conferences covering the low-power domain, e.g. ISLPED, PATMOS, DATE, MEDEA+ DAC. The project results have also fed directly into a new low-power initiative – COMCAS – in the CATRENE programme.

The overall result of the MEDEA+ project has been to boost European low-power expertise – a key driver for SoC technology for many years to come. It will speed the development of battery-operated devices that combine high computing power with ultra low power dissipation and low cost, enabling Europe to remain in the global vanguard in areas such as mobile phones and to develop future multiprocessor SoC infrastructures.

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MEDEA+ focuses on enabling technologies for the Information Society and aims to make Europe a leader in system innovation on silicon.