HiPEAC info

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Computing Systems Week Heraklion

'It's the memory, stupid': A conversation with Onur Mutlu

How HiPEAC is reinventing data centres, storage and networking

Database benchmarking breakthrough

Embedded intelligence at the heart of the Balkans

In June, HiPEAC coordinator Koen De Bosschere (Ghent University) and steering committee member Rainer Leupers (RWTH Aachen) presented HiPEAC at the Mediterranean Conference on Embedded Computing (MECO) in Budva, Montenegro. We caught up with MECO organizers Professor Radovan Stojanović and Professor Lech Jóźwiak to find out more about the embedded systems community in the Balkan Region.

What is the embedded systems ecosystem like in the Balkan region?

To a large extent, countries such as the United States, Western European countries, Japan, South Korea and China have a monopoly on embedded systems. Science and technology should be free from the barriers we often see in the political world, yet the technology gap between countries remains huge.

Lower income countries in Europe are often worryingly behind their higher income counterparts in technologies based on high-performance processors, systems-on-chip, integrated miniaturized sensors, and so on. Few hardware components for embedded systems are produced in those countries. However, the researchers and engineers in these countries have significant capacity in developing theory, algorithms, software and smart systems applications, as well as hardware and software integration.

How does MECO contribute towards building this ecosystem?

When we established MECO, our main idea was to help reduce the gap between lower income countries in Europe and industry leaders. We also wanted to create a bridge between scientists, engineers and students from east and west, north and south.

Seven years on, we can proudly say that we've succeeded in these objectives. The conference is attended by researchers, developers and students from over 40 countries. While the majority of participants come from Southeast Europe, the Mediterranean belt and the former Soviet Union, there are also many participants from Western Europe, the United States and other advanced economies.

MECO covers the theory, technology, design and applications of systems supported by smart computers, such as embedded / cyber-physical systems and the internet of things. With an excellent citation score and strong keynote programme featuring outstanding, multidisciplinary speakers, including two Nobel laureates, the conference has become a major event in the computing systems calendar.

As the only international conference in this field in the Balkan region, MECO plays an important role in facilitating technology transfer. Most companies working on embedded technologies in this region are small or medium enterprises (SMEs), who have very limited in-house research and innovation capacity. Since most research is carried out at universities, innovation mostly

HiPEAC heads east

comes from collaboration between SMEs and university researchers, as well as the young engineers emerging from the universities.

MECO helps transfer technology directly to university professors, industry engineers and students participating in the conference; indirectly, it is transferred through the professors to students, and thereby to the region's industrial sector. Participants report that the conference has substantially improved the situation of researchers, developers and students throughout the Balkan region. More than 50% of attendees are young researchers or developers, and the already low-cost conference offers special rates for students.

What were some of the highlights from this year's edition?
This year's conference featured 12 keynote talks over three thematic days and showcased research from world-class universities, with particular emphasis on the symbiosis of modern computing, Nobel-prize-winning medicine, and a socially responsible economy. A number of talks addressed the theme of this issue of *HiPEACinfo*, including ones by Professor Veljko Milutinovic (University of Bloomington and University of Belgrade), Onur Mutlu (Carnegie Mellon and ETH Zürich) and Agnis Stibe (Paris ESLSCA Business School). You can read all the presentations in the MECO library (see 'Further reading', below).

What are the main challenges in the embedded technologies sector over the next few years?
Embedded technologies should contribute towards improving society, the economy, the environment, transportation, healthcare, energy, defence systems, manufacturing and so on. Smart technologies should also help improve education, expand the availability of information and communication to everyone, and help reduce poverty.

At the implementation level, challenges relate to safety, security, reliability, autonomous work, flexibility, performance, energy efficiency, correctness, testability, maintainability, manufacturability, non-recurring engineering and unit costs, etc. With regard to the ecosystem, the main challenge in the Balkan area is the development of adequate support for research, enterprise and innovation.

How can HiPEAC support researchers and engineers in the Balkan region?
MECO and MECONet (Mediterranean Excellence in Computing and Ontology) are too small to draft a comprehensive vision and roadmap in embedded computing, but with the help of HiPEAC's 2,000-strong community we can achieve this. We aim to extend HiPEAC's activities within MECO, as well as disseminating HiPEAC's knowledge among MECO-related countries.

Participating in HiPEAC activities will not only enable knowledge transfer, but also support the establishment of international contacts and collaboration among scientists from academia and industry across Europe.

FURTHER READING:
MECOnet library
 meconet.me/MECOnet-Library
Mediterranean Embedded Computing Resources
 embeddedcomputing.me

Postcards from Montenegro

Over the last few years, RWTH Aachen's Rainer Leupers has been taking HiPEAC to regions which are currently underrepresented in the HiPEAC community.
This year's MECO, hosted in Budva, Montenegro – one of the oldest settlements on the Adriatic and a lively tourist destination – provided the perfect opportunity to present HiPEAC in the Balkan area.

'I was truly impressed to see that the MECO organizers were able to compile a fascinating, highly international conference programme, covering a wide spectrum of embedded ICT,' says Rainer. 'In addition to the latest results from local communities, we saw many inspiring keynotes from international speakers.' Opportunities for growth in the region, he suggests, include the region's strength 'in algorithm design for various embedded applications; in particular, medical electronics appeared to be an important field of growth'.

MECO attendees responded positively to the presentations by Rainer and HiPEAC coordinator Koen De Bosschere: 'I think they appreciated seeing how the combination of HiPEAC and the European Union (EU)-funded Innovation Action TETRAMAX provide opportunities in terms of networking infrastructure and technology transfer funding. We hope to attract many new members from the Western Balkans who will be active participants in our activities and open calls.'

Overall, the aim is to overcome the bridge between Eastern and Western European scientists, says Rainer. 'Over the past few years, Koen De Bosschere and I have visited nearly all the new EU member states, and now we are approaching countries who are on the verge of entering the EU. We've seen that many research groups and companies in Eastern European countries produce outstanding technologies and products, yet they are sometimes quite separate from Western European communities.'

'Our mission is to better connect these "hidden champions" to our well-established network structures, and thus to enable new collaborations such as project consortia beyond the "traditional" EU set-up.'