

Ultra High-Speed Mobile Information and Communication

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Message from the Coordinator

I am particularly happy to announce that Ericsson became a UMIC sponsor. We are looking forward to a fruitful collaboration.

With his retirement coming close, Prof. Otto Spaniol offered to resign from his position as Vice Coordinator to give a younger researcher the opportunity to become active in the UMIC Steering Committee. On July 14, 2009 a member meeting approved the following changes: Prof. Matthias Jarke is the new Vice Coordinator of UMIC. His position as Coordinator of Research Area B "Applications and Services" is now taken by Prof. Leif Kobbelt. The Vice Coordinator position of this research area is now held by a new member, Prof. Klaus Wehrle. The Steering Committee expresses his gratitude to Prof. Spaniol for his valuable contributions and his strong commitment and it wel-

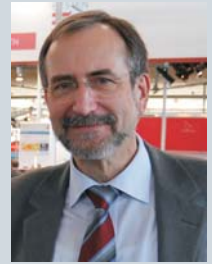
comes Klaus Wehrle in his new position.

Two major events since the last newsletter were the opening of the UMIC building and the IFIP Networking Conference 2009. The opening ceremony had a much larger attendance than expected with a lot of very positive feedback. I want to thank all who helped to organize the event and make it such a success. The Networking Conference was the third international conference attracted to Aachen and supported by the UMIC research centre. Further international conferences already agreed to come to the Aachen region which significantly helps raising the awareness level of RWTH Aachen and UMIC research in the international scientific community. This newsletter features short reports on the opening

event and the conference, in particular for all those who were unable to attend.

In addition, this third newsletter presents four articles on UMIC re-search projects touching key aspects of UMIC. While two of the articles focus on the physical layer and one on applications, "Energy Efficiency Challenges in all Research Fields of UMIC" gives an overview of UMIC activities in the different layers. More information about our research and a list of the publications is available on the UMIC website (www.umic.rwth-aachen.de). Enjoy reading the newsletter.

Gerd Ascheid, ISS



Celebrating the Opening of the UMIC Research Centre Building

After a record breaking short construction time, first research teams moved into the UMIC building in December 2008. It took some time to get everything up and running and the UMIC Steering Committee wanted to be able to give visitors an interesting insight into UMIC research, so the official opening was scheduled as an "Open Day" (Tag der offenen Tür) for March 18, 2009.



The opening ceremony started with speeches by the Rektor of the RWTH Aachen University, Prof. Dr.-Ing. E. Schmachtenberg, by representatives of the Electrical Engineering faculty and the Computer Science department and by the coordinator of UMIC. Afterwards, visitors had the opportunity to explore the building and, in parallel, to get an overview of UMIC research. Demonstrators, posters,

and experiments were shown in the various spaces and labs of the UMIC building. More than 120 visitors from RWTH, from industry, and from other German universities and research establishments as well as from the DFG used the open day to learn more about UMIC research. The event also attracted a larger number of press teams yielding an extended coverage of the event in various print media.

UMIC projects demonstrated at the event included

- application research like Dragon which aims at improving the interactive use of small displays as they are typical for handheld devices
- wireless communication research on multi-antenna systems
- implementation and tool research concerning virtual prototyping of multi-processor-systems on chip including simulation models of RF and mixed signal components.

Also shown was an UMIC partner project with the Electronic Measurement Research Lab of TU Ilmenau headed by Prof. Reiner Thomä, which aims at improving channel models for the cell edges.

A highlight was the demonstration of the Virtual Aachen Project featuring a virtual flight over and into Aachen on a 2,50m-diagonal high resolution screen in the UMIC demonstrator lab.

Last but not least, the professorships established under UMIC funding presented their research projects: Prof. Ulrike Meyer, IT Security, Prof. James Gross, Performance, Prof. Anke Schmeink, Information Theory, Prof. Sebastian Leibe, Mobile Multimedia and Prof. Renato Negra, Mixed Signal Design.

Because of the strong interest and the positive feedback of the visitors the UMIC Steering Committee is planning to offer open days on a regular (annual) basis. So, in case you missed the event, there will be another chance!

Gerd Ascheid, ISS



UMIC Research Results at MDM 2009 in Taipei

The Mobile Data Management Conference (MDM) provides researchers an international forum to exchange innovative and significant research results since 1999. The 10th MDM (2009) was held in May in Taipei, Taiwan featured keynote talks by Prof. Christian S. Jensen (Aalborg University), Dr. Wei-Ying Ma (Microsoft Research Asia), and Dr. Raghu Ramakrishnan (Yahoo!). A full research paper "Mobile Access to MPEG-7 Based Multimedia Services" presented research results by Yiwei Cao, Matthias Jarke, Ralf Klamma, Oscar Mendoza and Satish Srirama from the Chair of Computer Science 5. The research focuses on the analysis, design, development, and evaluation of a middleware that allows access from mobile devices to a bundle of multimedia services to enhance system interoperability, scalability,

reliability, and security. The multimedia metadata MPEG-7 based services are deployed on mobile servers. A prototype is developed to show how to access multimedia services from a mobile host. The analysis results of providing multimedia services as web services from mobile devices are monitored and measured.



Besides, a demonstration of "Virtual Campfire - Cross-Platform Services for Mobile Social Software" given by Yiwei Cao and Dominik Renzel presents a prototype and research results by CS 5 and History of Urbanization. It demonstrates future mobile social soft-

ware with real-time multimedia processing, semantic enrichment of user generated multimedia and complex collaboration such as mobile storytelling. Stories in SMIL format from the multimedia repository can be shared on the iPhone as depicted in the figure. The contribution on multimedia applications, services, and middleware on mobile devices raised the audience's interest at MDM 2009, while the most other demonstrations focused on the realization and optimization of wireless networks. In addition, Virtual Campfire was also demonstrated at CS 5 to Prof. Karl Aberer (EPFL, Switzerland) and Mr. Zia Afshar, Deputy Minister of Information and Culture of Afghanistan. Productive discussions helped for further research and realization of mobile applications and services.

Yiwei Cao, i5

UMICore – Physical Layer Demonstrator

One of the key goals of UMIC is the design of communication systems providing an order of magnitude improvement of the perceived quality of service compared to today's systems. On the physical layer the forthcoming standard UMTS-LTE (Universal Mobile Telecommunications System – Long Term Evolution) serves as reference for the UMIC physical layer advances.

In this context the physical layer demonstrator UMICore has been developed which allows for the demonstration of the achieved improvements in relation to UMTS-LTE. The main focus is on adaptive coding and modulation as well as iterative signal proces-

sing as designed and optimized in the sub-project "OFDM Transceiver: Turbo DeCodulation and Maximum Likelihood Reception". The physical layer demonstrator UMICore is able to demonstrate and visualize these newly developed concepts. The modular structure allows the fast and easy integration of new components and the comparison with state-of-the-art systems.

Different channel models can be used which are being developed in the sub-project "The UMIC Channel Models" in cooperation with the Technical University of Ilmenau (Prof. Thomä). These channel models are derived from an extensive measurement campaign

in the city of Ilmenau.

The implementation of the UMICore Demonstrator on a PC or a Laptop allows for a wide range of possible applications. It can be used for an interactive illustration of content in lectures, laboratories, or seminars as well as for the presentation of research results to project partners from academia and industry.

Benedikt Eschbach, IND



News

Dorkbot Aachen Launched



Dorkbot is an international network

of people doing interactive art and electronic hacks. Now Aachen has its own Dorkbot chapter (Prof. Jan Borchers and his Media Computing Group), one of the first in Germany. The inaugural meeting took place

on June 6, with participants from Aachen, Bonn, Cologne, Darmstadt, and Duisburg. More information is at: <http://hci.rwth-aachen.de/dorkbot>.

Using Floating Car Data for Traffic Management

For traffic management and traffic information services, reliable and high-quality data is indispensable. Data sources delivering road traffic monitoring information nowadays comprise mainly stationary detectors, such as inductive loops, laser scanners, or camera technology. However, stationary detectors have high deployment and operational costs and hence cannot be installed over large areas of the road network. Therefore, mobile detection solutions, namely Floating Car Data (FCD) technologies, gain more and more attention in recent transportation research. FCD is collected by cars equipped with cellular communication units and sensors for measuring position and speed. Extended FCD includes data from car sensors such as rain sensors or the ABS system. The CoCar project [http://www.aktiv-online.org/englisch/aktiv-cocar.html], funded by the German Federal Ministry for Research and Education (BMBF), tests the suitability of UMTS technologies and their foreseeable extensions for direct, targeted transmission of traffic data arising both, from stationary and vehicle-based sensors. Applications in the areas of traffic management and driver assistance have been identified for which Fraunhofer FIT cooperates with Ericsson GmbH, Eurolab R&D in Aachen in the CoCar project to investigate the data management challenges of such applications. Using mobile communication infrastructure for traffic management is, thus, becoming one additional application scenario which is investigated in cooperation with Computer Science 5 within research area B of UMIC.

The main challenge is the huge amount of data which has to be processed for traffic state estimation. This problem is addressed in two different ways. On the one hand, we use a multi-level quality-oriented and priority-based architecture (see figure 1) for data processing in traffic information systems using extended FCD,

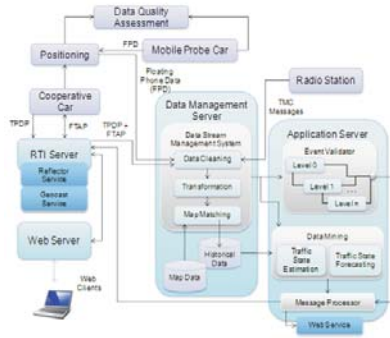


Fig. 1

mobile phone data, and data from external sources, such as TMC (Traffic Message Channel) radio messages. The input data is analyzed level by level. If the derived information has a certain quality and also depending on the priority of the message, the information is sent to system clients, such as cooperative vehicles. Otherwise, further data analysis techniques will be applied on the next level, possibly including additional data sources, to derive information with higher quality. The approach is based on an open architecture in which additional information sources can be integrated in a flexible way. An important component is a Data Stream Management System which allows integration and analysis of incoming streams of data.

On the other hand, we are analyzing the quality of the data in traffic information systems based on extended FCD and mobile phone data. Depending on the source of information, the incoming data is inaccurate (e.g., positioning based on mobile phone data) or uncertain (e.g., data from sensors in the car). Low data quality has to be taken into account in the design of a traffic information system and can be tackled by analyzing more data to get eventually accurate and certain

data. However, for traffic state estimation we need to know how much data we need to collect in order to be able to make estimates with a certain quality. Furthermore, the traffic parameters which are significant for traffic state estimation have to be identified. Additional information sources which can improve the data quality of the estimates considerably also need to be identified. To analyze the data quality in a traffic information system, we developed a quality model, which will determine the varying errors introduced by the different technologies used. The simulation test bed we use is depicted in figure 2.

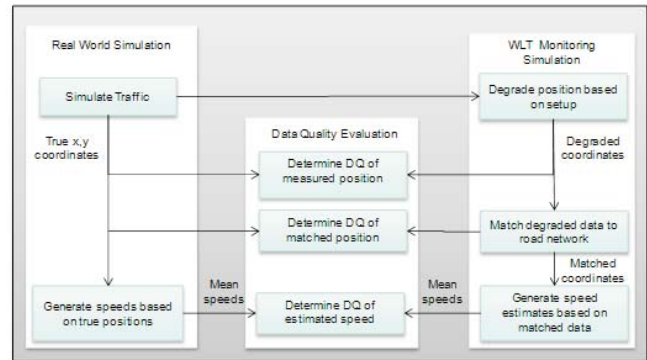


Fig. 2

The main idea of this simulation is to identify the characteristics guaranteeing “good” estimations in a monitoring system based on wireless location technologies (WLT). The data from the simulated traffic scenario is degraded based on several parameters (e.g., accuracy of the positioning, number of mobile phones simultaneously tracked). The degraded data is then used to estimate the mean speed on the roads. The quality of the estimated results is computed by comparing the estimated results with the true data of the traffic simulation. By simulating various scenarios and analyzing the generated quality, we can estimate the quality of WLT-based monitoring systems based on their characteristics (e.g., number of mobile phones in a certain area, accuracy of the positioning).

Christoph Quix, i5

UMIC goes York : A Report from the Leading European Software Conference

In the last week of March a kind of "UMIC working meeting" took place in York, England, on the occasion of the conference ETAPS 2009: Several UMIC researchers met there, serving for different tasks in this high-level event.

ETAPS stands for European Joint Conference on Theory and Practice of Software. It is the leading annual conference on software science in Europe. It consists of five international conferences and several more workshops. In order not to bore the reader, just the titles of the five main conferences are mentioned here:

- Foundations of Software Science and Computation Structures (FOSSACS)
- Tools and Algorithms for the Construction and Analysis of Systems (TACAS)
- Compiler Construction (CC)
- Fundamental Approaches to Software Engineering (FASE)
- European Symposium on Programming (ESOP)

UMIC was represented by altogether four researchers who served in official roles during ETAPS 2009:

- Stefan Kowalewski was as co-chair of TACAS,
- Carsten Weise was programme committee member of TACAS,
- Joost-Pieter Katoen was (and still is) a member of the ETAPS Steering Committee, and he also

was co-chair of the affiliated COMPASS workshop (Correctness, Modeling, and Performance of AeroSpace Systems),

- One of the two "ETAPS unifying keynote talks" was given by Wolfgang Thomas – he spoke on the foundations and challenges of automatic program synthesis.

But there were even more Aachen participants; for example, Martin Neuhäuser and Viet Yen Nguyen, doctoral students at the chair of Joost-Pieter Katoen, presented papers at FOSSACS and TACAS. The conference of more than 600 participants brought together many people from rather diverse areas, which gives this meeting a kind of interdisciplinary character. And indeed, the scope of the conference is so broad that one usually learns about interesting developments in several neighbouring fields.



Wolfgang Thomas, Stefan Kowalewski, and Carsten Weise in front of the central hall of the campus of the University of York

The picture shows three of the UMIC crowd on the campus of the University of York. The campus is a pleasantly designed area with lots of green space, ponds, and numerous geese walking around – everything in contrast to the medieval nature of the old town of York that has a still visible Roman heritage. For example, it was in York that Constantine the Great was proclaimed Roman emperor. The hard work during the conference was accompanied by memorable social events. The magnificent dinner was preceded by a reception in the museum of York which offers a fully reconstructed street in Victorian style. The dinner itself was held in a setting that can truly be called extraordinary: on a railway station platform! However, this platform was not located at York Main Station but in the National Railway Museum. During and after the dinner it was thus possible to inspect interesting historical trains – such as the trains of British kings and queens since 1900.

ETAPS in York showed that UMIC has something to say in the software community – so we hope that one year we shall be able to host ETAPS in Aachen.

Wolfgang Thomas, i7

Research Competition Award for Media Computing Group Student at CHI 2009

Marcus Reul, Diploma student at Prof. Jan Borchers' Media Computing Group at RWTH Aachen University, won a 3rd place in the Undergraduate Student Research Competition at ACM CHI 2009. Three undergraduate and three graduate (PhD) students received awards after a three-phase selection process from a total of 93 sub-

missions. As a result, Marcus receives a monetary prize from ACM, and will move on to the ACM Grand Finals in 2010.

After Gero Herkenrath in 2008, this is the second year in series for the Media Computing Group to bring home an award in this competition (see <http://www.acm.org/src/winners.html>).

CHI is the premier international

conference in Human-Computer Interaction, organized by the Association for Computing Machinery (ACM). The Media Computing Group conducts research in Human-Computer Interaction, and is Germany's most successful research group in terms of archival publications at CHI. For more information, see <http://hci.rwth-aachen.de/chi-ranking>.

Advanced Wireless Transmitter Architectures for Next Generation Mobile Terminals

Future communication networks are sought to be more ubiquitous, and agile than they are today. They will also need to support the large demand for mobility and high throughput requirements within the environment of multistandard communications. This adds up to the stringent power and spectrum efficiency needs of wireless communications equipment. Accordingly, future radio systems have to be designed to meet all the above mentioned critical capabilities.

In typical radio systems, linearity and power efficiency in the radio frequency (RF) front-end are greatly dominated by the performance of the RF power amplifier (PA). Linear PAs have been and are extensively used as output stages on both sides of wireless communication links. Due to their relatively poor efficiency, these linear PAs will be replaced by switching-mode PAs which are capable of providing considerably higher efficiency. This advantage in terms of efficiency leads to lower power consumption and consequently smaller battery size and longer battery life in mobile terminals, as well as reduced manufacturing, installation, and running costs in base station applications.

Advances in semiconductor process technologies and circuit techniques have successfully extended the application range of highly efficient switching-mode RF PAs to microwave frequencies. Recent realisations of switching-mode amplifiers reported power efficiencies of up to 88 % in the 2 GHz range using GaN HEMTs and around 70 % for CMOS implementations for wireless communication frequencies. This performance is by far better than that achieved by widely used linear power amplifiers which are in the range of only 25-40 %. The utilisation of such switching-mode PAs has to be considered closely

together with the system architecture in order to ensure optimal system-level performance. This implies that conventional transmitter architectures have to be adapted or modified to be able to integrate this new type of amplifiers.

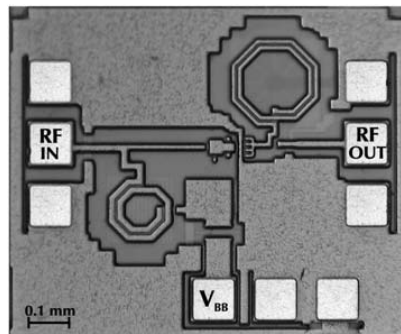


Fig. 1

Within the UMIC research cluster, the Mixed-Signal CMOS Circuits (MSCC) group investigates all-digital multiband transmitter architectures for future wireless applications which use discrete-level signals such as bi-level pulse-width or delta-sigma modulated signals throughout the entire system, e.g., fig.1. Conversion to an analogue continuous wave is performed only prior to transmission of the information over the antenna. Having discrete-level signals at each transmitter stage makes this system considerably less sensitive to any hardware imperfection, besides providing substantially higher energy efficiency due to the use of switching-mode circuits. Because all signal processing and

up-conversion are done in the digital domain, such systems are flexible in terms of multistandard, multiband reconfigurability with the potential to improve information exchange speed as well as service coverage. To fully exploit the abilities of this innovative architecture, signal processing and conditioning algorithms are optimised in terms of signal statistics and operational frequency. Thus, the design of all-digital multiband transmitters calls for the use of a mixed-signal approach to generate appropriate input signals that feed the RF front-end. This includes the design of the baseband to RF up-converter, the implementation of appropriate digital signal processing algorithms in the digital baseband part and the design of multiband highly efficient RF amplifiers. All-digital software defined radio (SDR) transmitters seem to have considerable potential in terms of flexibility, power and cost efficiencies, and might even bring important changes to the architecture of wireless multiband transceivers and shape the topology of future radio systems. Ongoing UMIC research projects target several aspects of all-digital multiband wireless radio systems: from RF design of innovative PAs in silicon technology (fig. 1), evaluation of suitable advanced transmitter architectures through circuit and system level modelling and simulation (fig. 2), as well as the development of adaptive signal processing algorithms for the investigated approaches.

Renato Negra, MSCC

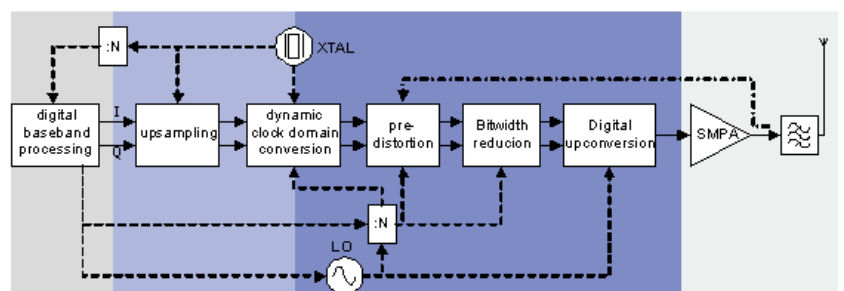


Fig. 2

“Flexible Radio and Related Technologies”: The NEWCOM ++ Winter School hosted by the UMIC Research Centre

“...What is flexibility? Which are the challenges which impose flexibility and which are the challenges when flexibility is imposed? How much flexibility is needed and how much does it cost?...”

These are some spontaneous questions which rise whenever we approach the topic of flexibility, in any of its various aspects, and some of the questions which were addressed during the “Flexible Radio and Related Technologies” Winter School of the European Network of Excellence for Wireless Communications (NEWCOM++). The School which took place on February 3-6 in Aachen has been hosted by the UMIC Research Centre. The event has been co-organized by the NEWCOM++ partners IASA National and Kapodistrian University of Athens, Greece (Prof. A. Polydoros) and Institute for Signal Processing Systems (ISS) RWTH Aachen University, Germany (Prof. H. Meyr, Prof. G. Ascheid).

Flexibility in modern radio networks is a new, interdisciplinary property which is met in a variety of flavors in the military and commercial areas, namely “Software Defined Radio”, “Reconfigurable”,

“Cognitive” or “Smart” radio. Radio flexibility is motivated by various and heterogeneous needs, such as efficient multi-modal or multi-standard transmission in order to preserve compliance of new and old air interfaces, reduction of costs via modular and parametric design, and the ability to operate under a variety of operational scenarios with a single device. In addition, flexibility allows trade-offs between different and contradicting demands in terms of energy efficiency, channel utilization, reliability and robustness, and provides the ability to optimize signal transmission and reception as a function of the operating scenario.

During the four-day intensive courses 14 NEWCOM++ and UMIC experts covered the various and interacting, aspects of radio flexibility. This included:

- The Algorithmic Flexibility required for optimizing the radio transmission parameters (i.e., Adaptive Modulation and Coding/AMC, Adaptive Radio Resource Management/RRM) but also required for efficient implementation of flexible radio receivers
- The Platform-Centric Flexibility, dealing both with the RF and the baseband processing parts as

well as with MPSoC platforms and design methodologies, and - The Network Level Flexibility and related challenges.

The school included demonstrations and a workshop where the participants had the opportunity to present their own related research work. It is noticeable that the interest of the participants was quite high during the whole school, and many enthusiastic discussions took place. This is also reflected by the results of the (anonymous) questionnaire which has been circulated. By using 5 different criteria (content, quality, support, material, and duration) 71% of the participants replied that the school was better than the average expectations and/or related past experience they had.

Konstantinos Nikitopoulos, ISS



Best Vision Paper Award ICRA'09

Prof. **Bastian Leibe** from UMIC's "Mobile Multimedia Processing" group at RWTH Aachen, in a collaboration with researchers from ETH Zurich, won the "Best Vision Paper Award" at the recent International Conference on Robotics and Automation (ICRA'09) held in

Kobe, Japan, in May 2009. The rewarded work presents an approach to find and track pedestrians in dynamic inner-city environments from a mobile platform in order to predict their future behavior and walking patterns. Particular emphasis is placed on robust real-world

performance under difficult sensing conditions. In the context of UMIC, the MMP group is developing a streamlined version of this approach for eventual use in Mobile Augmented Reality applications on camera phones.

Best Paper Award ICALP 2009

Alexander Fanhänel, **Thomas Kesselheim** and **Berthold Vöcking** from the department of theoretical computer science (i1) received the Best Paper Award of the 36th International Colloquium on Automata, Languages and Programming (ICALP 2009) in Track C ("Foundations of Networked Computation: Models,

Algorithms and Information Management"), July 5th - 12th. Their work "Improved Algorithms for Latency Minimization in Wireless Networks" deepened the understanding of power control and packet scheduling in radio networks and was honored with the prestigious award and a cash prize.



International Microwave and Radio Frequency Integrated Circuits Symposium 2009

This year's International Microwave and Radio Frequency Integrated Circuits Symposium (IMS/RFIC) presented the latest progress in the field of analog circuit design for RF front-ends and wireless communications. While the prestigious conference has seen many hot locations like San Francisco, Hawaii, and Atlanta over the last few years, this year it has returned to Boston, cradle of the American nation and home to world's most renowned universities. Despite the current economical crisis and the major shake-out going on in the semiconductor industry IMS/RFIC hosted almost as many attendees and exhibitors as before the crisis – clearly a sign that this is the one opportunity you do not want to miss to catch up with the latest buzz on RFIC and wireless design.



So, what's the latest buzz in RFIC design? Clearly, two major trends

can be identified: the road to software defined or “cognitive” radio as well as 60 GHz radios for short range communications. For software defined radio (SDR), some solutions have been presented to reduce RF front-end complexity in frequency domain duplex systems like UMTS by removing external surface acoustic wave filters that are usually needed to meet linearity requirements of the receiver. Moreover, discrete time techniques for configurable analog baseband processing have been presented by several groups. Although often dubbed “software defined radio” these architectures fail to address RF front-end flexibility challenges in terms of low noise amplifier and downconversion mixer linearity which remain major roadblocks to SDR. These issues are addressed by UMIC funded research at the Integrated Analog Circuits and RF Systems (IAS) group which has presented papers on improving front-end linearity in FDD systems (Bormann et. al.: “A 1.3 V, 65 nm CMOS, Coilless Combined Feedback LNA with Integrated Single Coil Notch Filter”) and an universal interference cancellation concept that addresses the mentioned front-end linearity problem (Werth et. al.: “Active Feedback Interference

Cancellation in RF Receiver Front-Ends”). Fortunately, the latter paper was recognized by a 2nd place in the Best Student Paper Competition.



Moreover, the IMS/RFIC has been a great opportunity to present UMIC research in a broader context in the workshop “Challenges of Future RF Integration” organized by Prof. Heinen and at the conference exhibition where UMIC, IAS, and the UMIC Mixed Signal CMOS Circuits group were represented by their own booth. The UMIC exhibit found much interest in academia and was well recognized by several representatives of industry. In this respect, the approach to use “Aachener Printen” as an ice breaker to get in touch with exhibition visitors proved particularly successful.

Tobias Werth, IAS

Special Guest at UMIC Summer Party



The Afghan Minister for Urban Development H.E. Eng. Y. Pashtun visited RWTH Aachen University upon invitation of Prof. Michael Jansen for the occasion of a workshop held at the Faculty of Architecture on urban renewal

strategies for the city of Ghazni (Afghanistan) which has been nominated Islamic Culture Capital for 2013. The Chair of Urban History is cooperating for many years with the Government of Afghanistan in the field of cultural heritage management at national level. The activities include registration and documentation of historical monuments throughout the country combining conventional and advanced recording methods (remote sensing, GIS/GPS, and 3D Laser-scanning). The Minister visited the UMIC Research Centre and gave first hand impressions on the importance of mobile communi-

cation for the reconstruction of his country. By the mid of 2009 the number of almost 10 million active subscribers has been reached, an equivalent of approx. 30% of the total population and, thus, the fastest growing economic sector of the country. He got informed on the recent developments in mobile communication technologies and tested the prototype of the mobile Web 2.0 multimedia application developed within the Virtual Campfire project in UMIC. The challenges of mobile communication in areas without traditional network infrastructure is one of the research topics within UMIC.

Networking 2009

The IFIP TC6 flagship conference 'Networking 2009' (this time organised in Aachen – Germany; 11-15 May 2009) was a really great event.

The quality of the presentations was astonishingly high. Most likely, this was the consequence of a very strict selection procedure not only during the review process, but also at the programme committee meeting where manuscripts of questionable quality – probably including many that would have easily been accepted at other conferences – were eliminated mercilessly. Moreover, the number of no-show authors was minimal, and in all cases the absence of the presenters was down to very valid reasons.

The Chairs of the technical programme committee (Luigi Fratta, Italy; Henning Schulzrinne, USA; Yutaka Takahashi, Japan) had done a perfect job. Unfortunately, however, Yutaka couldn't make it to the conference thanks to a rather questionable ruling of Kyoto university: they did (and still do) not allow travelling to countries where a single(!) case of swine flu had been reported. A side comment to this strange rule: members of Kyoto university are allowed to travel to Luxemburg or Tahiti, but not to China, India, USA, or Germany.

A special highlight of the conference were the three invited talks by Paul Francis on "A Dirty Slate Approach to Scaling BGP", by Paul Kuehn on "Development

of Global Communications", and by Mario Gerla on "Vehicular Urban Sensing".

In conjunction with the main conference, three one-day workshops were organised on: "Traffic Monitoring and Analysis", "Internet Charging and QoS Technologies", and "Mobile and Wireless Networks Security".

At Networking 2009, we tried several new conference features for the first time (well, at least in the 'Networking' environment). Among others, these included the OMM (One Minute Madness) sessions; much appreciated by everyone. In OMM, every presenter of a manuscript tries to advertise his/her paper on one slide in just one minute (in 45 seconds in our case, to be precise). As was to be expected, these advertisements differed very much between presenters. In any case, the sessions were good fun, and we can proudly state that several other conference organisers spontaneously announced to adopt this format at their own events.

Despite all this, the absolute highlight of Networking 2009 was the social event, held in the evening of 12 May. It started off with a concert in the 1200 years old Aachen Cathedral. The singer, Heike Schuhmacher, is the sister-in-law of the system administrator of chair of Computer Science 4. This was followed by a dinner at the Coronation Hall at the venerable Aachen Town Hall. At this occasion, Dr. Peter Reichl, ftw Vienna (an

'Informatik 4' alumnus) presented Italian songs at least as good as Luciano Pavarotti.



And, most spectacularly, the cycling club of the general chair showed a performance by three artistic cyclists – Iris Jungbluth (single woman), and Nicole Fürch and Angie Koepsel (double women).

The video can be watched via <http://www.networking-2009.org/multimedia/impressions.html>.

In conclusion, Networking 2009 in Aachen was a wonderful event that will be fondly remembered by all participants for a very, very long time.

"After 'Networking'" is "Before Networking" (adapted from Sepp Herberger, the German football national team coach in 1954) – the next event of the series will be held May, 10th-14th, in Madras (Chennai), India.

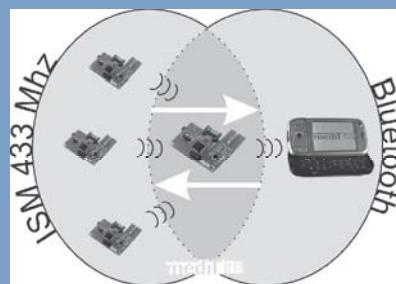
Otto Spaniol, i4

Poster Award of the 13th International Student Conference on Electrical Engineering 2009

Saim Kim and Moritz Pistor of the Chair for Medical Information Technology (director: Prof. Dr.-Ing. Dr.med. Steffen Leonhardt) received a Poster Award at the 13th International Student Conference on Electrical Engineering Poster 2009, held in Prague, Czech Republic, May 21, 2008. The paper "Development of a Body Sensor Network for Medical

Signal Acquisition" describes the newly developed Body Sensor Network, called the meditiBSN.

The target scenario for the validation is a cardiac monitoring application with an ECG and a temperature sensor. The concept focuses on the modularization of both hard- and software. It is expandable through sensor additions. Additionally, a PDA-based



visualization and data management software tool was developed.

New Standardization Activity for High Performance Video Coding

ISO/IEC JTC1 SC29/WG11 MPEG, the standardization body that released many successful standards such as MPEG-2, MPEG-4 AVC / ITU-T H.264, AAC, and mp3, is heading for a new standardization activity in the area of high performance video coding. At the 89th MPEG meeting in London, June 29th – July 3rd 2009, it was decided to kick off this new activity.

The new project addresses the need for higher compression efficiency for the increasing resolution of video in consumer applications (displays and cameras) as well as the demand for higher resolutions for mobile terminals. The new standard shall be applicable to entertainment-quality services such as HD mobile, home cinema, and Ultra High Definition (UHD) TV. The goal of the activity is to achieve significant gains in

compression efficiency at sustainable algorithmic complexity, or significantly lower complexity with comparable compression performance as existing video codecs, especially for resolutions of full HD and beyond.

Responses to a call for proposals are expected to be received by early 2010. The development phase is likely to last until 2012. Similar to the successful twin-text standard AVC/H.264 of ISO and ITU-T, video experts of both organizations will work on the new project, with a collaborative team being led by the video sub-group chair of MPEG, Jens-Rainer Ohm, and the ITU-T rapporteur of Q6/SG16 VCEG, Gary Sullivan. The success of the previous joint video standardization project AVC/H.264 became evident by being the first winner of two Emmy awards (one from the National Academy of

Television Arts and Sciences and one from the Academy of Television Arts and Sciences, photo).

With requirements explicitly including mobile HD video, the new development perfectly fits with the goals of UMIC, targeting for economic and energy-efficient solutions in advanced high-rate and high-quality mobile video services.

Mathias Wien, IENT



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Best Contribution Award for UMIC B project “Mobile Stream Data Mining”

Mobile Stream Data Mining

Data streams are ubiquitous in mobile environments. Management of data streams, therefore, plays an important role, especially data mining tasks such as classification, aggregation, prediction, and identification of relevant data. With an increasing data volume it is no longer possible to buffer the data. Even for transmission it may be too large because of the energetic cost for transmission and the restricted energy and resource capacities of mobile devices. Moreover, multi-user environments require scalable solutions and distributed mining processes. Within the UMIC project Mobile Stream Data Mining at the chair of computer science 9 (i9, headed by Prof. Dr. T. Seidl) research is conducted with

special focus on aggregation techniques and anytime algorithms for flexible stream mining.

Successful year 2009

After last year’s presentation of the HealthNet project at MDM 2008 and a full paper on data aggregation at ACM SIGMOD 2008, this year yields great success regarding stream mining and, in particular, anytime algorithms. Three accepted peer-reviewed full papers at top international conferences, namely EDBT 2009, ECML PKDD 2009, and VLDB 2009, and a journal article in the Data Mining and Knowledge Discovery Journal form a solid basis for further research on stream data mining.

Best Contribution Award

Sergej Fries worked on a diploma thesis within the UMIC project Mobile Stream Data Mining at i9.



For his contribution at the students program of the 13th GI-Symposium on Databases in Business, Technology, and Web (BTW 2009) he got the best contribution award sponsored by SAP. The photo shows the award ceremony when Dr. Dean Jacobs from SAP hands over the price to Sergej Fries. Since June 2009 Mr. Fries is working as a research assistant at i9.

Philipp Kranen, i9

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2 Best Paper Awards for UMIC Mobile Network Performance Group

The Mobile Network Performance Group lead by Prof. James Gross recently received two best paper awards for their research efforts with respect to OFDMA networks. The first best paper award was won at the 15th European Wireless conference (May 17th - 20th 2009 in Aalborg, Denmark), a conference with 120 submissions and an acceptance ratio of 45%. The awarded contribution had the title: "Optimal Power Masking in Soft Frequency Reuse based OFDMA Networks" and was a joint investigation between the Mobile Network Performance Group and the Telecommunication Networks Group of TU Berlin. The work deals with interference management in future cellular OFDMA-based networks. The core contribution of the work is to compare the performance of optimal, fine-grained interference control schemes (assuming the presence of global knowledge as well as infinite computational power) with several heuristic approaches that apply soft frequency reuse. The work basically shows, that neither a strict separation in frequency is favorable in cellular OFDMA

systems, nor a full frequency reuse between cells with a uniform power mask. Instead, a full reuse with variable power masks can improve especially the capacity of terminals at the edge of cells. However, for these terminals the difference to the (infeasible) optimal power mask control is still significant, which motivates further research in this direction, currently pursued within a UMIC project between Prof. Gross and Prof. Mähönen.

The second best paper award was won at 10th IEEE WoWMoM (June 15th - 19th 2009 in Kos, Greece). The symposium had this year about 160 submissions from which 24% were accepted as full papers. The awarded contribution had the title "Admission Control Based on OFDMA Channel Transformations". It deals with an analytical framework to predict the performance of OFDMA wireless cells. In these systems it is well known that dynamic resource allocation can significantly improve the performance. However, these algorithms are reactive, i.e., given a certain system state (for example queue and channel states), resources are

allocated in a favorable way for a very short time span. Here, the problem arises that for admission control somehow the long-term capacity of these dynamic algorithms has to be predicted, which turns out to be difficult if the prediction is required to be accurate. The paper presents a method that exploits channel transformations, i.e., the fact that dynamic resource allocation in OFDMA systems modifies channel gain statistics. Closed-form expressions for these resulting channel gain statistics are given which can be used for performance prediction. Based on this framework, the cell capacity for different admission control schemes can be predicted, e.g., estimating the number of VoIP streams that can be supported by the cell with respect to a certain level of quality-of-service. Performance prediction is one general topic in the vertical UMIC domain "Performance & Reliability" and the proposed framework is currently extended to systems with interference limitation as well as to systems with dynamic power control.

Best Paper Award: Design Automation and Test in Europe (DATE)

Manuel Hohenauer and **Rainer Leupers** from RWTH Aachen University, Balpreet Singh from NXP and Gerrit Bette from ACE received a Best Paper Award for their contribution to DATE 2008 titled "Retargetable Code Optimization for Predicated Execution".

DATE is the leading conference on Design Automation in Europe. In combination with the parallel technical exhibition a total of more than 2500 people attended the 2009 event at the beautiful Côte d'Azur in Nice. The spectrum of topics is very broad. The DATE parallel tracks range from VLSI design over architecture design to software tools and novel applications. The core conference program is accompanied by a variety of panel sessions, tutorials the day before the main confe-

rence, and a number of workshops afterwards. This unique combination of events makes DATE a very attractive event for researchers and industry members alike.



The paper honored at DATE 2009 presents a fully retargetable predicated execution support integrated into ACE's CoSy compiler framework. Predicated

execution (PE) is a processor feature often found in modern embedded processors, where the execution of instructions is dependent on a Boolean predicate. This allows to efficiently convert control dependencies to data dependencies, thereby increasing the ILP available in the instruction stream. The main challenges the paper addresses are to concisely describe the peculiarities of a specific PE implementation and to efficiently determine the regions of the code where to optimally perform if-conversion. The net effect is a significant increase in code quality for many embedded applications. The results have subsequently been productized by ACE and have been released as part of the CoSy retargetable compiler generation framework.