

Ultra High-Speed Mobile Information and Communication

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Message from the UMIC Coordinator

Since the last newsletter UMIC actively increased its visibility outside the scientific community. We had a booth at the Design Automation Conference (DAC 2010, June 13-18) in Anaheim, California. In particular, the parSC Simulation demo found a lot of interest by visitors (see the DAC report in this issue). The UMIC Workshop on Future Mobile Applications, organized jointly with IKT.NRW in March, addressed the local industry. Last but not least, an article on spectrum usage and the recent auction of former analog television bands in the June issue of "Bild der Wissenschaft", a popular German Scientific Journal, strongly referenced UMIC and included pictures of UMIC research activities (Bernd Müller, "Engpass im Äther", *BdW*, June 2010).

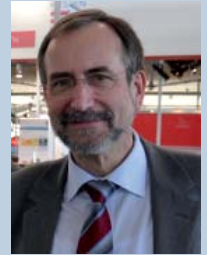
The UMIC research centre attracted a number of high ranked conferences already; the next major conference coming to Aachen is the DySPAN 2011. A special thank you goes to Petri Mähönen who was able to convince the DySPAN program committee that Aachen is an excellent conference location. In addition, several international conferences featured or will feature special sessions organized by UMIC.

To extend the networking with industry and scientific community UMIC is now a member of the Wireless World Research Forum (WWRF) and the Wireless Innovation Forum (the former SDR Forum). There is also now a closer collaboration with Rohde & Schwarz which brings a strong benefit for both sides.

This newsletter features project reports about CAE²SAR, an ASIC design within one of the key driver projects of UMIC (Nucleus project), CoCar, a UMIC associated project, and an applied research activity, a Vuvuzela-filter, which got a lot of attention during the Soccer World Championship 2010.

Enjoy reading the newsletter, more information about our research and a list of the publications is available on the UMIC web site (www.umic.rwth-aachen.de).

Gerd Ascheid, ISS



UMIC Open Day 2010

On April 21, 2010, the cluster of excellence UMIC – Ultra High-Speed Mobile Information and Communication at RWTH Aachen University opened the doors of its new building to students and visitors from academia, companies and the interested public. Emphasis was placed on new wireless applications developed by UMIC. Selected demonstrators were presented, and visitors were encouraged to test the application devices online, partially by walking through the building and being guided by an electronic handheld assistant. Some typical examples are briefly highlighted.

CORONA: Be part of an emperor coronation ceremony. The position and viewing angle of visitors is measured by sensors. A connected sound system with earphones gives you the feeling to be in the middle of the scene.

TWEND: Scrolling through electronic pages. Users can flip pages by bending the screen of a device for reading electronic books or information pages. The speed of skimming is controlled by sensors

which measure the pressure of the user's thumb, very close to what you do when reading conventional books.



LocalizeMe: Never get lost in a city. Simply take a picture of some interesting building with the digital camera of your smart phone. The computer system behind will identify the scene, tell your position and provide you with information related to what you see.

UMICORE: A close look at the physical layer of wireless systems. Different standards and the fast development of wireless systems have led to a vast set of potential modulation and coding schemes. The Simulation tool UMICORE

lets you freely compose certain parameters and investigate the performance of your system setup. It includes recent standards like UMTS and LTE enhanced.

There was a multitude of other applications and demonstrations, ranging from exploring the physical layer of wireless transmission to the direct handling and operation of new devices. Exhibits were shown all over the building attracting a large number of visitors from different areas. The UMIC open day formed another well recognized opportunity to popularize recent research progress.

Rudolf Mathar, TI



UMIC Workshop on Future Mobile Applications (UMICWS)

The UMIC Workshop on Future Mobile Applications (UMICWS) was held on February 26, 2010 at the UMIC Research Centre. The UMIC workshop was jointly organized by the chair of Information Systems & Databases (Informatik 5) at the RWTH Aachen University and the Fraunhofer Institute for Applied Information Technology FIT. It provided a forum for academics and practitioners to share knowledge and experience, explore future scenarios, directions and application domains of innovative research, and discuss the challenges and solutions for developing new mobile systems and applications.

Over 40 PhD students and researchers from UMIC and other institutions participated in the workshop, includ-

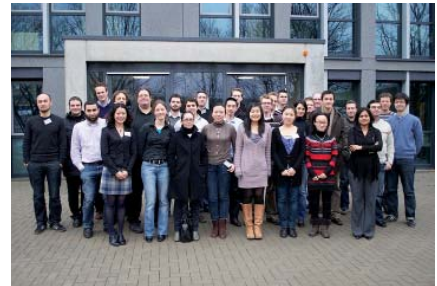
ing the German Research Center for Artificial Intelligence (DFKI), and the Open University of the Netherlands. Active discussion centered around the presented advanced research results and prototypes were presented. A research community across universities and research institutions for further knowledge sharing and long-term collaboration is fostered via this event.

In order to reach out to a wider international community, the workshop proposal PerCoSC 2011 is submitted successfully to the IEEE International Conference on Pervasive Computing and Communication, together with Prof. Christian S. Jensen from Aarhus University, Denmark. The First IEEE PerCom Workshop on Pervasive Communi-

ties and Service Clouds will be held in conjunction with the IEEE International Conference on Pervasive Computing and Communication on March, 21 2011 in Seattle, USA (cf. the Call for Papers in this Newsletter).

<http://dbis.rwth-aachen.de/cms/events/umic-workshop-on-future-mobile-applications>

Yiwei Cao, i5



UMIC Guest Lectures - Prof. Anthony D. Joseph (UC Berkeley, USA) on Cloud Computing: Past, Present, and Future

We were pleased to host a UMIC / Distributed Systems Group guest lecture by the distinguished Prof. Anthony D. Joseph from the University of California, Berkeley, USA.



In his highly topical and vivid course he explored cloud computing as the long-held dream of computing as an

utility. After giving an introduction into the evolution from time-sharing and utility computing to modern data center architectures and cloud computing, the economics and challenges of operating modern data centers at massive scale were discussed. Different aspects of networking, storage, and computing in the cloud, along with the opportunities for and barriers to widespread usage of cloud computing were covered.

In the complex interplay between mobile devices with limited computing capabilities on the one hand and data centers on the other, his RAD Lab is working on the ambitious vision of enabling a single person to develop, deploy and operate next

generation Internet applications over the course of a weekend. With mobile devices becoming more and more ubiquitous, this discussion couldn't be more timely.



The slides and video recording of his lectures are available at:

http://ds.cs.rwth-aachen.de/teaching/ws0910/cloud_computing/

Jó Ágila Bitsch Link, DSG

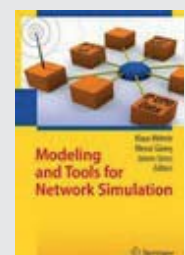
News

New Book: Modeling and Tools for Network Simulation

K. Wehrle, M. Günes, J. Gross (Eds.)

This book focuses on tools, modeling principles and state-of-the-art models for discrete-event based network simulations, the standard method applied today in academia

and industry for performance evaluation of new network designs and architectures.



Informatik 5 Shows Results at „aktiv“ Final Presentation in Mendig



The Cooperative Cars Extended Team with members from Ericsson, Vodafone, Ford, BaSt, BMW and Informatik 5

On June 23-24, Informatik 5 presented their work in the Cooperative Cars (CoCar) project at the “aktiv” final results presentation in Mendig. The Cooperative Cars project and its successor CoCarX investigate the suitability of UMTS and LTE

technologies for future cooperative vehicle applications. This work is done in the context of the research on new application scenarios for ultra high-speed mobile information and communication systems in research area B of UMIC.

In these two days interested people from automotive and telecommunications industry, as well as politics and universities had the opportunity to get informed about the work and research done so far in “aktiv”. The visitors experienced the innovations in live demonstrations and got additional information by static demonstrators and posters.

Members of the Model Management Group of Informatik 5 showed their intermediate results regarding data stream management in the applica-

tion field of traffic jams and traffic jam tail end detection. In the demo, they used the traffic simulation VIS-SIM to generate Cooperative Cars messages in a traffic scenario and analyzed them by means of data stream mining to determine for a road section if it contains a traffic jam tail end. Similar techniques are also applied in the UMIC Health-Net project, in which vital parameters of patients are analyzed using data stream mining to detect critical health situations.

Informatik 5 continues its cooperation with Ericsson in the CoCarX project and investigates further challenges in management and mining of data streams.

Christoph Quix, i5

Signal Processing to the Rescue: VuvuzelaUTLOS

The reduction of disturbing acoustic noise, especially for mobile telephones and digital hearing aids, is one of the core competences of the Institute of Communication System and Data Processing (IND). The list of noise sources is long, but during the soccer world cup it has been clearly dominated by the Vuvuzelas. Their deafening noise even rendered the TV broadcasts an acoustic challenge. Within two days and one night shift, two researchers at IND have developed an algorithm which is able to reliably suppress the disturbing Vuvuzela noise during soccer matches. The program

called VuvuzelaUTLOS implements an adaptive comb filter for the noise-relevant frequency range which consists of the fundamental frequency and the first five harmonics. The filter is controlled adaptively to minimize audible distortions of the stadium atmosphere and the TV commentary. VuvuzelaUTLOS is currently realized as a freely available plugin for the VLC media player. With an ample presence in the media and tens of thousands of downloads in Germany alone, the plugin gained great popularity within the internet community. Eventually, the colleagues at IND could enjoy

Vuvuzela-free soccer and barbecue events.

<http://www.ind.rwth-aachen.de/en/research/tools/vuvuzelautlos/>

Bernd Geiser / Florian Heese, IND



News

Mobile Campfire is available at iTunes App Store

Mobile Campfire, the mobile version of Virtual Campfire, developed at the chair of Information Systems & Databases (Informatik 5), has been launched on the iTunes App Store. Mobile Campfire enables user com-

munities to create, annotate, search, and share photos and multimedia stories on the iPhone, the iPod and the iPad with iOS 3.0 or higher. It serves as a good case study to deliver research results on mobile multimedia community services and analysis done in UMIC onto

software markets. Please find more information about Mobile Campfire at <http://itunes.apple.com/de/app/inmv/id365323266?mt=8>.



Soft-Input Soft-Output MIMO Detection: The CAE²SAR Chip

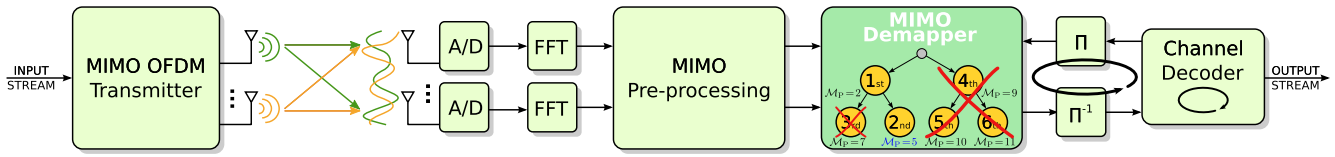


Fig. 1: MIMO-OFDM communication system with iterative demapping/decoding

A novel VLSI architecture for iterative multiple-input multiple-output (MIMO) demapping has been developed and taped out recently. MIMO systems (Fig. 1) promise to increase the spectral efficiency proportionally to the number of the antennas (within a reasonable range of scenarios) without increasing the required bandwidth. Since bandwidth is a limited resource, this technology is of high interest for mobile communication providers. MIMO-demapping algorithms and architectures for iterative receivers are investigated at the ISS as part of the UMIC Nucleus project.

Aside from improving spectral efficiency, MIMO communication significantly increases the complexity of the receiver, particularly in the demapping of the transmitted bits. A simple inversion of the channel matrix only operates sufficiently well under very good channel conditions, since distortions may not be completely removed and noise possibly be amplified by such an operation. A more advanced MIMO-detection algorithm allowing operation in worse conditions is sphere decoding (SD). Error rates can be further reduced by iteratively exchanging information between the demapper and the channel decoder (e.g., a turbo decoder, an LDPC decoder) which performs error detection and correction. For this purpose, the MIMO demapper needs to process and generate reliability information (soft bits).

Sphere decoding algorithms perform tree searches and thus exhibit non-trivial data and control dependencies. This is especially a problem for parallelizing and pipelining hardware implementations. Besides the challenging control flow, the complexity is dominated by metric

computations, which include dot products of complex-valued vectors and squaring operations. In order to speed up the tree search, sophisticated pruning techniques have to be applied at the cost of extra computations for sorting (enumerating) nodes in the tree. Enumeration is particularly complex when soft bits from the decoder have to be processed.

An efficient solution to the enumeration problem, named “hybrid enumeration”, has been developed in a cooperation with the National Taiwan University (NTU) by Chun-Hao Liao et. al. and has been presented at PIMRC in Tokyo, Japan in September 2009.

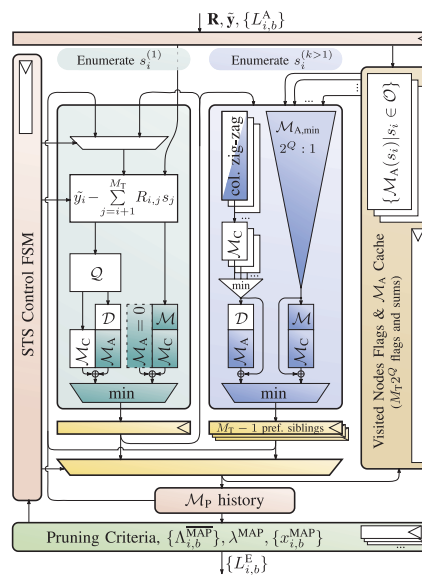


Fig. 2: Architecture of the soft-input soft-output STS sphere decoder

The hybrid enumeration algorithm has been integrated into a single tree-search (STS) architecture. CAE²SAR (CAE²SAR, An Efficient Enumeration Soft-input demapping ARchitecture) is capable of efficiently processing soft-input bits and generating soft-output bits. This is

the first reported soft-input STS architecture (Fig. 2) enabling iterative MIMO demapping. The pre-layout results of this implementation have been recently accepted for publication in the IEEE Transactions on Circuits and Systems II.

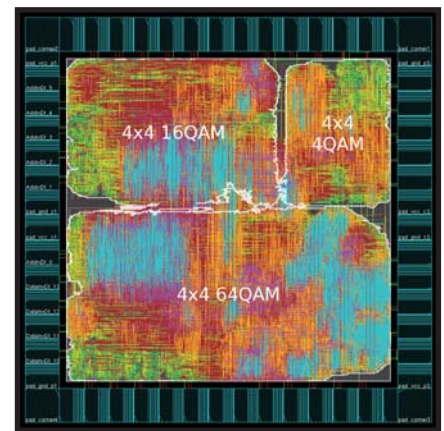


Fig. 3: CAE²SAR chip layout (90 nm UMC technology, 1.707 × 1.707 mm² core area, 68% occupation)

A second phase of design of the implementation process is the physical layout of the circuit, which includes placement & routing. This step is required to get more precise numbers for the chip area and timings, reliable power/energy estimates and – after fabrication – actual measurements. The physical implementation of three different design points (supporting respectively up to QPSK, 16QAM, 64QAM, each with max. 4 antennas) has been carried out during a one month visit by Filippo Borlenghi at the Integrated Systems Laboratory (IIS), ETH Zurich. The final layout (Fig. 3) has been submitted for fabrication to Europractice on June 30. In cooperation with IIS the chip will be characterized after fabrication, with particular focus on the energy efficiency measurements.

Ernst Martin Witte / Filippo Borlenghi, ISS

Flying High - Gliding Fast - Soaring Far



Take-off of „IR“, Rudolf Mathar’s 18 meter wing span glider equipped with an auxiliary engine

Rudolf Mathar from TI, principal researcher and member of the steering committee of UMIC, won the Bavarian Open Gliding Contest 2010 in Bayreuth from May 27 to June 6. By using convergence lines over the Thuringian Forest, he was able to fulfil the task of the last competition day at very high speed and finally reach position one in a field of 28 competitors in the 18m class, gliders with a maximum wing span of 18 meters. Rudolf Mathar is now qualified for the German Gliding Nationals next year.

Gliding contests are air races with engineless aeroplanes. If equipped with an auxiliary engine, as many modern high performance gliders are, it may only be used for take off and to avoid outlanding. Gliders use thermal lift, i.e., ascending

air bubbles heated by the sun, for climbing up to about 2000 meters above ground and use the potential energy to soar large distances at high speed. Typical tasks consist of three to six turn points, which must be circled before returning to the departure airfield. Total distances are typically between 300 and 700 km, depending on the daily weather and thermal conditions. Flights are monitored by a GPS based onboard documentation system, called “logger”. The pilot who fulfils the task at highest speed wins the day, and the final winner of the contest will be the pilot with the largest sum of all daily scores. On the last day, Rudolf Mathar achieved an average speed of 106 km/h over a task distance of 302 km.

Communication and information

systems are important for modern gliding, particularly within contests. First of all, radio voice communication is crucial for flight safety, coordination, and instruction. Flight control systems and corresponding computers use GPS signals for location and tactical decisions concerning flight track, speed and final glide range. Moreover, since a couple of years a collision warning and avoidance system, called “flarm”, has become standard. It uses recent radio channel multi-access technologies and is nowadays installed in nearly all gliders. It is mandatory during contests, where often gliders jointly circle close to each other in narrow thermal lift. Gliding – could it be a new application field for technologies from UMIC? At least one test pilot would be available.



Rudolf Mathar, TI

17th Innovation Day in Berlin

The 17th Innovation Day on June 17, 2010 took place in the garden of the AiF building in Berlin. This year over 200 companies and research institutes across Germany presented new products, processes and services to the funding foundations of the Ministry of Economics and Technology (BMW). Rainer Brüderle, Minister of Economics and Innovation, opened the presentation by a speech. Afterwards a delegation of politicians and members of the

funding foundations reviewed the presented research projects.

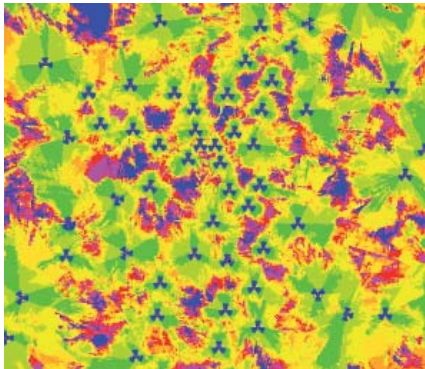
The RWTH Aachen University presented the UMIC sensor shirt. The growing demand of medical assessment of mobile solutions fascinated hosts and customers likewise. The presentation assured the awareness of decision makers of this urgent topic and demonstrated the achieved results.

Till Quadflieg, ITA



UMIC in Cologne: Telekom Deutschland Workshop

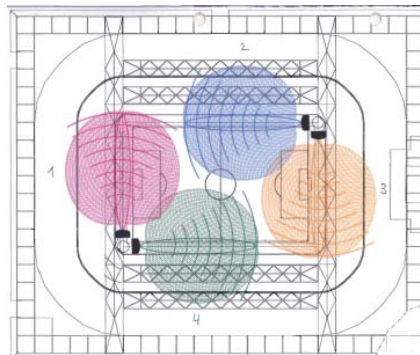
The UMIC-Telekom Mobile Radio Workshop was held May 28, 2010 in Cologne. 42 participants met at the Telekom Deutschland office in Cologne-Ehrenfeld to gain insights into the practical side of mobile radio. Nearly all of them were UMIC colleagues complemented by a few computer science students from the Cologne University of Applied Sciences.



The survey started at 10 a.m. with an introduction by the Head of the Technical Division West, Thomas Ebert. After an overview of the structure and tasks of Telekom Deutschland and its division Region West, the participants were arranged into small groups to be directed through six different departments. In the department Radio Network Planning the participants got an overview of problems that arise if you plan radio networks over different inhabited areas or inside a football stadium. Mo-

bile cell phone masts are often used to compensate a temporary lack of radio network availability, e.g., near exhibition centers or during meetings of a management board in rural landscape.

For the second station Deployment of Infrastructure the groups were led to the roof of the five floor building. In beautiful weather they had a clear view on the GSM and UMTS masts on top of the building. In Quality Checks and Optimizations an overview was given, how workload of mobile communications network is measured and abuse is detected.



In the department of EMC Measurements the participants had the possibility to perform some indoor electromagnetic compatibility measurements with an RF EMC antenna. Further measurements were presented during Radio Field Measurements, again under sunny conditions outside the building. Each

group had the possibility to take a look into a measurement vehicle, which you can clearly identify on the street by its eight antennas on top - used to receive GPS, GSM and UMTS signals. But Telekom uses also taxicabs, trains, and garbage collection trucks to execute field measurements by adding the correspondent equipment to these vehicles, called "Black Boxes".



The last station History of Mobile Communications contained a retrospect on the beginning of mobile communication with A-Netz devices that required an own car battery to operate.

The workshop finished with some shiny foresights for the mobile market, since mobile internet providers expect a doubling of the number of mobile internet users until 2012. So all UMIC colleagues left with a confident smile.

Dominik Franke, i11

The Big Kick to Johannesburg: A Case Study in Mobile Internet Service Community Coordination

Fraunhofer FIT and ITERGO Informationstechnologie GmbH developed an iPhone App to support "The Big Kick to Johannesburg", a charity project similar in spirit to the Olympic torch relay.



Around 2,000 HMI entrepreneurs dribbled a football from Hamburg, Germany to Johannesburg, South Africa - an endeavor which will easily take participants beyond the limits of their ambitions. The App presented up-to-date information about the location of the ball (located by another GPS based App developed by FIT), twitter news, and photographs.

The HMI ball arrived in Johannesburg on June 10, 2010, just one day before the 2010 Soccer World Cup kicked off. The 1,000 hours ordeal involves almost a dozen countries

on two continents. The initiative aimed at raising money for an African project administered by the German non-profit organization "Ein Herz für Kinder". It also served as an interesting real-world case study for the research on mobile multimedia community services and analysis done in UMIC.

http://www.fit.fraunhofer.de/projects/kooperationssysteme/thebigkick_en.html

<http://www.the-big-kick.de>

<http://itunes.apple.com/de/app/the-big-kick/id368202853?mt=8&ign-mpt=uo%3D6>

On the Achievable Rate of Stationary Fading Channels

Meik Dörpinghaus, ISS

In virtually all mobile communication systems data transmission takes place over a time-varying fading channel whose realization is unknown to the receiver. However, for coherent detection of the transmitted signal, which enables a low receiver complexity, an estimate of the channel fading process is required. For the purpose of channel estimation usually pilot symbols which are known to the receiver are introduced into the transmit sequence. In conventional receivers the channel is estimated based on these pilot symbols, allowing to perform coherent detection in a separate step. Bounds on the achievable

data rate with such conventional receivers are known.

In recent years, much effort has been spent on the study of receivers in which the channel estimation is iteratively enhanced based on reliability information on the data symbols delivered by the decoder. I.e., the channel estimation is not solely based on pilot symbols but also on data symbols. To evaluate the payoff for the increased receiver complexity by such a form of joint processing, it is important to study the possible performance gain. The question on the possible gain when using a joint processing of pilot and data symbols implies the general question on the capacity of stationary fading channels.

Therefore, in this thesis several aspects on the capacity/achievable

rate of stationary fading channels have been studied. On the one hand, the achievable rate on stationary fading channels without the use of pilot symbols has been examined, with a specific focus on Gaussian input symbols. On the other hand, we have identified which part of the information is discarded when using the conventional approach of coherent detection and a solely pilot based channel estimation. In addition, we have studied the achievable rate when using a joint processing of pilot and data symbols, e.g., iterative code-aided channel estimation in combination with coherent detection and decoding. Finally, we examined if the often used periodic pilot symbols are optimal in an information theoretic sense.

Efficient Knowledge Discovery in Subspaces of High Dimensional Databases

Emmanuel Müller, Computer Science 9

In recent applications such as mobile sensor networks or profile analysis on mobile phones, many attributes are measured at the same time. Extracting the hidden knowledge as patterns out of such huge data sets can help to reduce communication costs and extend the overall lifetime of mobile devices. However, the valuable knowledge to be learned out of the information is often hidden in subsets of the measured attributes. The discovery of knowledge in such subspaces poses major challenges for today's data mining methods.

In this work, we have discussed novel methods to tackle these challenges. The proposed subspace clustering models adapt to the intrinsic properties of subspace projections to achieve high quality clusters. In addition, the developed efficient processing schemes avoid the exhaustive search of all subspaces and reduce costly database accesses. Overall, the proposed techniques are scalable to large and high dimensional databases, providing all and only novel knowledge to the users.

As a general contribution to the community, we initiated a systematic evaluation study on a broad set of approaches. In this study, we show both efficiency and quality characteristics of major paradigms. Fur-

thermore, the developed evaluation framework is available as an open source project and provides a basis for future enhancements in this emerging research area. Thus, this work proposes not only novel methods for efficient cluster and outlier detection in subspace projections, but it is a fundamental basis for repeatable comparison of recent data mining approaches.

Empirical Modelling of Spectrum Use and Evaluation of Adaptive Spectrum Sensing in Dynamic Spectrum Access Networks

Matthias Wellens, iNETS

Access to sufficient radio spectrum is crucial for the success of future wireless systems. However, recent measurements showed that significant amount of spectrum is underutilized although licenses for that spectrum have been issued.

As solution to this problem Dynamic Spectrum Access (DSA) has been proposed: Smart secondary users (SUs) opportunistically access vacant spectrum bands that are not used by the official licensees for that spectrum, the primary users (PUs). The SUs constantly sense the spectrum and jump between spectrum bands in order to prevent any harmful interference to PU communication.

In some publications, DSA is also

referred to as Cognitive Radio (CR) although inside UMIC we see CR as a broader concept and DSA only as one component or application scenario.

The PU activity patterns have significant impact on the design complexity of a SU system. More frequent changes in spectrum use require the SU to more often sense and switch between bands. In this thesis, we have evaluated spectrum use across time, frequency, and



space. We carried out spectrum use measurements in several different locations using specifically developed setups.

The gathered data was the starting point for accurate spectrum use modelling that allows for improved understanding of PU behavior. The developed models can be applied in a variety of different problem areas and are an important prerequisite for further DSA research within UMIC and by other parties.

We used the models in order to optimize how many and which spectrum bands should be sensed by SUs. The proposed spectrum sensing strategies show enhanced efficiency.

The improved performance demonstrates the potential of a detailed understanding of spectrum use characteristics. It is a good example for the UMIC vision where smart radios exploit information about their environment for enhanced system

performance.



Research Competition Award for Yvonne Jansen, Media Computing Group Student at CHI 2010

Yvonne Jansen, Diploma student at Prof. Jan Borchers' Media Computing Group, a B-IT endowed chair at the RWTH Aachen University, won the 2nd place in the Undergraduate Student Research Competition at ACM Conference on Human Factors in Computing Systems 2010. Three undergraduate and three graduate (PhD) students received awards after a three-phase selection process from a total of 56 submissions. As a result, Yvonne received a medal and a monetary prize from ACM. Yvonne received the award for

her work on "Mudpad" (<http://hci.rwth-aachen.de/mudpad>), a new technique to bring localized, active haptic feedback to multitouch tables and similar surfaces using magnetorheological fluid. Just for the competition, Yvonne created a small "travel" version of her table-size system, using the prototyping facilities at the group's Fab Lab (<http://fablab.rwth-aachen.de>).

After Gero Herkenrath in 2008 and Marcus Reul in 2009, this is the third year in series for the Media Computing Group to bring home an

award in this competition (<http://src.acm.org/winners.html>).

CHI is the premier international conference in Human-Computer Interaction, organized by the Association for Computing Machinery (ACM), with a below-25% acceptance rate. The Media Computing Group conducts research in Human-Computer Interaction, and continues to be Germany's most successful research group in terms of archival publications at CHI (<http://hci.rwth-aachen.de/chi-ranking>).

UMIC at Embedded Systems 2.0 Symposium

On February 9, 2010, acatech, the German Academy of Technical Sciences (Deutsche Akademie der Technikwissenschaften, <http://www.acatech.de>) invited for the Embedded Systems 2.0 symposium. The mission of the meeting was to develop a concept for the paradigm shift from embedded to cyber physical systems. This shift is easily seen in the field of consumer electronics, where smartphones have changed the market substantially. But this shift is even more present in industrial applications ranging from logistics over new methods of traffic control to smart cars, smart grids, and health care. While Germany has currently a strong standing in the highly valued embedded market, there is a need for new concepts to be in place when moving from monolithic embedded systems to omnipresent

networks of cyber physical systems. The new development raises stronger demands in the areas of safety, security and quality, that can only be met by improved and more formal approaches.

The symposium presented a large number of prominent speakers from the field of cyber physical systems: Henning Kagermann (acatech president), Paul S. Otellini (CEO Intel), Reinhold Achatz (research director Siemens), Wolf-Dieter Lukas (Ministry for Research and Education), and Manfred Broy (Technical University Munich). The talks were complemented by a poster session. UMIC had been asked to present edge-of-technology embedded research taking place within the cluster of excellence.

Prof. Stefan Kowalewski and Dr. Carsten Weise (Embedded Soft-

ware Labs, Informatik 11), Prof. Klaus Wehrle (Distributed Systems Group, Informatik IV) and Stefan Schürmans (SSS, Software for Systems on Silicon) visited Munich on a cold day to present posters prepared by their institutes as a showcase of the innovative power of UMIC in cyber physical systems. During the poster session, they had many interesting discussions with the participants of the Embedded Systems 2.0 symposium.

Carsten Weise, i11



UMIC Research Enables Interactive Game Experience at World EXPO 2010 in Shanghai

Thousands of EXPO visitors have already shown what they want their neighborhood to look like in a future city. Buildings, trees, power lines, and water pipes are all created through a collaborative full-body gesture interface installed at the World EXPO 2010 in Shanghai.

The design of the interface based on UMIC research on gesture-based interfaces for mobile applications. In this context, moving away from traditional input devices allows for greater expressiveness without forcing the user into computer-centric interactions.

The interactive experience of the 'Silhouettes' game at EXPO was developed by Prof. Peter Russell's chair

for CAAD and Prof. Jan Borchers' chair for Media Computing. Located inside a unique bamboo structure, Silhouettes lets visitors create their own city block using body gestures. Reminiscent of traditional Chinese shadow play, each group of 16 visitors can use their digital body shadows to create their virtual neighborhood on a 15 meter video wall.

In this way, the game is taking up the EXPO 2010 theme of urban development. The resulting city block of each group, together with a group photo, is made available online as part of a growing 3D virtual city.

The game runs on Apple hardware under Mac OS X. It was developed for the "Germany and China - Mov-

ing Ahead Together" initiative of both governments and is the center of the German-Chinese House at the EXPO. A two-player demonstrator of the system is installed at the Media Computing Group at RWTH Aachen University.

Thorsten Karrer, i10



iNETS at DySPAN 2010

This year, the IEEE International Dynamic Spectrum Access Networks symposium (DySPAN) was held from April 6-9 in Singapore. DySPAN is a high ranked conference to present, discuss, and publish new results in DSA and Cognitive Radio Networks. As in the previous years, DySPAN 2010 gathered more than 300 engineers, network architects, researchers, academic scholars, regulators, and economists to share and demonstrate the latest developments in the field. The audience had the chance to enjoy three days of high-quality technical and policy talks on spectrum sensing, detection and measurements, algorithm and protocol design for cognitive radios and networks, market and regulatory issues for cognitive radio, etc. In addition to the outstanding technical contributions, four keynote speakers from public policy, business, technical and commercial field enriched the conference program. Among the keynote speakers was also Dan Reed, Vice President of Technology Policy and Strategy and leader of the eXtreme Computing Group (XCG) at the Microsoft Corporation, USA. One of my favorite talks was given by Dan

McCloskey from Google on "Wideband Transceiver Architectures for TV Whitespace Applications". It was quite surprising for the most of the audience that Google is actively designing hardware for cognitive radio applications.

One of the highlights of the conference was the demonstration session where industry and academia demonstrated working cognitive radio system or parts of systems. In this year's DySPAN our group participated with four technical papers and two demonstrations. Our first demonstration called "Decomposable MAC Framework for a Highly Flexible and Adaptable MAC Realization" highlighted the results of our research activities in the UMIC Nucleus project. We successfully showed a spectrum agile MAC protocol, which can be interactively composed and modified at runtime. The second demonstration "Cognitive Radio for Home Networking" presented our joint efforts with three other universities and four companies (among which are Microsoft and Toshiba), on cross-layer optimization and policy management for optimal resource allocation in home networks. During the demonstration

session very interesting discussions took place and we were happy to take positive feedback and very useful comments back home.

Finally, at the end of this short report, I'm pleased to announce that DySPAN 2011 has found its future home in Aachen. We at iNETS are delighted to have the opportunity to organize this unique symposium together with UMIC and bring the world's leading experts in DSA and cognitive radio to our beautiful student city. I encourage all of you working in the area of cognitive radios to actively contribute to the success of the symposium by submitting your interesting and novel research to DySPAN no later than November 15, 2010. For more information please visit www.ieee-dyspan.org.

Marina Petrova, iNETS



NGMN Partner Forum in Turin

UMIC is one of the advisory partners at Next Generation Mobile Networks (NGMN). As an active member, UMIC participated aside with other 59 partners in the NGMN conference in Turin between April 14-15, 2010. The focus of this conference was to present state-of-the-art techniques and development the domain of Self Organizing Networks (SON). In addition to that, new sponsors and an office report were introduced. The report contained a detailed summary of the taskforces of NGMN and their achieved milestones.

The Report

The office report included an announcement of the introduction of a new third pool for LTE patents. Joining this new pool requires having essential patents in LTE. It also reported of the implementation of QoS in LTE, which includes the definition of QoS requirements and building a business model for it in addition to EPC QoS mechanisms. The report also included trial evaluation methodologies and LTE Inter Operability Tests (IOT). The focus was on user data rates and their propagation-mode related parameters (e.g., location and antenna height). The report discussed scenarios of FDD and TDD coexistence and the requirements of LTE eNodeBs. The report shed some light on the deployment scenarios for same or between different operator(s) with respect to frequency availability and allocation in different countries. Single Baseband-IC and RFIC for FDD and TDD in addition to the requirements of a FDD/TDD single chipset were also discussed. The status of standardization work with regard to

SMS and Voice under LTE, roaming and billing was also reported.

Self Organizing Networks (SON)

The problem of an increasing demand on broadband access with the lack of profit has been introduced in the session for operational efficiency. Solutions, like exploiting existing networks and optimizing investment in network management and strategy, were proposed. This was the point that started SON in 2008/2009 with the scope of automation. Actix has introduced the SON-Node as a solution that does not require dedicated hardware. Strategies like open vs. closed loops and centralized vs. distributed approaches were also addressed in their presentation. Ericsson, as the first provider of commercial LTE equipment, introduced their LTE and Multi-Standard Radio solution that integrates to existing operations and features automatic eNodeBs and "SMART Simplicity®" technology as well. Some of the functions of Ericsson's solution include coverage optimization, load balancing and outage detection. Qualcomm presented their work on minimizing drive tests through automatic collection of test data and using triggers like time, location or preconfigural events. Alcatel-Lucent proposed extending SON into the core network for end-to-end optimization. They advocated the closed-loop model to reduce the complexity of optimizing network parameters, by sensing the network condition and feeding that back to the PCRF to evaluate the impact on QoS parameters in LTE. Reverb Networks introduced their SON suit for multi-technology networks, which allows automatic neighbor relations (e.g.,

when introducing new eNodeBs) and supporting multi-vendor & multi-technology adjacency optimization. Their plug-and-play BTS solution for 2G/3G/LTE allows policy setting and operator automation in addition to antenna sharing.

UMIC's Message

Kamal Barakat from UMIC research area D presented his approach to formally model QoS provisioning in Network Mobility (NEMO) as a use case. Future Network Mobility has a potential of applications especially in IMS-PAN and other fields like wireless internet connectivity in public transportation, vehicular interconnectivity and remote medical health systems. Such applications that imply mass access to the internet in addition to mobility requirements put NEMO as a preferable solution especially as it offers native integration to Mobile IPv6. However, NEMO needs improvements in some of its QoS aspects especially those relating to multihoming scenarios. This requires the NEMO network to be able to reconfigure itself on-the-fly and be able to adapt its structure and access policies as a response to dynamic events (e.g., parts of the networks spinning-off or new networks joining). For the formal modeling, π -calculus was introduced as the model of choice due to its flexibility and expressiveness in modeling telecommunication protocols and the ability it offers to verify these protocols. In addition, it offers means to define policies (e.g., for QoS) and impose them on network structures.

Kamal Barakat, i11

Paper Presentation at ICC 2010

The paper "Towards Network Centric Development of Embedded Systems" has been presented on the IEEE International Conference on Communications 2010 in Cape Town, South Africa.

The joint work of researchers from two UMIC institutes, namely Elias Weingärtner from the Distributed

Systems Group and Torsten Kempf and Stefan Schürmans from the Institute for Integrated Signal Processing Systems (ISS), combines the benefits of network simulators and virtual platforms.

By substituting a node in a network simulator with a virtual platform simulating an embedded system at a

high level of detail, an environment providing realistic network traffic is created for the simulated embedded system. At the same time, accurate estimates of packet processing times become available for the network simulator.

Stefan Schürmans, SSS

UMIC Exhibits “Network Planning and Resource Allocation” at EuCAP 2010

Modern wireless communication systems need to provide high capacities to serve an increasing demand. Network planning and resource allocation are key components to achieve this goal. The Institute for Theoretical Information Technology develops algorithms for optimal network planning as well as (re-)configuration of modern 4G wireless networks. Typically, a multitude of field strength predictions serves as input data for optimization. Thus, the prediction of radio wave propagation needs to be fast. Furthermore, optimal or smart algorithms for resource allocation in OFDM systems are embedded in a software-defined radio (SDR) test-bed based on GNU radios. Within the exhibition we have demonstrated the importance of ray-

based radio wave propagation in urban scenarios, as well as the multitude of possible configurations that may arise while planning or configuring a network. Currently, we are accelerating the prediction of radio wave propagation by applying concepts of parallel computing. We demonstrated our first efficient implementation of radio wave prediction on the Cell Broadband Engine Architecture, which is built in the Playstation 3. Besides this demonstration, we introduced our excellence cluster to the community as well as strengthened contacts with partners like Prof. Reiner Thomä from TU Ilmenau. Besides the conference and exhibition, we enjoyed the Castellars (typical Catalan human towers) and the FC Barcelona football team

playing in the impressive Camp Nou stadium, the largest in Europe. We would like to thank Prof. Dirk Heberling from the steering committee who helped us acquiring the tickets in the last minute.

Last but not least, we successfully managed to return from Barcelona in time in spite of an unexpected ash cloud, and a strike by the French rail workers.

Michael Reyer, TI



VTC 2010-Spring

The IEEE 71st Vehicular Technology Conference (VTC 2010-Spring) was held on May 16-19, 2010 in Taipei, the capital of Taiwan located in the north of the island.

VTC is the flag ship conference of



the IEEE Vehicular Technology Society with focus on the fields of mobile, wireless, and vehicular communication technology. It provides a forum for scientists, engineers, and leaders from academia and industry from all over the world and is a bi-annual conference taking place in North America in fall and in Asia or Europe in spring. Of the 1203 papers that were submitted to the conference from approx. 40 different countries, only 553 papers have been accepted for inclusion in the technical program. The technical sessions were complemented

with plenaries by William C. Y. Lee (Vodafone/Peking University, China), Gerhard Fettweis (TU Dresden, Germany), Lajos Hanzo (University of Southampton, UK), and Yi-Bing Lin (National Chiao Tung University, Taiwan).

Furthermore, interesting discussions on green radio and cooperative communications took place in form of panel sessions. Prof. Gerd Ascheid presented as panelist the UMIC view on green radio.

Adrian Ispas, ISS

NGMN Industry Conference

The Institute for Theoretical Information Technology (TI) demonstrated recent research achievements on radio resource management at the 3rd NGMN Industry Conference & Exhibition, held in Shanghai, China, June 2-4, 2010. Recognized speakers and panelists from the entire mobile world presented commercial and technological achievements and challenges ahead, and

gave an outlook on upcoming technology developments, device and service innovations. The SDR test-bed for optimal resource allocation in OFDM(A), developed within the UMIC cluster, was presented at the co-located exhibition where leading mobile technology vendors showed next generation network solutions.

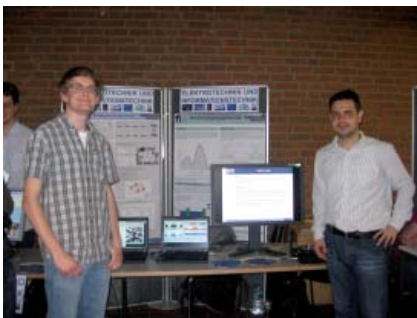
Milan Zivkovic, TI



UMIC at the Dies Academicus 2010

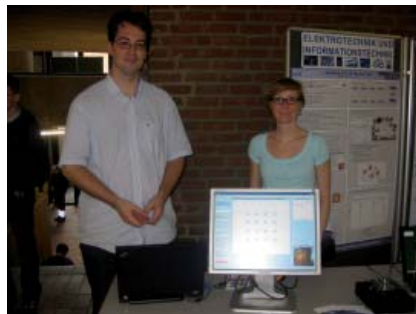
On June 9, the 20th Dies Academicus (University Open Day) took place at RWTH Aachen University. The Dies Academicus offers prospective students a great opportunity to learn more about the RWTH and its bachelor and master programs. Teaching and research was presented with various exhibits and academic advisors were available for personal advice. Furthermore prospective students could get a taste of the university by attending some selected lectures. This year approximately 4000 students visited the Dies Academicus.

The UMIC research cluster was present with four exhibits. All the exhibits have been well attended, not only from pupils interested in studying at RWTH Aachen University but also from current students looking for a bachelor thesis.



The Institute for Theoretical Information Technology (TI) demonstrated recent research achievements on radio resource management with their Software Defined Radio (SDR) testbed for optimal resource allocation in OFDM(A). The proposed demonstrator, implemented in the GNU Radio framework, enables capacity achieving OFDM-based data transmission between two network nodes with optimal rate and power

allocation over subcarriers subject to certain system constraints. Furthermore, a highly reconfigurable framework allows for extending the physical layer functionalities of current wireless standards and offers control and feedback mechanisms for easy reconfiguration of transmission parameters. Hence, the evaluation of different strategies by either simulation or real-time testing is strongly supported.



The Institute of Communication Systems and Data Processing (IND) presented the UMICore Physical Layer Demonstrator, a software tool which allows the demonstration of achieved improvements of mobile communication systems in relation to UMTS-LTE. The main focus is on adaptive coding and modulation as well as iterative signal processing. In addition channel models have been derived from extensive real world measurements in the city of Ilmenau. These models have been integrated in the UMICore Demonstrator, thus making the evaluation of physical layer concepts with more realistic channel models possible.

The Computer Graphics Group as well as the Mobile Multimedia Processing group presented two further exhibits.



The first exhibit is a mobile application called LocalizeMe. The user takes a picture of his surroundings with his smartphone. The picture is then sent to a server that matches the photo to a database of pictures with attached geolocations. The closest match is found and an interactive 3D video of the user's surroundings is sent back to the mobile client. This video is created in real-time and can be thought of as an interactive three-dimensional map. Computer vision methods for locating the user have the advantage that they work even when GPS signals are not available. The second exhibit shows how the 3D map and model of the user's surroundings is actually created. It is a demonstration of the Computer Graphics Group's Virtual Aachen project. The goal of this project is to create an efficient pipeline for creating, managing, and rendering of massive 3D city models. Since such models are very complex, using millions of points and triangles for the geometry, novel ways of creating and rendering such models are needed.

Benedikt Eschbach (IND), Arne Schmitz (i8), Milan Zivkovic (TI)

UMIC Exhibits „Parallel SystemC Simulation“ at DAC 2010

The number of cores in MPSoCs (multi-processor systems-on-chip) is growing steadily. With increasing complexity, the MPSoC performance behavior becomes more difficult to predict and such systems are becoming intricate to program and to debug. Simulators contribute substantially to alleviating this problem. However, with legacy simulation technologies, the user experiences a performance degradation linear to the number of simulated cores.

The chair for Software for Systems on Silicon (SSS) headed by Prof. Rainer Leupers developed a new, universally applicable parallel simulation technique to accelerate simulation of models specified in the industry-proven language SystemC. The main differentiator to existing

approaches is that this technique can give strong guarantees regarding the simulation accuracy and determinism of the simulation result. Such guarantees are essential, e.g., for performance verification purposes and debugging race conditions, which are a particularly severe kind of software defects.

The DAC (Design Automation Conference) exhibition in Anaheim, CA. (June 13-18) was an ideal forum to showcase this new simulation technique and getting in touch with major EDA (electronic design automation) vendors. The demonstration simulator, featuring fast and deterministic MPSoC+NoC (network on chip) parallel simulation of mixed abstraction level models with perfect accuracy at delta-cycle level, was very well received. The scientific background of

the work will be presented later this year at CODES+ISSS (International Conference on Hardware/Software

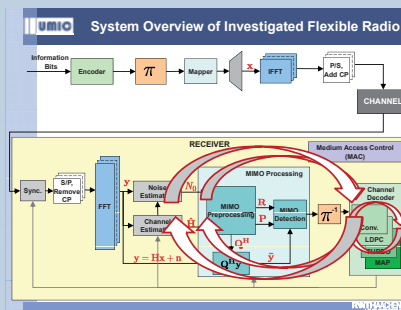


Codesign and System Synthesis). We used this chance successfully to raise interest in the EDA community in the UMIC excellence cluster by highlighting our vision of how to simulate massively parallel MPSoCs in future LTE implementations. Christoph Schumacher, SSS

UMIC in SDR / CR Research: A Report on 2010 ERRT Workshop

The 2010 European Reconfigurable Radio Technologies Workshop (ERRT 2010), organized by the Wireless Innovation Forum (formerly SDR Forum) took place in Mainz from June 23-25, 2010. Several key players in the SDR / CR domain, predominantly from Europe and North America, were present in the workshop. The workshop attracted experts from both academia and industry, serving as a platform for researchers to meet and exchange ideas. While companies showcased their products in the presentations, results from several European projects, including UMIC, were also presented at the workshop.

UMIC had a strong presence in ERRT 2010 and contributed both directly and indirectly. Prof. Gerd Ascheid and Venkatesh Ramakrishnan from ISS were part of the organization committee. Two sessions in the workshop were chaired by researchers from UMIC.



A special UMIC session on “Flexible and Efficient SDRs” was one of the highlights in ERRT 2010. This session focused mainly on the results from the Nucleus project, the flagship project of the RF Subsystem and SoC Design research area. Problems arising due to both flexibility and efficiency requirements in SDR design for mobile devices and their possible solutions were highlighted. The session covered several layers of SDR design. Prof. Stefan Heinen from IAS talked about the challenges posed by SDR / CR design to the RF layer.

Results from investigations on efficient implementations in the PHY layer for SDRs were presented by Venkatesh Ramakrishnan. The presentation of Xi Zhang from INETS focused on a software designed MAC layer for SDRs. Combinedly, this session provided the audience an overview on the issues spanning several layers in SDR design.

Apart from this, Xitao Gong from the ISS presented results on cooperative spectrum sensing in the session dedicated to spectrum sensing. UMIC also participated in the 66th working meeting of the Wireless Innovation Forum and has identified areas for contributing in the future. Due to the success of ERRT 2010, UMIC is determined to contribute also in the next year’s ERRT 2011, to be held in Brussels, Belgium.

Venkatesh Ramakrishnan, ISS



The First IEEE PerCom Workshop on Pervasive Communities and Service Clouds (PerCoSC 2011)

Held in conjunction with 9th Annual IEEE International Conference on Pervasive Computing and Communications 2011 (PerCom 2011), March 21, 2011, Seattle, USA

URL: <http://dbis.rwth-aachen.de/PerCoSC2011/>

email: percosc2011@dbis.rwth-aachen.de

The First IEEE PerCom Workshop on Pervasive Communities and Service Clouds aims to offer researchers, Ph.D. students, and practitioners a forum to present and discuss research advances and challenges related to cloud computing support for pervasive communities. The workshop thus aims to enable the sharing of insights and experiences related to the development and use of cloud computing technologies, often called service clouds, for supporting pervasive communities. Pervasive communities are user communities that are enabled by pervasive computing technologies. Service clouds denote the totality of cloud computing services, applications, platforms, and infrastructure that comply with the service-oriented architecture paradigm.

Pervasive community services deal with data sensed and collected from the users' physical environments via networked mobile devices. Hence, they support data exchange, communication, and collaboration among mobile users. Pervasive communities of users with mobile devices and network connections have been increasing. Thus, the pervasive technologies to support pervasive communities face new requirements, e.g., related to mobility support, context-awareness, spatiotemporal intelligence, connectivity to communities, information sharing, collaboration, pervasive interaction, and privacy and security issues. However, the computational capabilities of mobile devices remain limited, when faced with pervasive communities who share large data volumes. Cloud computing technologies offer computational resources on a pay-per-use basis and are capable of abstracting technical details from the mobile devices. These technologies thus hold the potential for enabling pervasive community services with varying computing requirements in a cost-effective and scalable manner. Indeed, service clouds may envision future pervasive computing and enables innovative pervasive community services and applications.

Topics of interest include but are not restricted to the following topics:

- cloud computing (services, platforms, infrastructure, and standards etc.) for pervasive communities
- cloud computing for pervasive technologies
- user-targeted pervasive, mobile and context-aware services and applications
- location-based, temporal, or spatiotemporal services and applications
- software architectures for cloud computing and pervasive computing
- data modeling and management for cloud computing and pervasive communities
- social software and Web 2.0 in cloud computing and pervasive computing
- augmented reality for pervasive communities
- security and privacy in cloud computing and pervasive communities

Submission

The papers should present original and previously unpublished results that are not simultaneously submitted elsewhere. Authors are invited to submit papers limited to 6 pages formatted in accordance with the IEEE format for conference proceedings. Workshop papers will be included and indexed in the IEEE digital libraries (Xplore), showing their affiliation with IEEE PerCom.

Please submit your paper to the EDAS Conference Management System at <http://edas.info/N9371>. author guidelines. The submission system EDAS will be open soon.

Important Dates

- October 31, 2010 Deadline for workshop paper submission
- January 7, 2011 Notification of acceptance
- January 28, 2011 Deadline for camera ready papers
- March 21, 2011 PerCom 2011

Workshop Organizers

- Ralf Klamma, RWTH Aachen Univ., Germany
- Christian S. Jensen, Univ. Aalborg, Denmark
- Yiwei Cao, RWTH Aachen Univ., Germany
- Dejan Kovachev, RWTH Aachen Univ., Germany

Prof. Anupam Chattopadhyay / MPSoC Architectures

Anupam Chattopadhyay is an assistant professor for the research field "Multi-Processor System-on-Chip Architectures" since February 2010. His research interests are designing and automating the design of application-specific, flexible processor architectures. Anupam received his Bachelor's in Electronics and Telecommunication Engineering from Jadavpur University, India in 2000. He obtained his Master's in Embedded System Design from the

University of Lugano, Switzerland in 2002 and the PhD from RWTH Aachen University in 2008 respectively. His PhD thesis was on the topic of "Language-driven modeling, exploration and implementation of partially reconfigurable processors", for which he received the Borchers medal from RWTH Aachen University. From 2008 to 2009, he was with CoWare India R&D as a member of the consulting staff.

Anupam's research work is well-re-

ceived in both industry and academia. His work resulted in the publication of several IEEE conference and journal papers as well as a book and 2 book chapters. The result of his work at ISS as a research assistant is now part of a major industrial product.



Zoltan Endre Rakosi / MPSoC Architectures

Zoltan Endre Rakosi was born in Brasov, Romania on January 5, 1982. He received the Dipl.-Ing. degree in 2006 from University of Brasov, Romania and the Master of Informatics degree from Kyoto University, Japan in 2010.

During university studies he was awarded with the "Socrates/Erasmus" scholarship, by use of which he spent a few months at the Institute for Integrated Signal Processing Systems (ISS) at RWTH Aachen

University, where he got introduced to reconfigurable processors and high level synthesis.

In 2007 he was awarded a MEXT scholarship (Japan) and the opportunity to further research in the area of reconfigurable computing with focus on reliability issues at the Processor Architecture and Systems Synthesis Laboratory at the University of Kyoto.

After receiving his MSc. degree, he returned to Germany and joined the

research group for Multiprocessor System-on-Chip Architectures at UMIC, under the guidance of Prof. Anupam Chattopadhyay. His current research and study interests lie in the area of new MPSoC Architectures and high-level synthesis tools.



Jovana Jović / SSS

Jovana Jović received her Diploma degree in electrical engineering from the University of Belgrade, Serbia in 2007, and her Master's degree in Embedded Systems Design from the University of Lugano, Switzerland in 2009. In autumn 2009 she joined the Chair for Software for Systems on Silicon (SSS) of RWTH as a research assistant.

Her present research topic deals with new simulation techniques for virtual platforms that can cope with increasing complexity of multi-processor systems on chip (MPSoCs). As the interconnect fabric gains more significance for MPSoCs, another focus of this research lies on fast but accurate simulation of the communication subsystem. The pri-

mary use case for these techniques is the virtual platform used within the Nucleus project of UMIC.



Dr. Andreas Lorenz / i5

Dr. rer. nat. Andreas Lorenz received a Diploma degree in Computer Science (2001) from the University of Kaiserslautern. From 2002-2009 he worked for the Fraunhofer Institute for Applied Information Technology in Sankt Augustin as research associate and project manager in several national and international projects on mobile and nomadic information systems, user modelling and user-adaptive systems, electronic health monitoring applications, and pervasive computing. He was coordinator

of the user interface development and evaluation for mobile health monitoring for the elderly in the Fraunhofer-funded senSAVE-project, coordinator of the integration activities in the EU-funded NoE for interactive media with personal networked devices, and coordinator of the FIT-internal project PowerInteraction for device independent interaction with services surrounding the user. He received a doctoral degree in Computer Science (2009) from RWTH Aachen University for his

research on the separated user interface in ambient computing environments and joined the UMIC research cluster as Post-Doc in February 2010. He works on the information exchange of wearable and mobile health-net applications in the research area Mobile Applications and Services at Informatik 5.



Steven Corroy / TI

Steven Corroy received the Diploma degree in computer science from the University of Karlsruhe (now Karlsruhe Institute of Technology), Germany, as well as the engineer degree (M.S.) in telecommunication from the ENSIMAG, Grenoble, France in 2006. From 2006 to 2009 he was research scientist at Philips Research, partly in Aachen, Ger-

many, and partly in Eindhoven, The Netherlands. There, he mainly worked in the fields of wireless sensor networks, and energy efficiency for wireless technologies. Since 2009, he is with the Institute for Theoretical Information Technology of RWTH Aachen University, Aachen. His current research interests include compressed sensing

theory and its application to mobile communication systems. Inside UMIC he is participating to the project "Energy Efficient Mobile Radio Network Planning".



Dominik Franke / i11

Dominik Franke received the Diploma degree in computer science from the RWTH Aachen University, Germany in 2009. He joined the Embedded Software Laboratory as a research assistant in autumn 2009. His present research topic deals with software quality of mobile

applications. Participating in "The UMIC Software Quality Initiative" he identifies the most relevant areas and most promising methodologies to improve software quality of mobile systems and integrates these approaches into a software quality framework. Another focus of his

research lies on testing real-time systems and evaluating the real-time capability of off-the-shelf computers.



NII Internship

The National Institute of Informatics (NII) in Tokyo is Japan's only general academic research institute. It seeks to advance integrated research and development activities in information related fields, including networking, software, and content. These activities range from theoretical and methodological work to applications. Besides offering Master or PhD studies, NII also provides long term or short term internship opportunities for students from all over the world.

This early spring, Haidi Yue, a PhD student of Prof. Joost-Pieter Katoen (MOVES Group) from UMIC research area D, went to NII for a three-months internship. The research focus of Haidi Yue is on modelling and analysing energy consumption of wireless network protocols by applying probabilistic model checking and formal modelling. During the internship, she stayed at the labora-

tory of Prof. Yusheng Ji, who's team works on wireless networks and their analysis by simulation. As we know, model checking and simulation are two different research methods which can complement each other pretty well. Haidi Yue together with Kien Nguyen, a Ph.D student of Prof. Ji, studied a medium access control protocol called RMAC, by using both simulation tools as well as the model checking technique. The first result provided by the PRISM model checker shows that RMAC is somehow sensible when transmission failures are considered. Which means, if there is some unsuccessful transmissions, the latency reduces significantly. A probably reason for it is that the protocol uses cross layer information: uplink node transmits messages only to a specific downlink node predetermined from upper layer. Hence, if some problems oc-

curs on that chosen router, it takes longer time to bring informations from source to sink in comparison to flooding protocols. The whole internship is very fruitful and the city of Tokyo is definitely a interesting place to visit. It has both the exotic Asian side but also some very western parts, which make the city multicultural and attractive. Japanese are extreme friendly, especially if you speak English, they respect you a lot!

Haidi Yue, i2



Community News

Prof. **Petri Mähönen** has been elected as a member of the editorial

board and an associate editor for the **IEEE Transaction on Mobile**

Computing for the next three year period.



The Eighth International Symposium on Wireless Communication Systems

Aachen, Germany, November 6-9, 2011 - www.ti.rwth-aachen.de/iswcs2011

Wireless Communications is at the centre of a new and passionate era characterised by smart and flexible transceiver concepts, the convergence of systems and technologies, a transition towards all-IP networks, and the development of technologies with a user-centric focus. In this context, the International Symposium on Wireless Communication Systems (ISWCS) is positioning itself as a recognised and dynamic forum for researchers and technologists to present and discuss original ideas and contributions in all fields related to mobile wireless communication systems.

The aim of this symposium is to provide a forum for researchers and technologists to present new ideas and contributions in the form of tutorials, panel discussions, keynote speeches, technical papers, posters and testbed implementations. ISWCS'11 seeks to address and capture highly-innovative and state-of-the-art research from academia, the wireless industry and standardization bodies. The scope of the conference includes a wide range of technical challenges encompassing wireless communications, quality of service support, wireless networking, signal processing, cross-layer air interface design for improved performance, wireless broadband access, and cooperative communications.



General Chair:

Rudolf Mathar, Faculty of Electrical Engineering and Information Technology, RWTH Aachen University



Technical Program Chair:

Gerhard Kramer, Electrical Engineering Department, University of Southern California

Workshop on “Storytelling and Educational Games in the Learning Flow”

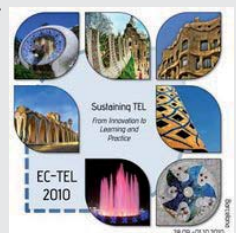
A workshop on “Storytelling and Educational Games in the Learning Flow” will be held in conjunction with the European Conference on Technology-Enhanced Learning (EC-TEL 2010), jointly organized by the chair of Information Systems & Databases (Informatik 5) at the RWTH Aachen University, *imaginary* srl, Innovation Network Politecnico di Milano, Italy, Universidad Complutense de Madrid, Spain, and Universitat Oberta de Catalunya,

Barcelona, Spain.

This workshop brings together different research teams and approaches around the topic of storytelling and serious games. It starts with a deep introduction to cover a range of research issues in storytelling and educational games including story and game design paradigms, Web 2.0 based storytelling and gaming scenarios, advanced storytelling, and educational gaming technologies. It will continue with user cen-

tered design of technology enhanced learning tools and a hands-on participatory activity to produce a game prototype starting from a given topic.

Please find more information at http://pretoria.uoc.es/wpmu/ectel_ws_games/.





FOR MORE INFORMATION, VISIT WWW.IEEE-DYSPAN.ORG/2011

CALL FOR PAPERS

Dynamic spectrum access (DSA) allows devices/networks to utilize the radio spectrum in a dynamic manner, rather than on a fixed basis, which has the potential to greatly improve spectrum utilization. There has been tremendous progress in the research and development of DSA in recent years. IEEE DySPAN is the premier conference to discuss, publish and present recent results in DSA and Cognitive Radio Domain. IEEE DySPAN 2011 builds on the success of IEEE DySPAN 2005 (Baltimore, USA), IEEE DySPAN 2007 (Dublin, Ireland), IEEE DySPAN 2008 (Chicago, USA), and IEEE DySPAN 2010 (Singapore).

IEEE DySPAN 2011, like its predecessors, is a unique symposium that gathers technology, policy and regulatory communities together. We will have special program tracks for technology and policy papers. The fifth symposium will also include system demonstrations, panels, invited talks, and tutorials some of those tailored for special target audiences such as regulators and industry.

IEEE DySPAN 2011 welcomes contributions dealing with policy and regulation issues on dynamic spectrum access, theoretical studies, algorithm and protocol design for cognitive radios and networks, as well as application-oriented contributions dealing with architectures, platforms, signaling and multiple access schemes. Selected conference papers will be fast-tracked to journal publications.

In 2011, we are particularly looking for papers reporting on systems aspects and prototypes, summaries on the regulatory advancements, recent spectrum measurements and analysis of white space opportunities, and business cases for DSA. The contributions outlining advances in self-optimization, learning, and context sensitivity of cognitive radios and DSA concept that consider whole networks and describe novel optimization are encouraged. We seek original and unpublished work not currently under review by any other journal/magazine/conference. We will be developing specific technology and policy programs with topics including, but not limited to, the following:

TECHNOLOGY PROGRAM

- Spectrum measurement and models
- Architecture and platform for dynamic spectrum access networks
- Efficient and broadband spectrum sensing
- Spectrum sensing mechanisms and protocol support
- Interference metrics and measurements
- Radio resource management and dynamic spectrum access networks
- Applications of DSA
- New spectrum sharing models
- Multiple access schemes for cognitive radio networks
- Cross-layer optimization for cognitive radio networks
- Information-theoretic aspects of cognitive radio networks
- QoS provisioning and MAC protocol
- Trust and security issues
- Experimental prototypes and results

POLICY PROGRAM

- Business model / Pricing for dynamic spectrum access
- Market trends for secondary spectrum usage
- Regulations for dynamic spectrum access
- Software regulation / standardization and equipment certification
- Industrial and government role in dynamic spectrum access
- Dynamic spectrum auction and economics
- Spectrum etiquettes for unlicensed bands
- Defining / Enforcing rights / responsibilities of spectrum licensees and easements

PAPER SUBMISSIONS: The conference language is English. Papers should be concisely written. Maximum paper length for review is 12-pages in IEEE conference proceedings format (two-column and 10-point font).

IMPORTANT DATES

Paper Submissions Due	15 November 2010 (firm)
Tutorial, Panel, Demo Proposals Due	15 November 2010
Abstract Registration	8 November 2010
Acceptance Notification	8 February 2011

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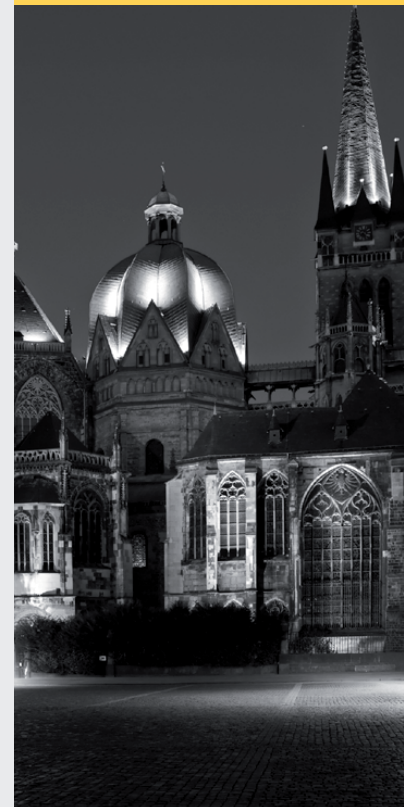
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