MMB & DFT 2010

15th International GI/ITG Conference on
"Measurement, Modelling and Evaluation of Computing Systems"
and "Dependability and Fault Tolerance"

March 15-17, 2010 @ Essen (Germany)

Conference Program

Sponsors and cooperating partners

MATERNA
Information & Communications

ICB
Institute for Computer Science
and Business Information Systems

Day 1: Monday, March 15, 2010

from 11.30 **Registration at Lecture Hall S07 S00 D07**
(Building S07, located in the north-east area of Campus Essen)

13.00 - 13.15 Opening Session

Bruno Müller-Clostermann (conference chair) & Markus Siegle (head of MMB)

13.15 - 14.15 Invited Talk

Chair: *Klaus Echtle (Univ. Duisburg-Essen)*

Phil Koopman (Carnegie Mellon University, Pittsburgh, PA, USA):
Mitigating the Effects of Internet Timing Faults Across Embedded Network Gateways

14.15 - 14.45 Coffee Break

14.45 - 16.15 Session: Dependability and Fault Tolerance

Chair: *Max Walter (TU Munich)*

Klaus Echtle and Thorsten Kimmeskamp:
Verification of a Control System Built Using Remote Redundancy by Means of Timed Automata and State Space Exploration

Sven Söhnlein, Francesca Saglietti, Frank Bitzer, Matthias Meitner and Siegfried Baryschew:
Software Reliability Assessment Based on the Evaluation of Operational Experience

Klaus Echtle and Mohamed Soubhi:
Clock Synchronization Issues in Multi-Cluster Time-Triggered Networks

16.15 - 16.45 Coffee Break

16.45 – 18.15 Industry Session

Chair: *Wolfram Lautenschläger (Alcatel-Lucent)*

Jeroen Voeten (Embedded Systems Institute, Eindhoven, Netherlands):
Performance prediction and design-space exploration for wafer scanners

Thomas Herpel (Automotive Safety Technologies GmbH):
Development and Performance Evaluation of Intelligent Vehicle Safety Systems

18.15 - 20.00 Welcome Reception at Lecture Hall S07 S00 D07

19:30 - 20:30 Meeting of the MMB Steering Committee

Day 2: Tuesday, March 16, 2010

09.00 - 10.30 Session: Networks 1

Chair: *Joachim Charzinski* (Nokia Siemens Networks)

Christian Hübsch, Christoph Mayer and Oliver Waldhorst:
User-perceived Performance of the NICE Application Layer Multicast Protocol in Large and Highly Dynamic Groups

David Hock, Michael Menth, Matthias Hartmann and Christian Schwartz:
Effectiveness of Link Cost Optimization for IP Rerouting and IP Fast Reroute

Andrey Kolesnikov and Martin Kulas:
Load Modeling and Generation for IP-based Networks: A Unified Approach and Tool Support

10.30 - 11.00 Coffee Break

11.00 - 12.00 Session: Tools (Short Presentations)

Chair: *Andreas Pillekeit (Univ. Duisburg-Essen)*

David Hock, Michael Menth, Matthias Hartmann, Christian Schwartz and David Stezenbach:
ResiLyzer: A Tool for Resilience Analysis in Packet-Switched Communication Networks

Michael Striewe, Moritz Balz and Michael Goedicke:
SyLaGen – An Extendable Tool Environment for Generating Load

Falko Bause, Philipp Gerloff and Jan Kriege:
ProFiDo – A Toolkit for Fitting Input Models

Sebastian Vastag:
ProC/B for Networks: Integrated INET Models

Sascha Geeren, Axel Langhoff, Bruno Mueller-Clostermann, Andreas Pillekeit and Falk Hoppe:
DELTA: A Web-based Simulation Training Environment Using JavaDEMOS

12.00 - 13.00 Lunch Break

Day 2: Tuesday, March 16, 2010 (continued)

13.00 - 14.00 Invited Talk

Chair: *Erwin Rathgeb (Univ. Duisburg-Essen)*

Paul J. Kühn (University of Stuttgart):
Green IT - The Power Saving Challenge and ICT Solutions

14.00 - 14.30 Coffee Break and Tool Demonstrations

14.30 - 15.30 Session: New Topics

Chair: *Jens Schmitt (Univ. Kaiserslautern)*

Haidi Yue, Joost-Pieter Katoen and Henrik Bohnenkamp:
Analyzing Energy Consumption in a Gossiping MAC Protocol

Axel Böttcher, Till Fischer, Aaron C. Coday and Helena Liebelt:
Defining and Measuring Performance Characteristics of Current Video Games

15.30 - 15.45 Coffee Break and Tool Demonstrations

15.45 - 16.45 Session: Networks 2

Chair: *Michael Menth (Univ. Würzburg)*

Joachim Charzinski:
Traffic Properties, Client Side Cachability and CDN Usage of Popular Web Sites

Vittoria de Nitto Personè, Andreas Pillekeit and Matteo Iacari:
Investigation of the Multimedia Adaptive Threshold Strategy for Mobile Integrated Services Networks

18:00 - 22:00 Dinner and Performance at GOP Varieté-Theater

Rottstraße 30, 45127 Essen (within 15 minutes walking distance from lecture hall)
http://www.variete.de/Essen/ and http://de.wikipedia.org/wiki/GOP_Varieté_Essen

Day 3: Wednesday, March 17, 2010

09.00 - 10.00 Session: Networks 3

Chair: *Ralf Lehnert (TU Dresden)*

Anne Remke, Boudewijn Haverkort and Geert Heijenk:
Setting the Parameters Right for Two-Hop IEEE 802.11e Ad-Hoc Networks
Simon Frohn, Sascha Gübner and Christoph Lindemann:
CrossTrace: Cross-Layer Measurement for IEEE 802.11 Wireless Testbeds

10:00 - 10.30 Coffee Break

10.30 - 12.00 Session: Queueing Theory

Chair: *Gerhard Haßlinger (T-Systems)*

Lothar Breuer:
The Total Overflow During a Busy Cycle in a Markov-additive Finite Buffer System
Hind Castel and Nihal Pekergin:
Accuracy of Strong and Weak Comparisons for Networks of Queues
Andreas Kiefer, Nicos Gollan and Jens Schmitt:
Searching for Tight Performance Bounds in Feed-forward Networks

12.00 - 13.00 Lunch Break

13.00 - 15.00 Session: Markov Techniques and Phase Type Distributions

Chair: *Peter Buchholz (TU Dortmund)*

Lothar Breuer and Alfred Kume:
An EM Algorithm for Markovian Arrival Processes Observed at Discrete Times
Jan Kriege and Peter Buchholz:
An Empirical Comparison of MAP Fitting Algorithms
Philipp Reinecke, Miklos Telek and Katinka Wolter:
Reducing the Cost of Generating APH-distributed Random Numbers
Ralf Wimmer and Bernd Becker:
Correctness Issues of Symbolic Bisimulation Computation for Markov Chains

15:00-15.15 Coffee Break

15.15 - 16.00 MMB 2010 Diploma Awards and PhD Award

Chair: *Markus Siegle (Univ. of the Armed Forces)*

Jennifer Mylosz: Nicht-ergodische Jackson-Netze mit unzuverlässigen Knoten
Oliver Hohlfeld: Statistical Error Model to Impair an H.264 Decoder
Tobias Hoßfeld: Performance Evaluation of Future Internet Applications and Emerging User Behavior

16.00 - 16.15 Best Paper Award and Closing Session

Chair: *Bruno Müller-Clostermann (Univ. of Duisburg-Essen)*

16.15 End of the Conference

Invited Talk 1

Mitigating the Effects of Internet Timing Faults Across Embedded Network Gateways

Philip Koopman and Justin Ray

Carnegie Mellon University, ECE Department
Pittsburgh, PA, USA

Extended Abstract
Traditional embedded systems such as automobiles and industrial controls are increasingly being connected to enterprise computing facilities and the Internet. The usual approach to making such a connection is to install a *gateway* node which translates from Internet protocols to embedded field bus network protocols. Such connections raise obvious security concerns, because the gateway must guard against attacks on the embedded devices it serves. For our purposes, we'll assume that typical enterprise and Internet vulnerabilities, such as buffer overflows, have already been taken care of. (Securing devices against traditional attacks is no small matter, but we are interested in uniquely embedded issues.)

Beyond normal gateway functions, an Internet to embedded gateway must also prevent timing faults and timing attacks from crossing over the gateway to affect the operation of attached embedded systems. An example of timing fault propagation would be severe clumping of messages on the Internet side so that many messages arrive at the gateway all at once, disrupting embedded system operation. While a queue can reduce the loss of incoming data and mitigate network overload, it cannot necessarily protect against timing-related faults on the embedded side of the gateway.

We report simulation results for several mechanisms to mitigate the effects of Internet message timing variations (whether due to faults or malicious attacks) on the performance of networked embedded systems using real-time data. Problems are caused primarily by excessive data delivery delay rather than messages being dropped from arriving clumps. This means that putting a queue in the gateway to manage arriving data clumps is typically worse than using no mitigation mechanism at all. Using a predictive filter seems intuitively better than using a queue, but finding a good generalized predictive filter is also quite difficult.

We believe that managing data streams from the Internet to embedded systems will require careful attention to the nature and time constants of data flowing through the gateway. Moreover, it seems likely that each distinct data stream will need a different set of data management mechanisms and policies at the gateway. In this case, one size *does not* fit all, making the design of a robust gateway a difficult problem that will require careful modeling of data value behavior for every gateway built.

Dr. Philip Koopman *is an Associate Professor at the Carnegie Mellon University, Electrical and Computer Engineering Department. His research interests include Embedded Systems Computing, Embedded System Safety, Security and Survivability.*

Invited Talk 2

Green IT - The Power Saving Challenge and ICT Solutions

Paul J. Kühn

Institute of Communication Networks and Computer Engineering (IKR)
University of Stuttgart, Germany

Extended Abstract
Energy consumption, the finite horizon of conventional fossile energy resources and maintaining sustainable environmental conditions form the biggest challenges in the near future. Renewable energy sources like wind, water, solar energy or biomass are limited and unsteady substitutes and require a radical rethinking of the energy problem. There are two main solution approaches: power saving and intelligent management of the use of energy. Both require advanced technologies and a close adaption between energy production and energy usage. Information Technologies (IT) themselves account for a major energy consumer by contribution of about 10 % to the global C02 production and will be a target for power saving but Information and Communication Technology (ICT) are the key for the intelligent power management.

The first part of the contribution addresses in a systematic way power consumption in ICT on different levels from hardware and device technologies up to application processes, as well as possible approaches and solutions such as new technologies (such as nanotubes), control of power consumption on the chip level, system level and application level by methods of dynamic power supply, adaptive sleep modes, disabling of temporarily unnecessary functionalities, and network virtualization.

In the second part, the purpose and the architectures of energy information networks will be discussed, a comparatively new approach to monitor and to control the consumption of energy depending on the currently available energy sources (such as wind, solar energy or batteries of automotive vehicles), costs for the energy itself and for its transport to the customer. Such energy information networks can be based on existing communication infrastructures (access networks, sensor networks, core networks) which have to be enhanced by other technologies (such as power line communications) and upgraded with respect to security, privacy protection and reliability.

In the final part, the contribution addresses the specific aspect of performance modelling. From this point of view, the issue can be considered as a resource sharing problem. Examples will be given how queuing theory can be used to optimize the use of resources (such as processors, communication links, storage areas, etc.) under stochastic conditions and dynamic scheduling schemes.

Prof. em. Dr.-Ing. Dr. h.c. mult. ***Paul J. Kühn*** *is holding the chair of Communication Networks and Computer Engineering at the University of Stuttgart, Germany. His areas of interest are communication network architectures and protocols, computer engineering, performance modelling and evaluation, wherein he authored more than 100 technical publications.*

Industry Session - Talk 1

Performance prediction and design-space exploration for wafer scanners

Jeroen Voeten

Embedded Systems Institute
Eindhoven, Netherlands

Abstract
Embedded control is a key product technology differentiator for many of the Dutch high-tech industries. The strong increase in complexity of embedded control systems combined with the occurrence of late changes in control requirements, results in many timing performance problems showing up only during the integration phase. This results in extremely costly design iterations, severely threatening the time-to-market and time-to-quality constraints.

In the Wings project this integration problem is attacked systematically through the construction of executable models. The key approach is to separate the logic of the embedded control application from the execution platform on which it is deployed. The resulting models yield a high-level overview and provide system-wide insight in timing bottlenecks. They further allow rapid exploration of alternatives for optimization of timing performance (by adapting the application, the execution platform or the mapping).

The Wings project has demonstrated the effectiveness of the performance prediction and optimization method by applying it to a complex performance-critical subsystem of a wafer scanner. The application of the method has resulted in more than a dozen improvement proposals yielding a huge overall timing performance gain and resulted in a development roadmap of the execution platform.

Curriculum Vitae
Jeroen Voeten received his master's degree in Mathematics and Computing Science and his Ph.D. in Electrical Engineering from the Eindhoven University of Technology, the Netherlands. He is a senior research fellow at the Embedded Systems Institute in Eindhoven and an associate professor in the Electronic Systems group at the faculty of Electrical Engineering. His research interests include system-level design methodology and performance modeling for embedded systems.

Embedded Systems Institute
The Embedded Systems Institute (ESI) is a Dutch public-private partnership that was founded in 2002 by the universities of Delft, Eindhoven and Twente, and by ASML, Philips, Océ and TNO. The mission of the Embedded Systems Institute (ESI) is to advance industrial innovation and academic excellence in embedded systems engineering for high-tech systems.

Industry Session - Talk 2

Development and Performance Evaluation of Intelligent Vehicle Safety Systems

Thomas Herpel

Automotive Safety Technologies GmbH

Abstract

Modern cars comprise various functions from active and passive safety, relying on vehicle-internal information or on data from environment sensor systems. The major goal is to enhance the car's capabilities in occupant protection and to mitigate crash severities by taking actions prior to a collision.

Development of such systems requires considerable efforts in design, modeling and performance evaluation of both hard- and software architectures, in order to avoid malfunctions in serial operation and to achieve a high level of reliability and efficiency. This talk provides an overview on current development issues from vehicle safety and presents methodic approaches to model and implement intelligent safety systems and to evaluate the performance at various levels of system development. The focus is on state-based modeling techniques, stochastic simulation and testing strategies.

Curriculum Vitae

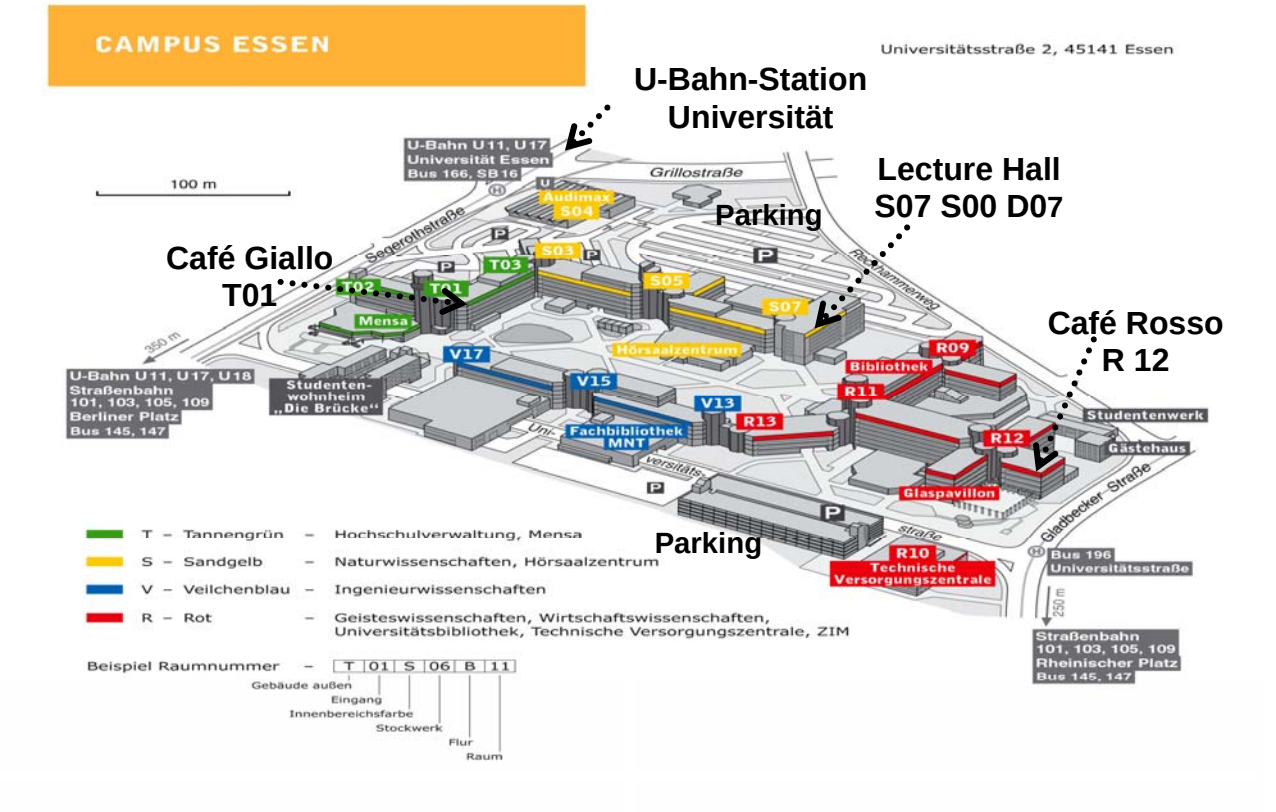
Thomas Herpel studied Computational Engineering at the University of Erlangen-Nürnberg, where he received the B.Sc. Degree in 2004 and the M.Sc. Degree in 2006. From 2006 to 2009, he was working as a Research Assistant at the Chair Computer Science 7 – Computer Networks and Communication Systems (Prof. Reinhard German) at the University of Erlangen-Nürnberg. In cooperation with the Department of Safety Electronics at the Audi AG, Ingolstadt he investigated time-critical data transmission for networked safety functions, focusing on performance evaluation with Network Calculus and Discrete Event Simulation. In November 2009, he received his Ph.D.-Degree. Currently, he works at the Automotive Safety Technologies in the fields of function development and functional safety.

Automotive Safety Technologies

The Automotive Safety Technologies was founded in 2009 as a joint-venture of the Audi Electronics Venture GmbH, Ingolstadt, Germany and Andata Entwicklungstechnologie GmbH, Hallein, Austria. The company focuses on development, simulation and testing of concepts and functions from the application area of intelligent vehicle safety systems and occupant protection.

Locations and Addresses

Lecture Hall: S07 S00 D07 (North-east area of University Campus Essen)
Cafeterias: Buildings T01 and R12



Social Event: GOP Varieté Theater
Rottstraße 30, 45127 Essen (within 15 minutes´ walking distance from lecture hall)