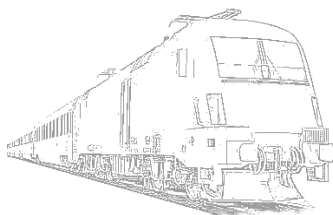


MOGENTES

Model-Based Generation of Test-Cases for Embedded Systems

Dissemination Report (Report 3, M39)

WP 8, D 8.2c



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Version	Date	Reason for Change	Pages Affected
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1.0r	2011-05-06	Released (M. Gruber)	Minor corr.
1.1r	2011-05-07	Released with minor additions (Prolan, TUG) (M. Gruber)	Minor corr.

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1 Introduction

1.1 Purpose and Scope

In collaborative research projects with partners from research and industry, dissemination of results plays a major role. Dissemination will ensure the optimal utilization of the project results and accelerate the adoption of MOGENTES results in the growing European markets of embedded systems products.

The dissemination reports describe the activities performed as well as the plans of all partners to distribute MOGENTES results and intents among targeted groups as well as to a wider public. The reports D 8.2 will collect this information on an annual basis (D 8.4 a – c).

In detail, WP8 is dedicated to spread MOGENTES' research results in the scientific community, to promote usage of formal methods and model-based approaches in validation of dependable embedded systems, to aid the early creation and adoption of products or industrial applications based on the project's results, to disseminate knowledge to technical/scientific audience and – as appropriate – to the general press and public, as well as to foster consideration of project results in respective standardization activities. This includes publications, presentations at renowned conferences, organisation of workshops and seminars serving to present MOGENTES objectives and results to a wider audience to foster awareness and exploitation. Existing networks of partners and contacts to user groups and organisations will be involved (such as EWICS TC7, ERCIM WG, DECOS Interest Group of the FP6 DECOS IP, industrial and academic groups and ETPs) and addressed actively.

A major step was achieved before M24 by a specific public workshop planned between M18 and M24 addressing stakeholder groups at FMCO 2009, other steps followed as a highlights in 2010: a MOGENTES Workshop at SAFECOMP 2010 in Vienna (AIT), a booth at CPS week in Stockholm, a demonstrator at a booth at ICT 2010 in Brussels (Re:Lab with AIT), and organization of FMCO 2010 in Graz (TUG) The ARTEMIS platform was addressed by disseminating MOGENTES information at ARTEMIS (Advanced Research and Technology for Embedded Intelligence and Systems) events and in project proposal groups, as well as was EPoSS (European Technology Platform on Smart Systems Integration). On industrial fairs associated to conferences MOGENTES was presented in 2010 too, e.g. Embedded World Nuremberg (with Artemis Spring event), at ETSI workshops addressing the testing groups, ITF in Leipzig, EPoSS Annual Forum, and on several national events and conferences.

1.2 Overview

In WP8, Task 8.1 and Task 8.3 are describing dissemination and standardization goals respectively:

Task 8.1: Dissemination. In this task, all activities with respect to dissemination are carried out. A website for the project will be created soon after project inception and will be updated at least four times per year. Information on the aims, objectives and current state of the work will be available. All project reports will also be accessible via the website, however those confidential to the consortium members and the EC will be access protected and a public annex will be provided for each to summarize the contents which can be disseminated even from non-public reports so that the public is sufficiently addressed. The website will also provide the ability to provide direct links to other related sites and EU programs and interaction with the interested public. For that purpose, a repository linking to and outlining the most prominent, relevant on-going activities will be setup and administered there.

Established user groups (such as EWICS TC7, ERCIM WG, DECOS Interest Group of the FP6 DECOS IP, industrial and academic groups and ETPs like ARTEMIS and EPoSS) will be addressed actively and invited to contribute.

MOGENTES was promoted at conferences, workshop, seminars (including some course material), and exhibitions, targeting developers of dependable and embedded systems of different domains as well as the communities for formal methods and validation. This will provide both dissemination and also help to generate valuable feedback on the work. Existing networks of partners will be involved to achieve synergies.

Publicity materials will be produced for use at exhibitions (two industrial fairs are targeted after month 18), and press releases for the public, in particular industry. Academic publications will be encouraged from all partners with particular emphasis on peer-reviewed conferences and journals. High-level conferences and workshops covering modelling and testing will be targeted, including the ETAPS (European Joint Conference on Theory and Application of Software), FM (Formal Methods), the SAFECOMP (Computer Safety, Reliability and Security) and SEFM (Software Engineering and Formal Methods) series. Journals include SOSYM (Software and Systems Modelling) and FACS (Formal Aspects of Computing), and Springer Series.

Organization of several conferences and workshops by MOGENTES partners provided ample opportunities to present MOGENTES in presentations, publications, on posters and exhibitions, e.g. FMCO 2010 in Graz, SAFECOMP in Vienna, ME10 (Microelectronics Conference) in Vienna.

Further on, the ARTEMIS platform was addressed as well by disseminating MOGENTES information (poster, flyers) at ARTEMIS events (ARTEMIS/ITEA Co-Summit, Brokerage Events) and in project proposal groups, as well as in EPoSS.

Task 8.3: Standardization. Functional safety standards like the IEC 61508-group recommend the usage of formal methods for validation, depending on the required SIL (safety integrity level). An important outcome of this project are concrete statements about the usability of methods investigated and applied in MOGENTES with respect to validation according to these standards. *A success was the inclusion of MBT (model-based testing) and TCG (test case generation) in the current IEC 61508 IS (Ed. 2.0,2010 finalized April 2010, now an International Standard).* A similar approach was started from the Austrian Standardization Institute ÖNORM K038 (road vehicles) by providing appropriate comments and proposed additions for the ISO/DIS 26262 just in time before the deadlines. The last comments were provided to Part 10.2 in March 2011. The partners were encouraged to address their national committees for support.

ETH has (as outcome of MOGENTES work) prepared two proposals for additional standard theories submitted to the SMT-Lib: a) for the theory for sets, lists and maps, and b) for floating-point arithmetic.

Additionally, most activities of the involved industrial partners are driven by domain-related standards like ISO 11783 (ISOBUS), and in ISO TC 23 19 WG6 "Safety of control systems", in particular in ISO 25119, CEN 50126, CEN 50128 and CEN 50129, the upcoming ISO 26262, or the AUTOSAR standards. A potential application of MOGENTES results could be support for conformance testing of implementations of AUTOSAR middleware services like COM or RTE.

Presentation of intermediate results to (pre-)standardization groups and working groups (e.g. EWICS TC7, ERCIM, Artemis Standards WG, EPoSS domain WGs) is a further activity to raise awareness of MOGENTES outcomes in the standardization community, as to gain feedback from these communities with respect to standards as well as to technology and market aspects.

The details of the standardization activities of the reporting period are already described in the bi-annual Exploitation Reports D 8.4e and D 8.4f (final exploitation report).

2 MOGENTES Dissemination

The MOGENTES Dissemination Reports are structuring in the following manner (subchapters):

- Training, education, internal meetings/workshops/demonstrations
- Publications
- Conferences, workshops, presentations
- Exhibitions, fairs
- Folders, articles, press conference, other media
- Lectures, Lab exercises using/addressing MOGENTES objectives/results
- Annexes: Workshop programmes, announcements, CfP, copy of flyers, text of press releases etc.

Dissemination started with the creation of the web site (public part and part for internal use and communication only) by AIT (month 3), by creation of the fact sheet and the MOGENTES flyer which was already distributed and communicated at several national and international meetings, seminars and conferences, just to mention a major event, at the Korea-EU ICT Co-operation Forum in Seoul, Korea, June 16-17, 2008, where AIT was invited to present a set of embedded systems projects, one of them being MOGENTES. A key event during the reporting period was the public workshop at Wider dissemination activities continued since then, with a considerable number of presentations and papers at conferences and workshops, and display and distribution of MOGENTES flyers and information at exhibitions and conferences (**for 2008-9 activities, see D 8.2b, for 2010-11 activities see Table 2-2**).

2.1 Training, education, internal meetings, workshops, demonstrations

2.1.1 Educational and Training activities and plans include:

BME:

- Regional activities: BME is founder member of the Embedded and Ambient Systems Working Party (BeAm-IM) of the John von Neumann Computer Society in Hungary that organizes regular presentations and lectures for national industrial and academic partners as well as international conferences (e.g. RCEAS, Regional Conference on Embedded and Ambient Systems). BME as a leading participant in BeAm-IM can disseminate the project results both in presentations and at the RCEAS conferences.

Educational activities: BME as the largest technology oriented university in Hungary and particularly its Dept. of Measurement and Information Systems is responsible for the curriculum of engineering specializations related to embedded systems (at the Faculty of Electrical Engineering and Informatics). Accordingly, scientific results and demonstrators of MOGENTES can be presented as case studies, demonstrating model based design and the application of formal methods in test generation. **AIT:**

- AIT has been engaged to give a 2 hours weekly lecture (blocked in January 2010) on "Critical Systems" at the University of Applied Science, Kapfenberg (Styria, Austria).
- MOGENTES and the results of the web survey "Testing too expensive?" were presented at several occasions in seminars and presentations since 2009 (STEV, Future Network, TTZ industrial seminars events).

TUG:The results of the MOGENTES project will be exploited in TU Graz's courses, research and industrial collaborations by means of tool development:

- Quality Assurance: this course includes model-based testing techniques
- Classical topics in computer science: covers modelling, semantics and conformance relations.

- Logic and Logic Programming: examples of the Prolog ioco equivalence checker will serve as exercises.
- Selected Topics of Software Technology: tools and techniques of MBT are taught

ETH/Oxford:

- MOGENTES work will be part of the co-operation with Oxford and Airbus UK in CESAR (Artemis project),

Courses given at Oxford University (ETH partners of MOGENTES) include Object Oriented Design (formal design of software systems), Software Verification (automated verification techniques such as those used for test case generation in the MOGENTES project), Digital Design and Computer Aided Formal Verification.

Other partners are involved in technology transfer and industry-related or internal (industrial) seminars (AIT, SP, industrial partners)

2.1.2 Internal meetings and workshops:

Table 2-1: Internal Meetings

Date	Location	Title	Involved WP(s)	Topic
Feb. 16/17, 2010	Graz, TUG	Hands-on Workshop	WP2, WP4 (WP5)	Integrating and assessing development status of tools and framework
May 27-28, 2010	Oxford, ETH	6th MOGENTES Consortium Meeting	all (except WP1 – finished)	Semi-annual project meeting: project status and planning of last period Steering Committee meeting
June 2, 2010	Vienna, AIT	AIT/TRSS technical meeting	WP5, WP6	Discussion of open issues (ATC-conversion, modelling details)
Dec. 2-3, 2010	Graz, TUG	7th MOGENTES Consortium Meeting	all (except WP1 – finished)	Semi-annual project meeting: project status and preparation of finalisation Steering Committee meeting
Mar. 9-11, 2011	Budakalász, PROL	Review Demonstration Preparation and Coordination Meeting	WP4-7	Selection and planning of demonstrations

2.2 Publications and events

This subchapter provides some highlights of publications. A complete list of all dissemination activities is provided in Table 2-2.

AIT organized a workshop at SAFECOMP 2010 (Sep. 14-17), which was organized by AIT and the Austrian Computer Society in Vienna. AIT prepared, in co-operation with TU Vienna and ÖVE, for ME'10 (April 7-8, Vienna) a session on "Embedded Systems", including V&V and Standardization issues. AIT chaired a session at IDIMT 2010 in the Czech Republic. AIT organised, together with SP and PROV, a presentation of MOGENTES at the CPS Week (April 12-16, 2010, Stockholm/Sweden), AIT was present (with MOGENTES

material) with an exhibition booth at ICT conference (Sep 27-29, 2010, Brussels), SAFECOMP 2010, AARIT Convention in Vienna and DATE 2010 (Dresden). AIT organized a MOGENTES session at SAFECOMP 2010 in Vienna and supported TU Graz by preparing the MOGENTES Session on FMCO 2010 in Graz (Nov.29 – Dec. 1, 2010). AIT planned a presentation about MOGENTES results at the TTZ Automation Day (April 7, 2011, Leoben/Austria).

AIT promoted MOGENTES results with respect to standardization groups in ARTEMIS and the ARTEMIS-driven FP7 Support Action ProSE (Promoting Standardization for Embedded Systems) at the ProSE Workshop at the premises of the ARTEMIS Joint Undertaking in Brussels on November 5, 2010. Information was distributed at the ETSI M2M workshop in Sophia Antipolis on October 19-20, 2010.

BME presented MOGENTES at a mainly industrial Forum: (Z. Micskei, B. Polgár):, Application of Model Based Testing in a project – The experiences of the MOGENTES research project”. Presentation in Hungarian at “Software Testing – Interactive Technical Forum”, an IIR Technical Conference, May 11 2011, Budapest, Hungary

TRSS presented its work in MOGENTES at a workshop entitled “Model Driven Engineering for Critical Information Systems” which was organized by Thales Research and Technology, Paris, France.

Re:Lab presented the MOGENTES demonstrator (as initially developed for ICT 2010 in Brussels) at EIMA Lab that is the R&D-dedicated section of the EIMA exhibition in Italy (Bologna, Nov. 10-14, 2010, “Technology for Agriculture”). RELAB has started to write down a paper to present the MOGENTES project outcomes to the University of Modena and Reggio Emilia.

TUG organized the international symposium FMCO 2010 (Formal Methods for Components and Objects), which was held from Nov 29th to Dec 1st 2010 in Graz. Nine EU projects contributed 31 talks. FMCO 2010 had 40 participants from 12 European countries. For further information visit the FMCO 2010 homepage (<http://fmco.liacs.nl/fmco10.html>).

TUG gave several presentations on MOGENTES topics:

On July 6, Bernhard Aichernig presented TUG’s mutation testing techniques on a project preparation meeting on model-based testing for embedded systems in Oldenburg, Germany. The techniques will form part of this new project proposal.

Harald Brandl. Model-Based Testing of Hybrid Systems. Presentation at UNU-IIST, Macao, 12.07.2010.

Harald Brandl. Automated Conformance Verification of Hybrid Systems. Presentation at International Conference on Quality Software (QSIC 2010), Zhangjiajie, 14.07.2010.

Bernhard K. Aichernig: “Efficient Mutation Killers in Action – Strategies in Model-Based Mutation Testing”; Presentation at Dagstuhl seminar Model-Based Testing in Practice, Dagstuhl, 19.10.2010.

Bernhard K. Aichernig; “UML in Action: A Two-Layered Interpretation for Testing”; Presentation at the Third IEEE International Workshop UML and Formal Methods (UML & FM 2010), Shanghai, 16.11.2010.

Bernhard K. Aichernig: “Model-Based Mutation Testing with Action Systems – A Story about Eight Killers”; Presentation at the international symposium Formal Methods for Components and Objects (FMCO 2010), Graz, 30.11.2010.

Elisabeth Jöbstl: “Efficient Mutation Killers in Action”. Presentation at the Fourth IEEE International Conference on Software Testing, Verification and Validation (ICST 2011), Berlin, 22.03.2011.

ETH/Oxford:

ETH/OXFORD is currently carrying out a case study applying a recent formulation of *k-induction* for software programs to equivalence checking of Simulink models, namely sub-systems extracted from the SAC Simulink model as benchmarks, based on MOGENTES work and to be distributed widely.

ETH published many papers and gave many presentations on MOGENTES technologies as can be seen from table 2-2. Furthermore, Daniel Kroening will be editor of two special issues of journals (FMSD and JSAT).

PROLAN: together with partners, plans further on to be involved in:

- FORMS/FORMAT: 9th Symposium on Formal Methods for Automation and Safety in Railway and Automotive Systems – Extensive cooperation with Budapest university of Technology and Economics Department of Control and Transport Automation.(PROL)
- Experiences, Observations – Evaluation, Introduction: Workshop with Prolan and Budapest university of Technology and Economics Department of Control and Transport Automation.(PROL + BME)
- Reviewer for newspaper articles about the project results after successful demonstration in the Hungarian Rail Technology journal (VEZETÉKEK VILÁGA Magyar Vasúttechnikai Szemle). (PROL)

2.3 Folders, articles, press conferences, other media:

The MOGENTES web site was created in Q1/2008 and is maintained since then. It contains a public and an internal part for members only (with login), where internal communication as well as released documents are stored (repository).

The MOGENTES folder and poster has been updated and was already distributed at many conferences, exhibitions and events (one of the reasons was the change of ARC to AIT).

A new MOGENTES poster was produced and used at AIT booth at DATE 2010, and one for the MOGENTES booth at CPS 2010 in Stockholm and ICT 2010 each

A press release is planned for Spring 2010.

2.4 Conferences, Workshops, Exhibitions

The following Table 2-2 provides a comprehensive overview on all dissemination activities performed and planned in the near future, which demonstrates that dissemination and exploitation are planned to continue after the end of the project. Since this is the last dissemination report, plans for the near future are included in the table.

2.4.1 Conferences, Workshops, Presentations, Exhibitions/Fairs, Publications during reporting period¹:

Table 2-2: Conferences, Workshops, Presentations, Exhibitions/Fairs, Publications

Planned/ actual Dates	Location	Type	Type of audience	Countries addressed	Size of audience	Partner responsible /involved
2010-01-06	Macau / China	Georg Weissenbacher: <i>"An Interpolating Decision Procedure for Transitive Relations with Uninterpreted Functions"</i> ; Presentation at the UNU IIST (United Nations University)	Academia	China, UN	25	ETH
2010-01-18	Madrid/ES	Georg Weißenbacher: <i>"Interpolant Strength"</i> ; Conference on Verification, Model-Checking and Abstract Interpretation (VMCAI)	academia	international		ETH
2010-01-19/21	Vienna	W. Herzner (talk), R. Schlick: <i>"When to test how (much)? Thoughts about efficient testing and model-based test case generation (German)"</i> Software Quality Days Conf.	Industry, Academia	Austria, Germany	50	AIT
2010-02-10/12	Sophia Antipolis /FR	ETSI ITS Workshop: Flyer distribution, talks about MBT/TCG at ETSI, about Standards	Industry, academia	International	200	AIT
2010-03-01/03	Nuremberg/ DE	Artemis meeting/Embedded World: Flyer distribution	Industry, academia	International	>100	AIT
2010-03-03	Leoben/A	W. Herzner (talk), E. Schoitsch, R. Schlick: <i>"Model-based testing and test case generation, and model-based software/system development – two complementary paradigms for cost-efficient development of safety-related systems"</i> (in German). Symposium "Automation Day", TTZ/IZW Organizers: AIT, SW Quality Labs	Industry	Austria	30	AIT
2010-03-09/11	Dresden /DE	MOGENTES at AIT Exhibition Booth: Poster, flyer distribution	Industry, academia	International	> 1000	AIT
2010-03-18/19	Wien/AT	COSINE/Artemis Austria "Embedded Systems Policy Conference" Flyer distribution	Industry, academia	International	> 150	AIT
2010-03-22/26	Paphos, Cyprus	Vijay D'Silva: <i>"Propositional Interpolation and Abstract Interpolation"</i> , 19th	Academia	European		ETH

¹ In case of multiple presentations at the same conference only the title is mentioned, conference details are not repeated.

Planned/ actual Dates	Location	Type	Type of audience	Countries addressed	Size of audience	Partner responsibl e /involved
		European Symposium on Programming (ESOP)				
2010-03-22/28	Paphos, Cyprus	Alisdair Donaldson, Daniel Kroening, Philipp Ruemmer, <i>Automatic Analysis of Scratch-pad Memory Code for Heterogeneous Multicore Processors</i> , 16th International Conference on Tools and Algorithms for the Construction and Analysis of Systems TACAS 2010.	Academia	International		ETH
2010-03-22/28	Paphos, Cyprus	Byron Cook, Daniel Kroening, Philipp Ruemmer, Christoph Wintersteiger, <i>Ranking Function Synthesis for Bit-Vector Relations</i> , 16 th International Conference on Tools and Algorithms for the Construction and Analysis of Systems, TACAS 2010.	Academia	International		ETH
2010-04-08	Vienna, AT	E. Schoitsch, <i>"Functional safety – the new standards"</i> . Proc. of Informationstagung Mikroelektronik 2010, 7.-8. April 2010, TU Wien, p. 273 - 283	academia, industry	Europe	50	SP
2010-04-08	Vienna, AT	R. Svenningsson, J. Vinter, H. Eriksson, M. Törngren, <i>"Towards Fault Injection Based Minimal Cut Sets Generation"</i> , In Proc. of Informationstagung Mikroelektronik 2010, 7.-8. April 2010, TU Wien, p. 245 - 252	academia, industry	Europe	50	SP
2010-04-08	Vienna, AT	(Presentation and Proceedings) W. Herzner, R. Schlick, H. Brandl, W. Krenn, W. Schütz: <i>"Towards Generation of Efficient Test Cases from UML/OCL Models for Complex Safety-Critical Systems"</i> ; in: Proceedings (ME'10) MicroElectronics 2010 conference, TU Vienna,, p. 237 – 244.	academia, industry	Europe	50	AIT
2010-04	Wien, New York	W. Herzner, R. Schlick, W. Schütz, H. Brandl, W. Krenn: <i>"Towards Generation of Efficient Test Cases from UML/OCL Models for Complex Safety-Critical Systems"</i> . In: e&i elektrotechnik und informationstechnik, issue 6.2010, pp.180-186; (ed.: ÖVE, Springer Wien New York 2010; ISSN: 0932-383X EIEIEE 127(6) 157-196, a1-a40 (2010)); DOI: 10.1007/s00502-010-0741-2, (extended Paper)	Industry	European	--	AIT (TRSS, TUG)
2010-04-08	Vienna, AT	R. Svenningsson, J. Vinter, H. Eriksson, M. Törngren, <i>"Towards Fault Injection Based Minimal Cut Sets Generation"</i> , In Proc. of Informationstagung Mikroelektronik 2010, 7.-8. April 2010, TU Wien.	academia, industry	Europe	40	SP
2010-04-13	Stockholm, SE	CPS Week Stockholm: Poster Presentation and Demonstrator at European Unit Funded Projects Poster and Demo Session, Demo specifically of the MODIFI fault injection tool	academia, industry	International	500	SP, AIT
2010-05-26/28	Leipzig, DE	ITF 2010 (International Transport Forum): Flyer distribution at AIT Booth	academia, industry,	International	800	AIT

Planned/ actual Dates	Location	Type	Type of audience	Countries addressed	Size of audience	Partner responsibl e /involved
			policy makers			
2010-06- 28/07-02	Brunow , Poland	Z. Szatmari, B. Izso, B. Polgar, I. Majzik: " <i>Ontology-based assessment of software models and development processes for safety-critical systems</i> ". Fifth International Conference on Dependability of Computer Systems (DEPCOS 2010)	Industry, academia	International	30	BME
2010-07-06	Oldenburg, Germany	Bernhard Aichernig. Presentation of TUG's mutation testing techniques on a project preparation meeting on model-based testing for embedded systems in Oldenburg, Germany. The techniques will form part of this new project proposal.	Research, industry	European	~40	TUG
2010-07-12	Macao, China	Harald Brandl. " <i>Model-Based Testing of Hybrid Systems</i> ". Presentation at UNU-IIST	Academia	International		TUG
2010-07-14	Zhangjiajie, China	Harald Brandl. " <i>Automated Conformance Verification of Hybrid Systems</i> ". Presentation at International Conference on Quality Software (QSIC 2010),	Academic	International		TUG
2010-07-14	Edinburgh, UK	D. Kroening, <i>A Primer on the Algorithmic Aspects of SMT</i> (invited tutorial at SAT 2010)	Academia	International	200	ETH
2010-07-14	Edinburgh UK	Philipp Rümmer, Thomas Wahl, <i>An SMT-LIB Theory of Binary Floating-Point Arithmetic</i> ; 8 th International Workshop on Satisfiability Modulo Theories (SMT) at FLoC	Academia	International		ETH
2010-07-14	Edinburgh UK	Angelo Brillout, Daniel Kroening, Philipp Rümmer, Thomas Wahl; <i>Program Verification via Craig Interpolation for Presburger Arithmetic with Arrays</i> ; 6 th International Verification Workshop (VERIFY) at FLoC, Edinburgh, Scotland, July 14, 2010	Academia	International		ETH
2010-07- 15/19	Edinburgh UK	Daniel Kroening, Natasha Sharygina, Aliaksei Tsitovich, Christoph Wintersteiger, <i>Termination Analysis with Compositional Relations</i> , 22 nd International Conference on Computer Aided Verification (CAV 2010),	Academia	International	100	ETH
2010-07- 15/19	Edinburgh, UK	Alexander Kaiser, Daniel Kroening, and Thomas Wahl, <i>Dynamic Cutoff Detection in Parameterized Concurrent Programs</i> (CAV 2010)	Academia	International	100	ETH
2010-07-18	Edinburgh, UK	Angelo Brillout, Daniel Kroening, Philipp Rümmer and Thomas Wahl, <i>An Interpolating Sequent Calculus for Quantifier-Free Presburger Arithmetic</i> (IJCAR 2010)	Academic	International	100	ETH
2010-08- 22/26	Loughborou gh, UK	(Paper, presentation) Hofmann, J. Wiessalla, E. Pofahl, T. Lenzen, R. Schlick and W. Herzner, <i>Model Based Generation of Test Cases for Safe and Reliable Vehicle Software in the Framework of MOGENTES</i> , 10 th Int. Symp. on Advanced Vehicle Control (AVEC 2010)	Automotive industry. academia, research	Europe	50	FFA / AIT

Planned/ actual Dates	Location	Type	Type of audience	Countries addressed	Size of audience	Partner responsibl e /involved
2010-09-01/03	Lille, France	36th Euromicro, SEAA (Int. Conference on Software Engineering and Advanced Applications) (flyers)	Industry, academia	International	250	AIT
2010-09-08/10	Jindrichuv Hradec, CZ	IDIMT 2010 (Interdisciplinary Information and Management Talks), (flyers)	industry, academia	Central Europe	45	AIT
2010-09-14	Vienna, Austria	29 th Int. Conf. on Computer Safety, Reliability and Security (SAFECOMP 2010) - ERCIM/MOGENTES workshop (to be publ. as ERCIM proceedings 2011)	academia, industry	international	30	AIT / BME, TUG, SP, ETH
		E. Schoitsch, <i>Exploitation of Embedded Systems Research Results via Standardization– a path towards business</i> (MOGENTES Standardization Input was one example).				AIT
		<u>W. Herzner</u> , <i>MOGENTES Overview</i> ,				AIT
		<u>R. Schlick</u> , <i>UML Modeling and Mutation</i> ,				AIT
		H. Brandl, <i>Automated Test Case Generation</i>				TU Graz
		A. Kövi, A. Pataricza, B. Polgár, I Kocsis, <i>Qualitative Fault Modelling</i>				BME
		R. Svenningsson, H. Eriksson, J. Vinter, M. Törngren <i>A Model based Fault Injection Tool (MIFI, MODIFI)</i>				SP
		B. Polgár, I. Rath, I. Majzik, <i>Service-oriented Framework for Tool Integration</i>				BME
2010-09-15-17	Vienna, Austria	Henrik Eriksson, Rickard Svenningsson, Jonny Vinter, Martin Törngren, “ <i>MODIFI – A Model-Implemented Fault-Injection Tool</i> ”, in: Proceedings of the International Conference on Computer Safety, Reliability and Security (SAFECOMP 2010), Springer LNCS 6351, p. 210-222, ISSN 0302-9743, ISBN-10 3-642-15650-9 Springer Berlin Heidelberg NewYork, ISBN-13 978-3-642-15650-2 Springer Berlin Heidelberg NewYork, 2010.	Industry, academia	International	100	SP
2010-09-27/29	Brussels, Belgium	ICT 2010: Exhibition, MOGENTES interactive demonstrator, poster, flyers	Industry, academia	Europe	1000	AIT, Re:Lab
2010-10-03	Oslo, Norway	R.Svenningsson, H. Eriksson, J.Vinter, M.Törngren, “ <i>Model-Implemented Fault Injection for Hardware Fault Simulation</i> ”, Models Workshop on Model-Driven Engineering, Verification and Validation (MoDeVva 2010)	Academia, industry	International		SP
2010-10-07/08	Lisbon, Portugal	EPoSS Annual Event (ETP on Smart Systems Integration), flyers	academic, industry	Europe	250	AIT
2010-10-10/15	Yogyakarta, Indonesia	Daniel Kroening, Jerome Leroux, and Philipp Ruegger, <i>Interpolating quantifier-free Presburger arithmetic</i> , Proceedings of LPAR, LNCS, vol. 6397, Springer, 2010, pp. 489–503.	Academia	International		ETH
2010-10-19	Dagstuhl, Germany	Bernhard K. Aichernig: “ <i>Efficient Mutation Killers in Action - Strategies in Model-Based Mutation Testing</i> ”, Presentation at Dagstuhl seminar Model-Based Testing in Practice	Research	International	~47	TUG
2010-10-19	Paris,	MOGENTES presentation in the	industry	France		TRSS

Planned/ actual Dates	Location	Type	Type of audience	Countries addressed	Size of audience	Partner responsibl e /involved
	France	workshop <i>"Model Driven Engineering for Critical Information Systems"</i> Organized by Thales Research and Technology (for Thales employees only)		(mainly)		
2010-10-19/29	Sophia Antipolis, France	ETSI TC M2M Workshop, flyers	Industry, academia	International	250	AIT
2010-10-20/23	Lugano, Switzerland	Demonstration as at ICT 2010 at FMCAD,	Industry, academia	International		Re:Lab, ETH
2010-10-26/27	Gent, Belgium	ARTEMIS/ITEA2 Co-Summit, project exhibition, ProSE booth: MOGENTES standardization results as success story in slide show, flyers	academic, industry	Europe	1000	AIT
2010-11-05	Brussels	MOGENTES Standardization success in IEC 61508 presented, at ARTEMIS JU premises	Academia, industry	Europe	20	AIT
2010-11-10/14	Bologna, Italy	EIMA Lab, EIMA R&D exhibition in Bologna (MOGENTES demonstrator, Re:Lab)	Industry	Italy		Re:Lab
2010-11-16	Vienna	AARIT Convention: Exhibition booth: MOGENTES flyers, information material	Academia (research)	Austria	50	AIT
2010-11-16	Shanghai, China	Bernhard K. Aichernig: <i>"UML in Action: A Two-Layered Interpretation for Testing"</i> . Presentation at the Third IEEE International Workshop UML and Formal Methods (UML & FM 2010)	Research	International		TUG
2010-11-29/12-01	Graz / AT	Symposium FMCO 2010 <i>"SW Technologies Concertation on Formal Methods for Components and Objects"</i>	Academia	Europe	50	Resp.: TUG Involved: AIT, ETH, SP
2010-11-30	Graz / AT	Presentation at FMCO 2010 R. Schlick, W. Herzner: <i>"Evaluating Mutation Operators for Test Case Generation from UML State Diagrams"</i>	Academia	Europe	50	AIT
2010-11-30	Graz, Austria	Bernhard K. Aichernig: <i>"Model-Based Mutation Testing with Action Systems - A Story about Eight Killers"</i> ; Presentation at the international symposium Formal Methods for Components and Objects (FMCO 2010)	Research	European	~40	TUG
2010-12-02/03	Braunschweig, Germany	B. Polgar, I. Rath, I. Majzik, <i>Model-based Integration Framework for Development and Testing Tool-chains</i> . 8th Symposium on Formal Methods for Automation and Safety in Railway and Automotive Systems (FORMS/ FORMAT 2010)	academic, industry	International	80	BME
2011-03-15/16, 2011-03-30/31	Varberg, Sweden	Training course "Prover iLock for signalling system engineering (Swedish: "Prover iLock för signalprojektering")."	Industry, academia	Sweden	16	PROV
2011-03-21/25	Berlin, Germany	E. Jöbstl: <i>"Efficient Mutation Killers in Action"</i> ; in proceedings of the Fourth IEEE International Conference on Software Testing, Verification and Validation (ICST 2011),	academic, industry	International		TUG
2011-04-07	Leoben, AT	W. Herzner (Rupert Schlick): <i>"Can you Prove Correctness by Testing? Results"</i>	Industry, Research	Austria	~ 20	AIT

Planned/ actual Dates	Location	Type	Type of audience	Countries addressed	Size of audience	Partner responsibl e /involved
		<i>from EU-Project ;MOGENTES (in German)</i> ; at Automation Day 2011, TTZ Leoben, (Presentation				
2011-05-05	Copenhagen, Denmark	Signalling & Train Control conference, panel session on optimal safety parameters for railway signalling systems.	Industry	Europe	350	PROV
2011-05-11	Budapest, Hungary	Z. Micskei, B. Polgár, <i>“Application of Model Based Testing in a project – The experiences of the MOGENTES research project”</i> . Presentation in Hungarian at “Software Testing – Interactive Technical Forum”, an IIR Technical Conference,	Industry, research	Hungary		BME
2011-06-05/09	San Diego, USA	He, Nannan P. Rümmer and D. Kroening: <i>“Test-Case Generation for Embedded Simulink via Formal Concept Analysis”</i> , in: Proceedings of DAC 2011.	Academic	international		ETH
2011-06-20/24	Limerick, Ireland	E. Jöbstl. <i>Symbolic Model-Based Mutation Testing</i> . Research Abstract accepted for Doctoral Symposium at 17 th International Symposium on Formal Methods (FM 2011),	Academia	International		TUG
2011-07-16/20	Salt Lake City, USA	D. Kroening, J. Ouaknine, O. Strichman, T. Wahl, J. Worrell: <i>„Linear Completeness Thresholds for Bounded Model Checking”</i> , in: Proceedings of CAV 2011, Springer LNCS 6806.	Academia, industry	International		ETH
2011-07-16/20	Salt Lake City, USA	G. Weissenbacher, D. Kroening, <i>“Interpolation-based Software Verification with WOLVERINE”</i> , in: Proceedings of CAV 2011, Springer LNCS 6806.	Academia, industry	International		ETH
2011-06-30	Stuttgart, DE	(Paper accepted) W. Herzner, R. Schlick, H. Brandl, J. Wiessalla: <i>Towards Fault-based Generation of Test Cases for Dependable Embedded Software</i> . At 4. Workshop “Entwicklung zuverlässiger Software-Systeme”	Research, Industry	European		AIT (TUG, FFA)
2011-09-19/21	Naples, IT	(Paper submitted) W. Herzner, R. Schlick*, E. Jöbstl: <i>“Fault-Based Generation of Test Cases from UML-Models – Approach and Experiences”</i> , SAFECOMP 2011.	Research, Industry	International		AIT (TUG)

2.5 Lectures and Courses, Lab Exercises and Students Exchange

2.5.1 Lectures and Courses

Lecture held by AIT:

- Jan. 2010: Lecture "Kritische Systeme" (including model-based testing and test-case generation) at FH Kapfenberg / Joanneum (a University of Applied Sciences) by AIT members (E. Schoitsch, W. Herzner, T. Gruber), for studies SWD (Software Design) and ITM (Internet Technology and Media), 6th semester.

Courses at BME where results and intents of MOGENTES were used:

- PhD course:
 - Software verification and validation
- Embedded information systems specialization (MSc) course:
 - Real-time and safety-critical systems
- Dependable system design specialization (MSc) courses:
 - Software verification techniques
 - Design for dependability
 - Critical Embedded Systems
 - System Integration and Supervision Laboratory Exercises
 - Project laboratory

Courses given at Oxford University (ETH partners of MOGENTES):

Courses given at Oxford University (ETH partners of MOGENTES) include Object Oriented Design (formal design of software systems), Software Verification (automated verification techniques such as those used for test case generation in the MOGENTES project), Digital Design and Computer Aided Formal Verification.

Courses given at TUG:

The results of MOGENTES will be exploited in the following courses:

- Quality Assurance: this course includes model-based testing techniques
- Classical topics in computer science: covers modelling, semantics and conformance relations.
- Logic and Logic Programming: examples of the Prolog ioco equivalence checker will serve as exercises.
- Selected Topics of Software Technology: tools and techniques of MBT are taught

Course given at Folkuniversitetet i Varberg (adult educational association):

PROV held a course in signalling system development and verification utilizing the Prover iLock tool suite, including the railway demonstrator model and toolset of MOGENTES.

2.5.2 Students' Exchange, Lab Exercises ("Practica")

Students' exchange and lab exercises ("practica") are another means to disseminate and exploit MOGENTES results and are considered by participating academic institutions. BME and TUG have included MOGENTES contents in lab exercises.

2.6 List of Bachelor, Master and PhD Theses

Academic partners (and may be hosting industrial partners) offer MOGENTES related topics for Bachelor, Master or PhD theses and report during the project.

BME:

- BME offered a topic for PhD thesis: "Formalization and verification of non-functional requirements in safety critical systems". The work started in September 2008 (ongoing).
- BME supervised 5 bachelor's thesis:
 - István Ágoston: Management of tool integration processes, 2009
 - Gergely Juhász: Distributed Data and Traceability Management, 2009
 - Benedek Izsó: Ontology based verification of Domain Specific Models, 2009
 - Ferenc Szabo: Integrating Eclipse Modeling Workflow Engine to Tool Integration Framework, 2010
 - Kristof Varnai: Interactive Transformation Chains: Verification and Automatic Synthesis of Process Models, 2010

ETH supervised several Master's theses on MOGENTES related topics since 2008:

- Raphael Mack, *Modelling and Verifying Embedded Operating Systems*. Master's thesis at the Computer Systems Institute ETH Zurich, April 2008. Supervised by Daniel Kroening and Georg Weissenbacher. <http://e-collection.ethbib.ethz.ch/view/eth:30359>
- Thomas Lenherr, *Taxonomy and Applications of Alias Analysis*, Master's thesis at the Computer Systems Institute, ETH Zurich, 2008, Supervised by Daniel Kroening and Thomas Wahl. <http://e-collection.ethbib.ethz.ch/view/eth:30904>

Both theses aimed at improving the automated verification tools underlying the test case generation tool currently being developed in the scope of MOGENTES (ongoing).

- Gerard Basler submitted his thesis on a Model Checker for concurrent Boolean programs.
- Nicolas Blanc submitted his thesis on formal reasoning for SystemC models.
- Mitra Purandare and Christoph Wintersteiger have graduated with a Dr Sc from ETH.

In the mean time, ETH partners of MOGENTES have advanced in their academic career: Philipp Ruemmer is now assistant professor at Uppsala University, Sweden and Alastair Donaldson will be assistant professor at Imperial College, London, UK.

AIT started in 2010 following PhD thesis:

- Oliver Zendel: Automated Test Data Generation for Dependable Computer Vision Applications

TUG supervised one Phd thesis (Dissertation) related to MOGENTES:

- Harald Brandl, *Testing of Hybrid Systems using Qualitative Models*. Dissertation at the Institute for Software Technology, Graz University of Technology, 2011. Supervised by Franz Wotawa, co-supervised by Bernhard K. Aichernig.

TUG also initiated a Master's Thesis related to MOGENTES, which is still ongoing work:

- Andreas Maller, *Model-Based Mutation for Embedded Systems*. Master's Thesis at the Institute for Software Technology, Graz University of Technology, 2011. Supervised by Bernhard K. Aichernig.

3 References

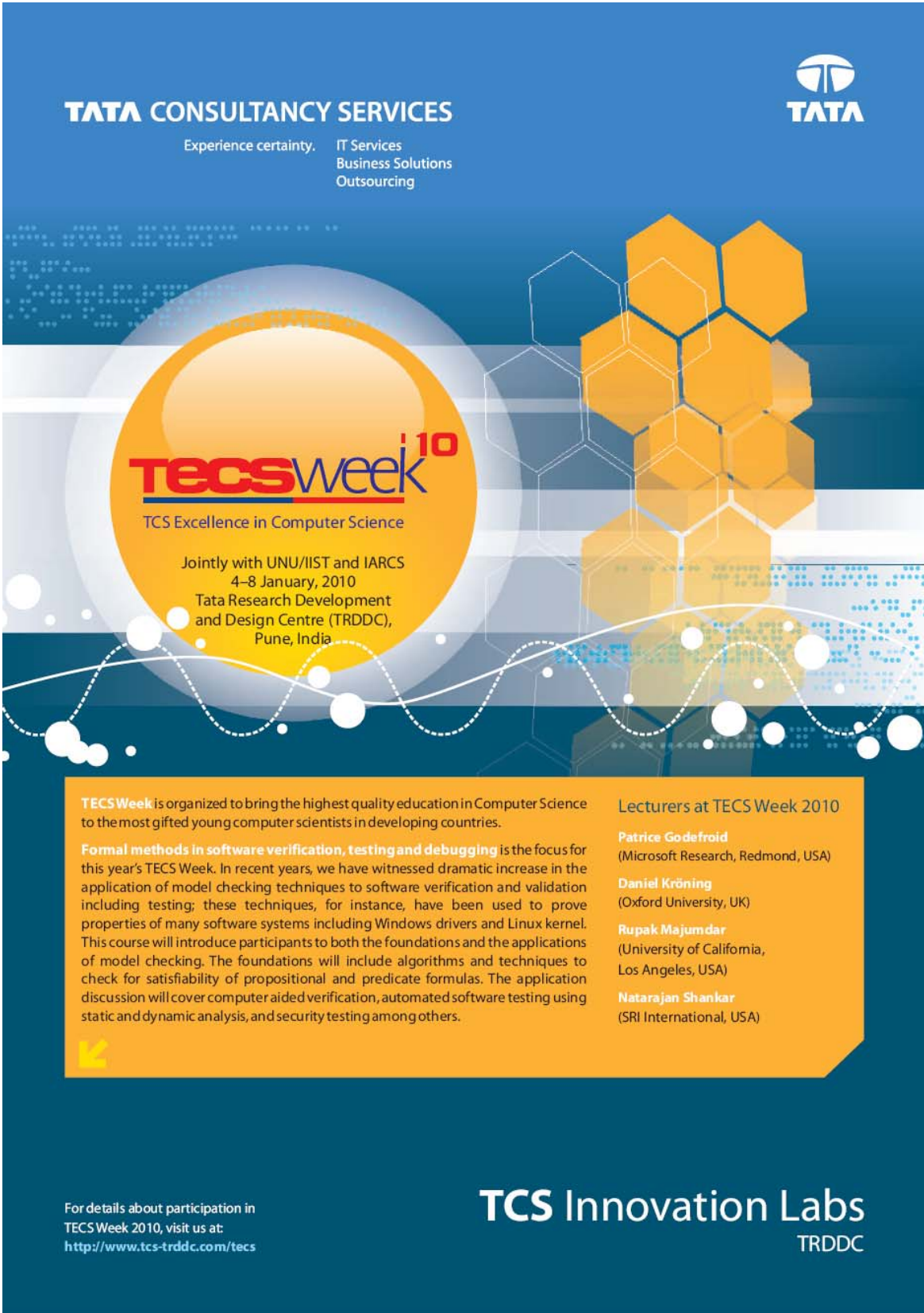
- [1] MOGENTES – Annex I, Description of Work, V 3.1.1, October 25, 2007.

4 Abbreviations and Definitions

Table 4-1: Abbreviations

Abbreviation	Explanation
Artemis	Advanced Research and Technology for Embedded Intelligence and Systems (ETP)
AUTOSAR	Automotive Open System Architecture
CAN	Controller Area Network (automotive bus)
CENELEC	European Committee for Electrotechnical Standardization
COM	Communication Layer
DECOS	Dependable Embedded Components and Systems, EU-IST-FP6 IP-project 511764
ECU	Electronic Control Unit
EN	European Norm (Standard)
EPoSS	European Technology Platform on Smart Systems Integration
ERCIM	European Research Consortium for Informatics and Mathematics
ETP	European Technology Platform
EWICS TC7	European Workshop on Industrial Computer Systems, Technical Committee 7, Safety, Reliability and Security
FMCO	Formal Methods for Components and Objects
HIL	Hardware-in-the-Loop (testing set-up)
IEC	International Electrotechnical Commission
ISO	International Organization for Standardization
ISOBUS	ISO 11783, communication system standard for agricultural equipment
MOGENTES	Model-Based Generation of Test-Cases for Embedded Systems
RTE	Runtime Environment
SAT	Satisfiability
SILn	Safety Integrity Level n (1..4)
SMT	SAT Modulo Theory
TCG	Test Case Generation

5 Annex I: TECS-Week Flyer



The flyer features a blue background with a central orange circle containing the 'TECSweek 10' logo. To the right, there is a graphic of orange hexagons forming a molecular-like structure. The TATA logo is in the top right corner. The text is arranged in a clean, professional layout with white and orange colors.

TATA CONSULTANCY SERVICES
Experience certainty. IT Services
Business Solutions
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TECSweek¹⁰
TCS Excellence in Computer Science

Jointly with UNU/IIST and IARCS
4–8 January, 2010
Tata Research Development
and Design Centre (TRDDC),
Pune, India

TECSWeek is organized to bring the highest quality education in Computer Science to the most gifted young computer scientists in developing countries.

Formal methods in software verification, testing and debugging is the focus for this year's TECS Week. In recent years, we have witnessed dramatic increase in the application of model checking techniques to software verification and validation including testing; these techniques, for instance, have been used to prove properties of many software systems including Windows drivers and Linux kernel. This course will introduce participants to both the foundations and the applications of model checking. The foundations will include algorithms and techniques to check for satisfiability of propositional and predicate formulas. The application discussion will cover computer aided verification, automated software testing using static and dynamic analysis, and security testing among others.

Lecturers at TECS Week 2010

- Patrice Godefroid**
(Microsoft Research, Redmond, USA)
- Daniel Kröning**
(Oxford University, UK)
- Rupak Majumdar**
(University of California, Los Angeles, USA)
- Natarajan Shankar**
(SRI International, USA)

For details about participation in TECS Week 2010, visit us at:
<http://www.tcs-trddc.com/tecs>

TCS Innovation Labs
TRDDC



TECS Week 2010

The computing and information processing industry, in all its forms, has provided opportunities for major growth in developing countries. The strength of this industry relies upon the sound knowledge and practice of Computer Science. Education and training in Computer Science is key to building a successful software industry and growing individual careers.

TECS Week is directed towards young postgraduate and research students, faculty and young professionals from research institutions and industry.

There are no fees for participation but selected participants will be expected to contribute towards their living costs in Pune.

TECS Week International Advisory Board:

Peter Druschel Max Planck Inst. for Software Systems	Jaya dev Misra U. Texas, Austin	Natarajan Shankar SRI International
Sir Tony Hoare FRS Microsoft Research	Amir Pnueli NY University / Weizmann Inst.	V.S. Subrahmanian U. of Maryland Inst. for Advanced Computer Studies
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6 Annex II: ME 2010 Final Program

Conference Programme ME 2010, Vienna

Mittwoch, 7. April 2010

09.30 h Registrierung

09.45 h Eröffnung

10.00 h **Nanoelectronics**

Begrüßung, Eröffnung
Erich Gornik / Karl Riedling

Keynote-Talk: **Prospects of Semiconductor Nanowires for Nanoelectronics**
Lars Samuelson, Semiconductor Electronics, Lund University, Sweden

10.40 h **UV-imprint lithography for advanced micro – and nanostructuring**
T. Fromherz, Institute of Semiconductor Physics, Johannes Kepler University, Linz, Austria

11.00 h **La₂O₃/ZrO₂ – A gate dielectric stack for the 22 nm node and beyond?**
Stephan Abermann, Institute for Solid State Electronics, Vienna University of Technology, Vienna, Austria

11.20 h Kaffee, Posters

11.40 h **Titel to be defined**
Martin Schrems, Process Development & Implementation, Austria Micro System AMS AG, Unterpremstaetten

12.05 h **DOTFET's**
Lis Nanver, TU Delft

12.30 h **Poster Session**

Crystal Structure and Orientation of Nanowires
D. Kriegner et al.

UV-imprint lithography for advanced micro- and nanostructuring
G. Chen et al., Positioning Nanocrystals on Prestructured Substrates
E. Lausecker et al.

Inverted Ge islands in {111} faceted Si pits - a novel approach towards islands with higher aspect ratio
M. Grydlik et al.

Epitaxial Ge Nanoislands on One-Dimensional “V”-Patterned Si Substrates
G. Springholz et al.

Towards nanospintronics: the assembly of magnetic, metallic nanocrystals in semiconductors*B. Faina et al.***X-ray studies and strain simulations on patterned arrays of buried SiGe quantum dots designed for field-effect transistor devices***N. Hrauda et al.***Nanowire-Metal Heterostructures for High Performance MOSFETs***T. Burchhart et al.***La₂O₃/ZrO₂ - A gate dielectric stack for the 22 nm node and beyond?***S. Abermann et al.***A Novel Concept of High Performance FETs for Harsh Environment***C. Ostermaier et al.***Terahertz Waveguide Emitters for the Investigation of Subwavelength Photonic Structures***M. Martl et al.***Terahertz microresonators based on gain photonic crystals***A. Benz et al.***The Al-free InGaAs/GaAsSb/InP Materials System for Unipolar Devices***A.M. Andrews et al.***Femto second pulse propagation in mid-infrared quantum cascade lasers***W. Parz et al.***Ring cavities for surface emitting quantum cascade lasers***E. Mujagić et al.***Continuous wave lead salt microdisk lasers with operation temperatures up to 135K***M. Eibelhuber et al.***A highly efficient Si rib waveguide photodetector with ordered array of Ge islands for 1.5 μm** *V. Lavchiev et al.*

13.15 h Mittagessen

14.30 h **Industrielle Elektronik und Sensorik**

Begrüßung, Eröffnung

Bernhard Jakoby

14.35 h Keynote Speaker:
Stelzer, Johannes Kepler Universität

15.15 h Poster Session
(Posterpräsentation á 3' / Poster)

Kaffee, Posters

17.45 h **Schlussworte**

Bernhard Jakoby

19.00 h **Conference Dinner im Melker Stiftskeller**

Dinner Talk

Donnerstag, 8. April 2010

09.00 h **Embedded Systems**

Begrüßung, Eröffnung

Erwin Schoitsch (AIT Austrian Institute of Technology), Christoph Grimm (TU Wien)

09.05 h Keynote-Talk:

Design Methodologies in the Era of Embedded Systems

Daniel Gajski (UC Irvine, USA)

09.50 h Kaffee

10.00 h Session 1:

Towards Generation of Efficient Test Cases from UML/OCL Models for Complex Safety-Critical Systems

Wolfgang Herzner, Rupert Schlick (AIT Austrian Institute of Technology), Harald Brandl, Willibald Krenn (TU Graz), Werner Schütz (Thales Rail Signalling Solutions)

10.20 h **Towards Fault Injection Based Minimal Cut Sets Generation**

Rickard Svenningsson, Jonny Vinter, Henrik Eriksson (SP Technical Research Institute of Sweden), Martin Törngren (KTH Royal Institute of Technology, Sweden)

10.40 h **Sequential Design of Experiments for Effective Model-based Validation of Electronic Control Units**

Monica Rafaila, Christian Decker, Georg Pelz (Automotive Power Infineon Germany), Christoph Grimm (TU Wien)

11.00 h **A range based method for Noise Analysis of mixed A/D Communication Systems**

Kangseok Lee, Florian Schupfer, Christoph Grimm (TU Wien)

11.20 h **Identifikation, Authentifizierung und Schlüsselgenerierung mittels Physical Unclonable Functions** (Poster mit Short Presentation)

Maximilian Hofer, Christoph Böhm (TU Graz), Holger Bock (Infineon, Austria)

11.30 h Kaffee, Poster

12.00 h Session 2:

Functional Safety: The new standards of IEC 61508 Ed. 2 and ISO 26262 (Automotive) - a comparison and new features

Erwin Schoitsch (AIT Austrian Institute of Technology)

- 12.20 h **A Novel Reconfigurable Architecture for Wireless Sensor Network Nodes**
Johann Glaser, Jan Haase, Markus Damm, Christoph Grimm (TU Wien)
- 12.40 h **Formale Verifikation von Embedded Systems Software**
Thomas Reinbacher, Martin Horauer (FH Technikum, Wien)
- 13.00 h **A Common Design Architecture Approach to Vehicle to Vehicle, Vehicle to Infrastructure Communication Systems**
Ömer Karacan (Siemens AG Austria)
- 13.20 h **System-Testumgebung für die verteilte Automobilelektronik** (Poster mit Short Presentation)
Oliver Praprotnik, Martin Zauner (FH Technikum, Wien)
- 13.25 h **Model-Based Design und Automatische Codegenerierung in der Industrieautomation**
(Poster mit Short Presentation)
Philipp H.F. Wallner (Bernecker & Rainer, Austria)
- 13.30 h **Abschlussession** (Best Paper Award pro Themenfeld: Nanoelectronics, Elektronik und Sensorik, Embedded Systems)
- 13.50 h Quick Lunch
- 15.30 h Ende der Veranstaltung/End of Conference

7 ANNEX III: SAFECOMP MOGENTES Workshop 2010, Vienna,

Workshop 2 (full day, 9:00 – 17:30): Room 2 (Sisi)

ERCIM/DECOS/MOGENTES - Dependable Embedded Systems: Model-based Design and Validation (Automated Test Case Generation)

Morning session: 9:00 – 12:45

- **09:00 – 09:15** Welcome, workshop introduction (ERCIM, EWICS)
- **09:15 – 09:45** Remote Presence: Performing Maintenance of Offshore Wind Farms without Leaving your Office (Øyvind Netland, NTNU, Norway)
- **09:45 – 10:15** Intelligent Transport Systems on the Road: Lane sensitive navigation with NAV-CAR – goals and challenges (Egbert Althammer, Reinhard Kloibhofer, AIT, Austria)
- **10:15 – 10:45** Coffee Break
- **10:45 – 11:15** Functional Specification for a Time Management Unit (Kristoffer Gregertsen, NTNU, Norway)
- **11:15 – 11:45** ADOSE Project (Reliable Application Specific Detection of Road Users with Vehicle On-board Sensors) (Jürgen Kogler, Christoph Sulzbachner, AIT)
- **11:45 – 12:15** Exploitation of Embedded Systems Research Results via Standardization– a path towards business (Erwin Schoitsch, AIT, Austria)
- **12:15 – 12:45** Self awareness, the next concept for ubiquitous industrial sensor networks (Amund Skavhaug, NTNU, Norway)
- **12:45 – 14:00** Lunch

Afternoon Session: 14:00 – 17:30

The afternoon session is dedicated to papers on “Validation and Verification”, presenting the results of the European FP7 project **MOGENTES** (Model Based Generation of Efficient Tests for Dependable Systems, contract no. 216679), planned presentations are:

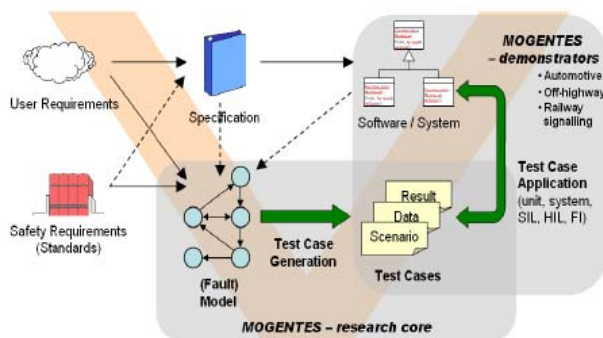
- **14:00 – 14:30** MOGENTES Overview (W. Herzner, AIT)
- **14:30 - 15:00** Modelling and Mutation Testing (UML) (R. Schlick, AIT)
- **15:00 – 15:30** Automated Test Case Generation (Harald Brandl, TU Graz)
- **15:30 – 16:00** Tool Integration and (Balázs Polgár, András Pataricza, Imre Kocsis, Budapest University of Technology and Economics)
- **16:00 – 16:30** Coffee Break
- **16:30 – 16:30** Model based Fault Injection Tool (MIFI, MODIFI) (SP Research Institute of Sweden)
- **16:30 – 17:00** Qualitative Fault Modelling (András Kövi, Budapest University of Technology and Economics)
- **17:00 – 17:30** Plenary discussion, concluding remarks

The papers and presentation material (slides) will be published as ERCIM proceedings after the workshop.

8 ANNEX IV: MOGENTES Poster CPS Week, Stockholm



Objectives: The goal of MOGENTES is to significantly enhance testing and verification of dependable embedded systems by means of automated generation of efficient test cases relying on development of new approaches as well as innovative integration of state-of-the-art techniques.



Application Demonstrators

- Car alarm system (test cases for HiL)
- Steering comfort



Automotive

- ISOBUS-conformant bucket control of off-highway vehicles



Railway

- Train-route management for electronic interlocking control system



- Verification of peripheral signals analyser

Approach and Activities:

Modelling languages and modelling

- chosen: (subsets of) UML/OCL, Matlab/Simulink, and Prover iLock
- developing models for all demonstrators in UML, adapt existing Simulink models

Test theories

- conformance relation between the model and implementation
- *mutation-based* test case generation (TCG)
- *fault models* guide mutation generation

Coverage criteria, metrics

- notion of success and failure of a test case

Model-implemented fault injection (MIFI)

- identification of FI tests for physical fault injection at model level using *failure mode functions*

Tool development

- for UML-based TCG using action systems
- for Simulink-based TCG using CBMC
- for MIFI

Framework

- for integration of tools into tool chain
- semantic-aware transformations
- integration with existing test environments

Intermediate results:

Models

- available for all demonstrators

Theory

- mutation-oriented coverage metrics
- qualitative abstraction for hybrid systems
- qualitative fault modelling

Tools

- UML2AS transformation including mutant gen.
- Argos/Ulysses: TCG from action systems (AS)
- COVER: TCG from Simulink models using CBMC
- Prover iLock: TCG based on minimal cut sets
- MODIFI: model-implemented fault injection

Participants:

- AIT Austrian Institute of Technology (AT)
- Budapest Univ. of Technology and Economics (HU)
- Ford Forschungszentrum Aachen GmbH (DE)
- Swiss Federal Institute of Technology Zurich (CH)
- Graz University of Technology (AT)
- Prolan Irányítástechnikai ZRT (HU)
- Prover Technology AB (SE)
- SP Technical Research Institute of Sweden (SE)
- Thales Rail Signalling Solutions GmbH (AT)
- Re:Lab S.R.L. (IT)

Contact:

- Dr. Manfred Gruber (manfred.gruber@ait.ac.at)
- Dr. Wolfgang Herzner (wolfgang.herzner@ait.ac.at)
- AIT Austrian Institute of Technology

Website: www.mogentes.eu

9 ANNEX V: MOGENTES demonstrator at ICT 2010, Brussels

