

Embedded Systems Institute

The Embedded Systems Institute (ESI), located in Eindhoven, The Netherlands, is a public-private partnership founded in 2002 by a number of universities and companies: Delft University of Technology, Eindhoven University of Technology, University of Twente, TNO, ASML, Océ and Philips. To advance industrial innovation and academic excellence in Embedded Systems Engineering a broad research program is executed. Our research is carried out in close cooperation between academia, industrial partners and other research organizations. ESI also provides an elaborate knowledge dissemination program, with seminars, lectures and a range of embedded systems technology courses.

The Embedded Systems Institute is currently hiring:

Research Fellows
Knowledge Managers
Project Managers

Please see the reverse side of this page.

www.esi.nl

**Aspect-oriented Language Concepts
and their
Application to Industrial Systems
(ALCAIS)**

Symposium, June 9, 2006

De Waaier 3
University of Twente, Enschede
The Netherlands

<http://trese.cs.utwente.nl/workshops/ALCAIS/>

Supported by:



Embedded Systems
INSTITUTE

General

We are proud to present a program on Aspect-Oriented Language Concepts and their Application to Industrial Systems (ALCAIS). This symposium is connected, both in time and topics, to the PhD defense of István Nagy. He carried out his PhD research on Software Engineering Group of the University of Twente.

During the symposium you have the opportunity to learn about the essential concepts of aspect-orientation, some of its benefits in software development, recent insights into the technology, and a lot of information about the application of aspect-orientation in an industrial context.

The symposium addresses both practitioners and researchers:

- Project managers, software architects, software analysts, software designers and software developers who are facing difficulties in managing their software developments due to the difficulties in cleanly separating the software into independent modules.
- Researchers who want to get up to date with the state-of-the-art research in Aspect Oriented Software Development.

We are grateful for the support of ESI, PATO, CTIT and AOSD-europe, which made it possible to make this event happen. We hope and expect that you will enjoy the program.

Lodewijk Bergmans
Program Chair

Organizing Committee:

Mehmet Akşit, Lodewijk Bergmans, Ellen Roberts-Tieke, Gür-can Güleşir, István Nagy

Software Engineering Group
University of Twente

Research Fellows

Scientific or Industrial Background

As part of its expansion plans ESI is actively looking for qualified and motivated professionals. Positions are available for Research Fellows, Knowledge Managers and Project Managers. Research Fellows have an academic education, preferably with a PhD and multiple years of professional experience. Scientific research fellows are leading specialists in one of the relevant embedded systems engineering disciplines. Industrial candidates preferably have a background in the design of complex high-tech systems, with relevant experience in system architecting or engineering.

If you have a passion to advance the field of embedded systems engineering and would like to work with an innovative and motivated team of professionals, then please contact ESI.

Postal address: Embedded Systems Institute,
attn. M. Willems,
Personnel Department,
Postbox 513, 5600 MB, Eindhoven,
The Netherlands.

Location: TU/e Campus, Laplace Building 0.10,
den Dolech 2, 5612 AZ, Eindhoven, The
Netherlands

Telephone: +31 (0)40 2474720
Mail address: office@esi.nl
Website: www.esi.nl



ABOUT PATO

PATO –Institute for Continuing Engineering Education– is the leading foundation in the Netherlands providing education and training specially designed for persons who have a degree in engineering (M.Sc./B.Sc.)

The mission of PATO is to develop and organise short courses in advanced technologies. PATO specialises in open short courses, presented by selected experts from The Netherlands and abroad. PATO organises over 60 courses a year. Usually the length of a course is between 2 and 6 days.

PATO courses are based on recent and actual industrial and advanced technical developments. The transfer of an optimal mixture of practical and theoretical based knowledge makes a PATO–course valuable for scientists, engineers and technical managers who aim at the expansion of their professional knowledge, skills and know–how.

The key elements of a PATO–course are experienced course directors, small groups and the interactive nature of our courses. PATO presents an unique way of education in which you will find an interaction between professional business & experiences and scientific & engineering education. Course directors are experts from universities, technological institutions and industry.

Within the PATO foundation are represented (technical) universities and representatives of various organisations and associations. Participation of the later ones consists of representatives from main industrial companies, Royal Institute of Engineers (KIVI NIRIA), NGI, IEEE and NERG.

The PATO office is located in the building ‘Torenhove’, M. Nijhofflaan 2, 2624 ES Delft, The Netherlands.

P.O. Box 1064, NL–2600 VB Delft

Tel : +31 15 2852574 Fax : +31 15 2576213

E–mail : info@pato.nl URL : <http://www.pato.nl>

Program

Location: De Waaier 3, University of Twente, Enschede

09:00-10:30	Registration (foyer Waaier)
09:30-10:30	Tutorial (De Waaier, room L200)
10:30-10:45	Opening (Waaier 3)
10:45-11:15	Talk: Aspects are a frame of mind <i>by Theo D'Hondt - Vrije Universiteit Brussel</i>
11:15-11:45	Break
11:45-12:15	Talk: Support for aspects in legacy applications using Event-based AOP <i>by Mario Südholt - École des Mines de Nantes</i>
12:15-12:45	Talk: On The Design of Aspect-Oriented Composition Models for Software Evolution <i>by Istvan Nagy - University of Twente</i>
12:45-14:00	Lunch break
14:00-14:30	Talk: Applying AOP in Industry; an Academic Perspective <i>by Gurcan Gulesir & Pascal Durr - University of Twente</i>
14:30-15:00	Talk: Discovering Faults in Idiom Based Exception Handling <i>by Tom Tourwe - CWI</i>
15:00-15:30	Break
15:30-16:00	Talk: Introducing AOP In Industrial Software Development <i>by Remco van Engelen - ASML</i>
16:00-17:00	Panel: Industrial application of Aspect-Oriented Technology

Symposium Topics

Due to the size and complexity of today's systems and the desire to achieve better quality, for example, in robustness, flexibility, time-to-market, etc, software development is becoming an increasingly complex discipline. In particular, so-called crosscutting concerns are an important cause of the problems. Crosscutting concerns cannot be modeled with state-of-the-art techniques such as OO, UML and patterns. During the last decade, Aspect-Oriented Software Development methods, tools and languages have been introduced to address such problems. In the recent years several practical applications have proved the versatility of these techniques in industrial applications.

This symposium aims at bringing together practitioners and researchers to achieve a better understanding of the problems caused by crosscutting concerns and how they appear in practice. In addition, experts present new insights in addressing these problems. Also, significant attention will be paid to the transfer of research results to an industrial setting.

The symposium "Aspect-Oriented Language Concepts and their Application to Industrial Systems" contributes to an exchange of expertise in the field of Aspect Oriented Programming (AOP). For attendees who are interested in the concepts and applicability of AOP, but do not have sufficient background, a short tutorial will be given just before the start of the symposium.

In the morning session, top researchers in the field of AOP will discuss new insights, share their experience in the application of AOP to practical applications, and will discuss the important trade-offs among software quality attributes when designing and applying AOP languages.

Registration

You may register on site or at the symposium website at <http://trese.cs.utwente.nl/workshops/ALCAIS>

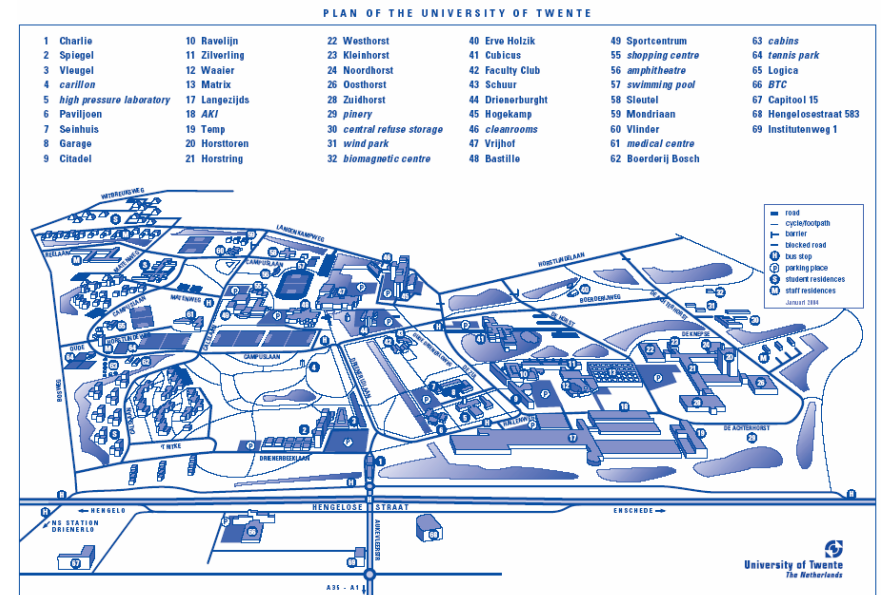
Registration fee:

- Companies 195 euro
- Universities 75 euro
- Students Free

The fee includes coffee, tea, lunch, and a copy of the thesis titled "On the Design of Aspect-Oriented Composition Models for Software Evolution". Students are not provided with the lunch and the copy of the thesis.

Venue

The symposium is held at de Waaier 3, Univeristy of Twente, Enschede, in the Waaier building no. 12 on the map below.



More details can be found at

<http://www.utwente.nl/dienstverlening/route/>

Panel

Topic

Industrial application of the Aspect-Oriented Technology

Panelists

Mehmet Akşit (moderator) – Theo D’Hondt – Mario Sudholt – Tom Tourwé – Remco van Engelen – Lodewijk Bergmans

Position Statements

Each panelist will present a short position statement followed by discussion.

Questions

During lunch participants can submit written questions to the panel.

Contact Information

Mehmet Akşit – *Software Engineering, University of Twente – The Netherlands* – m.aksit@ewi.utwente.nl

Lodewijk Bergmans – *Software Engineering, University of Twente – The Netherlands* – bergmans@ewi.utwente.nl

Theo D’Hondt – *Vrije Universiteit Brussel – Belgium* – tjdhondt@vub.ac.be

Pascal Dürr – *Software Engineering, University of Twente – The Netherlands* – durr@ewi.utwente.nl

Remco van Engelen – *ASML – The Netherlands* – Remco.van.Engelen@asml.com

Gürcan Güleşir – *Software Engineering – University of Twente – The Netherlands* – g.gulesir@ewi.utwente.nl

István Nagy – *Software Engineering, University of Twente – The Netherlands* – nagyist@ewi.utwente.nl

Mario Südholt – *OBASCO group, École des Mines de Nantes/INRIA – France* – Mario.sudholt@emn.fr

Tom Tourwé – *CWI – The Netherlands* – tom.tourwe@cwi.nl

In the afternoon session, the focus is more on the transfer of the concepts and solutions to an industrial context: how can the research results be made practical, a case study on applying an aspect to large scale software, and a talk about the planned introduction of aspects in the mainstream software development of ASML. The symposium will be concluded with an interactive panel discussing the benefits and obstacles of applying aspects in mainstream software development.

Theo D'Hondt
(Vrije Universiteit Brussel)

Title Aspects are a Frame of Mind

Abstract

In the 80-ies and 90-ies objects were used in totally inappropriate settings. Because object oriented programming is a frame of mind. Before that, the same was true of for instance recursion; and today the same can be said for aspects. That is because although a particular paradigm can benefit from a dedicated technology, it does not require this technology and neither is it diminished by its absence.

That aspect oriented programming is definitely a frame of mind will be illustrated by means of a software feature that is definitely cross-cutting: garbage collection. The way that a memory manager is interwoven with the code of a simple language interpreter - both statically and dynamically requires an approach that is reflected in many a modern aspect language. But generally available aspect weavers are too coarse for the kind of fine-tuning that garbage collection requires, so the memory management code crosscutting a language interpreter is introduced by hand. We will illustrate how an aspect frame of mind proves to be an asset in such a process.

Remco van Engelen
(ASML)

Title
Introducing AOP in industrial software development

Abstract

ASML is planning to introduce AOP in it's product software development before the end of this year. I will explain the reasons and process for doing so, give some examples of the cross-cutting concerns ASML intends to use AOP for, and address some of the concerns and challenges surrounding this introduction. Some of the notable unique properties of this introduction are the fact that most software at ASML is written in C, hence tooling for AOP in a C context needs to be developed, and that a significant part of the software will be migrated to use AOP, an estimated 2 million lines of source code.

Tom Tourwé
(CWI)

Title
Discovering Faults in Idiom Based Exception Handling

Abstract
In this paper, we analyse the exception handling mechanism of a state-of-the-art industrial embedded software system. Like many systems implemented in classic programming languages, our subject system uses the popular return-code idiom for dealing with exceptions.

Our goal is to evaluate the fault-proneness of this idiom, and we therefore present a characterisation of the idiom, a fault model accompanied by an analysis tool, and empirical data. Our findings show that the idiom is indeed fault prone, but that a simple solution can lead to significant improvements.

Mario Südholt
(École des Mines de Nantes-INRIA)

Title
Support for Aspects in Legacy Applications using Event-based AOP

Abstract
The adoption of AOSD as a software engineering methodology, in particular in industrial contexts, largely depends on appropriate aspect languages for the concise expression of crosscutting functionality in legacy applications. Current aspect technology, as exemplified by AspectJ, does not always support such concise aspect definitions, especially because of a lack of facilities for the expression of relationships between execution points relevant to such functionalities.

In this talk we motivate the usefulness of aspect languages geared towards the direct formulation of such relationships, give an overview of a such an aspect model, Event-based AOP, and corresponding implementation techniques, and present different applications of this model in industrial settings, in contexts based on Java as well as C/C++.

István Nagy
(University of Twente)

Title

On The Design of Aspect-Oriented Composition Models for Software Evolution

Abstract

Aspect-oriented programming is an emerging approach in software development, which provides new possibilities for separation of concerns. Aspect-oriented languages offer language mechanisms for the implementation of concerns whose modularization cannot be achieved by using traditional programming languages. The separated concerns in software must be composed together so that software behaves according to its requirements in a coherent way. We refer to language mechanisms that separate and compose concerns as 'composition mechanisms'. In this talk, we analyze some of the composition mechanisms of current aspect-oriented languages and propose new ones so that programs written using these mechanisms can improve with respect to software quality attributes such as, adaptability, evolvability, comprehensibility, etc. However, designing a new composition mechanism is a complex task; it requires balancing the tradeoffs among the above described software quality attributes. In this presentation, we show guidelines and techniques that may help in the design of adaptable composition mechanisms. We also present the software quality trade-offs that may arise when applying these techniques.

Gürcan Güleşir & Pascal Dürr
(University of Twente)

Title

Applying AOP in Industry; an Academic Perspective

Abstract

In this talk we report on a successful application of AOP in industry, in particular ASML. Our primary focus is on the "bridge" we established between the academic solutions and the industrial application of them.

We addressed the following crosscutting concerns; State Updating, Tracing, Profiling and Reflective Information. The "state updating" concern deals with sending stimulus to state charts, which triggers transitions. The stimuli has a context-specific nature; hence they are highly tangled with base functionality.

Due to this nature, we had to transfer the solution in a step-by-step and iterative manner. We call this an evolutionary approach. The Tracing, Profiling and Reflective Information are highly scattered and replicated crosscutting concerns. In contrast to State Updating, they are less tangled and less context dependent, hence a one-step approach was used to transfer the solution of these concerns. We call this a revolutionary approach. In this talk we explain both approaches and the benefits and costs associated with them.