Industry Visit Report: Ericsson AB, Stockholm

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Introduction

During 2006, I have spent approximately 1-2 days/week at Ericsson AB in Älvsjö, Stockholm. The site in Älvsjö is, among other things, responsible for the development and the maintenance of the software in the AXE exchange system. Ericsson as a company shouldn't need any further introduction.

The project that I am involved in, deals with adapting software written for sequential architectures to parallel hardware. This is carried out together with people from Ericsson, and I also have two of my (assistant) supervisors at the company.

The purpose of my visits

My visits to Ericsson started 2004 with the purpose to document (by a formal semantics) the language PLEX, which is used to program the functionality in the AXE system. This work was carried out together with my supervisors at Ericsson, and described in a previous Industry Visit Report [1].

The visits has continued during 2006, with inspection of the current software in order to get an opinion on how well the existing code is suitable for parallel processing, i.e., by trying to identify those parts of the software that are suitable candidates for concurrent processing. To determine this, we have looked at how the shared variables in the system are used, and if there are any potential problems/conflicts. A previous master thesis project [1] discussed this in general terms, but did not perform the necessary inspections.

The result of our studies was planned to be published during this fall, but the inspection has been far more time-consuming than we first expected, and the planned Technical Report (and a corresponding conference/workshop paper) has been postponed until this spring.

References

[1] B. Lindell. Analysis of reentrancy and problems of data interference in the parallel execution of a multi processor AXE-APZ system. Master's thesis, Mälardalen University, 2003.

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[1]http://www.artes.uu.se/mobility/industri/ind_ericsson-2005_JL.pdf

ARTES++ Travel Report to AAE'07

Advanced Automotive Electronics Technical Conference and Exhibition, 31st January 2007 at Heritage Motor Centre, Gaydon, United Kingdom.

About the event

The second Advanced Automotive Electronics, one-day technical conference and exhibition was held at the Heritage Motor Centre at Gaydon a part of Warwick county also known as the County of Shakespere, on 31st January 2007. This event was an essential diary date for every engineer, project leader and technical management professional involved in automotive electronic system design and development.

Comprehensive, practical and authoritative, the conference directly addressed specialist information needs. Selected by an independent judging panel of experts from within the industry, the seminar program was timetabled into three complimentary tracks, enabling the visitor to build ones own itinerary to meet his/her particular professional requirements. The conference papers were highly technical, but with practical applications in mind.

An integral part of the event, the aae07 exhibition featured a broad range of suppliers of automotive electronics solutions. Within the exclusive surroundings (see the picture below) of the Heritage Motor Centre, all visitors were able to investigate an extensive array of technology and services from these market-leading organizations and discuss their specific project needs throughout the day.

My contribution and experience

I presented my paper whose title was "*Dynamically sef reconfigurable automotive systems*". I was alloted 25 minutes time which, in my opinion was very short to introduce the different aspects of my project that I was presenting. The conference started with keynote speech by Mr. Alan Benett, the Chief Engineer of Auston Martin which was followed by a presentation of a paper "*Consumer Preferences and Attitudes Towards Navigation Systems in Europe*". Both of these persons mentioned the need for incorporating consumer electronic devices such as mobile phones and laptops along with the requirement of better technology than existing ones such as AUTOSAR and FlexRay

for dynamic reconfiguration of real time systems. I was very pleased to know and present that I am part of one of the first groups, who are working on these current as well as future requirements.

Relevance and Conclusion

The title of conference and exhibiton, at first glance does not seem to be relevant for real time systems, but if one go through the proceedings and the presentaion, he/she will realize its relevance as the future automtive vehicles which this event was all about, will be distributed real time systems. This was my first publication and also the first step towards my PhD. It has boosted my morale.

ARTES++ Travel Report to ACM MM 2006

Ni, Pengpeng

Jan. 2007

1 Introduction

The ACM Multimedia conference is the premier international multimedia conference. It is held annually, and covers all aspects of multimedia computing from underlying technologies to applications, theory to practice, and servers to networks to devices. It provides a perfect forum for communications among researchers from both academia and industry.

2 Conference program

In 2006, the conference was held in Santa Barbara, US. The topics of its interest included context-aware multimedia communications, peer-to-peer streaming, audio/video streaming, multimedia content distribution, wireless multimedia, adaptive support for scalable media,multimedia servers, operating systems, middleware and QoS.

Besides the main conference, where full technical research paper and short working progress paper were presented, the conference program included also tutorials, workshops, exhibitions covering various issues.

Those conference events were scheduled in parallel during about a week. But various topics were classified into three main research groups such as Content based information retrieval, Multimedia applications and System. Presentations in each group were organized in sequence. Collision could happen when your interest cross those slightly different areas.

3 My contribution

My contribution to this conference was a shot paper titled *User friendly H.264 for Remote video browsing*. I got the opportunity to interactively present my research idea and my research has gained some interests already during the conference time.

In addition, as the first conference I attended since my PHD study, this was a very good chance for me to broaden my sight in the enormous area of multimedia. I have

also learned a lot from other researchers' experiences. Moreover, some advanced techniques developed in other areas will probably benefit to my research or the broadcast industry(in where I do my current job). Examples are such as automatic video segmentation and classification etc.

4 Conclusion

ACM MM is a right conference for my own research interests, and the quality of the accepted papers is in general good, for example,the acceptance rate of ACM MM 2006 Short Papers was about 35percent. And there were 180 short papers submissions in 2006.

I was motivated a lot by the conference experience, and I definitely agree on the value of attending relevant conference as a researcher. However, time is running away and the submission of the corresponding full paper is somehow influenced by activities such as preparation, traveling and others.

ARTES++ Travel Report

CASTNESS school and workshop, Jan. 15 to 19, 2007 - Rome, Italy

Marcelo Santos[1], PhD. Student at MRTC, Mälardalen University

Purpose of Travel

The purpose of the trip was to attend the CASTNESS workshop and school. The CASTNESS (Computing Architectures and Software Tools for Numerical Embedded Scalable Systems) took place from 15th to 17th January 2007 in Rome, Italy, at the La Sapienza university, Physics department. The event was promoted by SHAPES (Scalable Software Hardware Architecture Platform for Embedded Systems) and ARTIST2. The objective of the event was cross-dissemination among SHAPES, projects like SARC and AETHER, HARTES, the APE Massive Parallel Processor initiative, and the academic and industrial research community sharing the topics addressed by those projects.

Activities

In the first day the workshop took place: the whole day was composed of 20 minutes talks from senior academic and industrial researchers and european/national research officers. In the second and third days it was the time for the school. It was composed of 2 hours in depth lessons about current research activities on exploration/generation tools of system software and hardware, with emphasis in software and analysis, focusing on tools and methodologies for automated generation of System Software. Particular interisting were the seminars by Peter Marwedel "Get Rid of Caches: Compiler Techniques for Scratch-pads" and Lothar Thiele's modular performance analysis and real-time calculus.

Travel support

The trip was supported by grants from ARTES (approx. 5000 SEK) and the ARTIST2 network of excelence.

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ARTES++ Travel Report

MOTIVES winter school, Feb. 19 to 23, 2007 - Trento, Italy
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Motivation

Motive winter school was held in Trento, Italy. The purpose of the school is to bring both young researchers who are working or want to work in modelling, validation, synthesis and performance analysis of embedded systems, and engineers from industry with a practical background in design, control and testing of embedded systems.

The main tracks during the five days were,
- Modelling and Design of Heterogeneous Systems
- Model Transformation and UML
- Static Analysis for Safety and Performance
- Schedulability and Controller Synthesis
- Testing and Run-Time Verification

Highlights

There were many interesting lectures such as,
- Contract-based Scheduling: An Overview of the Results of the FIRST EU Project by Giuseppe Lipari.
- UML for scheduling Analysis by julio Medina.
- Optimal Scheduling and Controller Synthesis **by** Kim Larsen.

In addition, it was interesting to listen to other lectures even though they were not related to my research.
I met many PhD students and researchers from different research centres and I think that was one of the most useful things in that school.
Unfortunately, some talkers were not well prepared to give their talks and other didn't attend!

Industry visit at Volvo 3P

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March 2, 2007

1   Introduction

During a week in June 2006 a visit at Volvo 3P in Gothenburg was done. Volvo 3P is a division within Volvo AB and is responsible for product planning, product development, purchasing and product range management for the three truck brands, Volvo, Renault and Mack.

2   Purpose of visit

The purpose of the visit was the get to know the company and also try to understand the complex automotive industry. To get this knowledge both about the industry and the company we met with employees from many different areas. We also made a one day visit at the production plant to see what and how vehicles are manufactured. Another purpose with the visit was to get to know persons within the company to get easier access to information and projects related to the research. This is important since much of the research will be based on interviews where the trust of the respondent is crucial to be successful.

3   Outcome of visit

We learned several things about the automotive industry that are hard or even impossible to accomplish without actually talking and meeting with people working there. The insight gained will prove valuable for upcoming research and motivate us even further. A more detailed report will be provided to the company.

ARTES Travel Report

ARTIST2 Winter School 2007

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Introduction

ARTIST2 Network of Excellence organized a Winter School, this year held in Trento, northern Italy. Lectures on a selection of different topics where held by both industry and leading researchers. The five day Winter Schools aim was towards new researcher within the interesting areas of modelling, synthesis and performance analysis of embedded systems. There where a lot of interesting people from almost all parts of the world present.

Contents

The major areas presented during the lectures was,

- Modeling and Design of Heterogeneous Systems
- Model Transformation and UML
- Static Analysis for Safety and Performance
- Schedulability and Controller Synthesis
- Testing and Run-Time Verification

For me the highlights were,

- Kim Larsen from Aalborg University, presenting Optimal Scheduling and Controller Synthesis.
- Giuseppe Lipari from Sant'Anna Pisa, presenting Contract-based Scheduling: An Overview of the Results of the FIRST EU Project.
- Roberto Passerone Trento, presenting Interface and component-based design for heterogeneous systems.

I was looking forward to Joseph Sifakis presentation on Component-based Construction of Real-Time Systems, but he was unfortunately sick.

Accommodation and activities

The school was held in the very nice city of Trento is located in the northern mountain areas of Italy. The accommodation was excellent, based on the same place as the lectures high up on the mountain side with an enormous view of the valley. We made a joint trip to a local winery where we learned the basics about wine making and we also had a delicious dinner where we tasted different types of wine. To travel in Italy was no problem if you are not afraid of high taxi speeds.

Figure 1 Not such a bad view from the balcony of my room ….

Report from industry visits at CC-Systems in Alfta

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Introduction

CC-Systems supplies control systems and computers for industrial applications with the main focus on onboard computers for heavy vehicles. During 2005 and 2006 I have made regular visits to CC-Systems in Alfta. The purpose of the visits has been to discuss the possibilities of using FPGA-technology in the CC-pilot vehicle computers and display units, and to present results related to this work.

The Project

The CC-pilot is a line of onboard computers for industrial vehicles and other rough environments. With a wide range of deployment platforms ranging from transport vehicles to forestry machines and military vehicles, the CC-Pilot computers are required to provide many different communication interfaces and other connection possibilities for external devices. In addition to the interfaces found on normal personal computers the CC-Pilot provide CAN-bus interfaces and analog video inputs.

The work conducted with CC-Systems has focused on using FPGA-technology to implement some of the communication and peripheral devices used in the CC-Pilot systems. During 2006 the work has mainly focused on the design of an FPGA based pre-processor and display controller for real-time video. The purpose of the video pre-processor is to allow display of multiple real-time video sources together with information provided by the CPU.

The work started with a design space exploration of the pre-processor, where the memory requirements for different implementation alternatives were investigated [1]. Recently the project has resulted in a video pre-processor implementation with limited support for scaling of the output video frame[2]. Future plans for the project involves design and implementation of a FPGA-based video enabled display unit for applications with relatively low computational requirements.

References

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[2]   N. Lepistö, N. Lawal, M. O'Nils "Implementation of a Video Pre-Processor for an FPGA based SoC, **Submitted** to Workshop on Rapid System Prototyping 2007

Travel Report
MOTIVES Winter School,
February 19-23, 2007, Trento, Italy

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MOTIVES Winter School

ARTIST2 Winter School on modelling, validation, synthesis and performance analysis of embedded systems, was held in Trento, Italy on February 19-23, 2007.

The 5-day winter school covered following topics:
- Modeling and Design of Heterogeneous Systems
- Model Transformation and UML
- Static Analysis for Safety and Performance
- Schedulability and Controller Synthesis
- Testing and Run-Time Verification

Even though some of these topics are not directly related to my research area, my overall impression for this Winter School is positive and it was interesting to see the research challenges in these areas. Furthermore I met many researchers from all around the world.

Day 4 (Schedulability and Controller Synthesis) was the most interesting day for me with the talks from Joost-Pieter Katoen, Kim Larsen and Guiseppe Lipari. Titles of their talks were:
- **Joost-Pieter Katoen** - Soft Real Time Scheduling and Quality of Service
- **Kim Larsen** - Optimal Scheduling and Controller Synthesis
- **Guiseppe Lipari** - Contract-based Scheduling: An Overview of the Results of the FIRST EU Project

View from the hotel where the winter school took place

ARTES++ Travel Report

MOTIVES winter school, Feb. 19 to 23, 2007 - Trento, Italy

Marcelo Santos[1], PhD. Student at MRTC, Mälardalen University

Purpose of Travel

The purpose of the trip was to attent the MOTIVES winter school. The MO-TIVES (MOdelling, TestIng, and Verification for Embedded Systems) winter school is an ARTIST2 event and took place at the conference center Panorama, Trento, Italy, from February 19 to 23, 2007. The main topic for the school is modelling, validation, synthesis and performance analysis of embedded systems. Each day was dedicated to the following themes:

- Modeling and Design of Heterogeneous Systems

- Model Transformation and UML

- Static Analysis for Safety and Performance

- Schedulability and Controller Synthesis

- Testing and Run-Time Verification

Activities

As I have started the PhD research a few months ago, the themes were inter-esting to me as they are almost all related to my research proposal (worst case execution time analysis of component-based embedded systems). Some talks and sessions were particularly interesting. In the Model Transformation session, they talked about graph transformation systems and their application, but none to component embedded systems (I think it would be interesting to investigate how such techniques can aid the formal analysis of software composition). The other more interesting session for my research group (WCET) was static analysis ses-sion (where Prof. Wilhelm gave a very good view of the problems with cache memory and pipeline) and the program analysis session, where there were talks about applying this formalism for analysis in security, floating point operations and communication systems.

Travel support

The trip was supported by a grant from ARTES (approx. 10100 SEK).

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ARTES ++ Travel Report
MOTIVES Winter School,
February 19-23, 2007 Trento, Italy

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Motivation

The purpose of the trip was to participate in a MOTIVES winter school where lectures were given by leading scientific and industrial experts. The school covered a selection of different topics such as: modeling, validation, synthesis and performance analysis of embedded systems.

Each day of the 5-day school covered one of the following tracks
- Modeling and Design of Heterogeneous Systems
- Model Transformation and UML
- Static Analysis for Safety and Performance
- Schedualability and Controller Synthesis
- Testing and Run-Time Verification

Highlights

Although not all of the topics of the school were directly connected to my research area, I found especially interesting the first two days of the lectures.
For me the highlights were
- Roberto Passerone from University of Trento, presenting Interface and component-based design for heterogeneous systems
- Wang Yi from Uppsala University, presenting Schedualability analysis of Timed Systems
- Reiko Heckel from University of Leicester, presenting Foundations of Model Transformation

Activities

The lectures were taught in the conference center Panorama, which was located on a top of a hill, overlooking the city of Trento. The view up from there was breathtaking. During the stay it was as well organized a social dinner in a local winery where we could taste four types of wine.

ARTES++ Travel Report
MOTIVES Winter School, February 19-23, 2007, Trento, Italy

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ARTIST2 Winter School on modeling, validation, synthesis and performance analysis of embedded systems, was held in Trento, Italy on February 19-23, 2007.

The 5-day winter school covered following topics:

- Modeling and Design of Heterogeneous Systems
- Model Transformation and UML
- Static Analysis for Safety and Performance
- Schedulability and Controller Synthesis
- Testing and Run-Time Verification

The topics of the school were rather interesting, though I particularly liked the first and the fourth days. Part of my work was presented by my supervisor, Wang Yi, during the second day. During the first day there were lectures about component based approach to modeling and verification of timed systems.

The fourth day concerned topics of my direct interest, namely schedulability analysis and controller synthesis. It was an interesting question session followed by an offline discussion on priced automata vs. arrival curves after the talk of Kim Larsen.

The venue of the school was very spectacular; the conference center is located on the top of the mountain right above Trento downtown. I have met many PhD students and we have had fruitful discussions during the brakes, over lunch and at the social dinner.

The view from the conference center terrace.

Report from ETAPS'07

I have attended ETAPS'07 (mainly FOSSACS'07 conference), which was held in Braga, Portugal, at the end of March 2007. I have presented the paper **Sampled Universality of Timed Automata** (joint work with Parosh Abdulla and Wang Yi) there. During the conference, there were many opportunities to discuss with the other participating members of the real time community. These discussions were very inspirational for my future research.

The presented paper in the real-time area were mainly focused on analysis of timed automata model (complexity, decidability), usually with restricted number of clocks. Another area was duration calculus, two papers presented by Martin Fraenzle (decidability results for extensions of the duration calculus) and Paritosh Pandya (sampling abstractions).

The most interesting invited talk presented a tool called Spec# (developed by Microsoft Research) which gives a support to a programmer while writing a program. The programmer can annotate the code with invariants, pre- and postconditions, ownership information, ... and the theorem prover checks (during the process of writing) whether some of the annotations are violated. A wide acceptance of such a programming standard supported by such tools would significantly improve the quality of the produced code.

Pavel

ARTES++ Travel Report

ETAPS Conference, Mar. 24 to Apr. 1, 2007 - Braga, Portugal

Marcelo Santos[1], PhD. Student at MRTC, Mälardalen University

Purpose of Travel

The purpose of the trip was to attent the European Joint Conferences on Theory and Practice of Software (ETAPS) and the satellite workshop about software composition (SC). The ETAPS event was established in 1998, is a confederation of five main annual conferences, accompanied by satellite workshops and other events and took place from March 24 - April 1, 2007, in Braga, Portugal. The goal of SC 2007 was to develop a better understanding of how we build and maintain large software systems, and thereby to build the body of knowledge and experience in software composition. It took place on on the first two days of the ETAPS event.

Activities

There were many interesting parallel seminars taking place, and it was hard to make a choice. The software composition workshop took place at the Minho University, and the conferences at the superb Teatro Circo. A new interesting topic in the SC event was Composition by Anonymous Third Parties (Farhad Arbab, CWI, The Netherlands) where Reo, a coordernation language for composition, was presented. Several other seminars talking about some aspect of software composition were also presented. In the conference, the Compiler Construction session had several interesting seminars, like Program Analysis and Timed Automata in the session Foundations of Software Science and Computation Structures.

Travel support

The trip was supported by a grant from ARTES (approx. 11000 SEK).

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A short summary of my time at University of Virginia, VA, USA

05.30 on June 28th 2006 a very tired family consisting of Marcus, Ulrika, Rebecca and Alexander Brohede were done with the check in at the Landvetter airport. An approximately 12 hour long flight (including stops) to the big country in the west was about to get started. Once the plane was in the air, taking us towards London and then onwards to Washington DC my wife and I laughed and told ourselves that we were crazy to take to small children across the earth for a four month long stay. We had found a place to stay at on the Internet and the landlords would meet us at the airport. They had promised to sell us their old car, a Toyota mini van. Our only means to contact them was a cell phone number and if they did not show up we would be stuck at Dulles International Airport with two kids, 5 and 3 years old. Maybe it was not so strange after all to be nervous.

After the long flight with absolutely no problems at all we finally arrived to the US. Gary Pennet (the landlord) met us at the airport and he and his wife to great care of us. The bought us Pizza and told us all about the practical stuff we needed to know about the car we bought and the townhouse we were renting. It turned out that we really struck gold concerning accommodations and car purchase. The Pennets were very friendly and helpful throughout our entire stay in the US, for example, Susan Pennet bought a booster seat for Alexander, our youngest son, to use.

Pizza at the Pennets

The accommodation in Charlottesville was excellent. We had, for example, access to a swimming pool and Ulrika, Rebecca and Alexander went there almost every day. I tried to use the pool when I got back from work. The kids, who did not know any English, got friends quickly. We got especially close to one family, the Smiths. We will keep in touch with the Smiths long after this trip. It feels like a life long friendship. Rebecca can still ask us if we can go to see Ezri and Kira, the two Smith girls.

Alexander & Rebecca playing and swimming.

I shared office with Leo Selavo, a post doc from Lithuania, during my four month stay at the University of Virginia. Leo, Jim (a PhD student from China), Gilles (a post doc from France) and I spent a lot of time together both at the office and socially. We discussed different research projects and research questions and I tried to participate in theory lunches when ever I could. On weekends and after office hours we met and did sports activities together.

Beach volleyball with some friends from UVA.

The project I carried out was to use my database architecture to connect MICAz motes and real-time simulations. The principal idea was to take sensor readings from one sensor that measured oxygen level and pulse. All readings should be stored in the distributed database and the simulator should read from the database. The results from the simulations should then also be stored into the database. Finally, this result should be propagated by the database's replication protocol to another MICAz mote that would give a nurse feedback on the patients situation and any potential future risks as indicated by the simulation.

My office at University of Virginia & a MICAz mote.

To evaluate our design we have implemented part of it as a proof of concept. The key features of our design is present in this implementation, i.e., we show the ability to sense the environment and to react based on the sensed data and simulated results based on the sensors. First we have collected vital signs (heart rate and blood oxygen level) data from volunteer persons. We then use this data in a replay fashion to achieve a scenario where the data represents a patient under examination without any risk to any real patients and with the ability to reproduce the scenario any number of times. Under normal operation the simulation application reads the sensor values that reside in the database every 10 seconds. Should something out of the ordinary occur, for example a spike in the heart rate or if the blood oxygen level suddenly begins to drop, the frequency of read readings will double to allow for a more fine grained data collection that the simulation application then uses as input. Should the patient's condition continue to decline the read frequency will increase until the maximum sample frequency has been reached.

A fixed time after a detected change in the vital signs pattern the simulation application will produce a suggestion on how to change the treatment of the patient. A nurse (or doctor) then can use this suggestion on how to continue to treat the patient and will get an improved situation knowledge to base such decision on. The suggestion in this simplified proof of concept would be of three different types, increase, remain, or decrease the amount of IV feed to the patient. If the suggestion is to increase or to decrease a suggested amount will also be presented.

The suggestion is displayed on a SeeMote, which is a special peripheral equipment that can be put on a MICAz mote. The SeeMote has a small LCD that can display the best and the second best course of action (as calculated by the simulation). As an extra feature a buzzer on a sensor board connected to a mote nearby the patient sounds an alarm if the pulse drops below 50 or if the oxygen level drops below 90. This will help to attract the attention of any nurses in the vicinity of the patient.

I did not have enough time to finish the project on site in US, and I am still working on the final part of the implementation. I did all the critical work at UVA and have good contact with key people should I run into problems with the implementation. The

outcome of my work is intended for a conference paper, preferably in the wireless sensor network community or the information fusion community.

The opportunity to see another research environment I value highly. To be able to spend four months in rather large research group (approximately 20 PhD, 2 Post Doc and 2 Professors) has made an impression on me and I am confident that my continued PhD studies will benefit from this experience. In the specific project that I carried out during my time at the University of Virginia I was able to collect sensor reading that I later on can use as input to one of my simulations. Something that I hope will be a substantial part of my thesis. The possibility to work with sensors and the programming of sensors I find invaluable and I also see the potential for future projects, some of which I am already working towards.

The building where I worked.

Finally, I would like to thank my sponsors for making this trip possible. I have as a researcher been able to broaden my network of contacts and gained a deeper knowledge in one of my primary subjects for my thesis. Furthermore, my family and I have had an experience of a lifetime in the US and we cannot wait to go back.

/Marcus Brohede

ARTES++ Travel Report to Mentor Graphics in Göteborg

About the workshop

The four day workshop was conducted by Mentor Graphics at their site in Göteborg. The purpose was to train personnel from automotive industry about the new Flexray protocol and the Mentor Graphics automotive softwares i.e. In vehicle software (IVS) and Volcano Target Package (VTP). This was followed by an introduction to future softwares by Mentor Graphics.

Relevance

I am doing my research in automotive embedded systems and currently I am involved in tool evaluation and development for dynamic middleware services. This was an opportunity for me to learn about the level of abstraction covered by tools from Mentor Graphics as well as tools from other companies as the training also included comparison between their software and the others manufactured by their competitors.

Experience and Conclusion

It was great experience to get some hands on experience on new softwares along with sightseeing of a beautiful city like Göteborg. I was interested in the software dealing with different networks such as CAN, LIN as well as industrial standards such as AUTOSAR and I got a lot of information about these during the visit.

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ARTES++ Travel Report to SELSE 3
2007 IEEE Workshop on Silicon Errors in Logic – System Effects

Daniel Skarin
April 27, 2007

1. Introduction

The third Workshop on Silicon Errors in Logic – System Effects (SELSE 3) was held at the University of Texas at Austin. Modern electronic devices are becoming more susceptible to soft errors, caused by reduced dimensions, higher clock frequencies, and lower operating voltages. SELSE was started to provide a forum to discuss system effects of soft errors and techniques to deal with soft errors. SELSE had this year expanded the scope to also include other forms of silicon errors than soft errors, e.g., wearout faults.

2. Technical Program

The technical program of SELSE 3 consisted of papers covering topics such as soft error characterization, wearout, error detection in processors, soft errors in memory, and system-level architecture. Two interesting panel discussions were held in addition to paper and poster presentations. I found one of the panel discussions, with the topic *"Silicon Errors in Modern Electronics: What are the Main Threats?"*, especially interesting. Panelists from academia and industry presented their view on which type of faults they expect to become the dominant cause of failures in future electronic circuits.

My contribution to the workshop was a paper titled *"Impact of Soft Errors in a Brake-by-Wire System"*, a joint work with Martin Sanfridson and my adviser, Professor Johan Karlsson. I received several questions and comments during the 30 minutes available for my presentation, feedback that will be of great value in our future work.

3. Conclusion

SELSE 3 had a technical program consisting of interesting presentations from academia as well as industry. Besides providing me with feedback of my work, the workshop gave me a better knowledge of areas close to mine, e.g., circuit-level error detection. SELSE provided an excellent forum to discuss the effects of silicon errors and different techniques to deal with these errors.

ARTES++ Travel Report to NeRES 2007

Networks for Reconfigurable Embedded Systems

Workshop in Aveiro, Portugal, April 2nd

About the Event

The NeRES workshop was a one-day informal workshop arranged in Aveiro, Portugal with participants from all over Europe.

The topic of the workshop was reconfigurable embedded systems – of which several different aspects were covered, both from an academic viewpoint and from the industrial perspective.

Several subtopics were the main focus of the workshop: motivations, interests and challenges of reconfigurability in distributed real-time embedded systems; network requirements to support reconfigurability in a safe way, adequacy of existing protocols and middlewares; real-time communication (including deducing further requirements) in highly flexible networks.

Diverse areas related to these areas were covered by the presentations – everything from middlewares and component models enabling reconfigurable networked systems, over networking technologies to sensor networks and challenges in industry.

My Contribution and Experiences

One of the twelve presentations held at the workshop was mine - I introduced the research my research group currently is involved in with the presentation "Dynamically Self-Configurable Automotive Systems". This research is very closely related to the topic of the workshop.

To me this was my very first international academic event, and it was very nice to have a chance to learn more about other researchers' approaches to reconfigurability in networked embedded systems.

Conclusion and Outcome

The event was very interesting and gave me a lot of new viewpoints on the research I'm currently doing. All of the presentations have since the workshop been put online on the webpage for the workshop. A jointly authored report will also be written about the conclusions and joint experiences from the workshop and be put on the workshop webpage.

Additionally, it was very nice to get a chance to see the Iberian Peninsula for the very first time. As I flew down to Portugal one day early I had a chance to enjoy a sunny warm spring's day in Lisbon before the event.

Magnus Persson
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NeRES 2007 website: http://www.artist-embedded.org/artist/Motivation-and-Goal.html

ARTES++ Travel Report to DSN 2007

The 37th Annual IEEE/IFIP International Conference on
Dependable Systems and Networks,
June 25-28th 2007

Carl Bergenhem
July 6th, 2007

1 DSN

Industry, business, infrastructure and individuals rely more and more upon systems and networks that integrate digital devices and communications with complex software and humans. These systems must maintain safety and confidentiality, be resilient to malicious attacks and accidental faults – it is essential that they deliver a service that is **dependable** in all respects.

DSN (Dependable Systems and Networks) is *the* annual international conference that directly addresses the requirement of dependability; presenting research and solutions, and posing new challenges. In 2007 the DSN conference will once again incorporate the Dependable Computing and Communications Symposium (DCCS) and the Performance and Dependability Symposium (PDS), together with workshops, tutorials, student forum, fast abstracts and an exhibition of tools and technologies. This years DSN contained 80 papers and corresponding presentations in the DCCS and PDS tracks and also papers and presentations in the student forum, fast abstract and several workshops taking place.

Solving problems with the presentation

2 Venue

DSN 2007 was held at the Edinburgh International Conference Centre and organised by Newcastle University, U.K. Edinburgh is the capital city of Scotland, and one of the most attractive cities in the UK. The city is situated along the "Firth of Forth"; the estuary or firth of Scotland's River Forth, which flows eastwards into the North Sea.

Edinburgh has convenient travel connections with Gothenburg. My travel arrangements consisted of a cheap Ryan Air flight to Prestwick (on the west coast) and train via Glasgow. As a UNESCO World Heritage Site, Edinburgh offers a vast range of cultural and historical attractions. These include: Edinburgh Castle, the Royal Mile, the new Scottish Parliament building, and the Queen's official residence in Scotland - Holyrood Palace; art galleries and museums abound, and of particular significance is the Scotch Whisky Heritage Centre.

3 Impressions

My general impression of the various speakers and their 30 minute presentations is that they are of the highest quality; well spoken, excellent slides and pedagogically conveyed topic. It is really a pleasure to see these presentations and also to read the corresponding papers. After all, the acceptance rate for the two main tracks (DCCS and PDS) is around 20%. This level of quality is definitely something to strive towards. However, in many situations the actual technical contribution does not seem to be high. It may be a new angle or incremental advance based on a known problem.

This leads to the question of what the essence of research is. The following may be considered.

1. Either research is the deep investigation of a particular hot topic and must always lead to a high advance of technology compared to the current state-of-the-art.
2. Or, that research is related to the writing process itself, methodology to perform the research itself, no matter on which subject, and the pedagogical proficiency to convey the knowledge. The proficiencies that are learnt in this view are, of course, timeless and applicable in any area; as opposed to the first view.

My view is that research should be firmly based on the second view but must also include elements of the first in order for the research to also be relevant. The research contributions at DSN generally fulfil both these goals, but the first goal may be questioned occasionally.

4 Thoughts and Conclusion

There were several gains of my visit to DSN 2007. As stated above, the main gain is the high quality of the contributions to the conference. They give inspiration for my own research and show the current hot topics in the area of which many are highly relevant for my own research. Then there is the chance to get to talk to other PhD students in the same area. Finally I also had good talks with my professor who attended DSN as a program committee member and session chair. Back home at Chalmers, there seems to be too little time for this type of informal discussions.

Together, the above reasons made the visit to DSN successful, even though I did not present a paper myself. Many thanks to ARTES for giving the grant for the trip!

Myself at the Forth bridge

Travel Report
International Conference on
Dependable Systems and Networks (DSN)
June 25-28, 2007, Edinburgh, UK

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DSN 2007

The 37th Annual IEEE/IFIP International Conference on Dependable Systems and Networks (DSN - 2007) was held in Edinburgh International Conference Centre, Edinburgh, UK on June 25-28, 2007.

There were several interesting presentations and workshops during the conference. However the conference was organized in many parallel sessions, therefore I could not attend all the interesting talks I wanted.

I attended some of the sessions of the Workshop on Architecting Dependable Systems (WADS) and some paper presentations in the main track. The following presentations were the most interesting ones for me:

On the Selection of Error Model(s) For OS Robustness Evaluation
Andréas Johansson, Neeraj Suri, Darmstadt University of Technology, Germany Brendan Murphy, Microsoft Research, Cambridge, UK

Foundations of Measurement Theory Applied to the Evaluation of Dependability Attributes
Andrea Bondavalli, Andrea Ceccarelli, Lorenzo Falai, University of Florence, Florence, Italy Michele Vadursi, University of Naples "Parthenope," Naples, Italy

As this conference is one of the most important ones in the broad field of *dependability*, this visit was a very good opportunity to meet and listen to the presentations of some of the world leading researchers in this area.

ARTES Travel Report to DSN 2007

The 37th Annual IEEE/IFIP International Conference on Dependable Systems and Networks

Raul Barbosa

June 29, 2007

1 Introduction

DSN is *the* flagship conference in the field of dependable computing. As such, it attracts a large number of scientists from all over the world. This year's edition took place in Edinburgh, Scotland, June 25–28.

The 2007 edition of DSN counted with the presence of 365 delegates both from academia and industry. As usual, this edition incorporated the Dependable Computing and Communications Symposium (DCCS) and the Performance and Dependability Symposium (PDS). Additionally, several workshops and tutorials took place in parallel with the main tracks.

2 Conference Program

The topics of interest for this conference encompass all aspects of dependability in systems that integrate digital devices and communications with complex software and humans. Consequently, there is a wide range of publication areas which address these issues by presenting new solutions, ongoing research and posing new challenges.

The opening ceremony of the conference was followed by a keynote speech by Professor Tony Hoare. The presentation, titled "Science and Engineering: a collusion on cultures", focused on the fruitful interaction between science and engineering. Though this interaction can be seen in almost all areas of research, the presentation illustrated the collusion of computer science and computer engineering on the research into program verification and systems' dependability.

Many interesting presentations took place during the following three conference days. Security protection, software and hardware fault tolerance, software assessment, distributed consensus, embedded systems and dependability modelling are a few examples

of the article sessions. Any researcher interested in this field should browse through the proceedings of DSN'07 to find the contributions to this year's conference.

3   Conclusion

The 2007 edition of DSN was an interesting reunion of people working in the dependability field. It was a great experience to meet fellow researchers and exchange research ideas which will certainly contribute to my future work. Moreover, attending a great number presentations always has a positive impact on our own ability to make good presentations. When a presentation is very good, we are inspired to improve our own; when a presentation is less good, we are inspired to make better ones.

ARTES++ Travel Report to ICSE'07

Peter Wallin & Andreas Hjertström
Mälardalen University

Introduction

The International Conference on Software Engineering (ICSE) is the most prestigious software engineering conference with over 600 participants. This year the conference was held in Minneapolis, USA. Before and after the main track several interesting workshops and tutorials were arranged. The range of the conference is very wide and includes almost all topics within software engineering such as modelling, testing, maintenance, design and debugging. There was special track on the Future of Software Engineering where invited speakers presented their concerns and thoughts for different domains where software engineering will play an important role in the future.

Contribution

Peter presented a paper called *Making Decisions in Integration of Automotive Software and Electronics: A Method Based on ATAM and AHP* at a workshop called Software Engineering for Automotive Systems (SEAS). An interesting workshop with lots of industrial influences where wrapped up with a nice dinner at a stake house.

We attended several of the interesting workshops and tutorials organized and found them very interesting. Due to the large range of presentations careful planning were needed to find the topics that best suited our research.

Wrapping it all up

We had a nice time in Minneapolis and can recommend the ICSE conference. It suits everyone involved in the software engineering area due to the wide range of topics and the quality of papers.

Minneapolis is quite close to the Canadian border but lacks mountains. It is so flat that Skåne seems like the Alps. Otherwise it is a very nice and clean city with the Mississippi river running through it. A must see if you go there is the Mall of America that is the largest shopping center in the States. It even has an amusement park in the middle.

ARTES++ Travel Report
19th Euromicro Conference on Real-Time Systems (ECRTS'07),
July 3-6 2007, Pisa (Italy)
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Motivation and Description

The purpose of this trip was to go to the 19th Euromicro Conference on Real-Time Systems (ECRTS'07) to present a paper in the Work-In-Progress session and also to attend the tutorial on MARTE. ECRTS is forum aiming at covering state-of-the-art research and development in real-time computing including applications, infrastructure and hardware, software technologies, and system design and analysis.

This conference week started with three satellite workshops and a tutorial done in parallel sessions:
- The Worst Case Execution Time Analysis workshop (WCET 2007).
- The Real-Time Networks workshop (RTN 2007).
- The Operating Systems Platforms for Embedded Real-Time Applications (OSPERT 2007).
- The Tutorial on MARTE: A New Standard for Modeling and Analysis of Real-Time and Embedded Systems.

Then the remaining of this week was split in eight sessions:
- Scheduling and schedulability Analysis
- Multiprocessor scheduling
- Control and energy management
- Wireless network scheduling
- Timing analysis
- Quality of service management
- Scheduling in networks and multicore platforms
- Fixed-priority scheduling

The main conference was held in the Scuola Superiore Sant'Anna, located in the heart of Pisa (in Italy) and, the workshops and the tutorial were in the RETIS Lab around 20min walk from the centre of Pisa.

Contributions

During the Work-In-Progress session, Séverine presented a paper entitled "*A Model-Based Framework for designing Embedded Real-Time Systems*". This paper describes a work-in-progress which aims at getting a common definition of what real-time components are as well as having a common structure (done as a Model-Based Framework) to specify and design those real-time components.

The Work-In-Progress session ended with an hour Poster session, which gave us a very good opportunity to have useful talks and comments on our work.

<u>Highlights</u>

As ECRTS is one of the leading conferences in Real-Time computing, many papers were very good and relevant. Among those and as our work is more focused on modeling, in our point of view, some talks were really interesting to listen to:

- The invited talk, *"From Model-Driven Development to Model-Driven Engineering"*, by Brian Selic in which he presented a state-of-the-art of the system development and the Jazz Platform, a scalable and extensible platform for collaborative development.
- The Tutorial on "MARTE: A New Standard for Modeling and Analysis of Real-Time and Embedded Systems" by Sébastien Gérard, Julio Medina and Dorina Petriu. This tutorial described in details this UML-profile which one of the main concerns addresses the modelling of time.

<u>Conclusion and Personal Impression</u>

In our opinion, our participation to ECRTS'07 was a very positive experience. Apart from being in a full of history environment (such as the nearby Piazza dei Miracoli with the famous Leaning Tower), this conference allowed us to meet many researchers of the Real-Time community, to listen to interesting talks and to get useful feedbacks on our work.

ARTES++ Travel Report
ECRTS 2007 July 4-6, 2007 Pisa, Italy
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ECRTS 07 conference

19th Euromicro Conference on Real-Time Systems (ECRTS 07) is a forum aimed at covering state-of-the-art research and development in real-time computing including applications, infrastructure and hardware, software technologies, and system design and analysis. The conference was held in Pisa, Italy.

In parallel with the conference there were 3 additional workshops and tutorials;

- WCET 2007: Worst Case Execution Time Analysis.
- RTN 2007: Real-Time Networks.
- OSPERT 2007: Operating Systems Platforms for Embedded Real-Time Applications.
- Tutorial on MARTE: A New Standard for Modeling and Analysis of Real-Time and Embedded Systems

We planed to attend the OSPERT 2007 workshop, but unfortunately due to a flight problem we missed some presentations, however the presentations that we attended were interesting.

Contributions

Moris' contribution to this conference was a work in progress paper titled **Independent Abstraction and Dynamic Slack Reclaiming in Hierarchical Real Time Open Systems**, and he gave a 5 minutes presentation. In this paper they showed the consequences of supporting independent abstraction on the CPU utilization. Independent abstraction is suitable for open systems where subsystems are developed and validated independently. They present their work in progress on dynamic slack reclamation, which keeps track of extra CPU allocations at run time. They are also investigating how to utilize those extra resources for supporting soft real-time tasks.

Huseyin's contribution to this conference was a work in progress paper titled **A Generalized Task Allocation Framework for Dependable Real-Time Systems.** This paper presents a framework which performs task allocation to the nodes of a distributed hardware under a wide range of allocation criteria.

There were many interesting papers and works, especially the following papers;
- **A Delay Composition Theorem for Real-Time Pipelines** by Praveen Jayachandran and Tarek Abdelzaher. This paper was selected as the best student paper. In this paper, they bound the end-to-end delay of a job in a multistage pipeline as a function of higher-priority job execution times on different stages.
- **The Global Feasibility and Schedulability of General Task Models on Multiprocessor Platforms** by Nathan Fisher and Sanjoy Baruah. In this paper, they derived near-optimal sufficient tests for determining whether a given collection of jobs can feasibly meet all deadlines upon a specified multiprocessor platform assuming job migration is permitted

- **On Controllability and Feasibility of Utilization Control in Distributed Real-Time Systems** by Xiaorui Wang, Yingming Chen, Chenyang Lu and Xenofon Koutsoukos. In this paper, they use the control approaches such as controllability and feasibility in to control multi-processor utilization of distributed real-time systems.

Our observation was that the following research topics **"Real time scheduling"** and "**multiprocessor scheduling"** are still popular in ECRTS while **wireless network scheduling** is getting more important.

Overall impression is that this conference was very good and useful and we have received many valuable comments during the poster session.
ECRTS is one of the most important European conferences in real time computing so it was a great opportunity to meet many researchers from several well known research groups.

Federated Events on Component-Based Software Engineering and Software Architecture (CompArch),

July 7-14, 2007 Boston, Massachusetts, USA

Aneta Vulgarakis & Séverine Sentilles

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Motivation

The purpose of the trip was to participate in the Federated Events on Component-Based Software Engineering and Software Architecture (CompArch) which took place in Boston, MA USA. The 5-day long CompArch 2007 brought together the 10th Int. Symposium on Component-Based Software Engineering (CBSE 2007), the 3rd Int. Conference on the Quality of Software Architectures (QoSA 2007) and the 3rd edition of a series of events investigating the Role of Software Architecture for Testing and Analysis (ROSATEA 2007). The aim of this federated event was to study the relationship between Software Architecture, Component-based Systems and Analysis, Quality and Testing. During CompArch 2007 it was as well organized a special industrial day where prominent industrial development managers and architects in Software Architecture and Component-based Software Engineering discussed and presented the latest trends in software modeling and design in leading software and software-intensive companies.

Highlights

As our research is in the CBSE field and the Int. Symposium on Component-Based Software Engineering is one of the most important events in the CBSE community, this visit was a very good opportunity to meet and listen to the presentations of some of the world leading researchers in this area. For the presentations there were allocated 20 min for longer papers and 10 min for shorter papers.

Activities

During the stay there were as well organized a social dinner and a night boat cruise. It has been a wonderful experience for us to see the night lights of the Boston skyscrapers from the ocean.

Travel Report from COMPSAC 2007

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20th Dec 2007

COMPSAC 2007 conference

COMPSAC is a major international forum for researchers, practitioners and managers interested in computer software and applications to discuss the state of art, new advances, and future trends in software technologies and practices. It was first held in Chicago in 1977. COMPSAC 2007 was held in Beijing from 23rd to 27th of July.

The conference program includes:
3 keynotes and 7 panel sections
6 tracks including 25 research and industry sections
2 doctoral symposium sections and 2 fast abstract sections
2 tutorials
14 workshops

Contribution

Ivica and I gave a tutorial entitled Emerging Technologies in Industrial Context: Component-Based and Service-Oriented Software Engineering. Component-based software engineering (CBSE) and service-oriented software engineering (SOSE) are two similar but distinguished approaches in software engineering. In this tutorial, we compare CBSE and SOSE and analyze them from different perspectives. We discuss the possibility of combining the strengths of the two paradigms.

ARTES++ Travel Report

Marcelo Santos[1], PhD. Student at MRTC, Mälardalen University

Purpose of Travel

The purpose of the trip was to attent ACACES 2007, the third International Summer School on Advanced Computer Architecture and Compilation for Embedded Systems, from July 15 to July 20, in L'Aquila, Italy. The school have broad scope and courses range from low level technological issues to advanced compilation techniques.

Activities

The school offered twelve courses, four lectures per day, with three courses running in parallel, so that each student could take four courses. I took the following:

1. Advanced Program Analyses for Object-oriented Systems, given by Barbara Ryder from Rutgers University, USA. This course presented program analysis (static and dynamic) for compilation and optimization, mainly analyzing the execution call structure of object oriented programs. The course covered some methods, with their costs and application domains;

2. Compilation Techniques for Embedded Systems, given by Jack Davidson from University of Virginia, USA. This course presented optmization needs for compilers for embedded systems, such as runtime performance, code size, memory performance, etc. It emphasized performance for speed, memory, energy and security requirements (for embedded systems);

3. Embedded VLIW Architectures and Compilers, given by Paolo Faraboschi from Hewlett Packard Laboratories, Spain. This course focused on low level issues involved in VLIW (very large instruction word) like cost, time to market, organization and design of the architecture, compilation, etc;

4. Memory Architecture Aware Compilation, given by Peter Marwedel from University of Dortmund, Germany. This course described the problem "memory wall", where the system speed is limited by the speed of the (slow) memory. The focus of the course was on how to optmize compilation to improve time-predictability and energy efficiency when the compilation is aware of the memory hierarchy. The focus was on scrach-pad memories.

Travel support

The trip was supported by a grant from ARTES (approx. 13000 SEK).

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Travel Report: RTCSA07 in Daegu, Korea

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A Travel Report in four "C" headings.

1 The Cause

The IEEE RTCSA conference is one of the leading conferences for Real-Time Systems, usually located in Asia. Many Asian researchers go to this conference, but also many Europeans and Americans participate. Me and my co-authors decided to submit our paper about a scalability approach for distributed real-time databases, "Virtual Full Replication by Adaptive Segmentation", and the paper was accepted as a full paper at the conference. A trip from Europe to Korea is quite expensive, compared to a trip to the US or a trip within Europe, why I applied for ARTES mobility support for this trip. The paper was finalized during my five-month visit in 2007 to University of Virginia, a visit that was co-financed by another grant from ARTES mobility support, and for which another Travel Report is available at ARTES.

2 The Country

The people in Korea seem to be very polite. The usual greeting when you meet unknown people is to quietly bow your head, not saying 'Hello', 'How are you?' or similar. In places that offer any kind of service, like hotels, shopping centers and at the railway, there are always employees just waiting to greet you. There is no tipping, but instead all service fees are included.

Korea develops very fast. In the conference I talked to a Korean man who lives in the US, and he claimed that the country changes every year. The country is densely populated, and it seems that many people in urban areas live in small flats in high buildings.

RTCSA07 was held in Daegu, in the south-east of Korea, and with high-speed train it's only 2 hours from Seoul in the north-west. The railway system seems very well organized in Korea, and fares are reasonable.

3 The Conference

The conference was held in a large conference center, "Hotel Inter-Burgo", large enough to host other conferences as well during the week, as well as wedding parties and a fashion show. This conference center has two different hotel buildings and offers as much as twelve different restaurants.

This year RTCSA offered three different tracks: Real-Time Systems, Ubiquitous Computing, and Embedded Systems. The track sessions were organized into two concurrent sessions, while the Keynote and Invited sessions were in common.

Many interesting papers were presented at the conference. Resource scheduling is still a popular subject in the real-time community. With the advent of multi-core processor a whole new branch of the subject has developed. This includes new scheduling approaches for processes, and new models for memory management. Power management is getting more important, and in particular for limited processors, such as used in wireless sensors. Being a real-time conference, RTCSA'07 also included presentations about analysis of real-time systems, distribution and collaboration, middleware and integration issues, fault tolerance approaches, and also had one session on real-time databases. Several papers in the conference had work connected to the medical domain.

At the Banquet, the Director of display applications at Samsung gave a long talk about the background and the upcoming technologies they intend to use. Much of it is about personalized media, both for tailored media consumption, but also for creation of personal content. Samsung is highly respected as a company in Korea, and the people seem very proud of having such a major consumer electronics company in the country.

At the last evening, conference participant could choose from a number of tours around Daegu. I went to the national museum and to a Buddhist temple area. We also had a visit to a cave with a Buddha statue, and finally a traditional Korean meal with many, many dishes.

4 The Conclusion

The RTCSA of 2007 was very nicely located and contained many interesting papers. It is an important conference to visit, if you regard yourself a part of the real-time community. Quite a few of the RTCSA visitors also went to the ECRTS real-time conference in Pisa, Italy, a month before this conference. I am happy to have presented my work at this conference, and I am also very satisfied with the feedback I got.

(Pictures are available at
http://picasaweb.google.com/gunnarmathiason/20070823DaeguRTCSA07)

ARTES++ Travel Report to RUNES Summer School
at University College London
9th – 11th July, 2007

About the summer school

The purpose of the summer school was to disseminate the technologies developed in the RUNES (Reconfigurable Ubiquitous Networked Embedded Systems, http://www.ist-runes.org/) project to scientists and engineers across Europe. The RUNES Summer School took place over three consecutive days in July 2007, with the first two comprising technical lectures and related hands-on programming seminars, while the third is self-contained and structured around the RUNES applications and the demonstrator. The aim was to broaden the students' appreciation for and interest in the field of networked embedded systems, while also extending their technical skills. In bringing students together from different parts of Europe, the RUNES Summer School also played an important role in strengthening the community in this field.

Relevance

I am doing my research in automotive embedded systems. Although at different platform and technology, the RUNES project addressed similar problems and constraints that we have in automotive embedded systems.

Experience and Conclusion

The hands on experience with wireless nodes and detailed knowledge of RUNES middleware will help me in my project, where I am involved in developing a middleware for dynamically reconfigurable automotive systems. Introduction to Contiki OS was also beneficial.
Security for better and secure utilization of communication resources is an important aspect of automotive systems as well. At the summer school, I also learned new security mechanisms to avoid the use of extra processing capabilities by a particular node in a network for power saving.

ARTES++ Travel Report to RUNES Summer school

Reconfigurable Ubiquitous Networked Embedded Systems

University College London, July 9-11

About the Event

The purpose of the RUNES summer school was to disseminate the technologies developed in the RUNES project (www.ist-runes.org) to scientists, engineers and students across Europe. The event took place over three days in July, the first two focusing on technical lectures combined with hands-on programming classes, while the third day was devoted to the usage of RUNES applications and demonstrators (and also targeted at a broader group than just computer engineers).

The program contained many different items – everything from information on the RUNES architecture and component model, via introduction to the Contiki OS used, to usage of encryption on embedded devices using hardware acceleration and data fusion. On the third day the presentations covered the applicability of wireless sensor networks to firefighting, an introduction to how firefighting is done, and finally a panel discussion on the opportunities and drawbacks of deploying technology like RUNES widely was held.

My Contribution and Experiences

I went to the event together with one of the other PhD students at my department, Tahir Naseer Qureshi, to learn more about the RUNES project and its results.

The RUNES summer school was a very interesting event for us to attend, even though the research I do isn't directly related to the research done within the RUNES project. Even though the RUNES project is more targeted on wireless sensor networks (and not automotive networks, as the two of us work on), the work they have done is still very relevant, as it is one of few embedded systems design from bottom up with reconfigurability in mind. This is an important common point of the area even if the application areas differ.

On the second day of the event, there was an opportunity for the participating students to present their own work. Together with Tahir, who also participated in the event, I introduced the work we do within the DySCAS project.

Conclusion and Outcome

All of the presentations, together with photos, have been put online on the webpage for the summer school (http://www.ist-runes.org/summer_school/). The event was very interesting and gave me a lot of new viewpoints on the research I'm currently doing, and I had the opportunity to meet a lot of PhD students from other parts of Europe involved in related research, mainly within the wireless sensor network community.

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Travel Report: University of Virginia

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1 Motivation

In the spring of 2007 I was given the opportunity for a five month visit the Department of Computer Science at University of Virginia (UVA). The Control Research Group has a long history of research in real-time databases, which is also the area of my thesis. Professor Sang H. Son acts as my thesis work co-advisor, and when the opportunity for a long stay came up, I was not late to respond to it. The aim of the visit was to continue pursue scalability problems in distributed real-time databases, to get extended advisor time, and to apply constraints given by Wireless Sensor Networks to my scheme for Virtual Full Replication in distributed real-time databases.

2 Research

The Control group is currently one of the strongest research groups in the world working with Wireless Sensor Networks (WSNs). The group consist of about 30 people, with three faculty people, a small group of post-docs, and PhD students.

The PhD students in the Control group work hard and long hours, although my impression is that they start later in the day compared to Europeans. The pressure to publish is very strong, and the support from the group in doing so is very elaborate. All known potential submission sites and dates are clearly communicated in the weekly meeting, and faculty is very direct and clear with which people may submit at the proposed dates. It is then up to the individual to take action to participate in tasks and work groups to get publications. In such groups, collaboration and effectiveness is emphasized. The work is shared and everybody is expected to contribute.

Faculty and advisors are highly involved in details of each student's work, and very distinct and supportive in their feedback. The feedback I got helped me a lot in focusing my research issues, approaches and evaluations. It is clear in the group that scientific work need to be highly interesting and bring novelty to excel in the competitive research world. Thus, both substance and presentations are usually of very high quality.

Often project work is connected to concrete usage scenarios, where the funding points the research in some direction that is useful for the funder. Projects and funding have a shorter time span, and requires more clear concrete results in terms of demonstrators and solutions. My impression is that American pragmatics plays a central role here. American PhD student conduct experiment and write papers. They are lightly or not at all involved in other department tasks or teaching. It is always a Professor that lectures at all course levels.

My impression is that every person need a very high personal motivation for his own success for driving his own progress forward. This is of course true for every PhD project, but the American self-made man attitude is very present, and also necessary. The PhD work is probably harder in the US, but also more rewarding. It is hard to think that US PhD student have much family life during their PhD project years.

3 Environment

University of Virginia has a long history and was founded by President Thomas Jefferson. People are, and should be, very proud of his heritage. The University and the surroundings are very nice and Charlottesville has been appointed the best place to live in the US, for several years. UVA is a large University with their own Police corps, Daily newspaper, and a Bus system. The transport and parking organization is large, since parking is an important issue due to limited parking space and the fact that most people drive to work. Living at the city border, commuting by bus from home was not possible for me. I got a parking permit for 'Blue parking' a mile away from the office, with a free 15 minute bus ride both in the morning and in the evening.

Americans are encouraging people. Most people in Virginia are very nice and open to others. Attending a church is very common and also quickly gives a social network that brings much good, in particular for me who went without my wife and children.

4 Results

During my stay I wrote two papers, which were accepted at RTCSA'07 and ECRTS'07 (WiP). The latter gave a de-tour to the ECRTS conference in Pisa, Italy, on the way back home from the visit. The papers published will be an important part of the substance of my Thesis.

During my stay I also got help in forming the Thesis layout and how to best use the content. The extended advisor time helped me found out the remaining work needed, and the time frame for it.

At the end of the visit I got the opportunity to visit George Mason University in Fairfax VA, to present the Information Fusion profile at University of Skövde together with Per Gustavsson from SAAB/University of Skvde. The presentation was well appreciated and is now available online (a pointer is given

on request).

5 Conclusions

The visit to University of Virginia has been very useful for me. The cost of administrational time to fund, setup, and actually carry out the trip with all the practical issues involved has been well spent in my opinion.

I have got a good time in Charlottesville, giving me many new friends, time to polish my (American) English, and invaluable experiences of seeing the American culture from the inside. I have learned to appreciate the US more, and I have seen how focused hard work pays off well in that society.

Finally, this trip gave my PhD work a good push forward, with two new publications accepted, and a good Thesis structure. The effort and the funding spent was well used and payed off for me.

Travel Report from Euromicro SEAA 2007

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20th Dec 2007

Euromicro SEAA 2007 conference

EUROMICRO SEAA conference brings together people from business, industry, research, and academia who are working in software engineering and information technology. The aim is to focus on innovative and advanced applications of software engineering. The conference was held in Lübeck, Germany from 28th to 31st of August.

The Conference offers several highlight keynote speeches:

- Semiconductor and EDA Challenges by Dr. CHI-FOON CHAN (President and Chief Operating Officer for Synopsys)
- Software Components and Software Architecture: Software Design on its Road to an Engineering Discipline By Prof. Dr. Ralf Reussner
- Grid Computing: Operating Large Distributed Infrastructures for Advanced Applications by Dr. Christian Grimm
- Design Without Borders by Prof. Jan M. Rabaey
- How good is a process: Evaluating Engineering Processes' Efficiency by Tom Gilb

There are three main conference tracks:
Component-Based Software Engineering (CBSE)
Multimedia and Telecommunications (MMTC)
Software Process and Product Improvement (SPPI)

Contribution

My contribution to the conference was to present a paper titled 'Component-Based and Service-Oriented Software Engineering: Key Concepts and Principles' which was written together with Magnus Larsson. In this paper, we present a comparison analysis framework of component-based and service-oriented software engineering and analyze them from a variety of perspectives. We discuss as well the possibility of combining the strengths of the two paradigms to meet non-functional requirements. The contribution of this paper is to clarify the characteristics of CBSE and SOSE, shorten the gap between them and bring the two worlds together so that researchers and practitioners become aware of essential issues of both paradigms and utilize them in a reasonable and complementary way.

ARTES++ Travel Report
First European-SouthAmerican School
for Embedded Systems

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Purpose of visit:
The purpose of the visit was to attend the First European-South American School for Embedded Systems that took place in Buenos Aires, Argentina between August 21 and 24 in 2007. The purpose of the school was to bring together the researches from Europe and South America in the field of embedded systems in order to establish and strengthen the relationships among these researchers.

Activities during the school:
Each day there was a lecture for two hours per lecturer for a total of 24 hours. The lectures were given by Joseph Sifakis, Gerhard Fohler and Luis Almeida in the following subjects:

- **Joseph Sifakis -** Component-based modeling of heterogeneous real-time systems:
  The topics covered in this lecture were:
    - Modeling Heterogeneous Real-Time Systems
    - Component-Based Construction
    - Composition of heterogeneous systems
    - Correctness by Construction
    - The BIP component framework
    - Applications: MPEG Video Encoder, Wireless Sensor networks
    - Research Directions and Open Issues
- **Gerhard Fohler -** Adaptive Real-time systems
  The topics covered in this lecture were:
    - Real-time, real-time systems
    - Types and properties of real-time systems
    - Scheduling of single and multiprocessor systems
    - Periodic and non periodic activities
    - Time triggered systems
    - QoS Management
- **Luis Almeida -** Networks for embedded control systems
  The topics covered in this lecture were:
    - Introduction to real-time communications
    - Issues on real-time communication
    - Paradigmatic protocols
    - The perspective of Control Applications
    - Trend towards flexible control systems

I have presented my ongoing research during allocated time for student presentations and exhibited a poster during the school. I have received valuable comments from other researchers.

ARTES Mobility Support Travel Report
RTCSA August 21-23, 2007, Daegu, Korea
Moris Behnam,
Mälardalen Real Time Research Center (MRTC)

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RTCSA 07 conference

The 13th IEEE International Conference on Embedded and Real-Time Computing Systems and Applications, tries to bring together researchers and developers from academia and industry for advancing the technology of embedded and real-time computing systems and applications. Three tracks were offered in this conference including Real time systems, Ubiquitous Computing and Embedded systems. Two parallel sessions were organized.

Contribution

My contribution to this conference was a paper titled **Real-Time Control and Scheduling Co-Design for Efficient Jitter Handling**. In this paper we propose an integrated approach for control design and real-time scheduling, suitable for both discrete-time and continuous-time controllers. It guarantees system performance by accepting a certain minimum value of jitter for control tasks and feasibly schedules them together with other tasks in the system. Results from comparison with other approaches from real-time and control theory domains underline the effectiveness of our method.
.
The following papers were interesting;

- **Contract-Based Reusable Worst-Case Execution Time Estimate.** *(selected as a best paper)*
  Johan Fredriksson, Thomas Nolte, Mikael Nolin, and Heinz Schmidt
- **An Approach to the Timing Analysis of Hierarchical Systems**
  Marco Panunzio and Tullio Vardanega
- **Networked Control Systems : Definition and Analysis of a Hybrid Priority Scheme for the Message Scheduling** *Guy Juanole and Gerard Mouney*
-

My overall impression is that this conference was good. The acceptance ratio for long papers is (29.6%) and for short papers (14.8%) out of 142 submitted papers, which shows that this conference is getting more important in real time community. More than halve of submissions where from Asia, so there were many Asian researchers at this conference.

ARTES ++ Travel report – ARTIST2 / UNU-IIST summer school 2007
Aug. 1st to 10th, 2007 – Suzhou, China

By Yue Lu [1], PhD student at MRTC, Mälardalens University, Västerås

Purpose of Travel

To attend the ARTIST2 / UNU-IIST 2007 summer school and seminars was the main purpose of the trip. The annual event is prompted by the ARTIST2 and UNU-IIST in order to provide the excellent opportunity of intercommunications and research collaborations between the Chinese academic and the European academic communities. The graduate courses are given by the European researchers. This year (2007), it took place on the 1st Aug and finished on the 10th Aug, in Suzhou, one beautiful and famous city in China. The department of Computer Science & Technology, at SooChow University was the host of this event.

Activities

Professors Luca Benini, Karl-Erik Arzen, Paul Caspi and Kim G.Larsen separately gave very interesting courses related to their research. Moreover, professors Wang Yi from Uppsala University (Sweden), Liu, Zhiming, John-Koo from China gave the talks about their relevant research on the seminars. I had some interesting discussions with Paul Caspi, e.g. computer theorem about the problem complexity of buffer optimization, Kim G.Larson e.g. heuristic verification, optimal scheduling related to Uppaal CORA etc. On the sixth day at the school, Mr. Zhou Chaochen, who is the Chinese academician, gave his presentation about sub-algebra and program verification before his 70 years birthday comes. Mr. Zhou showed us his professional and his enthusiasm to the research. At last, he gave the sincere encouragements to all the professors, researchers and PhD students joined the summer school. During my stay at Suzhou, I also had some interesting discussions with the local Chinese PhD students and abroad. Hopefully, there will be a number of collaborations among us in the future.

City

Suzhou is a very nice city, which was the capital of the Chinese South dynasty in the ancient time. It is famous for the silk and pearl necklace. I had dinner with friends at the Suzhou newly developing technology area, "Yuan Qu" which is besides the "Jin Ji" lake, where the Chinese movie ceremony (Chinese Hollywood) will be hold from next year to the endless. Enjoying the one of the most delicious food and beautiful landscape at night is the greatest moment in the life! It is a very nice place to visit after the hot and humid period passed, e.g. spring, autumn, even winter is preferable.

Travel Support

The trip is supported by the grants from ARTES++ (approx. 10,000 SEKs) and ARTIST2/UNU-IIST 2007 network of excellence.

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ARTES++ Travel report
Håkan Gustavsson, Mälardalen University

In brief

The main purpose of the conference was to present the paper "Coping with Variability in Automotive Product line Architectures Using Real Options" and to gain knowledge in the concept of software product lines. A software product line (SPL) is a set of software-intensive systems sharing a common, managed set of features that satisfy the specific needs of a particular market segment and that are developed from a common set of core assets in a prescribed way. This was the theme of the conference, which was discussed during one week at the Kyoto Research Park just outside Kyoto.

The conference

The visitors of the conference were a mixture of people from academia and Industry, even though most academic visitors had a strong industry coupling. Companies such as IBM, RICOH, Toshiba, NEC, Omron, Phillips and Mitsubishi had a strong presence; the automotive industry was represented by Bosch, Cummins and Scania. The author visited two tutorials, an introduction to SPL and one on the theme how to predict product line payoff with the method SIMPLE (see reference section). They were both very interesting, even if the SIMPLE method leaves a lot of open issues it is a good start. The paper was presented during the workshop "managing variability for software product lines" and was well received with interesting questions asked. During offline discussion it turned out that both SEI and Phillips medical are pursuing in the same research track and will publish a paper during SPLC2008.

Personal comments

The conference suited my field of interest very well and because of its small size (250persons) it provided an open atmosphere. I also believe the mix of industry with similar problem was very fascinating and stimulating.

References on the topic

Conference website:
http://sec.ipa.go.jp/SPLC2007/
http://www.lero.ie/SPLC2008
Introduction to product lines
http://www.sei.cmu.edu/productlines/
Tutorial to product lines similar to the one made by Linda Northrop at SPLC2007:
http://www.sei.cmu.edu/productlines/SPLKeynote.pdf

The simple website
https://simple.sei.cmu.edu/

Automotive project
http://www.esk.fraunhofer.de/projekte/automotive/mobilSoft2007.jsp

ReSIST Summer School 2007

Mikael Asplund

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December 21, 2007

1   Introduction

ReSIST is a European network of excellence with the objective "Towards a global dependability and security framework". On 24th-28th September 2007 the network members organized a summer school on the French island Porquerolles just outside Toulon that I attended. I was drawn by the excellent speakers such as Jean-Claude Laprie and Paulo Verissimo as well as the nice location in the Mediterranean Sea as a contrast to the cold Sweden at that time of the year.

2   Topic highlights

Resilience   The summerschool started very interesting with an introduction by Laprie on the term "Resilience". Apparently this was still a topic of debate among the network partners as not everyone agreed. In my view resilience seems to be more or less the same thing as dependability but with a slightly fancier image. But the distinction that Laprie wanted to make was that resilience also embodies the concept of change. His definition was as follows: "the persistence of dependability when facing functional, environmental, or technological evolutionary changes".

The human role   A most interesting talk by Alberto Pasquini discussed the importance of having a socio technical view when designing safety-critical systems. His example was the Uberlingen accident in 2002 where two airplanes crashed in mid-air dispite technical systems to prevent such events.

Design of resilient systems   Paulo Verissimo who now works mostly with security in distributed systems gave a nice tutorial on design. Again, I people were not entirely agreeing on the importance of malicous failures. Where Verissimo was arguing that the byzantine fault model was the only reasonable one, Laprie had earlier said that too much focus is on malicous fault on the expense of the much more common non-malicous faults.

Routers   Michael Behringer from CISCO gave a lecture on the challenges in adding security to routers. Apparently there is little one can do on high speed routers as there is such a vast amount of data that even the simplest algorithm takes so much processor resources that heating is a major problem.

3   Lessons learned

Overall the summer school was very rewarding in terms of insigths and connections. There were many interesing and nice people there and I hope to meet them again in conferences. One thing that might be interesting for fellow ARTES students is that a grant program was announced that was designed to allow young researches in Europe to travel and start cooporations in a small scale.

Kaj Hänninen

The visit

In September-07 I visited the group of Giuseppe Lipari and Giorgio Buttazzo at Scuola Superiore Sant'Anna in Pisa, Italy. Mr. Lipari gave a general presentation of Scuola Superiore Sant'Anna. He then presented some research performed by the group specializing on real-time systems. Lipari also presented his work on GRUB-PA, a resource reservation algorithm for power-aware scheduling of periodic and aperiodic real-time tasks. Paolo Gai gave an interesting talk about a spin off company called Evidence. Evidence develops firmware for embedded real-time systems.

I really enjoyed my visit to SSSA.

ARTES++ Travel Report
EMSOFT October 1-3, 2007, Salzburg, Austria
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EMSOFT 07 conference
EMSOFT is an annual ACM Conference on Embedded Systems Software sponsored by ACM. EMSOFT aims at covering all aspects of embedded software with focus on principles of embedded software development. EMSOFT07 was held in Salzburg, Austria, Oct. 1 – Oct. 3, 2007, within the Embedded Systems Week, which contains two other leading research conferences in embedded computing: CASES, CODES+ISSS. Besides, there were a number of workshops and tutorials affiliated with the main conferences.

In addition, there were two very interesting panels;
1. Grand Challenges in Embedded Software
2. Automotive Networks – Are New Busses and Gateways the Answer or Just Another Challenge?

Contribution
My contribution to this conference was a paper titled **A Synchronization Protocol for Hierarchical Resource Sharing in Real-Time Open Systems** in this paper we present a protocol for resource sharing in a hierarchical real-time scheduling framework targeting real time open systems. The protocol and the scheduling framework significantly reduce the efforts and errors associated with integrating multiple semi- independent subsystems on a single processor.

My overall impression
This conference was different from the other conferences that I have attended because the participants were from several different research communities. It was a great opportunity for me to meet researchers from other research communities who have different views and experience. I learned from this conference to be careful when discussing technical issues and specially using terms that have different meanings in different research communities. It was very good experience for me and I will submit a new paper to EMSOFT next year.

Report from ESWEEK'07

I have attended ESWEEK'07 (EMSOFT'07 and FORMATS'07 conferences), which was held in Salzburg, Austria, at the beginning of October 2007. I have presented the paper Multi-Processor Schedulability Analysis of Preemptive Real-Time Tasks with Variable Execution Times (joint work with Martin Stigge and Wang Yi) at FORMATS. The EMSOFT conference deals with the development of embedded systems with the strongest focus on the correctness (or safety) of the software. The panel discussion presented the grand challenges in this area: mainly to find appropriate abstraction layers for the development of embedded systems; a concrete challenge is a verified sensor network. The FORMATS conference is a smaller event for the formal methods community in real time systems, mainly timed automata community. It is a perfect opportunity to meet the people dealing with very similar problems as I deal with.

The most interesting tutorials presented the real-time calculus (Lothar Thiele) and the abstract interpretation based verification (Patrick Cousot). The real-time calculus provides a uniform framework for schedulability analysis of multi-processor (multi-resource) systems based on abstraction of the computation requests and resource availability by arrival and service curves, respectively. The main advantage of this approach is its uniformity and scalability. If the arrival/service curves abstraction suffices for our purposes then this method is definitely worth considering. An abstract interpretation of a program gives it a finite state semantics, which can be analyzed algorithmically. Choosing the abstractions such that they satisfy some properties allows us to conclude some properties about the original system.

Pavel Krcal, Uppsala University

ARTES++ Travel Report

Marcelo Santos[1], PhD. Student at MRTC, Mälardalen University

Purpose of Travel

The purpose of the trip was to attend the 19th International Symposium on Computer Architecture and High Performance Computing, held at Serra Azul Hotel (Gramado, RS, Brazil), from 24th to 27th October 2007.

Activities

The symposium, promoted by the Brazilian Computer Society, had several sessions about computer architecture in general and related issues, like benchmarks, grid computing, communication, etc. More interesting to my research were the sessions *Microarchitecture* and *Cache and Memory Architectures*, with some seminars about applications to embedded systems (soft real-time). Some of the presentations were about multicore for embedded applications (multithreaded processors and thread-level parallelism), while others were about energy optimization related to memory hierarchy. Less related to my research, but still in the area of embedded applications, were presentations about function optimization for DSP architectures and mobile computing. The *Mobile and Pervarsive Computing* session was part of the WSCAD workshop held in parallel with the symposium.

The City of Gramado

Gramado is a small city in the south of Brazil, about 100km from Porto Alegre, the capital of the state of Rio Grande do Sul. It is situated in a mountainous region and was populated mainly by German imigrants. Because of this, it has a German architectural style and good wine. Some pictures of the city center and coffee break:

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Travel support

The trip was supported by a grant from ARTES (approx. 15000 SEK).

ARTES++ Travel Report

Stefan Bygde

December 21, 2007

NWPT Workshop

NWPT is the Nordic Workshop on Programming Theory and was held in Oslo October 10-12 2007. NWPT is a annual workshop on programming theory mainly for nordic coutries. Topics for the workshop includes for example, semantics of programs programming logics, program verification, and formal specification of programs. The workshop accepts works that previously has been published as well as work in progress. It was a very nice workshop with interesting topics.

Contribution

This was my first presentation at a workshop and I was presenting my paper "Analysis of Arithmetical Congruences on Low-Level Code". This work is an extension of the arithmetical congruence domain which is used in abstract interpretation. The purpose was to be able to use the domain in analysis of low-level code. The workshop was divided into sessions and I presented at the session "hardware and low-level models" which was during the second day.

Travel Report
Progress trip to Pisa-Viareggio,
October - 2007, Italy

Hüseyin Aysan, Stefan Bygde, Aneta Vulgarakis, Séverine Sentilles,
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Introduction

PROGRESS is a project involving around 30 researchers including professors, senior researchers and PhD Students. It is dedicated to research on using software components in engineering of embedded systems. Research includes theories, methods, and tools for predictable embedded software development from software components and legacy code and adopting and applying real-time modeling and analysis techniques across all stages of the component-based design and development chain. Most of the PROGRESS members went to this trip.

The main purposes of this trip were,
- having internal meetings and workshops for the ultimate goal of writing roadmaps for the research directions within PROGRESS,
- having meetings and a joint workshop with the groups of
    o Antonia Bertolini at Software Engineering Research Laboratory at ISTI,
    o Guiseppi Lipari and Giorgio Butazzo at Scuola Superiore Sant'Anna,

Scientific activities during the trip

The Internal Presentations of the PROGRESS People

Hans Hansson presented the draft version of the road map of the PROGRESS project. He discussed the outlines of the activities within each group of PROGRESS and the program of the week in Pisa.

During the week each group within PROGRESS project presented their road maps and plans for research:

Paul Pettersson and Cristina Seceleanu presented the concepts and road map for analysis and formal verification of real-time components and also resource modeling of components. The research area of this group includes verification of PROGRESS components and resource models of the components.

Mikael Nolin presented the road map and the research direction of the platform synthesis group. He also presented concepts of real-time applications and platforms in the automotive industry.

Ivica Crnkovic presented the top-down component model framework and its levels. Jan Carlson presented the PROGRESS real-time component model and its design in the low level and future research that should be done around that.

Johan Fredriksson presented a contract-based technique to achieve reuse of known worst-case execution times (WCET) in conjunction with reuse of software components.

Johan Kraft presented the road map and the activity plan of the Legacy cluster in PROGRESS. He talked about the model extraction and model validation, and simulation concepts related to the complex real-time legacy systems and application of the models. Thomas Nolte also presented componentization of the legacy systems and reusing the components in the PROGRESS component model.

Tomas Bures had a presentation about the Integrated Development Environment (IDE) for design, implementation, and verification of the PROGRESS components and component model.

Kristina Lundqvist who has recently got the professor position in MRTC presented her research area which has been within avionics. She also introduced her plans and projects for research within MRTC.

At the end, the PhD students presented their individual research plans and road maps.

Meeting with the real-time group at Scuola Superiore Sant'Anna

The meeting with real-time group was held at Scuola Superiore Sant'Anna, Pisa. Giuseppe Lipary presented the Scuola Superiore Sant'Anna which is a school for advanced studies for graduate students and professionals. Then, he talked about the **ReTiS Lab** (**R**eal **T**ime **S**ystem **L**aboratory) which focuses on real-time operating systems, real-time schedulability analysis (especially in the area of adaptive real-time systems and reconfigurable real-time systems), security and wireless networks. He gave a short introduction about the projects that have been carried out at RETIS lab which are

- FRESCOR project Framework for Real-time Embedded Systems based on COntRacts
- The RI-MACS project, Radically Innovative Mechatronics and Advanced Control Systems
- ART DECO project, Adaptive Infrastructures for Decentralised Organisations

Paolo talked about a company called Evidence. Evidence was established at the end of 2002 as a spin-off of the ReTiS Lab of the Scuola Superiore Sant'Anna (Pisa, Italy). Evidence provides innovative software solutions for the design and the development of real-time embedded systems, with a special focus on multi-core hardware platforms.

Later, Lipary presented the paper "Using resource reservation techniques for power-aware scheduling" in details. This paper presents GRUB-PA, a new scheduling algorithm for power-aware systems. The algorithm can efficiently handle systems consisting of hard and soft real-time tasks. The algorithm reclaims the spare bandwidth caused by periodic tasks that execute less than expected or by sporadic tasks that arrive less frequently, and use this information to lower the processor frequency.

Meeting with the Software Engineering Research Laboratory at ISTI

The workshop was held in the Software Engineering Laboratory at the Istituto di Scienza e Tecnologie dell'Informazione (ISTI) in Pisa. It started with Antonia Bertolino, the head of the lab. She made a general presentation on the software engineering group and on their past and ongoing research activities. *Their goal is to foster the application of sound and systematic methods in software production, focusing especially on software quality and reliability chased from process definition, to testing, to validation and certification of both software processes and products. The emphasis of this effort is in the applicability of results, and therefore the research activity is conducted in cooperation with industrial partners applying both engineering and scientific approaches on real projects.* The research topics they are dealing with are:
- Software requirements analysis,
- Software process evaluation,
- Software product evaluation,
- Reliable assembly and validation of component-based software,
- Testing in the large and integration testing approaches,
- Methods and tools for improving white-box testing,
- Evaluation of software reliability, testability, test effectiveness
- Application of Software Engineering to telecommunication systems.

Then Ivica Crnkovic presented the PROGRESS Centre for Predictable Embedded Software Systems.

And the workshop ended with 2 more presentations: one from Guglielmo De Angelis and the second one from Jingua Gao. Guglielmo, who freshly defended his thesis (2 days before) gave us an interesting talk on a "Model driven approach to embedded systems". Jinghua Gao presented a testing tool called TAXI (Testing by Automatically generate XML Instances) and showed how to use it.

Meeting with Felicita Di Giandomenico in the Dependable Computing Research Laboratory at ISTI

Three PROGRESS members met Felicita Di Giandomenico in the Dependable Computing Research Laboratory at ISTI. Giandomenico presented the research being conducted in her group as well as briefly stated some of their industrial collaborations. The research topics they are focusing on are:
- Mechanisms for fault tolerant systems to improve availability and efficiency of systems
- Development of generic architectures for fault tolerant real-time systems based on COTS components
- Model based dynamic reconfiguration of complex critical systems
- Methods for early validation and evaluation of system designs

Later Sasi Punnekkat presented the current status of PROGRESS research with respect to dependability. The meeting was very interesting and important for finding out the common interests in research and will hopefully provide a basis for future collaboration.

Outcome

The discussions led to more common understanding of the goals, terminology and the concepts of the PROGRESS project. This, together with the individual roadmaps of each research direction was later refined to a common roadmap and the concept paper for PROGRESS.

Social Events

During this wee we also had some fun. The social events we participated in, include but are not strictly adherent to:

- Pisa-Viareggio 10k Run
- Joint dinners
- PROGRESS photo contest
  o The winning photo:

Budget

Budget per person (approximate sum of 10 800 kr)
- flight: 2 500kr
- hotel: 3 000kr
- bus transfers 500kr
- allowance for expenses 8*600kr

Travel report
Visiting Scuola Superiore Sant'Anna in Pisa

Kaj Hänninen

Introduction

This report describes my visit to Scuola Superiore Sant'Anna in Pisa, Italy. I visited the real-time systems laboratory (ReTiS lab) in September 2007. The ReTiS lab is well known for their excellent research in design and analysis of real-time embedded systems. Since my research concerns design and analysis of real-time systems, I found it very interesting to visit the lab.

Pisa

Pisa is a city in Tuscany Italy, with a population of ~100.000 people. Pisa is well known for the bell tower also referred to as the leaning tower. Pisa is also known for being the birth place of Galileo Galilei, an important early physicist, mathematician, astronomer and philosopher.

Visit to ReTiS lab

Mr Lipari, associate professor and coordinator of ReTiS, welcomed us to SSSA. He showed us the lab and gave a general presentation of Scuola Superiore Sant'Anna. He also presented some research performed by the ReTiS group. The ReTiS lab have a prominent position in the area of real-time systems. The research at ReTiS addresses real-time scheduling, real-time operating systems, quality of service for real-time systems, data security and wireless sensor networks. The lab has been involved in many research project throughout the years, for example, the FRESCOR project (aiming at developing a framework with flexible scheduling techniques), RI-MACS (defining a manufacturing control open architecture), ART DECO, ARTIST2, etc. During my visit, I got the opportunity to listen to Mr.Lipari when he presented GRUB-PA, a resource reservation algorithm for power-aware scheduling of periodic and aperiodic real-time tasks. GRUB-PA is a scheduling algorithm based on a resource reservation technique. I also met Mr Gai whose research focus on development of hard real-time architectures. He gave an interesting presentation about a spin off company (Evidence) that he founded at the end of 2002. Evidence develops firmware for embedded real-time systems. The company also provides consulting and technical support for development of embedded devices. Mr Gai also talked about E.R.I.K.A, an embedded real-time kernel architecture. It was a very interesting since my research focus on adding support for different execution models in a commercial real-time operating system called RubusOS.

I really enjoyed the visit to the ReTiS lab. I met a lot of interesting people and got a better understanding of the research performed at ReTiS.

ARTES++ Travel report
Håkan Gustavsson & Peter Wallin, Mälardalen University
Anders Sandberg, KTH

Electronic Systems for vehicles

10-11 October 2007, Baden-Baden, Germany

In brief

The hottest topics of the conference were Flexray, Autosar and the environment.
Many persons talked about how the new technology will change the roles of suppliers
and OEMs, both how business and development is done.
The number of independent OEMs was predicted to be decreased to 9 in 2015 and in
the same time the different segments in each brand will increase rapidly. The
different segments for Volkswagen have increased from 9 in 1987 to 36 in 2007.

The fair

This is a large gathering of mainly men in dark blue suits. Some 1000-1500 visitors
were present and the presentations took place in four different halls concurrently. At
the same time there ara four stories of exhibitions from the major and minor actors in
the German auto-industry; Daimler, BMW, Audi, Skoda, its main Tier 1 suppliers,
Bosch; Delphi; and many large and small development tool vendors, Telelogic;
Mathworks; dSpace; National Instruments; Vector; TTTech.
It was very well organised and for the main part the presentations, even if the
speaker was speaking german, was translated to English through earphones. The
proceedings was only available in the language of the presentation though.

Observed trends

There is a clear trend of standardisation and co-operation, not just Autosar, but also
CE4A (http://www.ce4a.de/), HIS (http://www.automotive-his.de/) and AESAS
(http://www.aesas.de/).

There was a large environmental focus, everybody is working hard on the issue and
moving more into details. Examples of such are how Bosch together with Blaupunkt
presented a new type of navigation optimized for the environment with an additional
'green route' option. This would give the user a chance to choose from fastest,
shortest and most environmental friendly route. In a keynote by Volkswagen it was
presented how the user most be informed about that also electrical energy increases
the emissions. This was shown with an example showing how an 100W audio system
increases the CO_2 emissions with 2g/km (100W=12V x 8A -> 0 ,1L/100km -> 2g/km
CO_2). Electric Power steering (ZF) and tire pressure monitoring system (Wabco) are
examples of features that were presented with a more environmental angle.

The architecture tools for analysis are becoming more and more mature. Many
suppliers (see references) showed examples of tools and some OEMs also
presented active usage (BMW, Mercedes, MAN etc.). On this aspect GM spoke of
reducing the number of global vehicle platforms to 6, by for example trying to

separate electronics from presentation. One choice to increase flexibility and still add volume was to make the radio free from user interface, which enables the same radio to be used in all vehicles.

One main topic was driver support systems development with many presentations on applications but also on development support frameworks, Audi; BMW. Having these frameworks supports application development by making bench testing and rapid prototyping tests in real vehicles of the same function seamless. They also supported logging of sensor data and replay of logged sensor data through a function. One of the supporting ideas behind this was to standardize the interfaces of a function within the OEM, without this effort the seamless operation is virtually impossible.

References on the topic

Vehicle architectures
http://www.chevrolet.com/electriccar/

Architecture tools:
http://www.aquintos.info/de/produkte/preevision_architekturbewertung.php
http://www.mentor.com/solutions/automotive/
http://www.pacelab.de/
http://www.symtavision.com/symtas-architect.html

Autosar articles in english:
http://www.elektroniknet.de/home/automotive/autosar/english/

Next conference www.fisita2008.com

Travel Report from RTCSA 2007

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15th Oct 2007

RTCSA is one of the leading conference that is usually held in Asia; hence, the 13th instance of this conference was held in the city of Daegu in South Korea. Thanks to competitiveness of this years version if the conference the quality of the presented papers was quite high. The conference was a three day event with three parallel sessions with 20 papers in each session. The three sessions were focused on real-time, ubiquitous computing and embedded systems. I attended most of the real-time track but also attended a few presentations in the other tracks. The papers in the real-time track was a rich mix between among others, resource sharing, the mandatory scheduling, multi-processor and multi-core issues, and finally a database session.

The conference was well organized with a very spiritual keynote held by Prof. C.L Liu talking about the conceptual size reduction of the earth. The keynote was ended with a joint singing session where Prof. Liu urged the audience to join him in a song regarding that we live in a small world :-)

The second keynote was given during the banquet by one of the CTOs of consumer electronics in Samsung. This keynote was mostly about future use of media applications.

THIS years version of RTCSA was very special for my part since my paper "Contract-Based Reusable Worst-Case Execution Time Estimates" was chosen for the best paper award in the real-time track. I was the first presenter in the real-time track during the first day of the conference. I received interesting questions and good feedback on the presentation. In the following days I could relax and only to the other presentations.

The most interesting part of the conference was, as usually, to meet and talk to fellow researchers. I met several fellow researchers from previous conferences, with whom I continued some rather interesting discussions. That is one of the very rewarding parts of returning to the same conferences and joining the same people. Of course it was also very special to receive the best paper award plaque during the conference banquet.

THE trip to Daegu started at 12am from Arlanda, via Frankfurt where we changed planes to a Lufthansa Airbus that was going to take me and a colleague I travelled with all the way to Seoul. When we arrived in Seoul we went with a bus for one hour to the Seoul train station, from where we took the 300km/h bullet-train to Daegu. Finally at 5pm local time (10am Swedish time) we arrived in the hotel in Daegu. The first evening in Daegu we spent

down-town trying to find a nice place to eat. After a few hours of walking we finally found a really nice small Korean style fish restaurant, shown in figure 1. Overall the food during the trip was excellent, ranging from raw meat and fish to exotic vegetables and fruits.

In the last day of the conference we joined a tour to a preserved Korean village. At the village we experienced traditional paper-making and soju-making. Soju is a very strong type of wheat-rice spirit. All participants of the tour got to make their own sheet of paper, and got to try some Soju.

The overall stay in Korea was very nice and very different from what I am used to. The people, the culture, the food and the cities is everything but European; but in a nice way. People are very friendly and constantly try to help. The food is quite spicy and it is common to share the food among several people, meaning that several people are eating from the same plate - also quite uncommon in Europe. All these things together with a well organized and interesting conference made our stay very exciting.

Figure 1. Korean traditional style fish restaurant.

ARTES++ Travel report
Håkan Gustavsson & Peter Wallin, Mälardalen University
Anders Sandberg, KTH

Electronic Systems for vehicles

10-11 October 2007, Baden-Baden, Germany

In brief

The hottest topics of the conference were Flexray, Autosar and the environment. Many persons talked about how the new technology will change the roles of suppliers and OEMs, both how business and development is done.

The number of independent OEMs was predicted to be decreased to 9 in 2015 and in the same time the different segments in each brand will increase rapidly. The different segments for Volkswagen have increased from 9 in 1987 to 36 in 2007.

The fair

This is a large gathering of mainly men in dark blue suits. Some 1000-1500 visitors were present and the presentations took place in four different halls concurrently. At the same time there ara four stories of exhibitions from the major and minor actors in the German auto-industry; Daimler, BMW, Audi, Skoda, its main Tier 1 suppliers, Bosch; Delphi; and many large and small development tool vendors, Telelogic; Mathworks; dSpace; National Instruments; Vector; TTTech.

It was very well organised and for the main part the presentations, even if the speaker was speaking german, was translated to English through earphones. The proceedings was only available in the language of the presentation though.

Observed trends

There is a clear trend of standardisation and co-operation, not just Autosar, but also CE4A (http://www.ce4a.de/), HIS (http://www.automotive-his.de/) and AESAS (http://www.aesas.de/).

There was a large environmental focus, everybody is working hard on the issue and moving more into details. Examples of such are how Bosch together with Blaupunkt presented a new type of navigation optimized for the environment with an additional 'green route' option. This would give the user a chance to choose from fastest, shortest and most environmental friendly route. In a keynote by Volkswagen it was presented how the user most be informed about that also electrical energy increases the emissions. This was shown with an example showing how an 100W audio system increases the CO_2 emissions with 2g/km (100W=12V x 8A -> 0 ,1L/100km -> 2g/km CO_2). Electric Power steering (ZF) and tire pressure monitoring system (Wabco) are examples of features that were presented with a more environmental angle.

The architecture tools for analysis are becoming more and more mature. Many suppliers (see references) showed examples of tools and some OEMs also presented active usage (BMW, Mercedes, MAN etc.). On this aspect GM spoke of reducing the number of global vehicle platforms to 6, by for example trying to

separate electronics from presentation. One choice to increase flexibility and still add volume was to make the radio free from user interface, which enables the same radio to be used in all vehicles.

One main topic was driver support systems development with many presentations on applications but also on development support frameworks, Audi; BMW. Having these frameworks supports application development by making bench testing and rapid prototyping tests in real vehicles of the same function seamless. They also supported logging of sensor data and replay of logged sensor data through a function. One of the supporting ideas behind this was to standardize the interfaces of a function within the OEM, without this effort the seamless operation is virtually impossible.

References on the topic

Vehicle architectures
http://www.chevrolet.com/electriccar/

Architecture tools:
http://www.aquintos.info/de/produkte/preevision_architekturbewertung.php
http://www.mentor.com/solutions/automotive/
http://www.pacelab.de/
http://www.symtavision.com/symtas-architect.html

Autosar articles in english:
http://www.elektroniknet.de/home/automotive/autosar/english/

Next conference www.fisita2008.com

Visit to:
Center for Multisource Information Fusion / International Conference on Scalable Uncertainty Management

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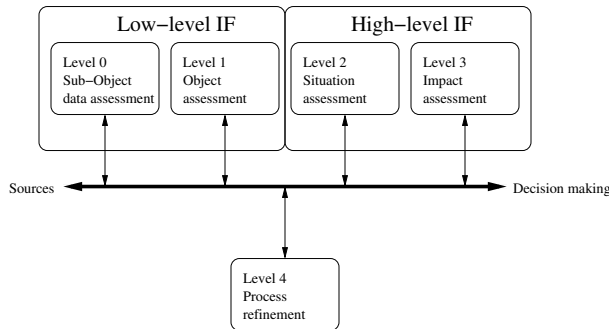
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November 15, 2007

Figure 1: The revised JDL model, adapted from [6]

1 Center for Multisource Information Fusion

Center for Multisource Information Fusion (CMIF), located in the state of New York at University at Buffalo, is one of the leading research centers within the information fusion (IF) community, with well-known and renowned researchers in the field.

1.1 Information fusion

IF has mainly been a research field tightly coupled to defense applications, however, in recent years researchers in other fields, e.g., *manufacturing* and *precision agriculture*, have started to recognized the potential benefits of IF. IF can be depicted as follows [3]:

> "Information fusion encompasses the theory, techniques, and tools conceived and employed for exploiting the synergy in the information acquired from multiple sources (sensor, databases, information gathered by human, etc.) such that the resulting decision or action is in some sense better (qualitatively and quantitatively, in terms of accuracy, robustness and etc.) than would be possible, if these sources were used individually without such synergy exploitation."

A "...*decision or action*..." is most often related with *uncertainty*, thus *uncertainty management* is crucial to IF. Most often the decision or action must be taken within a specific period of time, thus, methods for uncertainty management need to be able to meet certain time constraints. There is a well-known model for the research field IF which is denoted as the *JDL* model [5] (see Figure 1). One usually refers to Level 0, 1 as *Low-level IF*, where *Kalman filtering* is a common method [4], and Level 2, 3 as *High-level IF*, where *Bayesian networks* are often utilized [2].

1.2 Researchers I met

I met a number of researchers with whom I discussed IF-topics of common interest, e.g., *high-level information fusion*, *uncertainty management*, and *imprecise probability*.

1.2.1 Professor James Llinas, Executive Director CMIF

Professor James Llinas is one of the front figures in the IF domain and was the first president of the International Society of Information Fusion [1]. He is one of the editor's of the well-known "Handbook of Multisensor Data Fusion".

I had interesting discussions with Professor Llinas where we primarily discussed the concept of *imprecise probability* and its relation to *decision effectiveness*. Imprecise probabilities is a family of theories that uses a set of distributions for representing uncertainty and information related to that uncertainty.

1.2.2 Dr. Galina Rogova

Dr. Rogova is a well-known researcher in the fusion community who has several published papers about *high-level IF* and *decision making*. We had a meeting where we discussed *high-level uncertainty*, i.e., uncertainty about uncertainty. Basically such uncertainty concerns how reliable an estimate of something of interest is.

1.2.3 Dr. Kedar Sambhoos

Dr. Sambhoos is a research scientist at CMIF who has been involved in a number of different projects there. Amongst other things, Dr. Sambhoos has performed research about high-level uncertainty, high-level IF, and performance of IF systems. We discussed the notion and interpretation of high-level uncertainty and we talked about maybe writing a joint paper about this topic in the future.

1.2.4 Alan Steinberg

I met Dr. Steinberg during a dinner. We had a short discussion about high-level IF. Dr. Steinberg has written a chapter about high-level IF, which will appear in the new edition of the "Handbook of Multisensor Data Fusion".

2 International Conference on Scalable Uncertainty Management

I attended a conference on *Scalable Uncertainty Management* which was held at the University of Maryland, October 10-12. This was the first time the conference was held and intended to bridge the gap of research between databases and uncertainty management.

2.1   Reflection

The conference covered a range of different topics, e.g., inconsistency management in databases, information retrieval, description logics, probabilistic databases, and probabilistic logic programs, however, from my perspective it seems like the *uncertainty management* part was somewhat neglected in many of these presentations. It would had been interesting to see contributions with a more elaborate view on uncertainty management. Some of the interesting presentations, from my point of view, had also been cancelled. My overall impression of this conference is that it was primarily aimed at database researchers and that the conference felt a little bit unfocused maybe due to that it was the first time it was held.

3   Conclusions

The visit was very inspiring for me and I met several researchers with interesting ideas about imprecise probability and high-level information fusion. The conference *Scalable Uncertainty Management* was a little bit of disappointment, since I expected it to include more about uncertainty management.

Acknowledgement

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ARTES++ Travel Report from IECON'07

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IECON'07

IECON'07 was held in The Grand Hotel, Taipei, Taiwan from 5_{th} to 8_{th} of November 2007, and was the 33_{rd} annual conference of the IEEE industrial electronic society. It was an international conference of industrial applications of electronics, control, robotics, signal processing, computational and artificial intelligence, sensors and actuators, instrumentation electronics, computer networks, internet and multimedia technologies. The objectives of the conference were to provide high quality research and professional interactions for the advancement of science, technology, and fellowship. The conference was rather big in paper contributions where approximately 650 papers were accepted for the final program. Because of that, the topics for the presented papers were spread among different research areas. Some of the conference main topics included:

- Control Systems & Applications
- Electrical Machines & Drives
- Power Electronics
- Sensors, Actuators and Systems Integration
- Signal & Image Processing
- Industrial Informatics
- Intelligent Robotics
- Hands-on Intelligent Mechatronics and Automation

Contribution

My contribution to the conference was a full paper titled *Joint Angular Sensor Based on Distributed Biaxial MEMS Accelerometers*. The paper was presented during one of the 20 minutes oral presentation sessions.

The conference gave me opportunity to meet other researchers in my field, and discuss shared research problems.

ARTES++ Travel Report to ISSRE 2007

The 18th International Symposium on
Software Reliability Engineering,
November 5-9th 2007

Carl Bergenhem
November 20th, 2007

1   ISSRE

ISSRE focuses on the theory and practice of Software Reliability Engineering. The conference scope includes techniques and practices to (1) verify and validate software, (2) estimate and predict its dependability, and (3) make it more tolerant/robust to faults. The conference has grown steadily, attracting about 200 participants on a regular basis and is big enough to represent major topics in software reliability engineering, but small enough to provide an in-depth representation of theory or practice in these areas. Industry participation has also increased over time, leading to a healthy mixture of theory and practice.

Fabulous Trollhättan Water Falls by Night

2   Thoughts

There were several keynote speeches, among others by Martin Nilsson, Volvo Cars. The subject was: "Efficient system verification using model based techniques for a heterogeneous distributed real-time system". The message was that there is an increased need for research in this area. Here are some facts from the talk:

- Of the 60 computing nodes that are used in high-end cars, roughly 5 nodes contain software which is mostly model based. This implies the software is build with tools such as simulink or SCADE as opposed to being hand-coded.
- Roughly 30% of all software in a (Volvo) vehicle is related to diagnostics. Even so my impression is that industry is far behind research here. Mr. Nilsson gave the impression that the diagnostics strategy is still rather ad hoc and an add-on to nodes rather than being an intrinsic part of the architecture. New technology such as time-triggered busses and AutoSAR will hopefully bring this area forward.
- Tools for the different stages of development play an increasingly important role. An example is tools for configuration management of different variants of software to be placed in a vehicle with a specific market requirement.

- If the (Volvo) vehicle detects a failure in its system, it will degrade its functionality, e.g. by restricting top speed, and still enable the driver to safely get it to a workshop.

I also had the opportunity to speak to some people at the conference about various research issues. These persons also held fine presentations of their area. In System Reliability Engineering at Alcatel-Lucent in Canada, they consider the "five 9s" or 10^{-5} to be industry standard of reliability. This may be enough for telecom, but in not so for dependable systems where 10^{-9}.or better is adopted. Thus other methods are needed.

I discussed a method called capture-recapture which is used in software inspections for estimating the number of faults not found after the inspection. This subject was previously unknown to me but definitely interesting. A thought that occurred was how to put the good ideas to use in an industrial setting. This could leverage the knowledge and usefulness of companies which do third-party inspection (often mandated by embedded systems standards) of software in e.g. critical systems.

Despite being a conference of software reliability engineering (even in the title of the conference), there was a lack of papers using or on the subject of formal methods. This was slightly odd since it is a common subject at other conferences on reliability.

Together, the above reasons made the visit to ISSRE successful, even though I did not present a paper myself. Many thanks to ARTES for giving the grant for the trip!

Travel Report from Visiting UT Arlington

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Dec. 4, 2007

1. Introduction

I spent the whole November of this year at University of Texas at Arlington (UTA) as a visiting researcher. I mainly worked with a research group called iSec at the department of computer science and engineering, and also had some wonderful discussion with another research group called CReWMaN, which was in the same department. This trip was financially supported by ARTES.

2. Motivation

My current research interest is wireless sensor network (WSN), with a particular interest in solving security problems for WSN. The university I visited has a huge amount of people engaged in wireless sensor network research. Thus, I could get a good expertise by having discussions with experts there.

3. Research Experience

A good example about the things I learned was the importance of attack model (i.e., an infinite set of all possible attacks defined based on the assumptions of the attackers' ability) in security research. I already got used to focusing providing security solutions for a single type of attack, as it was usual the case in Internet security research. But experts in WSN said you should always provide a well-defined attack model, before any solution is given. Otherwise your paper won't get published.

Another expertise was about the intrusion detection methodology in WSN. Before I went to UTA, I got confused why there are so few people involved in providing intrusion detection system in WSN compared to its counterpart in Internet. The answer given by UTA experts was "Because it's so difficult to convince people using an intrusion detection methodology in WSN". Why it's so difficult? People interested in this can also visit UTA or simply drop in me (since I understand this question now) for the explanation.

4. Culture Experience

America is a really serious country. That's my first feeling about this new continent. Why was I asked so many questions on the custom place? There was no way I looked like a terrorist!

America is a really "colorful" country. That's my second feeling about America, because there are so many different face-looking people on its domestic flights and on its roadsides.

Oh. I was back in China again. That's my third feeling about America. I bought foods in Taipei or Hong Kong market. There were so many Asian foods. For most of them, I cannot buy in Stockholm's Chinese store. I ate in different Chinese restaurants. There were three Chinese

restaurants around my living place. All were managed by Taiwanese. On the campus, there were so many Chinese students who did not know each other. Almost one third of the faculties and PhD students in the department of computer science and engineering were Chinese, with another big portion coming from other countries like India, Korea. Even the refectory on the campus was mainly serving Chinese food, with a very Chinese name called Panda House. Of course, Sandwich and Pizza were also very popular.

5. Summary

Generally, it was a wonderful experience. Thanks ARTES for its generous support. Finally, I would like to share some pictures taken at USA.

Fig. 1 Visting UTA

Fig. 2 My working place

ARTES Travel Report – APLAS 2007

Viktor Leijon (leijon@csee.ltu.se)

December 17, 2007

I attended the *Fifth ASIAN Symposium on Programming Languages and Systems* (APLAS) 2007. It took place in Singapore from the 29th of November to the 1st of December 2007. The program is available at `http://www.comp.nus.edu.sg/~aplas07/program.html`.

The conference provides a very high quality forum for the programming language community, with a focus on the underlying theories and principles.

One very interesting talk was the invited talk by Sriram Rajamani from Microsoft Research titled "Static and Dynamic Analysis : Better Together" which discussed the combination of test case generation tools and static verification (in the form of the Microsoft SLAM software model checker) to be able to perform faster and more efficient verification of software properties. Their focus is on untimed systems, which means that while they can check for temporal ordering of events it cannot check for general time properties. But undoubtedly timed properties could be added to the system, if that was desired. In general all three invited speakers gave very good overviews of their areas.

When it comes to the research that comes closest to mine, which more directly applies to real-time programming, the most interesting contribution was *Timed, Distributed, Probabilistic, Typed Processes* by Martin Berger and Nobuko Yoshida. They introduce a typing discipline extending the linear type discipline to distributed timed processes, something that assures certain kinds of safety for the distributed timed processes.

I was very happy with the conference, even if I was more afflicted by jet-lag than I usually am, so I had to limit my social activities in favor of the scientific program. Singapore is a great country to visit though, with warm weather and good food. I would definitely go to APLAS again if I get the chance, and the same goes for Singapore.

ARTES++ Travel Report: ACM SenSys 2007 and a research visit to CSIRO
Australia, November 2007

Summary

In November 2007, I attended the prestigious wireless sensor networking conference ACM SenSys 2007 in Sydney, Australia. After the conference I had the pleasure of visiting the Australian research institute CSIRO for a few weeks. The trip was partly funded by ARTES++.

This travel report summarizes the major events of the trip, as well as my personal reflections.

Fredrik Österlind
ARTES++ student
Swedish Institute of Computer Science
December 2007

ACM SenSys 2007

SenSys is a highly selective, single-track conference in the area of networked embedded systems and wireless sensor networks. The conference is widely regarded as one of the top conferences in the area. This year the conference was in Sydney, Australia, and 25 papers out of 149 final submissions were accepted.

Apart from listening and learning from interesting and state-of-the-art paper presentations, the purpose of attending the conference this year was three-fold. I attended the Doctoral Colloquium (DC), where PhD students present and get their research topics evaluated by a panel of experts within the research area. For me, the feedback obtained by attending the DC this year was very helpful. The second purpose was presenting our demo on our On-line Energy Estimation approach in Contiki OS. The demo attracted lots of people, and definitely demonstrated the benefits of our approach. The final and main purpose of attending SenSys 2007 was presenting our paper: "*An adaptive communication architecture for wireless sensor networks*".

In summary, the conference was very good. I learned a lot but, perhaps most importantly, I met and discussed research ideas with some of the leading researchers in the area.

Conference dinner view: Sydney CBD including the famous opera house

CSIRO and QCAT

Commonwealth Scientific and Industrial Research Organization (CSIRO) is Australia's national science agency. CSIRO has more than 6500 staff at 56 sites in and outside Australia. I visited Queensland Center for Advanced Technologies (QCAT), located in Brisbane, for 3 weeks. The purpose of the visit was to increase the research collaboration between their sensor networking group and my group at SICS. More specifically, I had two major outputs during my stay. Firstly, I ported our sensor networking operating system Contiki to CSIRO's hardware platform FLECK. The research group is currently performing more extensive evaluations before deciding whether to start using Contiki as their main sensor networking OS. Secondly, I developed and evaluated a new reliable bulk transport protocol for use in sensor networks. We expect to submit a conference paper on the topic within soon.

Final remarks

Visiting other research groups is very beneficial. Not only did I make new friends and valuable contacts, but the experience of working in another research group (if only for a few weeks) did broaden my understanding of the research performed in this area as well as research in general. The fact that the location happened to be Australia was of course also nice: November is one of their hottest months (28 degrees C in the sea!) so off-work activities included both surfing and diving.

ARTES Travel Report
Visit to Computer Architecture Group (LRA) at Albert-Ludwigs-Universität of Freiburg

November-December 2007

Viacheslav Izosimov
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During the period from 21st November to 5th of December, I was visiting Dr. Ilia Polian and Prof. Bernd Becker from the Computer Architecture group at Albert-Ludwigs-Universität of Freiburg. The purpose of my visit was to establish research cooperation with the group, formulate joined research problems, and present my research.

About LRA and Albert-Ludwigs-Universität of Freiburg

The Computer Architecture group is called Lehrstuhl für Rechnerarchitektur (LRA) in German. Previously, they used to be called Institut für Rechnerarchitektur or "IRA", which is a little bit provocative. Their topics of research are model checking and verification, computer-aided design, testing techniques, some theoretical computer science problems, online real-time scheduling and many others. The head of the group is Prof. Bernd Becker.

Albert-Ludwigs-Universität of Freiburg is one of the oldest universities in Germany (dating to spring of early 1455), currently known the most for its medical school, research in biology, and nanotechnology (physics). Their computer science and electrical engineering departments are also well-established. The number of students in total is around 22.000 with many campuses distributed over the city of Freiburg, ranging from sociology and history to medical school (university hospital) and computer science.

Possible Joined Research Problems

Initially, the topic of cooperation was formulated as "I will digest error-detection techniques and will try to incorporate them into my scheduling and design optimization frameworks". During many discussions with Ilia, we have formulated and elaborated the following problem formulations:
1. Hardening of functional units in software/hardware co-design;
2. MPSoC (Multi-Processor System-on-Chip) hardening;
3. Integrating testing into static scheduling to increase quality-of-service;
4. Integrating testing into static scheduling to reduce power consumption.

Hopefully, many of these problems will result in conference and journal publications in the field of real-time embedded systems and low-cost fault tolerance against transient and intermittent faults.

Feedback to My Research

During my visit, I gave a talk based on my licentiate thesis "Scheduling and Optimization of Fault-Tolerant Embedded Systems" and my recent research on fault tolerance for soft real-time embedded systems. The talk was appreciated and several questions were discussed afterwards. Possibly, some of my techniques will be incorporated into LRA's work on online real-time scheduling and computer-aided design.

Social Activities

Although the weather in Freiburg was not perfect, mostly raining, during that time, I was exploring the city, which is very beautiful, especially the cathedral in the middle of the city and small shopping streets. The Christmas atmosphere was already there with the Christmas market and illuminating city lights. During one of the weekends, I went to the winter opening of "EuropaPark" – the famous Deutschland Disneyland with a lot of exciting attractions represented cultural differences in Europe, including Viking Land, Russia and Switzerland. I was also in Baden-Baden, which is a very interesting city with famous thermal aqua parks, such as "Caracalla Therme" and "Friedrichsbad". The ultraviolet-light bath, mineral water swimming pools, and various saunas helped me to recover from the Swedish late-autumn sadness.

Summary

Despite the short duration, my visit was very productive with formulating several real-time research problems, which will result in conference and journal publications. I have leant about the work that researchers in LRA had been doing on computer-aided design and testing. I have also presented my real-time research and received a positive feedback.

Industrimöte Trollhättan, Volv Areo

Introduktion
Volvo Aero är en tillverkare av flygmotorer samt detaljer till flyg- och
rymdindustrin. Företaget samarbetar med de stora flygmotortillverkarna
Rolls-Royce, Pratt & Whitney och General Electric. Man tillverkar även
delar till de raketmotorer som används på ESAs Ariane 5-raket.

Bakgrund
Företaget befinner sig nu i en fas där produktionsvolymer blir allt mer
prioriterade och har därför blivit tvungna att i större grad satsa på
automatisering av sina produktionslinor. I och med detta har dom insett att
graden av automatisk övervaktning av produktionsmaskiner och förlopp måste
ökas.

Möte
Vi (Peter Funk och Erik Olsson) träffade sex personer från Volvo Aero och
diskuterade ett framtida samarbete angående erfarenhetsåteranvänding inom
produktion i Volvo Aeros produktionslinjer. Volvo Aero och vi drog några
korta presentationer för varandra och vi fann flera upplägg för framtida
samarbeten. Volvo Aero var främst intresserade av vad vår forskning inom
tillståndsbaserat underhåll av industrimaskiner och vår erfarenhet och
kunskap att kombinera fallbaserat resonerande (CBR) och sensordata för
effektiv produktionsfeedback och processkontroll.

Fortsättning
Fler möten planeras efter nyår och vi ser fram emot ett givande samarbete!
Volvo Area är "comittade" och kommer driva processen att få till stånd
samarbete så att finansiering säkerställs då de ser stora ekonomisk
potential i vår forskning, ett fel i tillverkningen hos dem kan kosta
miljoner.

Erik och Peter

ARTES++ Travel Report to PRDC 2007

The 13th IEEE Pacific Rim International Symposium on
Dependable Computing (PRDC'07)
7-19 December, 2007, Melbourne, Australia.

Carl Bergenhem
January 7th, 2008

1 PRDC

PRDC 2007 is the thirteenth in this series of symposia started in 1989 that are devoted to dependable and fault tolerant computing. PRDC is now recognized as the main regular event of the Pacific area that is covering the many dimensions of dependability and fault tolerance, encompassing fundamental theoretical approaches, practical experimental projects, and commercial components and systems. As applications of computing systems have permeated in every aspects of daily life, the dependability of computing system has become increasingly critical. This symposium provides a forum for countries around the Pacific Rim and other areas of the world to exchange ideas for improving the dependability of computing systems. This years conference accepted around 30 full papers out of 100 submissions.

The symposium is returning to Melbourne in 2007 and will be held in one of the centrally located inner city hotels. Melbourne is a vibrant cosmopolitan city that has frequently been awarded one of the world's most "liveable" cities. Melbourne offers an excellent location for this Symposium with numerous local arts, cultural, architectural and sporting attractions. It also provides an excellent hub for many of the tourist attractions throughout Victoria and Australia.

Melbourne Central Business District,
close to the Yarra River

2 Thoughts

My presentation was alright and I received questions afterwards and valuable comments. As observed before, research into the membership problem differs depending on whether a synchronous or asynchronous system is targeted. The problems associated with each, target application and uses are largely different.

Several interesting keynote speeches were also held. Among others Paulo Verissimo held a keynote titled: "Computers meet the real world - Challenge of architecting dependable and secure CII (Critical Information Infrastructure)". Critical infrastructure is for example gas fired furnace water works, electricity generation. All of these types of utilities are commonly geographically distributed and sites are interconnected via both internal corporate networks but also the Internet. Because of the distributed nature and not least that communication over the Internet is used, there are a number of threats.

There are several real examples of incidents.
*2003: Ohio, USA. Slammer worm causes shut-down of monitoring system of nuclear plant. The plant firewall prevented worm, but it penetrated the supplier network and then plant through backdoor network. Worm propagated to SCADA network, then overload control-network. Could have caused a serious incident.
*2002: Australia. An angry ex-employee at a sewage management plant remotely caused a control system disruption which lead to raw sewage being disposed into nearby river. This was possible despite hardwired logic - safety interlocks in the control system.

The road to CII security is taking a new approach. Securing individual component is not solution. It must be possible to build secure systems of out of insecure embedded components. No system can be completely free from intrusions, rather it must be made to be Intrusion tolerance – i.e. enough resources to meet the safety goal, despite attacks. Replicas of infrastructure components, e.g. distributed voting firewalls will be attacked but must also have recovery mechanism.
More information on this can be found in the EU FP6 project CRUTIAL.

The visit to the conference; to participate and contribute with a presentation of my paper was a success. It is inspiring to talk to other people and get new influences and ideas for new approaches to the research at hand. Many thanks to ARTES for giving the grant for the trip!

ARTES++ Travel Report to PRDC'07

The 13th IEEE Pacific Rim Symposium on Dependable Computing

Raul Barbosa

March 20, 2008

1 Introduction

The 2007 edition of PRDC was the thirteenth symposium in this series dedicated to the field of dependable and fault-tolerant computing. The symposium was organized by Deakin University, Melbourne, Australia.

2 Conference Impressions

As a conference which aims to establish itself as the main regular event in the Pacific area covering the field of dependability and fault tolerance, PRDC attracts a very broad spectrum of scientists from all over the world. The accepted papers encompassed distributed algorithms, dependable networks and security; the research approaches were also broad in the sense that both theoretical analysis and benchmarking/measurement could be found in those papers.

The keynote speeches – by Prof. William Sanders and Prof. Paulo Veríssimo – targeted mostly computer security. Though the conference focuses mainly on dependability, the two fields are very interdependent. A system must be secure to be dependable and a system must be dependable to be secure. In fact, the two keynote sessions were particularly interesting because both speakers have a background on dependable computing.

As usual in PRDC, there were two parallel tracks for the paper presentations. The track on dependable networks focused on large-scale systems (*e.g.*, the Internet) and mobile environments. The concerns with the dependability of these communication networks are increasing due to the fact that users now rely on them to transfer sensitive information. Several presentations discussed wireless networks and the challenges involved in making them robust and fault-tolerant.

I also found the distributed systems track good to attend. The presentations focused on diverse topics, ranging from intrusion detection/tolerance to distributed real-time

scheduling. The common theme was how to address the many threats to dependability arising in distributed systems. My presentation took place in this track. It was, as usual, extremely gratifying to hold the presentation and answer the questions from the audience, which will definitely help in the development of future work in this area.

3 Accommodation and Surroundings

I was accommodated at the Rydges Melbourne, where the conference took place. Melbourne is well known for the quality of life and for being the sports capital of Australia. The good weather allowed everyone to enjoy nice walks around the city's skyline, which is crowded with tall buildings. During the days that followed the conference I had also the opportunity to travel south, along the Great Ocean Road, and to visit many other interesting places. Definitely worth the visit.

ARTES++ Travel Report to RTAS'07

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Introduction

14th IEEE Real-Time and Embedded Technology and Applications Symposium (RTAS) conference had about 80 participants this year and was held in Seattle, USA. Several interesting workshops and tutorials were arranged. The range of the conference is very wide and includes almost all topics within the area. CORE AREA: Real-time and Embedded Systems. Other areas were development, Verification, and Debug Tools for Real-Time and Embedded Systems, Real-Time and Embedded Applications/Benchmarks, Embedded Systems Hardware/Software Interaction/Co-Design. There was special track for work in progress (WiP).

Contribution

I presented a paper (my first) at the WiP session called

INCENSE: Information-Centric Run-Time Support for Component-Based Embedded Real-Time Systems

The session was as General Chair: Steve Goddard, University of Nebraska, Steve Liu, Texas A&M University said, the most important session with a look into the future.

Wrapping it all up

We had a nice time in Seattle and can recommend RTAS as a really good conference. It suits everyone within the real-time area since they have a wide range of topics and a high quality of papers. Seattle is quite close to the Canadian border with wonderful nature surrounding the city. We visited Microsoft's head office and were allowed to do some shopping for employee discount, which was very nice. We also made an interesting trip to Boeing factory with its enormous building, the largest in the world and a trip to a volcano. I'm sorry to say that we never saw the volcano once we got there due to bad weather.

Ps: According to my supervisor it was the first time ever that they served beer during WiP session presentations =)

Travel Report:

Two-day visit at Department of Computer Science and Technology, School of Computer Science and Engineering at Beihang University (BUAA)

Beijing, China

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1. Motivation

In the summer of 2007, I was given the chance of joining **ARTIST2 / UNU-IIST** summer school at Suzhou, China. At that moment, I met some friends from the department of Computer Science and Technology, school of Computer Science and Engineering at Beihang University (BUAA) and there were some interesting talks among us. At the end of the summer school, they asked me if there would be an opportunity for my short-term visit comes up in the near future. Thereby, I planned this two-day visit trip as the late response to them. As the time was quite short, i.e. only two days, the aims of the trip were to contact one of the best Computer Science and Technology department in Chinese academic filed in the first step, which includes presenting the research activities in my group that are mainly concerning on the timing analysis in maintenance of complex embedded system to the staffs at the Dep., have a look at what they are doings, and explore the possibility of having further communications, for instance a formal visit to them with more colleague(s) from my group, then start some kinds of collaborations in the future.

2. Research

The school of Computer Science and Engineering at Beihang University holds the 3rd place in the rank of the best institutions in Computer Science and Technology era in China. There are five sub-units, Department of Computer Science and Technology, Department of Computer Application Engineering, Department of New Media Art, Computer Teaching Experiment Center, Software Engineering Institute (SEI), and Network Research Center. Within the school, there are many collaborations with the industries, e.g. Microsoft Research Asia (MSRA), IBM, Lenovo China, Nokia-Beihang Series60 united lab, Joint Network Lab & Network School with Hua Wei Company, and many international visits from University of Cambridge, Nebraska University, USA etc. The place that I visited is Computer Science and technology department, of which part of the research is embedded real-time system and distributed system.

3. Environment

BUAA locates in Beijing which is the capital of the country as you may know. Beijing is a big city with the huge population, i.e. more than 17 millions from the 2007 June Population by-census. In this city, you can of course find out quite lots of different styles of foodies. One of my favourites is sushi, which I am most living on, an amazing Japanese food with a great price-performance ratio in Beijing.

As the 2008 Summer Olympic Games, which is from 8th Aug 2008 to 24th Aug 2008, is approaching, the city is changing every day in order to be ready for the Olympics and the life there is encouraging.

4. Results

During my visit, I had a presentation about our research works in the group, e.g. timing analysis in maintenance of complex embedded systems including model extraction, model validation and model analysis, the existing results from the above research activities, relevant papers accepted and future plans. Mr. Yang, Zhibin, a PhD student at the department of Computer Science and Technology, also introduced his research work on using AADL (An Architecture Analysis & Design Language for Developing Embedded Real-Time Systems) for analysis of complex embedded real-time system; For instance, what is AADL, why to use AADL (due to the complexity of formal methods in his application), what are the drawbacks of AADL, AADL behaviour annex, and his future research plan about AADL complex component composition. From his presentation, it showed that he had many discussions with the people from IRIT, Université Paul Sabatier where is the main contributor to AADL, and now he is formulating the research topic in more detailed level. What is more, I also had a guided tour at the university, e.g. visit to weight lifting gymnasium for 2008 Olympics games and its featured biggest office building in China which is shown as follows.

5. Conclusions

The two-day visit to the department of Computer Science and Technology at BUAA has been very useful for me since not only both of us had a better understanding about each other's research topic, but also I can see the chance of some further activities, e.g. further visit to the department at BUAA in the higher level (professor level) this coming summer, and the possibility of developing some collaborations.

The cost of the trip with all the practical issues involved has been well spent according to my plan.

Last but not least, I am very grateful for this kind support by ARTES, and become a witness of her successful "ringing down the curtain".

Travel Report: Internship at Google.

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At the end of 2007, I spend 12 weeks as an intern at the platforms team in Google, Mountain View, CA, USA. I was happy to escape the cold weather in Sweden and in early September I set my foot for the first time in North America.

Why internship?

I was introduced to Google and their internship program by a colleague of mine and once I had applied I was soon contacted by a recruiter. After a series of steps we found a location that suited my background and interests. There were several factors that made me apply for an internship. It is a great way to increase my professional network and find out how working in the United States in general, but also at a company with such ambitious goals.

Impressions and practical issues

Since it was my first visit to America, I did not know what to expect. California is very multicultural, and I found people to be very friendly and helpful. I lived in Mountain View, but I tried to visit the neighboring areas when I had the opportunity. Unfortunately not everything is accessible with public transport and since I do not have a drivers license, I had a somewhat smaller selection of things to see and do. The weather around San Francisco is very pleasant, even during the winter months. Most of the times I did not even need a jacket, though nighttime was often cold, sometimes even below zero degrees. Since many houses in California were not built for cold weather, I had to wear lots of clothes to stay warm at night.

Google have lots of experience with hosting interns. We were treated very well and I felt that I could really contribute. It was also nice to spend time with other interns who were in the same situation like me. This way we could help each other with practical issues or social events. I also had the opportunity to present my research and get feedback from an industrial perspective.

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