ISR*Connector*

HOT RESEARCH

Multitasking in the Workplace: The Three-Minute Work Stretch

Are you overwhelmed by information technology? Can you remember the last time that you were able to work three hours straight on a single task without interruption? Over the last several years UCI Informatics Professor **Gloria Mark** and her students have been researching the extent and nature of

Mark

multitasking for information workers. Mark and her students have adapted an ethnographic method called shadowing to measure how much people actually multitask. Observers follow information workers around as they conduct their daily activities in the workplace. Each informant's activity is timed with a stopwatch to the second, over a three day period. For example, when the telephone rings, the start time is noted. When the call ends and the phone is hung up, the stop time is noted. For every single activity the informant does, it is timed to the second.

The results were surprising, even to Mark and her students who feel burdened by multi-tasking. They found that people switched events (phone calls, working on a Word document, spreadsheet use, etc.) every three minutes on the average. But, reasoning that task switching may not be bad when the tasks concern the same topic, they clustered events into projects, or what they call working spheres. They found that people switched working spheres about every ten and a half minutes. The good news though is that people resume about 82% of their interrupted working spheres on the same day. The bad news is that it takes them about 23 minutes to do so. The reason is that interruptions are nested; task A is interrupted by task B which is interrupted by task C, and so

RESEARCH BRIEFS

ISR Director **Richard N. Taylor**, Prof. **Nenad Medvidovic**, and alumnus **Peyman Oreizy's** paper, "Architecture-Based Runtime Software Evolution," was awarded the Most Influential Paper of the 20th International Conference on Software Engineering (ICSE 1998). Each year the current ICSE program committee reviews the papers from the ICSE held 10 years prior and selects the paper they consider to have had the most influence on the theory or practice of software engineering since its original publication. For more on the impact of this paper, see Message from the Director, page 2.

Prof. **Paul Dourish** has been elected to the CHI Academy, an honorary group of individuals who have made substantial contributions to the field of human-computer interaction. They are the principal leaders of the field, whose efforts have shaped the disipline and led the research in human-computer interaction. For more information on Dourish, see Focus on Faculty, page 3.

Prof. **Paul Dourish** was awarded a $500,000 NSF grant for his work on "Designing and Evaluating Ambient-Tangible Displays for Collaboration."

Two ISR faculty members were recipients of a 2007 Google Research Award, each in the amount of $50,000. One award went to Prof. **Alfred Kobsa** to support his research on "Compliance with Disparate Privacy Laws and User Privacy Preferences." The other award went to Prof. **Gloria Mark** in support of her research on managing multi-tasking and interruptions. For more information on Mark's research, see Hot Research, this page.

on. Interruptions cannot always be attributed to other people dropping in, or phone calls, or email notifications. People interrupt themselves (44%) almost as often as they are interrupted by such external sources (56%). More relevant to user interface design, the researchers found that people average a bit more than two minutes on any device (laptops, phone, etc.) before switching to do something else.

With her graduate student **Norman Su**, Mark has begun investigating how communication and solitary work are interconnected. In a recent study, where Su shadowed 19 information workers, they found that people multi-task in their communications in a similar way as they do in their solitary work:

Su

people switch communication partners, media, and organizational contexts. Most communication in the workplace occurs as communication chains, which are communication acts that occur in quick succession. Using a Markov analysis, they were able to identify particular patterns of communication chains and how they are affected by work events. Attributes such as the number of communication acts (links), and the rate of media and organizational context switching can be predicted from the first catalyzing link of the chain. For example, communication chains triggered by external interruptions (e.g. a phone call) have more links than when people self-interrupt.

There are interesting patterns when organizational context is examined. People use

MESSAGE FROM THE DIRECTOR

One of the key factors in assessing the quality of a research and development program is "impact" – did the work actually make a difference? Assessing impact is notoriously difficult. As I discussed in my "Message from the Director" in the previous issue of the **ISR** *Connector,* many years and many people in many roles are typically involved in the transition of an idea from its conception to its widespread use. That Message focused in particular on the National Science Foundation/SIGSOFT "Impact Project," designed to document outstanding success stories in Software Engineering.
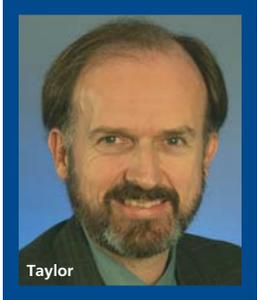
This month I want to highlight another indication of impact, namely recognition by the research community, as it applies in one specific case. I also want to use this occasion to draw attention to what I believe should be a real-location of effort within the research community's portfolio of projects. The recognition I want to spotlight is the International Conference on Software Engineering (ICSE)'s award for the Most Influential Paper (MIP). ICSE grants this award for the most influential paper from those appearing at the conference *ten years before*. That is, influence is assessed over a ten year period, then the awardee is selected. I'm very pleased to report that during ICSE 2008 the MIP award was given to two ISR Ph.D. alumni, **Peyman Oreizy** (Consultant, Launch21) and **Nenad Medvidovic** (Associate Professor, USC), and me, for our paper "Architecture-Based Runtime Software Evolution" presented at the 1998 ICSE.

That 1998 paper was focused on runtime software adaptation and evolution – changing a software system during its execution. The work in runtime evolution was motivated by our society's increasing dependence on software-intensive systems and the real risks, costs, and inconvenience that their downtime presents. This need for dynamic adaptation extends beyond the software that runs national power grids, global banking and financial systems, and into commonplace systems such as:
- hosted email services (e.g., Google Gmail, Yahoo Mail, and Microsoft Hotmail), on which millions of people and businesses depend for communication, as updates are deployed to fix bugs, increase capacity, and provide new functionality;
- operating systems, where security patches that require a system reboot to install are not just inconvenient for end-users, but disruptive to mission-critical systems built atop these operating systems;
- consumer online banking systems, where a competitive analysis recently revealed that while many major U.S. banks had less than one hour of downtime over a two-month period, one of the nation's leading banks had over two days of downtime during the same period;
- cellular networks, as a recent outage of a popular network was traced to an issue with a "routine upgrade".

Change is unavoidable in most systems: intensive use breeds change. Thus we need approaches that reduce, even eliminate, the costs and risks of evolving these systems without incurring downtime.

Our original paper and its follow-on journal version were novel in their espousal of an architecture-based approach to runtime adaptation. In particular, they demonstrated the beneficial role of: (1) software connectors in aiding runtime change; (2) an explicit architectural model fielded with the system and used as the basis for runtime change; and (3) architectural style in providing both structural and behavioral constraints over runtime change.

As Peyman, Neno, and I reflected on this work and the intervening ten years, we concluded that the major success stories in software adaptability were based on the development and use of particular *architectural styles*, such as REST. While this is not particularly surprising ("if you design to make adaptation easier, it is"), what is surprising is the relatively small part of research efforts that are directed at formulating architectural styles to make achievement of adaptability *and other desirable properties* easier. The research community seems to have allowed its appropriate focus on software analysis concerns to shunt to the side an even more appropriate focus on development of software synthesis techniques.

We hope the 2008 MIP Award is a harbinger of change. Design, realization, adaptation, and domain-specific software engineering are all critical focus areas for the community.

An expanded journal version of our paper can be downloaded from *http://dx.doi.org/10.1109/5254.769885*.

ISR Director **Richard N. Taylor** can be reached at taylor@uci.edu.

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more varied types of media to communicate with people who are organizationally "far-ther" away (e.g. outside one's business unit). The researchers suggest that people use media strategically, switching from synchro-nous to asynchronous means to keep up with the multi-tasking demands of the workplace. They argue that communication chains are a consequence of how people strategically use communication and media to align their work with others.

With students from the Humboldt University in Berlin, Mark also investigated the relationship of interruptions and stress. People worked in a simulated office envi-ronment in a laboratory setting doing an email task. In one condition, people worked without interruptions; in another condition, interruptions were induced. They found that people actually completed interrupted tasks in significantly less time compared to nonin-terrupted tasks, with no difference in quality. The data suggests that people compensate for

interruptions by working faster; i.e. if people come to expect interruptions in their environment, then they will adjust their pace to take this into account. However, this comes at a high price: people experienced significantly more stress, higher frustration, time pressure and effort.

These researchers argue that their results on multi-tasking demonstrate a paradox in information technology support: current information technology is designed around supporting distinct applications that relate to separate events (Word documents, spreadsheets, etc.). Yet this design paradigm does not consider that such separate events are actually connected together into working spheres that appear cohesive to information workers. Currently the burden falls on the user to find and connect their information together as they are working in a particular working sphere. This is especially difficult when people are constantly interrupted. Intervening tasks often lead people to restructure their physical environment, e.g., they open new documents, or close applications. The user thus must reorient back to an interrupted activity in a work setting that often has changed. Mark argues that information electronically organized into working spheres can make it easier to reorient back to an interrupted task.

Technology solutions may also be able to help people manage interruptions. Future systems might be able to determine which interruptions are likely to result in long communication chains requiring multiple parties to be contacted. Systems that could filter out interruptions that are likely to have many links of longer duration may help facilitate users in conducting solitary, creative multi-tasking work.

Future work will continue to examine different aspects of multi-tasking. With other students, Mark has begun to examine the nature of work "breaks" while at the desktop. It seems that coffee breaks and walks are being replaced by work breaks in the age of Web 2.0: visits to social networking sites and blogs. In other work, Mark and students are developing a prototype to easily inform collaborating partners when they are available for interruptions for particular tasks. Multi-tasking won't go away, but a combination of technical and social solutions can ease the burden.

For more on Prof. Mark's research, see:

> http://www.isr.uci.edu/~gmark/

Mark can be reached at gmark@ics.uci.edu.
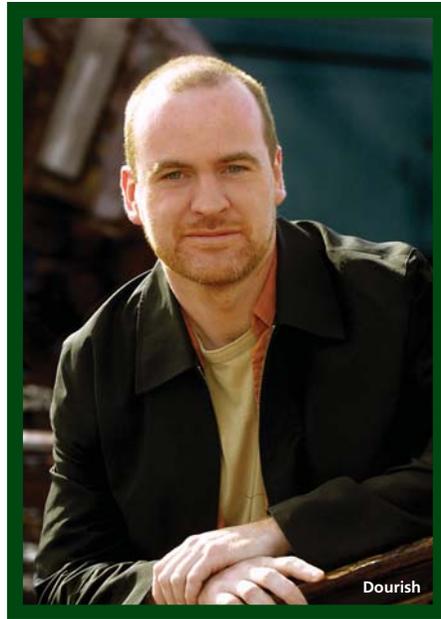
Dourish

Meet Paul Dourish at the Intersection of Computer Science and Social Science

Prof. **Paul Dourish's** research takes him to all the corners of the UCI campus. In addition to a faculty appointment in Informatics, he also teaches in the interdisciplinary "Arts, Computation, Engineering" graduate program, holds a courtesy appointment in Anthropology, and has active collaborators in Social Science, Social Ecology, and Humanities.

This sort of interdisciplinary engagement is not new; it's how he "grew up," beginning with his undergraduate training (double major in Artificial Intelligence and Computer Science at the University of Edinburgh) but especially cemented by his first research position at Rank Xerox EuroPARC, the European satellite lab of Xerox PARC. EuroPARC was a small lab, which brought together computer scientists, psychologists, and sociologists, and there he learned to see the value of doing research that drew theoretical and practical insights from multiple domains.

Dourish believes that in subsequent years this perspective has become increasingly relevant. As computer systems and digital technologies have evolved, so too have our ways of understanding them. Digital systems are not merely technological artifacts, but also social and cultural ones. He says, "it's not simply a question of 'social impacts',

although that's relevant; it's a question of how digital technologies are incorporated into social and cultural practices, how they help us do what we want to do as part of being who we want to be."

According to Dourish, that means being able to look at information systems from multiple perspectives at once. For example, if you want to say something interesting about an iPod or a digital camera, you need to be able to talk about more than real-time operating systems and processor performance. At the same time, the materiality and constraints of the underlying technologies are central to the uses to which the technology can be put. He maintains we need to be able to speak both languages simultaneously, the language of technology and the language of practice.

Says Dourish: "Over the last several years, I have been investigating two research topics that speak to these questions. One is space and mobility, and how our understanding of the space that we inhabit is related to the technologies that we carry about with us and the ways in which we encounter it. Pervasive wireless networking makes us think about spaces differently; far from seeking out a coffee shop as a place to relax, you now find people seeking them out as a place to get online. We're interested in how the experience of space changes when it is viewed through the lens of technologies such as mobile telephony, satellite navigation, and GIS. The second topic is privacy, which we approach not so much as something that people have but more as something that people do. Digital technologies, especially things like blogs, sites like Facebook and services like Twitter, allow people to make themselves available to each other in new ways and to craft new sorts of presentations of themselves, and so I'm interested in how social boundaries are marked and enacted."

A recent project that brought these two concerns together is an NSF-funded collaboration with Simon Cole in Law, Criminology and Society, and Jennifer Terry in Women's Studies. With his students, Dourish has been studying the relationship between privacy and identity through a range of technologies, including video blogging and mobile systems. In April, he presented the first part of this research—a study of paroled sex offenders in Southern California whose movements are tracked via GPS devices around their ankles—at the CHI conference in Florence.

He observes that "Human-Computer Interaction (HCI) is increasingly concerned with topics such as these, as we realize that

Judy Chen (P. Dourish, advisor) interned at Microsoft Research in Cambridge, UK from Oct. 2007 to Jan. 2008. With Alex Taylor, in the Socio-Digital Systems group, she worked on designing technologies for the home, particularly focusing on interactive photo displays and ways of navigating photo archives.

Chen

Johanna Brewer (P. Dourish, advisor) presented her paper "Aesthetic Journeys" at the ACM Conference on Designing Interactive Systems (DIS 2008), held in Cape Town, South Africa in February. The paper was co-authored by Scott Mainwaring of Intel Corp. and her advisor **Paul Dourish**.

Brewer

Ruy Cervantes and **Nithya Sambasivan** (B. Nardi, advisor), first year graduate students in Informatics, had their poster, "VoiceList: A User-generated Audio-based Mobile User Interface," accepted to the 10th International Conference on Human-Computer Interaction with Mobile Devices and Services (MobileHCI 2008), to be held in Amsterdam in September.

Cervantes

Sambasivan

For more on students:

http://www.isr.uci.edu/people.html

FOSSRRI 2008

the 'interface' between people and computers incorporates the cultural imagination as well as the keyboard and mouse."

In recognition of his substantial contributions, Dourish was recently elected to the CHI Academy—a group of researchers honored for their contributions to the development of HCI as a discipline. Dourish says: "I take this as a sign that the broader perspective we have been developing here at UCI and at ISR is gaining both in recognition and in importance."

For more on Prof. Dourish's research, see:

http://www.isr.uci.edu/~jpd

Dourish can be reached at jpd@ics.uci.edu.

ISR hosts Workshop on Free/Open Source Software (FOSS) Repositories and Research Infrastructures

In February, ISR hosted a two day workshop on Free/Open Source Software (FOSS) Repositories and Research Infrastructures. The NSF-sponsored FOSSRRI workshop was chaired by Prof. **Walt Scacchi** and involved more than 20 researchers from universities and industrial research laboratories from around the country, including Syracuse Univ., Elon Univ., Notre Dame, Univ. of Michigan, Avaya Labs, and Zee Source, among others. ISR faculty members **Les Gasser** (Univ. of Illinois, Urbana-Champaign), **John Noll** (Santa Clara Univ.) and **Jim Whitehead** (UC Santa Cruz) participated, as did alumnus **Jason Robbins** (Google) and doctoral students **Justin Erenkrantz** (Apache Software Foundation President) and **Chris Jensen**. The workshop focused on understanding the emerging roles of large data sets, databases, and other repos-

itories that are being organized to support either academic research, commercial R&D, or to facilitate the development of national/ global communities of FOSS developers.

Workshop participants engaged in a close review and critical discussion of three large FOSS project data repositories (FLOSSmole, SourceForge Database at Notre Dame, and Google Code). FLOSSmole and the Notre Dame SF Database already have dozens of external users who access, query, and download FOSS data from these repositories, and who often engage in quantitative, statistical, or social network analysis of the data selected. Participants also reviewed the practices and needs of researchers who focus primarily on qualitative and other forms of data analysis (including data mining and knowledge discovery) to better understand or explain FOSS development processes, work practices, and project community dynamics. Lastly, participants discussed whether it would be desirable to the research community to have a commercial interest set up and operate a "research data service" that would be focused to needs of the FOSS research community.

A great deal of work lies ahead in creating FOSS research infrastructures. The way forward appears to be a federation of multiple disparate repositories of FOSS data, rather than a massive integrated repository. To achieve this, participants proposed an international series of workshops to plot the course of research infrastructure development and a Web portal to facilitate collaboration between FOSS researcher and FOSS practitioner communities.

More information is available at:

http://fossrri.rotterdam.ics.uci.edu/

Prof. Scacchi can be reached at wscacchi@ics.uci.edu.

Prof. **Alfred Kobsa** has been elected to the 15-member Editorial Board of the Springer Lecture Notes in Computer Science (LNCS). Prof. Kobsa will specifically oversee the areas of Information Systems and Applications including Human-Computer Interaction.

Prof. **André van der Hoek** has joined the editorial board of ACM Transactions on Software Engineering and Methodology (TOSEM).

Prof. **Walt Scacchi** has been appointed to EON Reality's board of advisors, where he'll provide strategic technical direction for EON Reality's core software development and partnerships.

Prof. **Alfred Kobsa** gave an invited talk on Privacy-Enhanced Personalization at the Twenty-First International Florida AI Research Society Conference (FLAIRS 2008) in Coconut Grove, FL in May.

Prof. **Nenad Medvidovic,** USC, received a $20,000 IBM Real Time Innovation Award for his research on "Prism-RT: A Java-Based Architectural Middleware Platform for Real-Time Embedded Systems."

Prof. **Nenad Medvidovic,** USC, delivered the keynote address, "Software Architecture and Mobility: A Perfect Marraige or an Uneasy Alliance?", at the International Workshop on Software Architectures and Mobility (SAM), held in Leipzig, Germany in May, in conjunction with the 30th International Conference on Software Engineering (ICSE 2008).

Visitor from The Netherlands Conducts Study on Customer Configuration Updating

During Winter and Spring of 2008, ISR hosted visitor **Wouter Buts**, a Masters degree student focusing on Business Informatics in the Department of Information and Computing Sciences at Utrecht University in the Netherlands, in their Center for Organization and Information. Buts holds a Bachelor of Information & Organizational Sciences with a minor in Management & Communication.

Buts and van der Hoek

Buts's research focuses on Customer Configuration Updating (CCU) with regard to product software vendors on a global scale. This process consists of the Release, Delivery, Deployment and Usage of software products and updates. While at ISR, Buts conducted a survey of software product vendors to gather information on the CCU process. The software products studied were not locally hosted web products, but those physically delivered and executed at the customer site. The research goal was to validate a generic model of the CCU process, based on previous surveys and case studies executed in The Netherlands, and to establish an overall state of the practice of the CCU process in the global product software market.

Buts handpicked UC Irvine/ISR as his host university because of ISR's knowledge base in this research area and its broad selection of industry contacts. Prof. **André van der Hoek**, who served as Buts's faculty host, is an important contributor to the Configuration Management field. Prof. van der Hoek helped refine Buts's survey for an international audience and will also be involved in organizing and analyzing the results from the survey responses collected.

A distinguishing characteristic of Buts's research is that it contributes to computer science as well as business. After completion of the survey every participant receives a custom-made benchmark report that evaluates the vendor's CCU process and compares it to competitors in the same market or using the same development techniques. The report particularly identifies some possible 'quick win' opportunities, enabling the software vendor to improve its processes accordingly.

Jahmeilah Richardson (B. Nardi, advisor), a first year graduate student in Informatics, received a National Science

Richardson

Foundation fellowship in a program called the East Asia and Pacific Summer Institute. The funds will enable her to conduct research in Singapore this summer. The program makes awards to science and engineering students to conduct research with local hosts.

Norman Su (G. Mark, advisor) presented his paper "Communication Chains and

Su

Multitasking," co-authored with Prof. **Gloria Mark**, at the ACM Conference on Human Factors in Computing Systems (CHI 2008) in April. Another paper co-authored with Mark, "Designing for Nomadic Work," was presented by her at the ACM Conference on Designing Interactive Systems (DIS 2008) in February. For more on Su and Mark, see Hot Research, page 1.

Hazel Asuncion (R. Taylor, advisor) presented her paper, "Towards Practical

Asuncion

Software Traceability," at the 30th International Conference on Software Engineering (ICSE 2008) Doctoral Symposium, held in Leipzig, Germany in May. The Doctoral Symposium provides useful guidance for completion of dissertation research and initiation of a research career.

For more information on students:

http://www.isr.uci.edu/people.html

Gerald Bortis (A. van der Hoek, advisor) presented his paper "Software Pre-Patterns as Architectural Knowledge," co-authored by Prof. **André van der Hoek**, at the Third International Workshop on Sharing and Reusing Architectural Knowledge, held in Leipzig, Germany in May, in conjunction with ICSE 2008.

Leila Naslavsky (D. Richardson, advisor) presented her paper "Using Model Transformation to Support Model-Based Test Coverage Measurement" at the Third International Workshop on Automation of Software Test (AST'08), held in Leipzig, Germany in May, in conjunction with ICSE 2008. The paper was co-authored by ICS Dean Prof. **Debra J. Richardson**.

Erik Trainer (D. Redmiles, advisor) presented his poster, titled "Continuous Coordination Within The Context Of Cooperative And Human Aspects Of Software Engineering," at the Cooperative and Human Aspects of Software Engineering (CHASE) Workshop held in Leipzig, Germany in May, in conjunction with ICSE 2008. The poster was co-authored by Ban Al-Ani (Project Scientist, UCI/ICS), **Roger Ripley** (Ph.D. student) **Anita Sarma** (CMU Post-doc, ISR alumnae), Prof. **André van der Hoek** and Prof. **David Redmiles.**

For more information on students:

http://www.isr.uci.edu/people.html

Participants are being solicited through summer 2008. For more information and completing the survey, please visit:

http://www.isr.uci.edu/projects/ccu-survey/

If you aren't able to participate in Buts's survey, you can learn about his work in several ways: look for an ISR Technical Report to be published in Fall 2008; Buts's Masters thesis will be completed by August and made available on the survey web site; and a scholarly publication based on his thesis will follow.

Prof. van der Hoek can be reached at andre@ics.uci.edu.

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Debra A. Brodbeck
Technical Relations Director
brodbeck@uci.edu, (949) 824-2260

ISR Participates in Ground System Architectures Workshop (GSAW 2008)

ISR's history of participation in the Ground System Architectures Workshop (GSAW), sponsored by long-time ISR supporter The Aerospace Corporation, is just one facet of our rewarding relationship with The Aerospace Corporation. Since its inception in 1997, ISR's involvement in GSAW has taken many forms, from faculty giving presentations, serving as panelists, and delivering tutorials, to graduate students presenting at and assisting with breakout sessions – especially the Architecture-Centric Evolution (ACE) workshop.

This year, Prof. **Hadar Ziv** participated in two activities at GSAW 2008. His half-day tutorial, "Use Case Literacy: Requirements Specification with Use Cases," provided a brief introduction to use cases, included

Sergio Alvarado of The Aerospace Corp. with Hadar Ziv

ISR Technical Reports Available Online

ISR technical reports present information resulting from student and faculty research carried out under the auspices of the Institute. They showcase early results not available in print elsewhere. ISR technical reports are available in PDF on the ISR web site. Recent reports include:

"A Survey of Software Architecture Decision-Making Techniques"
Lihua Xu, Debra J. Richardson, Hadar Ziv
UCI-ISR-07-10, December 2007

"Establishing the Connection Between Software Traceability and Data Provenance"
Hazeline Asuncion, Richard N. Taylor
UCI-ISR-07-9, November 2007

"A Study of Ranking Schemes in Internet-Scale Code Search"
Sushil Bajracharya, Trung Ngo, Erik Linstead, Paul Rigor, Yimeng Dou, Pierre Baldi, Cristina Lopes
UCI-ISR-07-8, November 2007

All ISR technical reports are available at:
http://www.isr.uci.edu/tech-reports.html

For more information, contact:

Debra A. Brodbeck, Technical Relations Director, brodbeck@uci.edu, (949) 824-2260

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cant Q&A time for attendees at all levels. According to Ziv, a key message and theme of the tutorial is that while use cases seem straightforward to read and consume, in practice they are not so easy to write, produce, adopt and adapt to an existing software-development house.

Ziv also served on an 8-person panel in the Architecture-Centric Evolution (ACE) workshop. Each panelist presented on an architectural design topic of their interest; Ziv's presentation was titled "From Requirements to Architectures." Ziv reflected on his experience: "I used my time to bring up requirements again, making the point that the gap and impedance mismatch between software requirements specifications versus architectural designs exists and persists and cannot be ignored by practitioners. Many requirements engineers seem to ignore or downplay architectures, and many architecture designers seem to ignore or downplay requirements. But both are important, and neither of those attitudes is healthy or helpful to the success of the project." The positive feedback Ziv received indicated his presentation resonated well with the ACE attendees.

For more information on Prof. Ziv's GSAW tutorial and ACE presentation, visit:

http://sunset.usc.edu/GSAW/

Embarking on the Collaborative Road with ISR's Graduate Student Research Symposium (GSRS)

In 2005 Lockheed Martin employee **Leyna Cotran**, who then was also a Masters student at Santa Clara University, came to ISR's Graduate Student Research Symposium (GSRS) and annual Research Forum with her advisor, ISR faculty member **John Noll**, of Santa Clara University. One of the goals of ISR's annual GSRS is to foster community and interdisciplinary collaboration among students in software and information technology fields, and Noll believed the experience would be rewarding for Cotran.

Cotran was delighted at the community she encountered which included fellow aerospace engineers from companies such as The Aerospace Corp., Boeing, and Northrop Grumman, as well as students from other universities, such as UC Santa Cruz, UC San Diego, USC, and Claremont College. Cotran enjoyed the GSRS atmosphere and was impressed by the fact that graduate students organized and ran the event. She walked away with new colleagues and connections.

When the GSRS Organizing Committee asked her to return in 2006 as both a

Ph.D. student Leyna Cotran on GSRS 2006 panel

Program Committee member to review submissions, and a panel member to talk about her perspective as an industry employee pursuing a graduate degree, she had no hesitation. Cotran's experiences at ISR's GSRS and annual Research Forum those two years had such a positive impact that she applied to UCI's ICS Ph.D. program. When she entered the program in Fall 2006, she eagerly joined the GSRS 2007 Organizing Committee.

One of the papers accepted to GSRS 2007 was authored by Ph.D. student Sarah Heckman (Prof. Laurie Williams, advisor) from North Carolina State University at Raleigh. Heckman presented her research on Adaptive Ranking Models (ARMs) for Automated Static Analysis Alerts, a compelling topic for the audience. Cotran and Heckman spent time together that day at GSRS and ISR's annual Research Forum, where Heckman gathered information about GSRS and its purpose. Heckman noted that the GSRS Program Committee feedback was some of the best she'd received from fellow students and said it provided different perspectives that she might expand on. Fostering the connection established that day, Cotran and Heckman keep in contact, communicating about their common research interests in Agile methods.

Having been inspired by ISR's GSRS, Heckman wasted no time in starting an equivalent at North Carolina State University (NCSU). Much like Cotran when she came to her first GSRS, Heckman too was impressed at the community she encountered at UCI. Heckman envisioned a similar symposium where graduate students from NCSU and other universities could get together and cross-collaborate on research directions and ideas. The result was NCSU's Inaugural Symposium for Graduate Research (SGR) held on March 29, 2008.

To support her research efforts and foster a

collaborative relationship between UCI/ISR and NCSU, Cotran submitted a paper on a research case study on adding Agile methods to an embedded systems project that she was working on jointly with Lockheed Martin (her employer), John Noll (her advisor from Santa Clara University) and ISR Prof. **Susan Elliott Sim**. The case study explores the effects of Agile methods in the aerospace domain, which traditionally does not foster Agile practices. Cotran's presentation at NCSU's SGR, her first research presentation to an academic audience, was extremely well received. "What a tremendous experience this was for me. The audience was well versed in Agile methods and embedded systems, and asked a lot of great questions. The feedback was incredibly useful."

Cotran's experiences at ISR and our Graduate Student Research Symposium have started her on a path down the collaborative road. Her connections to the research world started via GSRS, ultimately brought her to UCI, and fostered connections to colleagues at other universities and companies. ISR's

Graduate Student Research Symposium has served Cotran well—a true success story.

As well, inspiring a kindred symposium at North Carolina State University is not only a tacit measure of achievement, but is certainly a fitting tribute to the graduate students who make our GSRS a success each year.

Cotran can be reached at leynacotran@gmail.com.

For more information on GSRS, visit:

   http://www.isr.uci.edu/events/GSRS-2008/