

HOT RESEARCH

CREST: When REST Just Isn't Enough

In the last issue of the *ISR Connector*, we provided a retrospective of the contributions made to the World Wide Web by ISR students and faculty. Now, we'd like to introduce one of the active research projects led by ISR Director **Richard N. Taylor**, Computational REST (CREST), a guide for the next generation architecture behind the World Wide Web.

As discussed in "Designing a RESTful World" (*ISR Connector* Issue 6, Spring/Summer 2005), the Representational State Transfer (REST) architectural style guided the reformations introduced in HTTP/1.1. These changes allowed the Web to gracefully scale to enormous heights—with over 22.5 billion pages (according to <http://www.worldwidewebsite.com/>) and 128 million active websites (according to Netcraft).

While REST has done a superlative job guiding the web through this stage, new types

of web applications have emerged that are not easily explained by REST. A prominent example are "mashups," applications that rely upon Asynchronous JavaScript and XML (AJAX). Unlike traditional web sites, which

deliver static HTML pages or images to a passive browser, mashup web sites transfer a little bit of XML along with some mobile code (in the form of JavaScript) that "programs" your web browser—telling it what to display and when. Sites such as Google Maps, AmazonOnlineReader, and Flickr are all examples of AJAX-based sites.

The main benefit of these AJAX-based sites is that basic operations (such as scrolling on a map) can be handled by the browser without asking the server for direct assistance in redrawing the page. By eliminating the round trip to the server for these computations, these web applications look and feel

RESEARCH BRIEFS

ISR Prof. **Cristina Vidiera Lopes** and colleagues have been awarded a \$1.1 million NSF grant to develop a trustable cyberinfrastructure for water management. Their work focuses on transforming the California Sustainable Watershed Information Manager (CalSWIM: <http://calswim.org/>) into an Open Collaborative Information Repository, in the form of a wiki with advanced content management features, including databases, GIS layers, and other forms of digital data. Prof. Lopes, with ICS Prof. Baldi, also received a \$600,000 NSF grant for their "Large Scale Empirical Validation of the Aspect-Oriented Design Hypothesis" project, and will leverage this research to derive principles for modular design.

ISR Prof. **Gloria Mark** has been awarded a \$450,000 NSF grant on "Collaboration Resilience: Restoring Human Infrastructure with Technology". Her work examines how human infrastructure, the patterns of relationships of people through various networks and social arrangements, can be repaired using information and communication technologies when the environment is disrupted. In partnership with IBM Haifa (Israel), the primary data collection for this project will be an ethnographic field study of people's experience with the recent Israeli-Lebanese war.

ISR Prof. **Alfred Kobsa** published the July cover article of the *Communications of the ACM*. The article, "Privacy-Enhanced Personalization", presents human-computer interaction strategies, policy measures, and software architectures that can contribute to reconciling personalization and privacy.

More Research Briefs on page 5.

more responsive to the end-user. However, the REST style is silent on how such applications should be designed and implemented—a significant obstacle for those wishing to design new web applications that take advantage of the latest techniques.

CREST Architectural Style

Stepping back and looking at these and other shifts in web applications, ISR Ph.D. students **Justin Erenkrantz**, **Michael Gorlick**, ISR Post-Doc/Alumnus **Girish Suryanarayana**, and ISR Director Taylor synthesized a new architectural style, Computational REST (CREST), that provides detailed design guidance to explain and facilitate the principled construction of these novel and emerging application architectures.

CREST assumes that "computational

exchange" will drive future web applications. Up to this point the web is content-centric with content exchange the common communication modality between servers and clients. Furthermore, the HTTP/1.1 dominated web is almost entirely server-centric,

wherein servers dictate content and clients (browsers) are, with the exception of mashups, mere consumers of content. This is consistent with the traditional REST perspective where the client is a passive participant

dedicated to rendering hypermedia and subservient to the origin server.

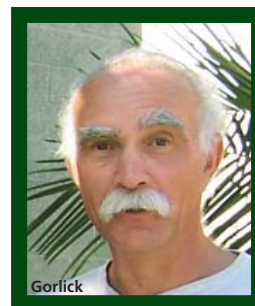
CREST, in contrast, reverses the traditional roles of servers and clients. In a CREST world, servers are execution environments for the mobile code supplied by clients, with clients and servers exchanging computations (mobile code + state) back and forth until the client is satisfied with the outcome. Here the client is an active participant that dictates the actions of the servers with which it communicates. The key CREST design principles,

IN THIS ISSUE:

- 3-Message from Director
- 4-Meet Prof. Nenad Medvidovic
- 4-5-Student News
- 5-Research Briefs
- 5-Tribute to Roberta Lamb
- 6-Technical Reports
- 7-ISR Sponsorship, Student News
- 8-Vboard: Design Exploration
- 8-ISR Events



Erenkrantz



Gorlick

CREST Principles

- The key abstraction of computation is a resource, named by a URL.
- The representation of a resource is a program, a closure, a continuation, or a binding environment plus metadata to describe the program, closure, continuation, or binding environment.
- All computations are context-free.
- Only a few primitive operations are always available, but additional per-resource operations are also encouraged.
- The presence of intermediaries is promoted.

a generalization of the REST design principles, are given in the sidebar (above).

Implications of CREST

Because CREST requires bilateral computational exchange among clients and servers, it largely erases distinctions between the two classes. Since a CREST participant may be a client in one series of exchanges and a server in another, it's more accurate to label them as "peers" with computational exchange occurring among equals. Peers practice "extreme code mobility" meaning that all participants in a chain—the nominal client, proxy or cache, and origin server—communicate content, intention, and state transformation by executing, in peer-specific computational environments, the mobile code provided by others and by supplying mobile code of their own in response.

A CREST client, to extract content from a CREST server, will deliver mobile code to the server for execution. The outcome of that computation will itself be mobile code returned to the client for execution client-side and it is the value of that final client-side execution that is the content outcome of the exchange. For example, in a CREST world, instead of your browser requesting JavaScript and XML from Google Maps the browser ships a program to the Google Maps server that assembles, from the rich mapping primitives available within the Google Maps execution environment, a tailored geographic application program whose code is transmitted back to the browser to be executed locally to deliver the CREST-equivalent of Google Maps.

The exchange of mobile code as dictated in

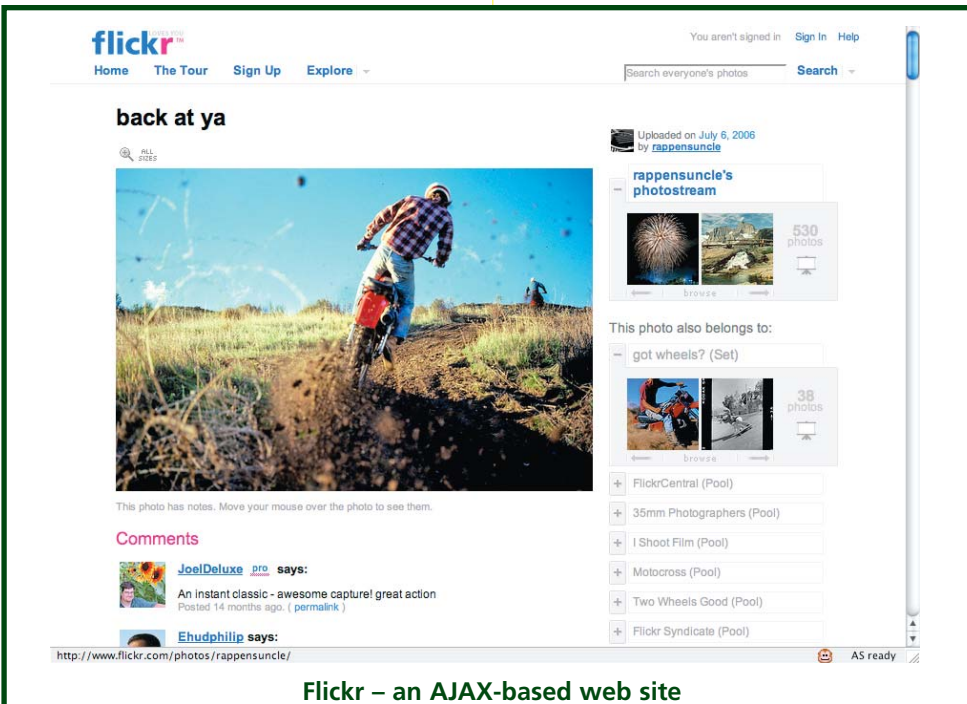
CREST introduces a broad class of security concerns that real CREST implementations must protect against. The first security mechanism we utilize is through a technique called "environment sculpting". For example, any functions that allow the mobile code to open an arbitrary file in the file system of the host are purged and the ability to contact other CREST peers may be broadly restricted. In addition, our CREST implementations will employ "resource sandboxing" to ensure that no mobile code, either by intent or accident, consumes more than its fair share of resources including memory, processor cycles and network bandwidth. Operators of CREST servers may establish a "sandbox" of limitations on the performance and behavior of the mobile code executed through a combination of throttling, priority manipulation, resource allocation, monitoring, and code analysis.

CREST Implementation

CREST is not just for a far future web; it also applies to the real-world constraints of HTTP/1.1. Using the CREST design principles Justin Erenkrantz has implemented Serf, a high-performance, asynchronous, HTTP client library. Serf is used by Subversion and is now a part of the next-generation prototype of the Apache HTTP Server. Serf in these instances "rehabilitates" current HTTP/1.1 applications, allowing them to better conform to the beneficial principles of CREST. In addition, CREST also allows us to improve on the underlying wire protocol within HTTP/1.1. To that end, we are providing a brand new infrastructure that supports this new set of protocols.

We have implemented, in Scheme, a CREST server, named Circus, that allows for dynamic Internet-scale event distribution mechanisms similar to those specified by the WS-BaseNotification standard. Circus supports event subscription, deletion and renewal, push and pull event transmission, and the pause and resumption of events on a per-subscription basis. As a natural consequence of the client-centric architectural style of CREST, Circus adds features not supported by WS-BaseNotification including arbitrary event filtering and event-based computation, as well as the participation of third-party event consumers and transformers.

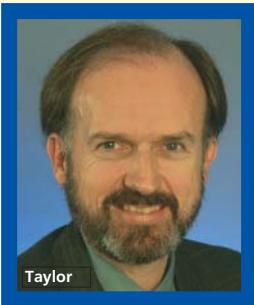
To ease backwards compatibility with existing Web clients, we have created a CREST/HTTP gateway, named Sham, that allows HTTP/1.1 clients, such as browsers, to interact with CREST servers like Circus. Similarly, to ease integration into a world of



Flickr – an AJAX-based web site

MESSAGE FROM THE DIRECTOR

At the most recent International Conference on Software Engineering (Minneapolis, May 2007), a special track of invited papers addressed the “Future of Software Engineering”. The twenty-five papers covered most of the major topics of software engineering, including, for instance, reverse engineering, software testing, requirements engineering, and model-driven development. ISR Professor **Jim Whitehead** from UC Santa Cruz addressed collaboration in software engineering, while former UCI Professor and IRUS Director **Leon Osterweil** gave the lead-off talk on “A Future for Software Engineering?” during which he argued for the importance of curiosity-driven research as a complement to problem-driven research.



ISR Professor **André van der Hoek** and I contributed a paper to this collection, with the title “Software Design and Architecture: The once and future focus of software engineering.” The subtitle, inspired by an epitaph for the legendary King Arthur, “the once and future king,” reflects our conviction that software design, and the ability to design, is re-emerging as both a critical focus for software engineering research, and as a strategic corporate competency. While methods and techniques for software design were a primary focus of software engineering in its early years, over time that focus seems to have been lost amidst a sea of competing emphases. Perhaps the most concerning consequence is the diminished ability of many developers to conceive novel designs, particularly designs which stray from the all-too predictable paths of OO.

Yet if one considers the design of applications which have truly shaken the world and created entirely new business enterprises, it is apparent that those designs did not spring from a careful use of UML or the day’s popular commercial middleware. Whether it is the Web, Skype, e-commerce, or ubiquitous computing, design of novel architectures is at their core. Fostering the creation of such systems is a most worthy topic, and hence was the focus of our paper.

To provide a taste of the paper, and hopefully to encourage you to read it (it is available from the IEEE digital library at <http://doi.ieeecomputersociety.org/10.1109/FOSE.2007.21>), let me close with an excerpt from the paper’s conclusion:

“Design and architecture ... comprises a broad field and arguably sits at the very core of software engineering. All of its aspects are vital: ways of designing, architectural representations, means for performing analysis, techniques for transitioning a design into an implementation, ways of capturing design experience, and so on. Absence of progress in any one of the areas discussed impedes progress in the others. Thus, broadly based advancement on the whole set of sub-topics constitutes a grand challenge for software engineering ...

Designing a software application involves designing its structure as well as its user-observable properties, functional and non-functional alike. By removing the counter-productive boundary between requirements and design, a holistic view of product conception emerges. By analogy to building architecture, a building can be seen as being composed of beams, bricks, pipes, glass, and wires, but also being composed of living spaces, galleries, sun rooms, and cooking facilities. Building architects can show clients cut-away views of buildings, simultaneously revealing both structure and facility, the inter-relationships between natural light and ceiling truss. Imagine now interactive cut-aways of buildings, whereby the designer could move skylights and see the consequences for the roof’s structure, or change specifications on a window and note how the quality of interior light improves.

Realizing an analogous vision for software design requires our supporting the design and visualization of user functionality at least as well as our supporting the design and visualization of software structures. Not only must we see and manipulate components and connectors in an architecture, but see, as we do so, how the user’s data display is changed, or how the electronic commerce purchasing experience is shaped, or how facilities for controlling the chemical plant are set.

The community must develop the languages, techniques, and tools for enabling the multitude of stakeholders in an application design to sketch, evaluate, revise, and refine design concepts for applications. Success will be achieved when clients are able, through working with the design team, to see their tasks in new ways and are able to innovate new ways of meeting those tasks.”

I hope you will join with us in again making design “the focus of software engineering”.

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

HTTP/1.1 servers, we are implementing a CREST-aware HTTP client, named Imposter, that will allow CREST peers (both clients and servers) to access, via HTTP/1.1, the wide world of web-accessible resources.

A research paper detailing the rationale, principles, and guidelines behind CREST was presented at ESEC/FSE 2007 in Croatia.

Additionally, a vision of how to replace Web Services with a CREST-based model was presented at DESRIST 2007. We expect to continue to work on providing the essential infrastructure supporting the CREST style and we will be reporting on these implementations (Circus, Sham, and Imposter) along with some early experimental results on performance in a forthcoming paper.

For more information CREST and other ISR web technology research, please visit:

<http://tps.ics.uci.edu/svn/projects/CREST/>
<http://www.isr.uci.edu/projects/web/>

ISR STUDENT NEWS BRIEFS

Sushil Bajracharya and **Joel Ossher** (C. Lopes, advisor), with visiting student



Bajracharya

Otavio Lemos (Universidade de Sao Paulo, Sao Carlos) won the first prize in the ACM student research competition at OOPSLA 2007 this year for their poster titled “CodeGenie: a Tool for Test-Driven Source

Code Search”. This puts them in the finals for the annual ACM SIGPLAN Student Research Competition. Bajracharya also recently completed an internship at Microsoft Research, Redmond, with the Human Interactions in Programming group.

Hazel Asuncion (R. Taylor, advisor) presented her paper, “An End-To-



Asuncion

End Industrial Software Traceability Tool”, co-authored by Frédéric François (formerly of Wonderware) and Richard N. Taylor at the Sixth Joint Meeting of the European Software

Engineering Conference and the ACM SIGSOFT Int’l Symposium on the Foundations of Software Engineering (ESEC/FSE 2007).

Jose Romero-Mariona (D. Richardson, advisor) interned at Motorola in the Integrated Solutions Division this summer. He focused on researching and developing new methodologies and tools for software testing.



Romero-Mariona

For more information on students:

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

FOCUS ON FACULTY

Meet Software Architecture Expert Nenad Medvidovic

Nenad Medvidovic is an Associate Professor in the Computer Science Department at the University of Southern California. He is a faculty member of the USC Center for Systems and Software Engineering (CSSE), and is an alumnus (R. Taylor, advisor) of the Irvine Research Unit in Software, the predecessor to ISR.

Medvidovic’s research interests are in the area of architecture-based software development. Over the years, his work has focused on software architecture modeling and analysis; middleware facilities for architectural implementation; product-line architectures; architectural styles; architecture-level support for software development in highly distributed, mobile, resource constrained, and embedded computing environments; and, most recently, role of software architectures in biologically inspired computing.

Medvidovic has worked with event-based software architectures for almost 15 years. Throughout this period, one distinguishing feature of his research has been the primacy of the systems described by the architectures, as opposed to the usual focus on

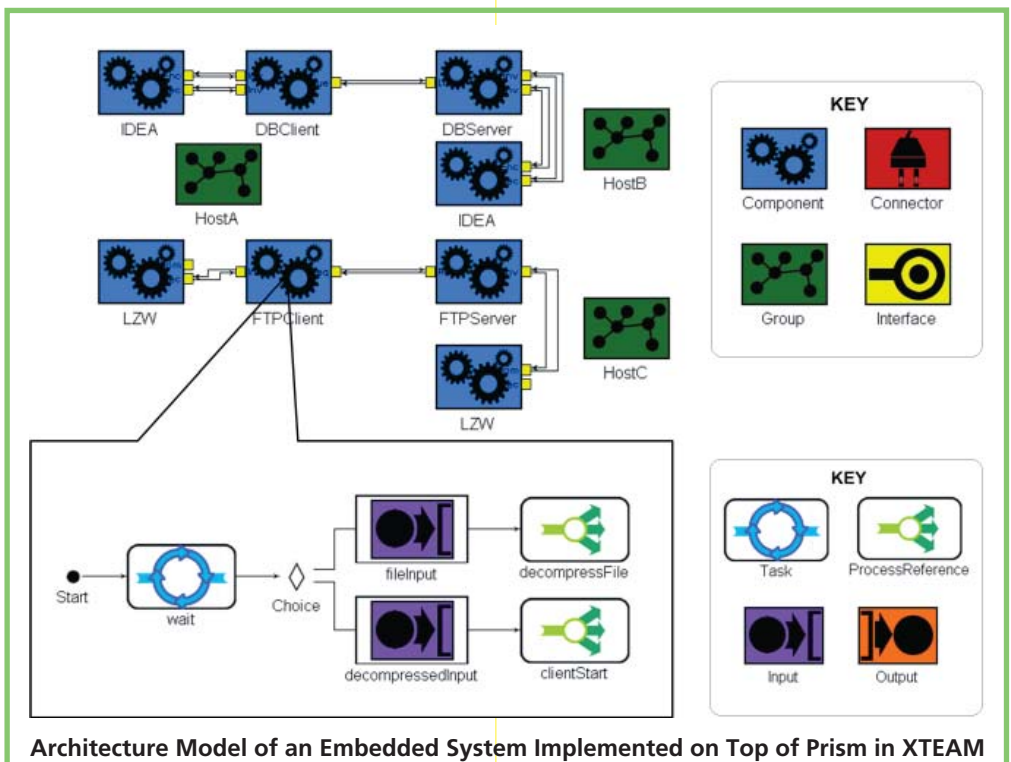


Medvidovic

architectural models. With the recent proliferation of inexpensive, but computationally quite capable, small, mobile devices (e.g., PDAs, cell phones), the emergence of the grid, and the advances in wireless, ad-hoc, and body area net-

works, the question Medvidovic’s research group naturally began asking is “what role can software architectures play in these new domains?”

The result has been an exciting foray into embedded, wearable, high performance, and biologically inspired systems. This has not been just a passing fad for Medvidovic’s research group: at least one of his Ph.D. students has completed or is working on a dissertation in each of these areas. As one recent example, a student of Medvidovic’s recently developed a distributed software architecture-based technique, based on a formal model of crystal growth, for solving NP-complete problems



RESEARCH BRIEFS

Prof. **Walt Scacchi** gave a State of the Art invited talk at the European Software Engineering Conference and ACM SIGSOFT International Symposium on the Foundations of Software Engineering (ESEC/FSE 2007) titled “Free/Open Source Software Development: Recent Research results and Emerging Opportunities.”

Prof. **Gloria Mark** gave a keynote speech at the Joint HCSNet-HxI Workshop on Human Issues in Interaction and Interactive Interfaces. She presented empirical results from field-work observations and experiments over three years which detail how information workers experience a high level of fragmentation in their work, regardless of organizational role.

Margaret Elliott, ISR Research Specialist, and Prof. Ken Kraemer, Director of the Center for Research on Information Technology and Organizations (CRITO), have co-edited a special issue of *The Information Society*, *The Legacy of Rob Kling: Social Informatics as a Research Discipline*, Vol. 23, No.4, 2007. This issue honors the late Prof. Rob Kling’s contributions to the Social Informatics (SI) community—his impact on the past, current, and future state of the field of SI. The papers in this special issue are a subset of 24 papers presented at the Social Informatics Workshop, held at UCI, March 11-12, 2005 (<http://www.crito.uci.edu/2/si/>). See also **ISR Connector** Spring/Summer/2005, “Honoring the Late Rob Kling”.

on large, unreliable networks such as the Internet. The technique is realized in an architectural style, referred to as the tile style, which results in systems with provable levels of discreetness (a malicious intruder cannot discover the algorithm being computed or the input to the computation), robustness, and scalability.

Other examples include the development of an architecture-based middleware platform for embedded and resource-constrained systems. The platform, called Prism, natively supports development in different architectural styles (e.g., client-server, peer-to-peer), and results in highly efficient systems with very small memory footprints. Prism has been accompanied by advanced techniques for architecture-based system modeling, analysis, deployment, and dynamic evolution. As an example (see figure, left), the XTEAM tool supports architecture modeling, simulation, and different types of analyses of those models (e.g., for properties such as end-to-end latency, system reliability, and energy consumption).

Medvidovic is a recipient of the National Science Foundation CAREER (2000) Award and the Okawa Foundation Research Grant (2005). His research has been funded by grants from DARPA, NSF, U.S. Army, NASA, Boeing, Xerox, Intel, and Bosch.

Download Prism at:
<http://sunset.usc.edu/~softarch/Prism/>

For more on Medvidovic’s research, see:
<http://sunset.usc.edu/~nen0/>

Medvidovic can be reached at nen0@usc.edu.

A Tribute to Roberta Lamb, Social Informatics Scholar

Roberta Lamb was an Associate Professor of Informatics in the Bren School of Information and Computer Science at the University of California, Irvine, and she held a Research Affiliate position in the College of Business Administration at the University of Hawaii, Manoa when she passed away a year ago, in November 2006. This article pays tribute to her outstanding contributions to information systems and social informatics research specializing in the area of online technologies and socio-technical networks. She was an excellent teacher and student mentor.

Roberta joined the ICS faculty in April 2006 and was excited to return to her alma mater having earned her Ph.D. in Information and Computer Science at UCI in 1997. Upon graduating in 1997, Roberta became an Assistant Professor of Information Systems at Case Western Reserve University. From 2000 to 2006, she was Associate Professor of Information Technology Management in the College of Business Administration at the University of Hawaii, Manoa. Prior to her academic career, she worked extensively in the software development industry.

At the time of her death, she was directing two NSF-funded studies, focusing on the role of information and communication technologies (ICTs) in scientific collaborations that cross boundaries between academia and industry, and, on ways to model people and

ISR STUDENT NEWSBRIEFS

Justin Erenkrantz (R. Taylor, advisor) has been appointed President of the Apache Software Foundation (ASF).



The ASF (co-founded by ISR Alumnus **Roy Fielding**) is one of the world’s largest and most highly respected open-source organizations. Their flagship contribution, the http server project, powers

the majority of the world’s web sites. Erenkrantz also recently presented his paper “From Representations to Computations: The Evolution of Web Architectures”, co-authored by **Michael Gorlick**, **Girish Suryanarayana**, and **Richard N. Taylor** at ESEC/FSE 2007. For more about Erenkrantz, see Hot Research, page 1.

Anita Sarma (A. van der Hoek, advisor)



presented her paper, “Towards Supporting Awareness of Indirect Conflicts across Software Configuration Management Workspaces”, co-authored by **Gerald Bortis** (A. van der Hoek, advisor) and **van**

der Hoek at the 22nd IEEE/ACM Int’l Conference on Automated Software Engineering (ASE), where it was nominated for the best paper award.

Mamadou Diallo (T. Alspaugh, advisor)



completed a summer internship at IBM T.J. Watson Research Center, where he designed and implemented an independent Fault Model, which automatically generates fault conditions for testing based

on requirements specified in the form of use cases.

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:

“Establishing the Connection Between Software Traceability and Data Provenance”
Hazelina 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

“Static Analysis of Task Interactions in Bristlecone for Program Understanding”
Brian Demsky, Sivaji Sundaramurthy
UCI-ISR-07-7, October 2007

“Bristlecone: A Language for Robust Software Systems”
Brian Demsky, Alokika Dash
UCI-ISR-07-6, October 2007

“SIFT: A Simulation Framework for Analyzing Decentralized Reputation-based Trust Models”
Girish Suryanarayana, Richard N. Taylor
UCI-ISR-07-5, August 2007

“A Generic Framework for Modeling Decentralized Reputation-based Trust Models”
Girish Suryanarayana, Mamadou Diallo, Richard N. Taylor
UCI-ISR-07-4, August 2007

“Incorporating Social Navigation into a Usable Security System”
Carolina Johansson
UCI-ISR-07-3, July 2007

“A Comprehensive Evaluation of Workspace Awareness in Software Configuration Management Systems”
Anita Sarma, André van der Hoek, David Redmiles
UCI-ISR-07-2, June 2007

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

ICTs as social actors in agent-based systems. She and Rob Kling won the 2003 annual Best Paper Award of the *MIS Quarterly* for their paper “Reconceptualizing Users as Social Actors in Information Systems”. She had just completed a 4-year NSF-funded study of the development of organizational intranets, and the interorganizational relationships that shape intranet use. She published widely in journals such as *Data Base*, *MIS Quarterly*, *CACM*, *The Information Society*, *Information*, *Technology*, and *People* and elsewhere. She also served as deputy editor for *The Information Society*, associate editor for *Information Technology and People*, and as Social Aspects theme editor for the *Journal of Digital Information*. Roberta taught graduate and undergraduate courses on the socio-technical aspects of computing and information systems. In Fall 2005, she visited the

University of Turku, Finland as a Fulbright Scholar.

The following is an excerpt from a phone interview conducted with Roberta in March, 2006 by a graduate student from the Rob Kling Center for Social Informatics, Indiana University in which Roberta discusses her passion for research in social informatics (<http://rkcsi.indiana.edu/index.php/interviews-with-colleagues-and-friends>):

Do you have any words of wisdom you would like to pass on to others involved in Social Informatics research – especially for fledgling graduate students like myself?

I do a whole talk on it. One of the main points is to do what you really love doing. Make sure you do it and don't stop. That

will take up all your time. It's not a 9-5 kind of thing.

Where would you like to see the field of Social Informatics go?

I don't have disciplinary and field aspirations. I want to see the whole planet come to an understanding of how to live better, take care of the planet better, and use ICTs to make things better...I really care about the research.

In a 2007 issue of *The Information Society*, Vol. 23, No. 5, there is a section titled “Remembering Roberta Lamb” where four colleagues write tributes to Roberta including Steve Sawyer, Associate Professor of Information Sciences and Technology, Penn State University. He states:

“I first met Roberta in person in 1997 when she briefly stopped by for dinner while traveling from one place to another. This meeting is metaphorical: Roberta was a woman constantly on the go and very much on her way to someplace important...Roberta became a close intellectual colleague, a co-author, and an inspiration. I write now to remind the future that Roberta, while not sentimental, must be remembered for her passion and contributions to the approach to studying computerization that is social information...I write my stories to help us recall Roberta's dynamicism and to remind us of her contributions to shaping the trajectory of research on computerization. I want to convey Roberta's love of scholarship, her real passion for all aspects of research. And I want to highlight her contributions to social informatics: the social actors model, the contrasts among socio-technical models and tool-based views of digital commerce (and the uses of information and communications technologies more generally).”

Roberta also influenced many ISR associates:

“Roberta and I were graduate students together in the 1990's in the Computing, Organizations, Policy and Society (CORPS) group in the Information and Computer Science Dept., now known as the Interactive and Collaborative Technologies group in the Bren School of Information and Computer Sciences. Roberta amazed us all by continuing to work for a software firm while attending classes full time. She truly loved research and it became her life. She was thrilled to be back at UCI with its rich research community. I especially liked one of her articles in which she and Rob very nicely articulate the power of technological utopianism in

WANT TO GET INVOLVED?

Sponsoring ISR has many benefits. It enables your company to form closer ties with our faculty and students, puts you on the fast track to our leading edge research, and gives you first crack at our experimental software tools. Choose from five levels of sponsorship:

Support Level	Annual Contribution	Contribution goes to:
Friend	\$10,000	ISR's general research fund.
Affiliate—Research	\$30,000	A designated ISR research area.
Affiliate—Visiting	\$40,000	Faculty host's research area.
Affiliate—Grad Student	\$60,000	Graduate student fellowship.
Partner	\$100,000 or more	Large-scale research project.

For more information about ISR Sponsorship, please contact:

Debra A. Brodbeck
brodbeck@uci.edu
(949) 824-2260

interpreting the future of digital libraries: Analyzing Alternate Visions of Electronic Publishing and Digital Libraries. Chapter 2 in Robin P. Peek and Gregory B. Newby, eds. *Scholarly Publishing: The Electronic Frontier.* **Margaret Elliott**, ISR Research Specialist

"I was inspired by Roberta's fearlessness in tackling big picture issues and the way she skillfully wove together large-scale organizational and social issues without forgetting the actual people at the end of the food chain." **Bonnie Nardi**, ISR Professor

"Roberta was truly dedicated in her work and always had her eye toward the future in pursuing new projects. She was instrumental in pushing the bounds of the field of Social Informatics—continuing the work that Rob Kling started. One of her greatest strengths was her ability to forge relationships and projects. It is really rare to find such a person with such an amazing amount of energy who can so skillfully bring people together." **Gloria Mark**, ISR Professor

"Social Informatics suffered a great loss intellectually. Roberta was moving towards developing important theoretical advances in Social Informatics when she died. She was a passionate advocate of critical realism, especially as applied to utopianistic views of technology and the workplace, and I expected her work to break important new ground. She had the same intellectual insight and force that Rob Kling and others at the Irvine School had in their early, seminal work in Social Informatics." **Mark Ackerman**, ISR Professor

Roberta is sadly missed by many.

Become Part of the ISR Family

Rubbing elbows with ISR faculty, staff and students gives you a valuable window into the technology landscape of the future. But a relationship with ISR can be much more:



Brodbeck

Think of us as an extension of your company—a think tank, an R&D department, a research library, a consulting firm, a training department, and an employment agency, all rolled into one. More importantly, when you sponsor

ISR you become part of a friendly group of folks who speak the same language and are eager to work with you to solve your current technical problems in the most cost-effective way possible.

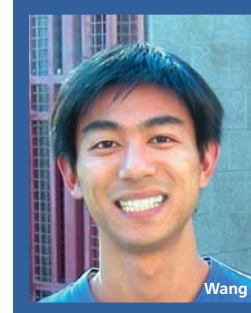
Be part of the ISR Family—a Friend, Affiliate, or Partner.

For more information, visit our web site: <http://www.isr.uci.edu/sponsorship.html> or contact:

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

ISR STUDENT NEWSBRIEFS

Yang Wang (A. Kobsa, advisor) presented his paper "Respecting Users' Individual



Wang

Privacy Constraints in Web Personalization", co-authored by **Alfred Kobsa**, at the 11th International Conference on User Modeling (UM07) in Corfu, Greece. Wang also interned at Intel

Research this summer, in the People and Practices Research Group where he did an exploratory ethnographic study of virtual currency use in China.

Norman Makoto Su (G. Mark, advisor) presented two papers recently. The first, "Workplace Connectors as Facilitators for Work", co-authored by his advisor



Su

Gloria Mark and **Stew Sutton** of The Aerospace Corp., was presented at the 3rd Int'l Conference on Communities and Technologies (C&T 2007). The second, "The Gospel of Knowledge Management in

and out of a Professional Community", co-authored by Ph.D. student **Hiroko Wilensky**, and Profs. **David Redmiles** and **Gloria Mark**, was presented at ACM GROUP 2007.

Steve Abrams (G. Mark, advisor) presented his paper, "Network-Centricity:

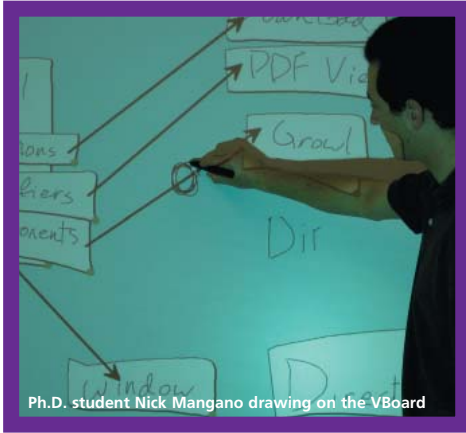


Abrams

Hindered by Hierarchical Anchors", co-authored by **Gloria Mark** at the 1st Symp. on Computer Human Interaction for Management of Information Technology (CHIMIT'07).

For more information on students:

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



Ph.D. student Nick Mangano drawing on the VBoard

FOCUS ON ISR TECHNOLOGIES

VBoard: A Prototype Early Design Exploration Tool

ISR Ph.D. student **Nicolas Mangano** and his advisor Prof. **André van der Hoek** are developing VBoard, a hands-on application that supports the conception and exploration of ambiguous designs, particularly in the context of early idea generation addressing a complex software design problem. An open drawing canvas, coupled with pen driven user interaction, provides a flexible setting for rapid exploration of ideas of all sorts. Expanding to a multiple canvas view, a grid of active sessions provides a context to organize and relate a magnitude of ideas.

Designed from the ground up to unobtrusively support the sketching activity, VBoard complements a creativity session. The user may directly draw and erase figures on a canvas. Figures can be grouped into metaphorical "scraps", which take on the physical characteristics of a scrap of paper. They can be moved, stacked, drawn on, and have relationships created between them with arrows. The scrap metaphor enables the environment to be responsive in a fashion unavailable to regular drawing tools, both digital and physical. However, it retains the quick manipulation that is unavailable in more structured tools, such as CAD design software or traditional software design tools.

At the highest level of abstraction, VBoard organizes all drawing canvases within a grid. At any time during a drawing session, a user can move to the grid perspective. In addition to providing the user with a historic trail of their explorations, the grid perspective allows the user to organize their high level ideas, for example to contrast alternatives or to group convergent thoughts.

ISR EVENT SCHEDULE

Mark your calendars now!

November 2, 2007

Distinguished Speaker: Kumiyo Nakakoji

University of Tokyo and SRA Key Technology Laboratory Inc.

Personalized, Task-specific, Ad Hoc Expert Communities for Effective Knowledge Collaboration

November 30, 2007

Distinguished Speaker: Steve Easterbrook

Dept. of Computer Science and Bell University Labs, University of Toronto

Scale Changes Everything: Understanding the Requirements for Systems of Systems

January 25, 2008

Distinguished Speaker: Robert E. Kraut

Human-Computer Interaction Institute, Carnegie Mellon University

Conversation & Commitment in Online Communities

February 15, 2008

Distinguished Speaker: Wolfgang Emmerich

London Software Systems, Dept. of Computer Science, University College London

Managing Web Service Quality

April 4, 2008

Distinguished Speaker: Gruia-Catalin Roman

Dept. of Computer Science & Engineering, Washington University in Saint Louis

Coexistence, Collaboration, and Coordination Paradigms in the Presence of Mobility

June 6, 2008

2008 ISR Research Forum and

Graduate Student Research Symposium: For Students By Students

The 2007 GSRS Best Paper Award was given to **Rosalva Gallardo's** paper "Planning and Improvisation in Software Processes", co-authored by her advisor **Susan Elliott Sim**. *ACM Crossroads* published the paper in Vol. 14, Issue 1, 2007. *We look forward to your submissions for GSRS 2008!*



Gallardo

For more information:

<http://www.isr.uci.edu/events.html>

VBoard is currently under development. An early prototype is available for use, available at:

<http://vboard.bhnet.us>

For more information, contact:

Nicolas Mangano, nick@bhnet.us

André van der Hoek, andre@ics.uci.edu

SPECIAL THANKS

The UCI Institute for Software Research is generously supported by:

The Aerospace Corporation
The Boeing Company
Fuji Xerox
IBM
Intel Corporation
Northrop Grumman

ISR

To receive the *ISR Connector*, send an email request to: brodbeck@uci.edu

ISR news, including the *ISR Connector*, is available at the ISR website: <http://www.isr.uci.edu/>

For more information, contact:

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

UNIVERSITY of
 CALIFORNIA
 IRVINE