HOT RESEARCH

Capability Accounting for Decentralized Systems using the COAST Architectural Style

A decentralized system is a distributed system for which there is no central administrative authority to dictate how the distributed subsystems must be developed, operated, or maintained. In decentralized systems service providers and service clients can each operate under different authority and evolve independently. Designing and implementing these systems is a substantial challenge. ISR Director **Richard Taylor's** research group addresses these questions from a fresh perspective, **COmputationAl State Transfer (COAST)**, an architectural style for secure and adaptive decentralized systems. COAST constructions permit and encourage continuous accounting and systemic auditing to verify the correct operation and integrity of critical elements of a decentralized system. Under COAST the basic unit of exchange and accounting is a capability

Taylor's research group members Giorgio, Gorlick, and Nies.

(an unforgeable right to perform some action within a system). Taylor and his group propose that capability accounting — tracking the creation, transfer, exercise, and revocation of capability — is fundamental to the debugging, verification, and forensic auditing of decentralized systems.

Taylor's researcher group has made fundamental contributions to the design and evolution of the world's largest and best known decentralized system: the World

RESEARCH BRIEFS

Prof. **Cristina Videira Lopes** has been awarded $465,040 from the National Science Foundation for her research on "An Aspect-Oriented Approach to Large-Scale Urban Simulations." She has also received $325,724 in DARPA funding for her research on "Software Datasets for Code Mining."

Prof. **Walt Scacchi** has been awarded $117,500 by the Naval Postgraduate School, Acquisition Research Program for his research on "Achieving Better Buying Power through Acquisition of Open Architecture Software Systems for Web and Mobile Devices." This marks the ninth consecutive award for Scacchi and ISR research associate **Thomas Alspaugh** from the NPS ARP.

Prof. **Cristina Videira Lopes'** book *Exercises in Programming Style* has been included on the Computing Reviews (CR) 19th Annual Best of Computing list, a compilation of the most interesting books and articles published in 2014.

Profs. **André van der Hoek** and **Walt Scacchi** gave invited presentations at the Microsoft Research Software Engineering Mix in Seattle in July. van der Hoek spoke on "Crowdsourcing in Software Engineering" and Scacchi spoke on "Open Source Ecosystems: Challenges and Opportunities."

Prof. **Hadar Ziv** contributed to a free MOOC prepared by UCI Extension in conjunction with the TV show *The Strain* on FX Network. Three learning modules are featured in the online course; Ziv's module is on cybersecurity.

Wide Web. ISR alumnus **Roy Fielding's** work on the HTTP 1.1 protocol played a major role in the astonishing growth of the web. His Representational State Transfer (REST) has gained widespread acceptance as an architectural style for scalable web services, but as web applications pushed the web in new directions, ISR alumni **Justin Erenkrantz** and **Girish Suryanarayana**, and Ph.D. student **Michael Gorlick** defined Computational REST (CREST), a distinct architectural style for a new generation of decentralized, autonomous, self-governing applications

where independent and physically distributed agencies collaborate by exchanging computations rather than content.

Gorlick further evolved this work into COmputAtional State Transfer (COAST), which provides new principles to support the design of openly secure decentralized applications, and has built a new generation of infrastructure that supports more sophisticated forms of computational exchange. COAST addresses security as a fundamental concern. It targets decentralized applications where organizations offer services formulated as execution hosts (peers) and third-party organizations create their own custom-tailored versions of services by dispatching computations to asset-bearing peers. Decentralized security and guarding against untrusted or malicious mobile code are principal concerns. Applications in healthcare and in financial systems are described on pages 2-3.

In COAST, communication between peers is both granted and constrained by **capability URLs (CURLs)**. A CURL conveys

MESSAGE FROM THE DIRECTOR

"L'Etat, c'est moi." "Et moi." "Et moi!"

It used to be that only an absolute monarch like Louis XIV of France would have the temerity to say, "The state, it is I." Now everybody is in on the act. It seems that we all want to treat the world as our own personal kingdom where we get to make all the laws, all the rules, determining for ourselves what is right. Cyber-managed data is a prominent issue here. Edward Snowden and Bradley Manning made Louis XIV-like decisions when they unilaterally decided to reveal secrets they were privy to, but for which they had no right of disclosure. Until, of course, they decided they did. Obviously, it is not just individuals who make such decisions. According to a July 9, 2015 editorial in the Wall Street Journal, "The Consumer Financial Protection Bureau plans to monitor 95% of all credit-card transactions by 2016," arguing a legislative mandate to do so. Currently, the CFPB "through its 12 data mining programs, collects and monitors information for nearly 600 million personal credit-card accounts on a monthly basis." That should give you pause. Then there's the massive Office of Personnel Management data breach; who decided that data should be "theirs"? (Ambiguous antecedent intentional.) Pick up a paper and on almost every day a new instance appears of individuals or institutions unilaterally deciding, "I am the state."

Taylor
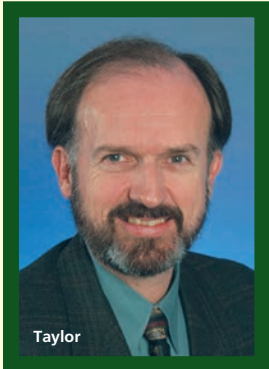
Of course in a world where, "L'Etat c'est moi," one begins to wonder about one's privacy. We all know how we feel about this: *my* information should be private. Your stuff? Not so much.

What does all of this have to do with ISR? Quite a bit, actually. Arguably we have contributed to the problem through our varied contributions to the development of the Web. More recently ISR has started to make some contributions to privacy through a recent project focused on Electronic Health Records (EHRs). EHRs pose an interesting challenge: how can I ("L'Etat") see to it that only those people whom I desire have access to my health records, and no one else. I want to make those decisions. Of course, no matter how much in our hearts we want to be monarch of the universe, we are not. And when it comes to health records many other organizations have a perspective on their use and management (they believe they are the State—how impertinent!) So the technical issue becomes one of enabling each entity in the health care system to properly manage its own data, maintain its privacy, and some-how cooperate with other entities such that, in the end, everyone's would-be kingdom is respected.

This EHR work has been based on the COAST technology that is highlighted elsewhere in this issue, but there the focus is anoth-er privacy-intense industry: the financial world. While the work highlighted in this *ISR Connector* is preliminary, the importance of diverse efforts to self-protect one's personal information is evident. The repeated failures of government agencies to protect even Federal workers from inadvertent disclosures of personal information shows, among other things, the limitations of "secu-rity perimeters." Historic solutions have not sufficed, and are not likely to. Can technology help us take back some of the power that has been arrogated by institutions, so that sharing data does not have to be absolute, and so that we can have some control over the information? Security and privacy do not admit simplistic answers.

On a happy note, and one very much connected to this theme of security and privacy, I am very pleased to announce the arrival of a new member of ISR: Professor **Sam Malek**. In a future issue we will feature Sam and his work with security and privacy, but suffice it to say that we are very excited to have Sam join our faculty and contribute to this critical technical (and societal) need.

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

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the ability for two computations to com-municate. A CURL *c* issued by a compu-tation *x*, is an unguessable, unforgeable and tamper-proof reference to *x* that grants to any computation *y* holding *c* the power to transmit messages to *x*.

In her doctoral dissertation, ISR alumnae **Alegria Baquero** applied the COAST architectural style to the security chal-lenges of sharing healthcare data. Baquero developed COASTMed, a COAST-based software system for Electronic Health Records (EHR) management that assigns

policy-based rights to individuals to access and manipulate their data, and allows service providers to offer fine-grained, customer-controlled access to patient information.

Even in a world of perfect security, how-ever, continuous auditing is necessary to verify the correct operation and integrity of critical systems. As part of an NSF-funded project, graduate students **Matias Giorgio** and Gorlick along with ISR staff member **Kari Nies** are exploring systemic auditing, auditing policy, and architectural

accountability in COAST systems. The objective of this work is twofold: first, to create a framework that can capture, store, and analyze capability events, and second, to verify the framework and its efficacy within a real-world domain: financial trad-ing platforms.

Before joining ISR, Giorgio worked for several years as a professional software developer, building monitoring sys-tems for the financial industry. Giorgio observes, "Working with these kind of sys-tems is very challenging, especially when

Figure 1: COAST applications capture capability events and store them into a database. COMET performs different types of analyses using the collected data.

something goes wrong because they can't be stopped for analysis; logs must be collected and inspected while the systems are still running."

Auditing Policy and Systemic Auditing of Capabilities

In the proposed framework, four different types of events are captured and analyzed: the creation, exploitation, transfer, and revocation of communication capabilities. **Creation** occurs when a COAST peer creates a CURL which allows other peers to send messages to it. **Exploitation** occurs when one peer sends a message to another peer via a CURL. **Transfer** occurs when a peer sends a CURL embedded in a message to another peer. **Revocation** occurs when a CURL is invalidated and can no longer be used for communication.

Giorgio has augmented the COAST platform in order to capture capability events and store them in a database for future inspection and analysis, as shown in Figure 1. Additionally, Giorgio is developing COMET (COast Monitoring Event Tool) a tool that can inspect and analyze capability events, detect event patterns, highlight useful information, and report anomalies.

Figure 2: Two peers interacting following the COAST style.

COMET can be used to compare observed event patterns against expected patterns in order to determine whether a system behaves as it should. Furthermore, COMET can also help developers perform exploratory analyses in order to understand the dynamics of a system, including who is communicating with whom, how often and, in some cases, why. Figure 2 shows two peers running computations in a COAST system. Computations send messages to other peers as long as they hold valid CURLs. For example, the computation x_3 is able to send messages to computation x_1 because it holds the CURL c_1. A CURL can be seen as a voucher that gives its holder the right to send a message to whomever issued it.

Communications between COAST peers can be described as follows: In order to receive messages, x_1 must **create** a CURL (i.e. c_1) that other computations will use to send messages to it. In this example, x_1 **transferred** the CURL c_1 to x_3 on a previous communication and x_3 is able to use it. When x_3 sends a message to x_1, x_3 is **exploiting** the capability referenced by the CURL c_1. Imagine that x_1 suspects that security may have been compromised in x_3 and wants to cease communication with it: x_1 **revokes** the CURL c_1. From that moment, c_1 can no longer be exploited. Similarly, x_3 can communicate with x_2 because it holds the CURL c_2, issued by x_2.

Creation, **exploitation**, **transferring**, and **revocation** are events captured by the platform and stored into the database for future inspection.

Capability Accounting Applied to Financial Trading

Giorgio and Nies are developing a COAST-based model of a securities trading system to illustrate how capability accounting can be used by developers to: debug a system, inspect the behavior of a component, and monitor its security.

In the example illustrated in Figure 3, a trading firm deploys a trading algorithm into a broker's infrastructure to trade
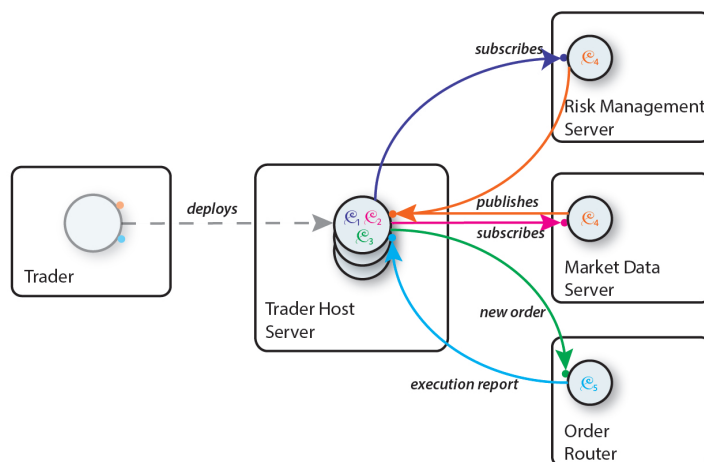

Figure 3: A financial trading scenario where a trading firm uses brokerage services to trade on an Exchange.

stocks on an exchange. After that, the trading algorithm should immediately register itself with the Risk Management and the Market Data servers in order to receive market updates and use this information to start dispatching orders into the Order Router. Now imagine that the trader's computation does not generate an order within an expected time period, such as 10 seconds. Several problems could prevent it from behaving as expected: the deployment or the initial registration with the servers failed, the connection to the Order Router could not be established, or servers were unable to send updates back, just to name a few. These issues are difficult to debug; they involve not only the trading computation but also interactions with other components. Looking at captured capability events can help software developers localize faults more quickly.

Registration on the exchange's servers includes **creating** the necessary CURLs and **transferring** those CURLs to the serv-
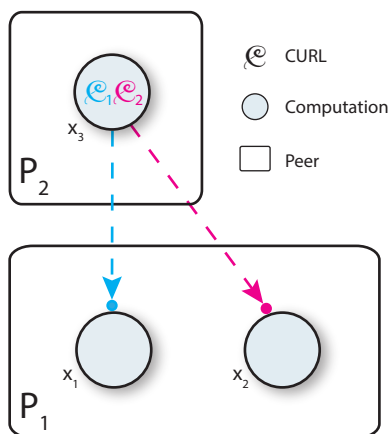
Mengyao Zhao (D. Redmiles, advisor) is interning this summer at Xerox in El Segundo, CA as a UX designer in the Experience Design Group in the Global Development Group. Additionally, Zhao's paper, "A Brief Perspective on Microtask Crowdsourcing Workflows for Interface Design," was accepted to the 2nd International Workshop on Crowdsourcing in Software Engineering, held in May in Florence, Italy. The paper is co-authored by Prof. **André van der Hoek**.

Zhao

Byron Hawkins (B. Demsky, advisor) received a Best Student Presentation award at the 2015 International Symposium on Code Generation and Optimization for his paper titled "Optimizing Binary Translation for Dynamically Generated Code." The paper is co-authored by his advisor Prof. **Brian Demsky** and Derek Bruening and Qin Zhao of Google.

Hawkins

Ankita Raturi (D. Richardson, advisor) was a co-organizer of the iConference 2015 Workshop on ICT for Sustainability – Current and Future Research Directions, held in March in Newport Beach, CA. She also served as a student volunteer at the conference.

Raturi

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 multiple levels of sponsorship:

Support Level	Annual Contribution	Contribution goes to:
Friend	$10,000	ISR's general research fund.
Affiliate—Collaborative	$20,000	Collaborative efforts.
Affiliate—Research	$30,000	Designated ISR research area.
Affiliate—Visiting	$40,000	Visitor at UCI.
Affiliate—Grad Student	$60,000	Graduate student research.
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

ers so that the servers can send updates back to the trading computation. In general, each interaction between peers can be mapped to a sequence of capability events. COMET can be used to verify if the trading computation produced the expected events. If COMET finds out that the expected sequence is not satisfied, it can notify software developers, helping them localize the fault.

Monitoring the execution of the trading computation in the broker system is essential for the ecosystem security and integrity. The interaction between the trading computation and other computations can be anticipated; thus, unexpected patterns of behavior can be detected. For example, if the trading computation issues a CURL different from the one that the trading firm should use to send commands, COMET can trigger an alert. More generally, any unforeseen communication can be found and reported.

Taylor and his research group conjecture that, with enough information, even issues grounded in domain-specific business logic, such as spoofing in financial trading, could be mapped to capability events and analyzed using capability accounting.

For more information, contact Taylor at taylor@uci.edu and Giorgio at mgiorgio@uci.edu, or visit: http://isr.uci.edu/content/coast-dynamic-secure-demand-services.

This work is currently supported by NSF grant # CNS-1449159 and by Bloomberg L.P.

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: 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.

Brodbeck

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http://isr.uci.edu/partnerships/sponsorship/
or contact:

Debra A. Brodbeck
Assistant Director

brodbeck@uci.edu, (949) 824-2260

ISR Community Provides Feedback on Research Projects

ISR would like to thank those of you who responded to two recent calls for volunteers sent to the ISR email list by Professor and Informatics Dept. Chair **André van der Hoek** and his research group. They were particularly looking for professionals who could help them evaluate new ideas and tools in the areas of code search and crowdsourcing software programming, respectively.

Many of you responded and participated for a few hours in the experiments, and the results could not have been better. The feedback and comments for the new CodeExchange (codeexchange.ics.uci.edu) search engine, for instance, helped both shape its current features and led to a key observation that diversity in code search results is as important as relevancy (a result that led to a subsequent experiment that formed the basis for the paper "Sameness: An Experiment in Code Search" by Ph.D. student **Lee Martie** and Prof. van der Hoek that was just published in Mining Software Repositories, a major conference in the field).

In much the same way, the frank (the way we would expect from you!) feedback about CrowdCode, a new experimental platform for programming with micro-tasks, has not only helped van der Hoek and his research group envision further advances in their approach, but also provided them with the necessary data to be able to write and submit several papers.

We hope many of you will think about volunteering for future such calls. A professional perspective from those in practice is invaluable to our work!

For more information, contact Prof. André van der Hoek at andre@ics.uci.edu or visit: http://sdcl.ics.uci.edu.

SIGSOFT Impact Award announced at ICSE 2015.

Prof. Jim Jones Receives Prestigious SIGSOFT Impact Paper Award

Congratulations to Prof. **James A. Jones** for receiving the venerable SIGSOFT Impact Paper Award! The 2015 award was bestowed upon Jones, the late Prof. Mary Jean Harrold, and Prof. John Stasko of Georgia Tech for their 2002 paper "Visualization of Test Information to Assist Fault Localization" which was presented at the 2002 International Conference on Software Engineering (ICSE '02). The award was announced at ICSE 2015 in May; Jones will receive the award at ESEC/FSE in September where he will give a retrospective talk on the research and its impact.

The ACM SIGSOFT Impact Paper Award is presented annually to the author(s) of a paper presented at a SIGSOFT sponsored or co-sponsored conference held at least 10 years prior to the award year. By including all of SIGSOFT's conferences in the competition, the award recognizes the breadth and vitality of the software engineering community. The papers are judged by their influence since their publication.

Jones' paper has been cited over 700 times–per Google Scholar, is the 10th most cited paper of all time for ICSE (as of July 2015, http://dl.acm.org/event.cfm?id=RE228), has influenced hundreds of other research papers, and is taught in dozens of university courses.

Jones's paper appears in the ICSE 2002 Proceedings and can be found online at http://dl.acm.org/citation.cfm?id=581339.581397.

For more on Prof. Jones's research, visit http://www.ics.uci.edu/~jajones. Contact Jones at jajones@uci.edu.

Thomas Debeauvais (C. Lopes, advisor) presented his paper "Gate Me If You Can: The Impact of Gating Mechanics on Retention and Revenues in Jelly Splash" at the Foundations of Digital Games Conference, held in Pacific Grove, CA in June. The paper is co-authored by his advisor Prof. **Crista Lopes.**

Debeauvais

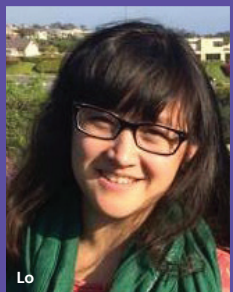**Martin Shelton** (B. Nardi, advisor) is spending his summer as an intern at Google in Mountain View, CA, focusing on usability for security software. Shelton is working as part of the Privacy and UX Research Team, for Sunny Consolvo. Additionally, Shelton's paper, "Online Media Forums as Separate Social Lives: A Qualitative Study of Disclosure Within and Beyond Reddit," was nominated for a Best Paper Award at the iSchools' iConference 2015, held in Newport Beach, CA in March. The paper was co-authored by Ph.D. student Katherine Lo and Shelton's advisor Prof. **Bonnie Nardi**.

Shelton

Katherine Lo (P. Dourish, advisor) has been awarded the Google Anita Borg Memorial Scholarship, which supports women in technology with a $10,000 award as well as an invitation to the annual Google Scholars' Retreat held at the Googleplex in Mountain View, CA.

Lo

Professor Debra J. Richardson Retires

Congratulations to Prof. **Debra J. Richardson** as she retires from UCI! Richardson has led a distinguished career at UC Irvine with numerous accomplishments along the way. During her 28 years at UCI, she served as the Founding Dean of the Donald Bren School of Information and Computer Sciences, and prior to that, as Chair of the independent Department of Information and Computer Science. Richardson has graduated fifteen Ph.D. students and seven Masters degree students, who have gone on to successful careers as well. She has authored over 140 refereed book chapters, journal articles, and conference papers.

Richardson has been a leader in software engineering research for many years. She pioneered research in specification-based testing, whereby formal specifications are employed to guide software testing. She has focused on enabling specification-based testing technology throughout the software lifecycle, from requirements and architecture analysis through operation and evolution. Her research was recognized by designation as a Fellow of Automated Software Engineering for significant and sustained contributions to the ASE Community, through scientific accomplishments and community service. Though retired, Richardson is active at

Richardson's retirement celebration on June 1. Top to bottom: Debra J. Richardson, Owen O'Malley (Ph.D. '96), Hadar Ziv (Ph.D. '97), Stephanie Lief (M.S. '89), Juei Chang (Ph.D. '99), Leyla Naslavsky (Ph.D. '09), Jose Romero-Mariona (Ph.D. '10), Ankita Raturi (Ph.D. student), and Kristin Roher (Ph.D. student).

UCI as a Professor Emeritus and continues her research in areas including: increasing the participation of women and minorities in STEM fields, especially in computing – as featured in the *ISR Connector* Fall/

Scacchi Co-Edits Book on Computer Games and Software Engineering

Prof. **Walt Scacchi** and Kendra M.L. Cooper have co-edited the book *Computer Games and Software Engineering* which was released in May.

Featuring contributions from leading experts in software engineering, this book provides a comprehensive introduction to computer game software development that includes its history as well as emerging research on the interaction between these two traditionally distinct fields.

An ideal reference for software engineers, developers, and researchers, this book explores game programming and development from a software engineering perspective. It introduces the latest research in computer game software engineering (CGSE) and covers topics such as HALO (Highly Addictive, sociaLly Optimized) software engineering, multi-player outdoor smartphone games, gamifying sports software, and artificial intelligence in games.

The book is part of the Chapman & Hall/CRC Innovations in Software Engineering and Software Development Series, and is available on Amazon.

Congratulations to 2015 PhD Graduates and Post Docs

Join us in wishing our recent graduates well as they move on to new jobs around the country and the world. Three cheers to one and all!
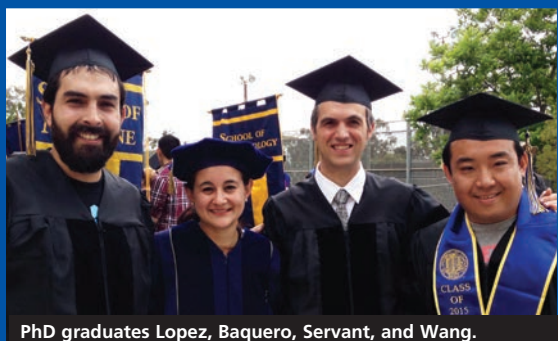
PhD graduates Lopez, Baquero, Servant, and Wang.

Alegria Baquero (R. Taylor, advisor) has taken a position on the Technical Staff at ZocDoc in New York City. **Nicholas DiGiuseppe** (J. Jones, advisor) is now a Software Developer Engineer-in-Test at Yahoo! in Sunnyvale, CA.

Bart Knijnenburg (A. Kobsa, advisor) starts his new position as an Assistant Professor at Clemson University in Fall.

Nicolas Lopez (A. van der Hoek, advisor) took a position in his home country and is now a Software Engineer at Google - Belo Horizonte, Brazil.

Francisco Servant (J. Jones, advisor) starts his new position as Assistant Professor at Virginia Tech in the Fall.

Michael (Six) Silberman (B. Nardi, advisor) is now a Researcher at IG Metall, the German Metalworkers' Union, in Frankfurt, Germany.

Oliver Yi Wang (D. Redmiles, advisor) is now a Research Staff Member at IBM Research Almaden.

We also bid fond farewell to postdoctoral research associate **Thomas LaToza** who starts his new position as an Assistant Professor at George Mason University in Fall.

Winter 2014 issue; software engineering for sustainability – as featured in the *ISR Connector* Spring/Summer 2013 issue; and information and communication technology (ICT) support for human development in less economically developed regions. She continues to advise both Ph.D. and Masters students.

Contact Prof. Richardson at debra.richardson@uci.edu.

RESEARCH BRIEFS

Prof. **Crista Lopes** gave a keynote talk titled "Exercises in Programming Style" at the Joy of Coding conference in Rotterdam, The Netherlands in May.

Prof. **Paul Dourish** gave a keynote talk titled "The Politics of Infrastructure Projects" at the Do-It-Yourself Networking workshop, held with the 13th International Conference on Mobile Systems Applications, and Services (MobiSys), in May in Florence, Italy.

Prof. **Bonnie Nardi** and ICS Profs. Don Patterson and Bill Tomlinson won the UCI Excellence in Undergraduate Education Instructional Technology Innovation Award for an online course they taught called "Global Disruption and IT." Additionally, Prof. **Jim Jones** was named the Excellence in Undergraduate Education School of ICS Honoree.

Prof. **Alfred Kobsa** served as a panelist on the Federal Networking and Information Technology Research and Development (NITRD) National Privacy Research Strategy Workshop panel on "Privacy Perspective: Individual/Consumer" in February in Arlington, Virginia.

Postdoctoral research associate **Thomas LaToza** co-chaired the Second International Workshop on Crowdsourcing in Software Engineering (CSI-SE), held at the International Conference on Software Engineering (ICSE) in Florence, Italy in May.

ISR STUDENT NEWS

Eugenia Gabrielova (C. Lopes, advisor) is interning this summer at SPAWAR Systems Center Pacific in San Diego, in the Cybersecurity Science & Technology division. She is working on a software testing framework for non-functional software properties, particularly cyber-security. She hopes to continue this research when she returns to UCI in Fall. Her SPAWAR mentor is ISR alumnus **Jose Romero-Mariona.**

Gabrielova

Vijay Krishna Palepu (J. Jones, advisor) is interning this summer as a software engineer at Microsoft in Redmond, WA with the Office team. He is focussing on the iPhone app for Microsoft Office Word.

Pelapu

Fernando Spanghero (A. van der Hoek, advisor) is interning this summer at Amazon.com in Seattle, WA where he is developing software as part of the Retail Systems team. Additionally, Spanghero was on the winning team for the iConference 2015 Social Media Expo. Their entry was titled "Racial Violence Archive: Public Information System on Incidents of Violence during the Civil Rights Period." The team's faculty sponsors were ISR Prof. **Alfred Kobsa** and UCI Prof. Geoff Ward, in Criminology, Law & Society.

Spanghero

Prof. Alfred Kobsa with Best Doctoral Dissertation Award winner alumnae Xinru Page.

ISR shines at iConference 2015

ISR made a great showing at iConference 2015, held March 24-27 in Newport Beach, CA. iConference is an international gathering of scholars and researchers concerned with critical information issues in contemporary society. It is presented by the iSchools organization, a collection of Information Schools. The UCI Donald Bren School of ICS is a member of the iSchools, and hosted the 2015 conference. Informatics Dept. Prof. Gary Olson led the way as conference General Chair. With over 530 attendees, 2015 was a great success!

Prof. Olson enlisted ISR's support, with ISR Assistant Director **Debra A. Brodbeck** serving as Conference Manager. ISR has a long history of supporting conferences, including ICSE 2011, SPLASH 2011, FSE 2008, ASE 2005, and FSE 2004.

iConference 2015 was special for ISR, as so many people participated. Notably, but not exhaustively:

- The Doctoral Dissertation Award is bestowed upon the author of the dissertation judged the best completed during the preceding academic year at any iSchool. The 2015 winner is alumnae **Xinru Page**, for her dissertation "Factors that Influence Adoption and Use of Location-Sharing Social Media Archives." Her advisor was Prof. **Alfred Kobsa**.

- Ph.D. student **Martin Shelton's** paper, "Online Media Forums as Separate Social Lives: A Qualitative Study of Disclosure Within and Beyond Reddit," co-authored by Ph.D. student **Katherine Lo** and Prof. **Bonnie Nardi**, was nominated for the Best Paper Award.

- The Social Media Expo winning team was from UCI, with two of the seven student team members from ISR. Their

presentation was titled "Racial Violence Archive: Public Information System on Incidents of Violence during the Civil Rights Period." The ISR team members were graduate students **Hosub Lee** and **Fernando Spanghero**. The faculty sponsors were Prof. **Alfred Kobsa** and UCI Prof. Geoff Ward, Social Ecology.

- Seven ISR graduate students served as student volunteers: **Nicole Crenshaw**, **Caitlin Lustig**, **Ankita Raturi**, **Martin Shelton**, **Michael (Six) Silberman**, **Dakuo Wang**, and **Yiran Wang**.

- The organizers of the workshop on "ICT for Sustainability" included Prof. **Debra Richardson** and Ph.D. students **Michael (Six) Silberman** and **Ankita Raturi**.

SPECIAL THANKS

The UCI Institute for Software Research is generously supported by:

Bloomberg
The Aerospace Corporation

ISR EVENT SCHEDULE

Mark your calendars!

http://isr.uci.edu/isr-events/

Devanbu

January 22, 2016
ISR Distinguished Speaker: Prof. Prem Devanbu
University of California, Davis

February 5, 2016
ISR Distinguished Speaker: Judith Bishop, Ph.D.
Microsoft Research

Bishop

Rothermel

March 11, 2016
ISR Distinguished Speaker: Prof. Gregg Rothermel
University of Nebraska-Lincoln

April 8, 2016
ISR Distinguished Speaker: Prof. Margaret-Anne Storey
University of Victoria

Storey

February 29, 2016 - March 3, 2016
Ground System Architectures Workshop (GSAW 2016)
Held in cooperation with ISR. *http://gsaw.org*

August 2-5, 2016
International Conference on Global Software Engineering (ICGSE 2016)
Supported by ISR. *http://www.icgse.org*

Additionally, Prof. **Bonnie Nardi** is serving as Papers Co-Chair for iConference 2016, to be held in Philadelphia, PA.

More info: http://ischools.org/the-iconference/

ISR

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

ISR news, including the ISR *Connector*, is available at the ISR website: *isr.uci.edu*

For more information, contact:

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