Vugranam C. Sreedhar

PERSONAL INFORMATION

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RESEARCH INTERESTS

(1) Computer and Information Security, (2) Software Engineering and Quality, (3) Concurrency Analysis and Optimization, (4) Multicore Architecture and Applications, and (5) Program Analysis and Compiler Technology,

SHORT BIO

I graduated from McGill University (Montreal, Canada) with a Ph.D. in Computer Science in 1995 (Deans Honor). My thesis advisor was Prof. Guang Gao (now at University of Delaware). I then worked in the core optimizing compiler group at HP California Language Lab in Cupertino. Since 1998 I am at IBM TJ Watson Research Center. I am currently a Senior Research Staff Member and a Project Leader at the IBM TJ Watson Research Center in Security and Privacy department. I am currently leading a project for defining, designing, and developing security models and analysis techniques for building tools for writing secure Web 2.0 applications. To this end my group is building security checking and understanding tools. The main theme of our work is how to make security accessible to application developers, who are typically not well versed in the nuances of secure software development. Therefore from a tooling perspective, our tools are part of an integrated development environment (IDE) which has the ability to fix and address security problems and issues in a manner consistent with that is currently expected for syntax errors. We provide "easy buttons" and "quick fixes" requiring as few clicks in the IDE as possible to perform reasonable security problem fixes. Providing such functionality is quite challenging. I also work in the area of Concurrency Analysis, Multicore Architecture, and Transactional Memory.

I am very active with the Academic Community. I am a Senior Member of ACM and SIGPLAN. I and Steve Zdancewic initiated a new workshop called Programming Languages and Analysis for Security (PLAS), to bring people in Programming Languages and Security together. PLAS is in its third incarnation PLAS 2008. Rebecca Wright, Angelos Keromytis, and myself also started a local Security and Privacy Day that is rotated in three different locations. S&P Day is in its fourth incarnation. I have mentored several students, junior researchers, and post docs throughout my career at IBM research. I have also served on Ph.D. thesis defense committees evaluating Ph.D. thesis work as an external examiner.

EDUCATION

- Ph.D. in Computer Science (**Deans Honor Distinction**), McGill University, Montreal, Canada, September 1995.
  Thesis: *Program Analysis Using DJ Graphs*
  Ph.D. Advisor: *Prof. Guang Gao*
- MS in Computer Science, University of Nevada, Las Vegas, July 1990. Thesis: *Computation in Director String Calculus.*
- M.Tech in Systems and Control Engineering, Indian Institute of Technology, Bombay, India, M.Tech, December 1986. Thesis: Studies in Computer Vision: The Problem of Occlusion.
- B.E. in Electrical Engineering (10th University Rank, out of 500+ students), University Visveswaraya College of Engineering, Bangalore, India, December 1984.

EMPLOYMENT

1998-..... Senior Research Staff Member and Project Leader, IBM TJ Watson Research Center, Yorktown Heights, New York.

1995-1998 Member of Technical Staff, Hewlett-Packard Company, Cupertino, California.

1994-1994 Summer Internship, Center for Advanced Studies, IBM Canada, *Summer 1994.*

1988-1988 Engineering Staff, Wipro System Ltd., Bangalore, India.

1987-1987 Engineering Staff, Tata Consulting Engineers, Bangalore, India.

1984-1985 Research Staff, Indian Institute of Science, Bangalore, India.

Awards and Recognition

- Selected to ACM Distinguished Speaker Program, 2008.
- Elected to ACM SIGPLAN Senior Member, 2008.
- Third Plateau Invention Achievement Award in Appreciation and Recognition of Creative Contribution to IBM 2007.
- IBM Research 2006 Outstanding Technical Achievement for contribution to BEAM tool.
- A special letter of commendation from the Office of Vice President (Research) for my extraordinary enthusiasm, energy, and commitment to the 2006 Research Summer Intern program.
- IBM Bravo Award 2006 for exceptional leadership, rapid execution, and exceptional team work for my effort as a summer student coordinator
- IBM Recipient Choice Thanks Award 2007 (3 awards in 2007).
- IBM Recipient Choice Thanks Award 2006.
- IBM Recipient Choice Thanks Award 2005.
- Second Plateau Invention Achievement Award in Appreciation and Recognition of Creative Contribution to IBM 2003.
- The IBM Interoperability in Heterogeneous Special Patent Incentive Award 2002.
- First Plateau Invention Achievement Award in Appreciation and Recognition of Creative Contribution to IBM 2001
- IBM Team Award for exceptional team work 2000.
- Over 13 Invention achievement award from 1999 to 2006.

Teaching Experience

Polytechnic University, NY
Adjunct Faculty: Computer and Information Science Department **January 2005**
Teaching: Programming Languages

McGill University, Montreal, Canada
Adjunct Faculty: Management Department and Continuing Education Department **1992 to 1995**
Teaching: Information System Technology and Artificial Intelligence

McGill University, Montreal, Canada
Teaching Assistant School of Computer Science. **1990 to 1995**
TAed a number of courses.

Research Funding

Being a senior technical and project leader I have led several efforts in writing funding proposals and getting projects funded.

- Continuous Security Analysis: Joint Program Funding from Rational Product Organization, 2007/2008, 5 PYs
- Multitenancy Security Analysis: Joint Program Funding from multiple product groups, 2007/2008.
- PHP Security Analysis: Joint Program Funding from Cross Software Group (xSWG) 2005/2006, 2.0PYs

- BEAM Project: Joint Program Funding from System Technology Group (STG) 2004/2005, 1.5PYs (Person Years).
- Web 2.0 Security: Joint Program Funding from several product organization 2006/2007, 5.0PYs
- Embedded Systems: Research Funding from First-Of-A-Kind Industry Solutions Lab, 2002, 4PYs

Student Advising and Mentoring

Summer 2006 Student Coordinator: Managed and coordinated over 14 summer interns for the Security, Privacy, and Extensible Technology department. I was given a Bravo Award by the Department Head, a special letter of commendation from the Office of Vice President (Research), and a Thanks Award by my peers for the summer coordination work.

Summer Intern Advisor: During the summer of 2006 I mentored and advised two summer students Dana Glasner and Gabriela Cretu from Columbia University during their summer intern work.

Thesis Committee and Co-Advisor: Co-advising Yuan Zhang for her Ph.D. thesis and I am on her Ph.D. thesis committee. Yuan is a Ph.D. student in the Dept. of Electrical and Computer Engineering, University of Delware.

Student Mentor: Co-advising Weirong Zhu who is currently pursuing Ph.D. degree in the Dept. of Electrical and Computer Engineering, University of Delaware.

Student Mentor and Thesis Committee: Co-mentoring Marcio Buss who is currently a co-op student working at IBM Research. Marcio is currently pursuing Ph.D. degree in the Dept. of Computer Science, Columbia University.

Ph.D. Thesis Committee: Katia Hristova, Department of Computer Science, Stonybrook University, 2007.

PUBLICATIONS AND PATENTS

Referred Journal

1. Jong Choi, Manish Gupta, Mauricio Serrano, Vugranam Sreedhar, and Sam Midkiff., "Stack Allocation and Synchronization Optimization for Java Using Escape Analysis" Transaction on Programming Languages and Systems (TOPLAS) 25(6), Nov 2003.
2. B. Alpern, C. R. Attanasio, J. Barton, M. G. Burke, P. Cheng, J.-D. Choi, A. Cocchi, S. Fink, D. Grove, M. Hind, S. F. Hummel, D. Lieber, V. Litvinov, T. Ngo, M. Mergen, J. R. Russell, V. Sarkar, M. J. Serrano, J. C. Sheppherd, S. E. Smith, V. C. Sreedhar, H. Srinivasan, and J. Whaley. "Jalapeno Virtual Machine" IBM Systems Journal Special Issue on Java Performance, 39(1), 2000.
3. Vugranam Sreedhar, Yong-fong Lee, and Guang Gao., "A new framework for elimination-based data flow analysis using DJ graphs," ACM Transaction on Programming Languages and Systems, 20(2), p388-435, 1998
4. Vugranam Sreedhar and Guang Gao., "Computing phi-nodes in Linear Time Using DJ-graphs" Journal of Programming Languages 3(4), p191-213, 1996.
5. Vugranam Sreedhar, Guang Gao and Yong-fong Lee. "Incremental Computation of Dominator Trees" ACM Transaction on Programming Languages and Systems, 19(2), p239-252, 1997
6. Vugranam Sreedhar, Guang Gao and Yong-fong Lee. "Identifying Loops Using DJ Graphs" ACM Transaction on Programming Languages and Systems, 18(6), p649-658, 1996.

7. Vugranam Sreedhar and Kazem Taghva, "Capturing Strong Reduction in Director String Calculus" in Theoretical Computer Science, 107(2), Jan. 1993.

Refereed Conference

1. Marcio Buss, Daniel Brand, Vugranam Sreedhar, and Stephen Edwards Fast, Flexible Pointer Analysis Using Assign-Fetch Graphs, ACM Symposium on Applied Computing, Brazil, 2008 (SAC 2008).
2. Daniel Brand, Marcio Buss, and Vugranam C. Sreedhar "Evidence-Based Analysis and Inferring Precondition for Bug Detection". 23rd International Symposium on Software Maintenance, Paris, France, 2007 (ICSM 2007).
3. Dana Glasner and Vugranam C. Sreedhar "Configuration Reasoning and Ontology For the Web ", IEEE International Conference on Services Computing, Salt Lake City, Utah, 2007 (SCC 2007).
4. Weirong Zhu, Vugranam C. Sreedhar, Ziang Hu, Guang Gao. "Synchronization State Buffer: Supporting Efficient Fine-Grain Synchronization on Many-Core Architectures". ACM/IEEE International Symposium on Computer Architecture (ISCA), 2007.
5. Yuan Zhang, Vugranam C. Sreedhar, Guang Gao, and Vivek Sarkar, "Towards Optimal Lock Assignment and Allocation - A Method for Exploiting Concurrency among Multiple Critical Sections" ACM Conference on Principles and Practice of Parallel Programming 2007 (Short paper and poster) (PPoPP 2007).
6. Vugranam C. Sreedhar "Data-Centric Security: Role Analysis and Role Typestate" Proceedings of the 11th ACM Symposium on Access Control Models and Technologies, 2006 (SACMAT 2006).
7. Marco Pistoia, Vugranam C. Sreedhar Robert Flynn, and Larry Koved, "Interprocedural Analysis for Privileged Code Placement and Tainted Variable Detection" 2005 European Conference on Object Oriented Programming.
8. Marina Biberstein, Vugranam C. Sreedhar, and Bilha Mendelson. "Instrumenting Annotated Programs, First ACM/USENIX International Conference on Virtual Execution Environments (VEE'05)
9. Vugranam C. Sreedhar and Maria-Cristina Marinescu "From Statecharts to ESP*: Programming With Events, States and Predicates For Embedded Systems", ACM Conference of Embedded System Software (EMSOFT) 2005.
10. Vugranam C. Sreedhar "Mixin'Up Components" Proceedings of the ACM International Conference on Software Engineering (ICSE), Florida, 2002
11. Vugranam Sreedhar, Michael Burke, Jong Choi., "A Framework for Interprocedural Analysis in the Presence of Dynamic Class Loading" In Proceedings of the ACM SIGPLAN Conference on Programming Language Design and Implementation, 2000.
12. Vugranam Sreedhar, Roy Ju, David Gillies, and Vatsa Santanam., "Translating Out of Static Single Assignment Form" Symposium on Static Analysis, September 1999.
13. Michael Burke, Jong Choi, Stephen Fink, David Grove, Michael Hind, Vivek Sarkar, Mauricio Serrano, Vugranam Sreedhar, Harini Srinivasan and John Whaley., "The Jalapeno dynamic optimizing compiler for Java" Proceedings of the 1999 ACM SIGPLAN 1999 Java Grande Conference, June 1999.
14. Jong Choi, Manish Gupta, Mauricio Serrano, Vugranam Sreedhar, and Sam Midkiff, "Escape Analysis for Java" Proceedings of the ACM SIGPLAN Conference on Object-Oriented Programming, Systems, Languages Applications, October 1999.

15. Vugranam Sreedhar, Guang Gao and Yong-fong Lee. "A New Framework for Elimination-Based Exhaustive and Incremental Data Flow Analysis." In Proceedings of the ACM SIGPLAN'96 Conference on Programming Language Design and Implementation, 1996.
16. Vugranam Sreedhar and Guang Gao., "A Linear Time Algorithm for Placing Phi-Nodes" in the Proceedings of the Symposium on Principles of Programming Languages, January 1995.

Refereed Workshop

1. Marina Biberstein, Vugranam C. Sreedhar and Ayal Zaks "A Case for Sealing Classes in Java ", The Israeli Workshop on Programming Languages and Development Environments, July 2002
2. Vugranam C. Sreedhar "ACOEL on CORAL: A Component Requirement and Abstraction Language" Workshop on Specification and Verification of Component-Based Systems, held in conjunction with OOPSLA, October 2001.
3. Vugranam Sreedhar, Guang Gao and Yong-fong Lee. "Incremental Computation of Dominator Trees" in the Proceedings of the ACM SIGPLAN Workshop on Intermediate Representation (held in conjunction with Symposium on Principles of Programming Languages, January 1995).

Technical Reports

1. Guangming Tan, Vugranam C. Sreedhar, and Guang R. Gao, "Just in Locale and Percolation for Optimizing Irregular Applications on a Manycore Architecture", CAPSL Technical Memo 81, 2007.
2. Ted Habeck, Larry Koved, Orlando Marquez, Vugranam C. Sreedhar, Michael Steiner, Wietse Venema, Samuel Weber, Gabriela Cretu, and Krishnaprasad Vikram. "Experiences With Building Security Checking and Understanding Tool", IBM Research Report RC24243, 2007.
3. Marcio Buss, Daniel Brand, Vugranam Sreedhar, Stephen A. Edwards. "A New Abstraction for Summary-Based Pointer Analysis" in IBM Research Report RC24104, 2007
4. Marco Pistoia, Robert J. Flynn, and Vugranam C. Sreedhar, "Static Evaluation of Role-Based Access Control Policies in Distributed Component-Based Systems", IBM Research Report RC23836, 2005.

Patents Granted

1. J. Choi, M Gupta, S. Midkiff, M. Serrano, and V. C. Sreedhar, "Method for optimizing locks in computer programs", US Patent 6,530,0079, March 2003.
2. J. Choi, M Gupta, S. Midkiff, M. Serrano, and V. C. Sreedhar "Method for optimizing creation and destruction of objects in computer programs" US Patent 6,381,738, April 2002.
3. V. C. Sreedhar, Roy Ju, David Gillies, and Vatsa Santanam. "Translating out of SSA form" US Patent Awarded. 6,182,284, Jan 2001.
4. V. C. Sreedhar, M. Burke, and J. Choi., "Interprocedural Analysis and Optimization in the Presence of Dynamic Class Loading" US Patent 6,865,730, March 2005

Patents Filed

1. Doug Kimelman, V. T. Rajan, Tova Roth, V. C. Sreedhar, and Mark Wegman. Methods and Apparatus for determining software component implementations based on dynamic information" US. Patent Filed Feb 2001 Docket Number YOR290000726.
2. V. C. Sreedhar "Method and Apparatus for programming software components" Filed July 2001.
3. Doug Kimelman, V. T. Rajan, Tova Roth, V. C. Sreedhar, and Mark Wegman. "Recognizing groups of objects in repeated runs of object oriented programs" US Patent Filed DISCLOSURE NO. YOR820020035.
4. Doug Kimelman, V. T. Rajan, Tova Roth, V. C. Sreedhar, and Mark Wegman. Writing Efficient Libraries or Generic Components US Patent Filed DISCLOSURE NO. YOR820020034.
5. Doug Kimelman, V. T. Rajan, Tova Roth, V. C. Sreedhar, and Mark Wegman. "Minimizing Changes of Representation for Data Structure Values In Computer Programs" US Patent Filed DISCLOSURE NO. YOR820020033.
6. Marina Biberstein, Vugranam C. Sreedhar, and Bilha Mendelson. Method and Apparatus for Instrumenting Annotated Programs, Submitted for US Patent. 2004.
7. V. C. Sreedhar Method and Apparatus for Variational Modeling Using Extension Types U.S. Patent filing YOR9-2003-0353, Sept. 2003.
8. V. C. Sreedhar "System and method for static analysis using fault paths", U.S. Patent Filing YOR9-2005-0224, 2005.
9. V. C. Sreedhar "Method and Apparatus for Role Flow Analys, Role Escape Analysis, and Role Type Analysis" US Patent Filing YOR8-2006-0017, 2006
10. V. C. Sreedhar, Gabriela Cretu. and Julian Dolby "Method and Apparatus for Sparse Vulnerability Analysis" US Patent Filing YOR8-2006-0640, 2007
11. V. C. Sreedhar and Dana Glasner "Method and Apparatus for configuration modeling and consistency checking of Web applications" US Patent Filing YOR9-2006-0623, 2007.
12. M. Buss, D. Brand, and V.C. Sreedhar. "Procedure Summaries for Pointer Analysis" US Patent Filing YOR9-200700-63US1, 2007. US Patent Filing YOR8-2006-0629.

Community Activities

- Core member of IBM Security Architecture Board Work Group on Secure Software Development Process.
- Core member of IBM Software Development Community Leadership Council.
- Core member of Senior Technical Development Council for PL/X and zOS.
- Core member of Business Transformation Solution (BTS) strategy team.
- Organized internal working group on Model Driven Development to consolidate project proposals for strategic joint program funding.
- 2006 Eclipse Innovation Grant evaluator and technical liaison.
- Hosted, interviewed, and recruited a number of junior and senior candidates.
- Served as a seminar coordinator within the PLSE PIC special interest group at IBM Research.
- Served as a core member of IBM Ph.D. Fellowship and Faculty Award committee.
- Volunteered in several activities for local communities and schools, including part of EXITE camp, visiting local high school to evaluate science projects, and a mentoring high student.

PROFESSIONAL ACTIVITIES

- Initiated and Co-Chair of Stevens Institute/IBM/Columbia Security Day held in Nov 2005. S&P Day is now in its fifth incarnation and I represent IBM in this joint local effort.
- Initiated and Co-Chair of Programming Languages and Analysis for Security (PLAS) 2006. PLAS is in its third incarnation and I am on the steering committee of PLAS workshop series.
- Program committee member of ACM Conference on Embedded Software (EMSOFT 2005).
- Program committee member of ACM Conference on Programming Language Design and Implementation (PLDI) 2001.
- General Chair for a new workshop on Optimizing Middleware (OM2001) which was held in-conjunction with PLDI 2001, Salt Lake City.
- Co-Chair for a new workshop on language Mechanism for Programming Software Components which was held in-conjunction with OOPSLA 2001, Tampa.
- General Chair for a new workshop on dynamic optimization called Dynamo 2000, which was held in-conjunction with POPL 2000, Boston.
- Program committee for Dynamo 2000, Feedback Directed and Dynamic Optimization (FDDO 2000), and Binary Translation (BT 2000).
- Program committee First AOSD Workshop on Aspects, Components, and Patterns for Infrastructure Software April 23, 2002, Enschede, The Netherlands
- Program Committe HICSS-40 Minitrack 2006 Automated Software Testing and Analysis: Techniques, Practices and Tools, Waikoloa, Hawaii 96738
- Coordinated a workshop on Compiler and Architecture Issues for Future Generation Microprocessors: Superscalar, Superpipelined, VLIW and Hybrid, organized in conjunction with the IBM CASCON'94 at Toronto.
- Member of ACM and SIGPLAN ACM.
- Reviewed papers for a number of conferences like PLDI, OOPSLA, STOC, POPL, etc. and journals like IEEE Trans. On Computers, ACM Trans. on Prog. Lang. and Sys., Software Engineering. and Practices, etc.
- I presented a number of seminar talks at various places like UPenn, MIT, UDel, Microsoft Research, Hewlett-Packard, IBM, etc.