

AJITHA RAJAN

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EDUCATION

Ph.D. in Computer Science, University of Minnesota, Minneapolis.

Graduation Date: July 2008

Advisor: Dr. Mats P.E. Heimdahl.

Thesis title: *Coverage Metrics for Requirements-Based Testing.*

The dissertation focuses on resolving research issues related to software validation. Defines coverage metrics directly over formal high-level requirements that provide objective adequacy measures for software validation testing. Also, provides an approach and framework for automatically generating test cases directly from requirements.

Master of Science in Computer Engineering, University of Minnesota.

Graduation Date: April 2007

BTech (Bachelors in Technology) in Information Technology, Sri Venkateswara College of Engineering, University of Madras, India.

Graduation Date: May 2002.

RESEARCH EXPERIENCE

Oct 2008 – Present. Post Doctorate, Laboratoire d'Informatique de Grenoble (LIG), Grenoble, France. Currently working on a project aimed at addressing testing challenges in service-oriented computing. The project also aims to evaluate the feasibility of using formal verification techniques in this domain.

Jun 2004 – July 2008. Research Assistant, Department of Computer Science and Engineering, University of Minnesota, Minneapolis.

Worked on several projects in collaboration with Rockwell Collins Inc. (NASA contract NCC-01001), NASA Ames Research Center (Cooperative Agreement NNA06CB21A), NASA IV&V Facility (Contract NNG-05CB16C). Primary contribution in these projects has been providing formal verification and validation capabilities.

Jun 2001 – Dec 2001. Part-time Intern, Satyam Computer Systems, Chennai, India.

The project developed a methodology to perform de-centralized content management for the site www.trw.com which enabled fully integrated content management, workflow, and scalable content delivery.

TEACHING EXPERIENCE

Guest Lecture, Department of Computer Science and Engineering, University of Minnesota.

Course: CSCI 5802 Software Engineering 2 Feb, April 2008

Course: CSCI 5801 Software Engineering I Oct 2007

Course: Csci 8980 Domain Specific Languages and Analyses April 2007

Duration of each of the guest lecture was 1 hr 15 mins.

Jun 2003 – May 2004 Teaching Assistant, Department of Electrical Engineering, University of Minnesota.

Course: Digital Systems Design Lab Sep 2003 - May 2004

Duties included leading lab recitations, holding office hours, and grading. Number of hours spent in contact with students: 8 hrs/week.

Course: Analog and Digital Electronics Jun 2003 - Aug 2003

Duties included holding office hours and grading. Number of hours spent in contact with students: 3 hrs/week.

CONFERENCE PUBLICATIONS

The underlined author presented the paper at the conference.

Lydie Du Bousquet, **Ajitha Rajan**, Catherine Oriat, Jean-Luc Richier, and German Vega. Service Specification and Validation in the Context of the Home. *In proceedings of the 10th International Conference on Feature Interactions (ICFI 2009)*, Lisbon, Portugal. To Appear in Jun 2009.

Ajitha Rajan, Michael Whalen, Matt Staats and Mats Heimdahl. Requirements Coverage as an Adequacy Measure for Conformance Testing. *In Proceedings of the 10th International Conference on Formal Engineering Methods(ICFEM 2008)*, pages 86 - 104, Kitakyushu, Japan, Oct 2008. *Acceptance Rate 32% (62 Submitted, 10 Accepted)*

Ajitha Rajan, Michael Whalen and Mats Heimdahl. The Effect of Program and Model Structure on MC/DC Test Adequacy Coverage. *In Proceedings of the 22nd IEEE International Conference on Software Engineering (ICSE 2008)*, pages 161-170, Leipzig, Germany, May 2008. **Awarded ACM Distinguished Paper**. *Acceptance Rate 15% (371 Submitted, 56 Accepted)*

Ajitha Rajan, Michael Whalen and Mats Heimdahl. Model Validation Using Automatically Generated Requirements-Based Tests. *In Proceedings of the 10th IEEE High Assurance Systems Engineering Symposium (HASE 2007)*, pages 95-104, Dallas, USA, November 2007. *Acceptance Rate 33% (100 Submitted, 33 Accepted)*

Renee Bryce, **Ajitha Rajan** and Mats Heimdahl. Interaction Testing in Model-Based Development: Effect on Model Coverage. *In Proceedings of the 13th Asia Pacific Conference on Software Engineering (APSEC 2006)*, pages 259-268, Bangalore, India, Dec 2006. *Acceptance Rate 25% (230 Submitted, 59 Accepted)*

Michael Whalen, **Ajitha Rajan**, Mats Heimdahl and Steven Miller. Coverage Metrics for Requirements-Based Testing. *In Proceedings of the ACM/SIGSOFT International Symposium on Software Testing and Analysis , (ISSTA 2006)*, pages 25-36, Portland, USA, July, 2006. *Acceptance Rate 24% (82 Submitted, 20 Accepted)*

JOURNALS

Invited to submit to ACM Transactions on Software Engineering and Methodology (TOSEM). **Ajitha Rajan**, Michael Whalen, Matt Staats and Mats Heimdahl. The Effect of Program and Model Structure on MC/DC Test Adequacy Coverage. *In preparation*.
The invitation to submit to TOSEM was from the ACM Distinguished Paper Award: “*The Effect of Program and Model Structure on MC/DC Test Adequacy Coverage*”. 22nd IEEE International Conference on Software Engineering. Leipzig, Germany, May, 2008.

OTHER PUBLICATIONS

Mats P.E. Heimdahl, Michael W. Whalen, **Ajitha Rajan**, and Matt Staats. On MC/DC and Implementation Structure: An Empirical Study. *Proceedings of the 27th IEEE Digital Avionics Systems Conference – DASC 2008*. Oct 26-30, 2008.

Matt Staats, Weijia Deng, **Ajitha Rajan**, Mats Heimdahl, Kurt Woodham. ReqsCov: A Tool for Measuring Test-Adequacy over Requirements. *In Proceedings of the 23rd IEEE/ACM International Conference on Automated Software Engineering, ASE 2008 (Tools Paper)*, pages 499 - 500, L’Aquila, Italy, Sep 2008.

Ajitha Rajan and Mats Heimdahl. Challenges in Automated Testing Beyond Test Case Generation. *Workshop on State-space Exploration for Automated Testing (SSEAT 2008, co-located with ISSTA08)*, Seattle, USA, July 2008.

Ajitha Rajan and Mats Heimdahl. Assessing Requirements Quality Through Requirements Coverage. *The Sixth NASA Langley Formal Methods Workshop*, Virginia, USA, May 2008.

Ajitha Rajan. Coverage Metrics to Measure Adequacy of Black-Box Test Suites. *In Proceedings of the 21st IEEE/ACM International Conference on Automated Software Engineering, ASE 2006 (Doctoral Symposium)*, pages 335-338, Tokyo, Japan, Sep 2006.

Mats Heimdahl, Michael Whalen, **Ajitha Rajan** and Steven Miller. Testing Strategies for Model-Based Development. NASA Technical Report. 2006. Document ID: 20060018336; Report Number: NASA CR-2006-214307.

POSTERS

Ajitha Rajan. Automated Requirements-Based Test Case Generation, *Foundations of Software Engineering (FSE 2006)*, Portland, Oregon, Nov 2006.

Ajitha Rajan. Automated Requirements-Based Testing, *Grace Hopper Celebration of Women in Computing*, San Diego. Oct 2006. Participant of the Student Research Competition (SRC) sponsored by Microsoft and awarded travel grant to attend the competition.

INVITED TALKS

Coverage Metrics for Requirements-Based Testing. VERIMAG Research Lab, Grenoble, France, Mar 2008.

Coverage Metrics for Requirements-Based Testing. LIG Research Lab, Grenoble, France, Mar 2008.

Model Validation in Model-Based Development. NASA Software Assurance Symposium (SAS 07), West Virginia, Sep 2007.

Introduction to Model Checking and Lustre Translator Framework. NASA Independent Verification and Validation Facility, West Virginia. Jan 2007.

AWARDS

Best paper award (software track): 27th IEEE Digital Avionics Systems Conference (DASC 2008), October 26-30, 2008. “*On MC/DC and Implementation Structure: An Empirical Study*” with Michael W. Whalen, Mats P.E. Heimdahl, and Matt Staats.

ACM Distinguished Paper Award. 22nd IEEE International Conference on Software Engineering. Leipzig, Germany, May, 2008. “*The Effect of Program and Model Structure on MC/DC Test Adequacy Coverage*” with Mats P.E. Heimdahl and Michael W. Whalen.

Graduate School Fellowship. University of Minnesota, Sep 2002 - May 2003.

OTHER ACCOMPLISHMENTS

Selected to present research at Honeywell Nobel Initiative Conference at the University of Minnesota, Oct 2007.

Nominated for University of Minnesota Doctoral Dissertation Fellowship 2007-2008.

Accepted to the 17th International School for Computer Science Researchers: Formal Methods: Theory And Practice. Lipari Island, Jul 2005.

PROFESSIONAL SERVICE

PC Member for 24th IEEE/ACM International Conference on Automated Software Engineering, ASE 2009.

PC Member for International Conference for Software Testing (ICST 2008), for Student Paper Track.

PC Member for Graduate Student Research Symposium (GSRS 2007) held at University of California, Irvine.

Paper Reviewer for 22nd IEEE/ACM International Conference on Automated Software Engineering, ASE 07.

Paper Reviewer for 15th IEEE International Requirements Engineering Conference, RE 07.

Paper Reviewer for 1st International Workshop on Aerospace Software Engineering (AeroSE 07) held in conjunction with ICSE 2007

Paper Reviewer for 30th Annual International Computer Software and Applications Conference, COMPSAC 2006.

Paper Reviewer for 14th IEEE International Requirements Engineering Conference, RE 06.

REFERENCES

1. Dr. Mats P.E. Heimdahl
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University of Minnesota, Minneapolis
4-192 EE/CS Bldg. 200 Union Street S.E., Minneapolis, MN 55455
Email: heimdahl@cs.umn.edu
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2. Dr. Yves Ledru
Professeur l'Universite Joseph Fourier (Grenoble-1)
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3. Dr. Michael Whalen
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4. Dr. Eric Van Wyk
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