

# Nachiappan Nagappan

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Last updated: 04/22/2019

## RESEARCH INTERESTS

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My research interests are in the field of Software Engineering focusing on Software Reliability, Developer Productivity, Software Data Analytics and Empirical Software engineering. More broadly I work on software analytics for improving software engineering practices. My work is strongly interdisciplinary and my current research projects span the spectrum of software analytics ranging from developer productivity, empirical software engineering analytics for the development process, intelligent software design for games; to predicting software service outages for cloud services.

## EDUCATION

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<b>North Carolina State University, Raleigh</b> Ph.D. in Computer Science, Title: <i>A Software Testing and Reliability Early Warning (STREW) Metric Suite</i> Advisor: Dr. Laurie Williams Committee: Dr. Mladen Vouk, Dr. Christopher Healey, Dr. Jason Osborne	Feb 2005
<b>North Carolina State University, Raleigh</b> M.S. in Computer Networking (Computer Science) Advisor: Dr. Laurie Williams	Dec 2002
<b>University of Madras, Madras</b> B.Tech. in Information Technology First class with Distinction	May 2001

## PROFESSIONAL EXPERIENCE

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<b>Microsoft Research</b> - Principal Researcher Research in Software Engineering (RiSE Group)	(Feb 05 – Present)
Intern - Testing Verification and Measurement Group	(May 04 - Aug 04)
IIIT – Delhi – Adjunct Professor	(Oct 13 – Present)

**North Carolina State University**

Research Assistant – Software Engineering research group

(May 02 - Feb 05)

Teaching Assistant – Department of Computer Science

(Aug 04 - Dec 04)

**Coimbatore Stock Exchange (CSX)**

Senior Thesis, “nETBROKER”

(Jan 01 - May 01)

Network Engineer Trainee

(Apr 99 - Jun 99)

**TEACHING EXPERIENCE**

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CSC 712 - Software Testing and Reliability (NCSU):– Teaching Assistant

- Lectured, created assignments and tests, setup labs, graded projects and tests.
- Course Feedback ( on a scale of 1-5 )- (Department averages in parentheses)

TA is well informed	TA understands subject	TA understands platforms	TA attends office hours	TA overall
<b>4.92 / (4.21)</b>	<b>5.0 / (4.24)</b>	<b>5.0 / (4.21)</b>	<b>5.0 / (4.16)</b>	<b>4.77 / (4.21)</b>

Guest Lecturer

- CSC 326 (Undergraduate Software Engineering Fall 2003),
- CSC 510 Graduate Software Engineering, Fall 2002 (Software Reliability), Fall 2003 (Agile Software Development), Fall 2004 (Software Reliability).

**PATENTS**

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1. Kim S Herzig, Nachiappan Nagappan, “Method of Detecting False Test Alarms Using Test Step Failure Analysis”, Provisional patent application filed with USPTO on 09/03/2015.
2. Michael Fanning, Christopher Faucon, Nachiappan Nagappan, Benjamin Livshits, Magnus Madsen, Matthew Hall, “CODE DEPENDENCY CALCULATION”, Provisional patent application filed with USPTO on 10/16/2012.
3. Thomas Zimmermann, Christian Bird, Nachiappan Nagappan, Syed Emran, Thirumalesh Bhat, Ashish Gupta, “ANALYZING POWER CONSUMPTION IN MOBILE COMPUTING DEVICES”, Provisional patent application filed with USPTO on 11/1/2011.
4. Thomas Zimmermann, Christian Bird, Nachiappan Nagappan, “SOFTWARE DEVELOPMENT AUTOMATED ANALYTICS”, Provisional patent application filed with USPTO on 6/22/2011.
5. Nachiappan Nagappan, Thomas Zimmermann, Brendan Murphy, Andreas Zeller, “PREDICTING DEFECTS IN CODE”, Provisional patent application filed with USPTO on 8/3/2009.
6. Srivatsan Laxman, Prasad Naldurg, Nachiappan Nagappan, Jacek Czerwonka, “PROGRAMMING ELEMENT MODIFICATION RECOMMENDATION”, Provisional patent application filed with USPTO on 5/1/2009.

7. Michael Fanning, Nachiappan Nagappan, Thomas Ball, Sean Sandys, PRIORITIZING QUALITY IMPROVEMENTS TO SOURCE CODE”, Provisional patent application with USPTO filed on 11/12/2007.
8. Todd King, Michael Fanning, Nachiappan Nagappan, Marcelo Birnbach, “INTERMEDIATE CODE METRICS”, Provisional patent application filed with USPTO on 6/16/2007.
9. Nachiappan Nagappan, Thirumalesh K. Bhat, “TECHNOLOGIES FOR CODE FAILURE PRONENESS ESTIMATION”, Patent # 7,926,036 granted 04/12/2011 USPTO.
10. Thirumalesh K. Bhat, Nachiappan Nagappan, Arild E. Skjolsvold, “AUTOMATICALLY EXTRACTING COUPLING METRICS FROM COMPILED CODE”, Patent # 7,725,881, granted on 5/25/2010, USPTO.

## **NATIONAL ACADEMIES COMMITTEE MEMBERSHIPS**

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1. National Academies' Computer Science and Telecommunications Board sponsored by the Defense Information Systems Agency committee on “Improving Processes and Policies for the Acquisition and Test of Information Technologies in the Department of Defense” - (2008-2009)

**Report Published as:** Achieving Effective Acquisition of Information Technology in the Department of Defense, ISBN-10: 0-309-14828-6, National Academies Press.

2. National Academies' Committee on National Statistics committee on “Theory and Application of Reliability Growth Modeling to Defense Systems”, 2011- 2014

**Report Published as:** Reliability Growth: Enhancing Defense System Reliability, ISBN-978-0-309-31474-9, National Academies Press.

## **AWARDS AND HONORS**

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1. Ranked #2: Top Ten Computer Science Education Research Papers of the Last 50 Years at ACM SIGCSE. <https://www.acm.org/media-center/2019/march/sigcse-top-10-papers>
2. IEEE Software: Best paper award at ICSE 2019 for our work on Software Engineering for AI
3. ACM Distinguished Scientist, 2015.
4. ACM SIGSOFT Distinguished paper award for our FSE 2015 paper
5. ACM SIGSOFT Distinguished paper award at ICSE 2014.
6. ACM SIGCHI 2013 Best Paper Honorable Mention Award for our Halo work. (top 5% of submitted papers)
7. IEEE SOFTWARE, Best Paper Award for SEIP for Characterizing and Predicting which Bugs get Reopened (ICSE 2012), Zurich, Switzerland, 2012.

8. IEEE SOFTWARE, Best Paper Award for Industrial Paper for Scrum + Engineering Practices: Experiences of Three Microsoft Teams (ESEM 2011), Banff, Canada, 2011.
9. Best Industry Paper of ICST for CRANE: Failure Prediction, Change Analysis and Test Prioritization in Practice - Experiences from Windows, (ICST 2011) Berlin, Germany, 2011.
10. Gold – Star Award. Early Career Stock Award from Microsoft in recognition of outstanding contributions to Windows.
11. ACM SIGSOFT Distinguished Paper Award for Distributed development paper at International Conference on Software Engineering (ICSE) 2009.
12. ACM Research Highlights: Invited paper to CACM (Communications of the ACM) based on “Does Distributed Development Affect Software Quality? An Empirical Case Study of Windows Vista”, 2009. First Software Engineering paper invited.
13. Bench Program 2009. Microsoft High Potential and Fast Track Growth Program – Future leaders at Microsoft. Only 0.2% of company selected (200 out of 80,000 employees).
14. Selected Best paper at ISSRE 2008 “Profiling the Operational Behavior of OS Device Drivers” Invited to Special issue of Empirical Software Engineering journal, 2008.
15. Ship-it awards, Microsoft Corporation for: Windows 7, Microsoft Visual Studio 2008 and .net Framework 3.5. For Tech Transfer contributions that shipped commercially to millions of users.
16. Nominee, Department of Computer Science, North Carolina State University, ACM Doctoral Dissertation Award Competition 2005.
17. First place, ACM Student Research Contest, co-located with ACM SIGCSE, Norfolk, VA, for work titled “Software Reliability Estimation using Internal Code Metrics”. Results: [www.acm.org/src](http://www.acm.org/src)
18. University of Madras, 4<sup>th</sup> rank in B.Tech degree program, India, 1997-2001.
19. University Rank Holder for Academic Performance - 2<sup>nd</sup> rank May 1999, 2<sup>nd</sup> rank, December 1998.

## **SELECTED PRESS COVERAGE**

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(Numerous threads in Reddit about various research studies over the years)

1. Seeker, which is the Discovery Channel’s online news site. March 2017  
<http://www.seeker.com/video-game-research-reveals-path-to-advanced-gaming-skills-2295416868.html>
2. Yahoo News (March 2017)  
<https://www.yahoo.com/news/heres-become-better-gamer-according-134604654.html>
3. Digital Trends Full article – March 2017.  
<http://www.digitaltrends.com/gaming/learn-from-starcraft-2-halo-reach/>

4. American Scientist, Empirical Software Engineering, Nov-Dec 2011, Volume 99, number 6, <http://www.americanscientist.org/issues/feature/2011/6/empirical-software-engineering/1>
5. Defining dangerous developer "defect density", by By Adrian Bridgwater , CWDN: The Computer Weekly Application Developer Network, <http://www.computerweekly.com/blogs/cwdn/2011/02/defining-developer-dangerous-defect-density.html>
6. C't Magazine (Germany's most popular computer Magazine) Article, Making of Windows 7, c't 2007, Heft 23, Daniel Melanchthon, Oliver Scheer
7. Communications of the ACM, Prof. Dr. Bertrand Meyer, Article: "The Rise of Empirical Software Engineering (I): the Good News", 2009.
8. Story points, Why are they better than hours, Jeff Sutherland, <http://scrum.jeffsutherland.com/2010/04/story-points-why-are-they-better-than.html>
9. TDD Study (40 plus articles). E.g. <http://codedgers.com/blog/2010/feb/21/8/>
10. "Exploding Software-Engineering Myths", Highlighted at Reddit and various other blogs. <http://research.microsoft.com/en-us/news/features/nagappan-100609.aspx>
11. "Empirical Studies Show Test Driven Development Improves Quality", InfoQ, covers our ESE journal paper on Test Driven Development. Mar 2, 2009. (<http://www.infoq.com/news/2009/03/TDD-Improves-Quality>)
12. "Microsoft Pushes Secure, Quality Code", covers our tech transfer to VSTS 2008. *eWeek*, October 5 2007. (<http://www.eweek.com/article2/0%2C1895%2C2192515%2C00.asp>)
13. The *Frankfurter Allgemeine* covered the work Andreas Zeller did with me on mining Microsoft's bug databases, 2006-3-14. (<http://www.faz.net/s/RubDD681563C93F46A0B1F423E34DC58DAB/Doc~E86A82A38CEA145A187ECFF35CBF1E6E3~ATpl~Ecommon~Scontent.html>)

## PUBLICATIONS

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### BOOK

1. Nagappan, N., "A Software Testing and Reliability Early Warning (STREW) metric suite", ProQuest Information and Learning, Ann Arbor, MI, 2006.

### BOOK CHAPTER

1. Zimmermann, T., Nagappan, N., Zeller, A., "Predicting bugs from History" in "Software Evolution", pp. 69-88, Eds. Mens, T., Demeyer, S., Springer 2007.
2. Nagappan, N., Ball, T., "Evidence-based Failure Prediction", in "Making Software, What Really works, and Why we believe it", pp.415-434, Addison-Wesley, Eds. Oram, A., Wilson, G., 2010.

### INVITED PUBLICATIONS

1. Sarbu, C., Johansson, A., Suri, N., Nagappan, N., "Profiling the Operational Behavior of OS Device Drivers", Empirical Software Engineering Journal, 15 (4), pp. 380-422, 2010.  
*Invited Best paper from ISSRE 2008*

2. Nagappan, N., "Myths in Software Engineering: From the Other Side", Proceedings of the Test, Analysis and Proofs (TAP) conference, Malaga, Spain, 2010.
3. Bird, C., Nagappan, N., Devanbu, P., Gall, H., Murphy, B., "Does Distributed Development affect Software Quality? An Empirical Case Study of Windows Vista", Communications of the ACM (CACM), 52(8), pp.85-93, 2009.  
*CACM Research Highlights*  
*Invited Best paper from ICSE 2009*
4. Sarbu, C., Johansson, A., Suri, N., Nagappan, N., "On Equivalence Partitioning of Code Paths inside OS Kernel Components", Proceedings of the 2009 Software Technologies for Future Dependable Distributed Systems (STFSSD), pp.17-19, Tokyo, Japan, 2009.
5. Nagappan, N., Zeller, A., Zimmermann, T., "Mining Software Archives", (guest editors introduction). IEEE Software, 26(1), pp.24-25, 2009

## **JOURNAL PUBLICATIONS**

1. Kochhar, P.S., Lo, D., Lawall, J., Nagappan, N., "Code Coverage and Post-Release Defects: A Large Scale Study on Open Source Projects", IEEE Transactions on Reliability, 66(4): 1213-1228, 2017
2. Huang, J., Yan, E., Cheung, G., Nagappan, N. and Zimmermann, T., Master Maker: Understanding Gaming Skill Through Practice and Habit From Gameplay Behavior. Topics in Cognitive Science, 9, pp. 437-466, 2017. doi:10.1111/tops.12251
3. Xia, X., Lo, D., Pan, S.J., Nagappan, N., Wang, X., "HYDRA: Massively Compositional Model for Cross-Project Defect Prediction" IEEE Transactions on Software Engineering, 42(10), pp. 977-998, 2016.
4. Hindle, A., Bird, C., Zimmermann, T., Nagappan, N., "Do topics make sense to managers and developers?", Empirical Software Engineering, 20(2), pp. 479-515, 2015.
5. Murphy-Hill, E.R., Zimmermann, T., Bird, C., Nagappan, N., "The Design Space of Bug Fixes and How Developers Navigate It", IEEE Transactions on Software Engineering, 41(1), pp. 65-81, 2015.
6. Kim, M., Zimmermann, T., Nagappan, N., "An Empirical Study of Refactoring Challenges and Benefits at Microsoft", IEEE Transactions on Software Engineering, 40(7): 633-649, 2014.
7. Carver, J., Nagappan, N., Page, A., "The Impact of Educational Background on the Effectiveness of Requirements Inspections: An Empirical Study" IEEE Transactions on Software Engineering, 34(6), pp.800-812, 2008.
8. Eaddy, M., Zimmermann, T., Sherwood, K.D., Garg, V., Murphy, G.C., Nagappan, N., Aho, A.V., "Do Crosscutting Concerns Cause Defects?" IEEE Transactions on Software Engineering, 34(4), pp.497-515, 2008.

9. Nagappan, N., Maximilien, E. M., Bhat, T., Williams, L., "Realizing Quality Improvement through Test-Driven Development: Results and Experiences of Four Industrial Teams" To appear: Proceeding of Empirical Software Engineering, an International Journal, 13(3), pp. 289-302, 2008.
10. Zheng, J., Williams, L., Nagappan, N., Snipes, W., Hudepohl, J., Vouk, M., "On the Value of Static Analysis for Fault Detection in Software", IEEE Transactions on Software Engineering, 32(4), pp. 240-253, 2006.

## CONFERENCE PUBLICATIONS

1. Bhagwan, R., Philip, A., Kumar, R., Maddila, C., Nagappan, N., "FastLane: Test Minimization for Rapidly Deployed Large-scale Online Services", To APPEAR: International Conference on Software Engineering (ICSE 2019), Montreal, Canada, 2019.  
Acceptance rate: 20.6%
2. Amershi, S., Begel, A., Bird, C., DeLine, R., Gall, H., Kamar, E., Nagappan, N., Nushi, B., Zimmermann, T., "Software Engineering for Machine Learning: A Case Study", To APPEAR: International Conference on Software Engineering (ICSE 2019) - Software Engineering in Practice track, Montreal, Canada, 2019.  
Acceptance rate: 25.4%
3. Rastogi, A., Nagappan, N., Gousios, G., Hoek, A., "Relationship between Geographical Location and Evaluation of Developer Contributions in GitHub", in the Proceedings of the Empirical Software Engineering and Measurement Conference (ESEM), Oulu, Finland, 2018  
Acceptance rate: 21.4%
4. Ford, D., Zimmermann, T., Bird, C., Nagappan, N., "Characterizing Software Engineering Work with Personas Based on Knowledge Worker Actions" TO APPEAR: , in the Proceedings of the Empirical Software Engineering and Measurement Conference (ESEM), Toronto, Canada, 2017.  
Acceptance rate: 19.3%
5. Rastogi, A., Nagappan, N., "On the Personality Traits of GitHub Contributors", Proceedings of the IEEE International Symposium on Software Reliability Engineering (ISSRE), pp.77-86, Ottawa, Canada, 2016.  
Acceptance rate: 34.6%
6. Rastogi, A., Nagappan, N., "Forking and the Sustainability of the Developer Community Participation - An Empirical Investigation on Outcomes and Reasons", in the Proceedings of the IEEE 23rd International Conference on Software Analysis, Evolution, and Reengineering (SANER), pp.102-111, Osaka, Japan, 2016.  
Acceptance rate: 37.1%
7. Lo, D., Nagappan, N., Zimmermann, T., "How practitioners perceive the relevance of software engineering research", in the Proceedings of the Foundations in Software Engineering Conference (SIGSOFT ESEC/FSE), pp. 415-424, Bergamo, Italy, 2015.  
Acceptance rate: 25.4%

8. Rastogi, A., Thummalapenta, S., Zimmermann, T., Nagappan, N., Czerwinka, J., "Ramp-Up Journey of New Hires: Tug of War of Aids and Impediments", in Proceedings of the Empirical Software Engineering and Measurement Conference (ESEM), pp.96-105, Beijing, China, 2015.  
Acceptance rate: 25%
9. Harpstead, E., Zimmermann, T., Nagappan, N., Guajardo, J.J., Cooper, R., Solberg, T., Greenawalt, D., "What Drives People: Creating Engagement Profiles of Players from Game Log Data", Proceedings of the ACM SIGCHI symposium on Computer-human interaction in play (CHIPLAY), pp.369-379, London, UK, 2015.  
Acceptance rate: 27.8%
10. Herzig, K., Nagappan, N., "Empirically Detecting False Test Alarms Using Association Rules", in Proceedings of the International Conference on Software Engineering (ICSE), SEIP Track, pp.39-48, Florence, Italy, 2015.  
Acceptance rate: 22.5%
11. Ray, B., Nagappan, M., Bird, C., Nagappan, N., Zimmermann, T., "The Uniqueness of Changes: Characteristics and Applications", in the Proceedings of the International Conference on Mining Software Repositories (MSR), pp.34-44, Florence, Italy, 2015.  
Acceptance rate: 30%
12. Kochhar, P.S., Thung, F., Nagappan, N., Zimmermann, T., Lo, D., "Understanding the Test Automation Culture of App Developers", Proceedings of the International Conference on Software Testing, Verification and Validation(ICST), pp. 1-10, Graz, Austria, 2015.  
Acceptance rate: 24%
13. Cheung, G.K., Zimmermann, T., Nagappan, N., "The First Hour Experience: How the Initial Play can Engage (or lose) New Players", Proceedings of the ACM SIGCHI symposium on Computer-human interaction in play (CHIPLAY), pp.57-66, Toronto, ON, Canada, 2014.  
Acceptance rate: 29%
14. Herzig, K., Nagappan, N., "The Impact of Test Ownership and Team Structure on the Reliability and Effectiveness of Quality Test Runs", in Proceedings of the Empirical Software Engineering and Measurement Conference (ESEM), pp.1-10, Torino, Italy, 2014.  
Acceptance rate: 18.7%
15. Gupta, A., Zimmermann, T., Bird, C., Nagappan, N., Bhat, T., Emran, S., "Mining Energy Traces to Aid in Software Development: An Empirical Case Study", in Proceedings of the Empirical Software Engineering and Measurement Conference (ESEM), pp.40.1-40.8, Torino, Italy, 2014.
16. Bird, C., Ranganath, V-P., Zimmermann, T., Nagappan, N., Zeller, Z., "Extrinsic influence factors in Software Reliability: A Study of 200, 000 Windows Machines" in Proceedings of the International Conference on Software Engineering (ICSE), SEIP Track, Hyderabad, India, 2014.  
Acceptance rate: 21%



17. Muslu, K., Bird, C., Nagappan, N., Czerwinka, J., "Transition from centralized to decentralized version control systems: a case study on reasons, barriers, and outcomes", in Proceedings of the International Conference on Software Engineering (ICSE), Hyderabad, India, 2014.  
Acceptance rate: 20%
18. Murphy-Hill, E.R., Zimmermann, T., Nagappan, N., "Cowboys, ankle sprains, and keepers of quality: how is video game development different from software development?" in Proceedings of the International Conference on Software Engineering (ICSE), Hyderabad, India, 2014.  
Acceptance rate: 20%
19. Zimmermann, Nachiappan Nagappan: Software Analytics for Digital Games. Software Engineering - Fachtagung des GI-Fachbereichs Softwaretechnik, pp. 23-24, Kiel, Germany, 2014
20. Huang, J., Zimmermann, T., Nagappan, N., Philips, B., Harrison, C., Mastering the Art of War: How Patterns of Gameplay Influence Skill in Halo", Proceedings of the International Conference on Computer-Human Interaction (CHI), Paris, France, 2013.  
Acceptance rate: 20%
21. Kocaguneli, E., Zimmermann, T., Bird, C., Nagappan, N., Menzies, T., "Distributed Development Considered Harmful?" Proceedings of the International Conference on Software Engineering (ICSE) – Experience Track, San Francisco, CA, USA 2013.  
Acceptance rate: 20.4%
22. Murphy-Hill, E., Zimmermann, T., Bird, C., Nagappan, N., "The Design of Bug Fixes", in Proceedings of the International Conference on Software Engineering (ICSE), San Francisco, CA, USA 2013.  
Acceptance rate: 18.5%
23. Kim, M., Zimmermann, T., Nagappan, N., A Field Study of Refactoring Challenges and Benefits, in Proceedings of the International Symposium on Foundations of Software Engineering (FSE), Research Triangle Park, NC, USA, 2012.  
Acceptance rate: 17.4%
24. Hindle, A., Bird, C., Zimmermann, T., Nagappan, N., Relating Requirements to Implementation via Topic Analysis, in Proceedings of the International Conference on Software Maintenance (ICSM 2012), Riva del Garda, Trento, Italy, 2012.  
Acceptance rate: 25.4%
25. Hullett, K., Nagappan, N., Schuh, E., Hopson, J., Empirical Analysis of User Data in Game Software Development, in Proceedings of the Empirical Software Engineering and Measurement Conference (ESEM), pp.89-98, Lund, Sweden, 2012.  
Acceptance rate: 25.3%
26. Mandala, N., Walia, G.S., Carver, J.C., Nagappan, N., Application of Kusumoto Cost-Metric to Evaluate the Cost Effectiveness of Software Inspections, in Proceedings of the Empirical Software Engineering and Measurement Conference (ESEM), pp.221-230, Lund, Sweden, 2012.  
Acceptance rate: 25.3%

27. Zimmermann, T., Nagappan, T., Guo, P.J., Murphy, B., Characterizing and Predicting which Bugs get Reopened, in Proceedings of the International Conference on Software Engineering (Experience Track) (ICSE), pp. 1074-1083, Zurich, Switzerland, 2012.  
Acceptance rate: 18.5%
28. Bird, C., Nagappan, N., Who? Where? What? Examining Distributed Development in Two Large Open Source Projects, in Proceedings of the Working Conference on Mining Software Repositories (MSR), pp. 237-246, Zurich, Switzerland, 2012.  
Acceptance rate: 28.1%
29. Guo, P.J., Zimmermann, T., Nagappan, N., Murphy, B., "Not my bug!" and Other Reasons for Software Bug Report Reassignments, in Proceedings of the ACM Conference on Computer Supported Cooperative Work (CSCW), pp. 395-404, Hangzhou, China, 2011.  
Acceptance rate: 21.6%
30. Kim, S., Zimmermann, T., Nagappan, N., Crash graphs: An Aggregated View of Multiple Crashes to Improve Crash Triage, in Proceedings of the IEEE/IFIP International Conference on Dependable Systems and Networks (DSN), pp.486-493, Hong Kong, 2011.  
Acceptance rate: 17.6%
31. Williams, L., Brown, G., Meltzer, A., Nagappan, N., Scrum + Engineering Practices: Experiences of Three Microsoft Teams, in Proceedings of the Empirical Software Engineering and Measurement Conference (Experience Track) (ESEM), pp. 463-471, Banff, Canada, 2011.
32. Li, P., Kivett, R., Zhan, Z., Jeon, S-o, Nagappan, N., Murphy, B., Ko, A.J., Characterizing the differences between Pre- and Post- release Versions of Software, in Proceedings of the International Conference on Software Engineering (Experience Track) (ICSE), pp. 716-725, Hawaii, USA, 2011.  
Acceptance rate: 18.0%
33. Zimmermann, T., Nagappan, N., Herzig, K., Premraj, R., Williams, L., An Empirical Study on the Relationship between Dependency Neighborhoods and Failures, in Proceedings of the International Conference on Software Testing (ICST - Industry), pp. 347-356, Berlin, Germany, 2011.  
Acceptance rate: 29.1%
34. Czerwonka, J., Das, R., Nagappan, N., Tarvo, A., Teterev, A., CRANE: Failure Prediction, Change Analysis and Test Prioritization in Practice - Experiences from Windows, in Proceedings of the International Conference on Software Testing (ICST - Industry), pp. 357-366, Berlin, Germany, 2011.  
Acceptance rate: 29.1%
35. Gill, P., Jain, N., Nagappan, N., Understanding Network Failures in Data Centers: Measurement, Analysis, and Implications, Proceedings of the ACM SIGCOMM 2011 Conference on Applications, Technologies, Architectures, and Protocols for Computer Communications, pp.350-361, Toronto, ON, 2011.  
Acceptance rate: 14.3%

36. Bird, C., Nagappan, N., Murphy, B., Gall, H., Devanbu, P., Don't Touch my Code!: Examining the Effects of Ownership on Software Quality, in Proceedings of the Foundations in Software Engineering Conference (SIGSOFT ESEC/FSE 2011), pp. 4-14, Szeged, Hungary, 2011.  
Acceptance rate: 16.7%
37. Vishwanath, K., Nagappan, N., Characterizing Cloud Computing Hardware Reliability, in Proceedings of ACM Symposium on Cloud Computing (SoCC 2010), pp. 193-204, Indianapolis, USA, 2010.  
Acceptance rate: 19.3%
38. Nagappan, N., Zeller, A., Zimmermann, T., Herzig, K., Murphy, B., Change Bursts as Defect Predictors, in Proceedings of the 21st IEEE International Symposium on Software Reliability Engineering (ISSRE), pp.309-318, San Jose, USA, 2010  
Acceptance rate: 32.3%
39. Guo, P.J., Zimmermann, T., Nagappan, N., Murphy, B., Characterizing and Predicting Which Bugs Get Fixed: An Empirical Study of Microsoft Windows, in Proceedings of the 32th International Conference on Software Engineering (ICSE), pp.495-504, Cape Town, South Africa, 2010.  
Acceptance rate: 13.7%
40. Zimmermann, T., Nagappan, N., Williams, L., Searching for a Needle in a Haystack: Predicting Security Vulnerabilities for Windows Vista, Proceedings of the 3rd International Conference on Software Testing, Verification and Validation (Experience Track) (ICST), pp. 421-428, Paris, France, 2010.  
Acceptance rate: 25.7%
41. Bird, C., Nagappan, N., Gall, H., Devanbu, P., Murphy, B., Using Socio-Technical Networks to Predict Failures, Proceedings of the IEEE International Symposium on Software Reliability Engineering (ISSRE), Mysore, India, 2009.  
Acceptance rate: 24.7%
42. Williams, L., Kudrjavets, G., Nagappan, N., "On the Effectiveness of Unit Test Automation at Microsoft", Proceedings of the IEEE International Symposium on Software Reliability Engineering (ISSRE), Mysore, India, 2009.  
Acceptance rate: 24.7%
43. Mockus, A., Nagappan, N., Dinh-Trong, T., "Test Coverage and Post-Verification Defects: A Multiple Case Study", Proceedings of the ACM-IEEE Empirical Software Engineering and Measurement Conference (ESEM 2009), Orlando, FL, 2009.  
Acceptance rate: 39%
44. Zimmermann, T., Nagappan, N., Gall, H., Giger, E., Murphy, B., "Cross-project Defect Prediction", To appear: Proceedings of the ACM SIGSOFT European Software Engineering/Foundations of Software Engineering Conference (ESEC/FSE 2009), Amsterdam, 2009.  
Acceptance Rate: 14.7%

45. Bird, C., Nagappan, N., Devanbu, P., Gall, H., Murphy, B., "Does Distributed Development Affect Software Quality? An Empirical Case Study of Windows Vista", Proceedings of the International Conference on Software Engineering (ICSE), Vancouver, Canada, 2009.  
Acceptance rate: 12.3%
46. Sarbu, C., Johansson, A., Suri, N., Nagappan, N., "Profiling the Operational Behavior of OS Device Drivers", Proceedings of the IEEE International Symposium on Software Reliability Engineering (ISSRE), pp.127-136, Seattle/Redmond, WA, 2008.  
Acceptance rate: 25%
47. Pinzger, M., Nagappan, N., Murphy, B., "Can Developer Social Networks Predict Failures?", Proceedings of the ACM SIGSOFT Foundations of Software Engineering Conference (FSE 2008), pp. 2-12, Atlanta, GA, 2008.  
Acceptance rate: 20%
48. Layman, L., Kudrjavets, G., Nagappan, N., "Iterative Identification of Fault-Prone Binaries Using In-Process Metrics" Proceedings of the ACM-IEEE Empirical Software Engineering and Measurement Conference (ESEM 2008), pp.206-212, Kaiserslautern, Germany, 2008.  
Acceptance rate < 30%
49. Begel, A., Nagappan, N., "Pair Programming: What's in it for me", Proceedings of the ACM-IEEE Empirical Software Engineering and Measurement Conference (ESEM 2008), pp.120-128, Kaiserslautern, Germany, 2008.  
Acceptance rate < 30%
50. Bugde, S., Nagappan, N., Rajamani, S., Ramalingam, G., "Global Software Servicing: Observational Experiences at Microsoft", Proceedings of the IEEE International Conference on Global Software Engineering (ICGSE 2008), pp.182-191, Bangalore, India.  
Acceptance rate: 32%
51. Begel, A., Nagappan, N., "Global Software Development: Who Does It?" (short paper), Proceedings of the IEEE International Conference on Global Software Engineering (ICGSE 2008), pp.17-20, Bangalore, India.
52. Bhat, T., Nagappan, N., "Tempest: Towards Early Identification of Failure-prone Binaries", Proceedings of the 38<sup>th</sup> IEEE/IFIP International Conference on Dependable Systems and Networks (DSN 08), pp.116-121, Anchorage, Alaska, 2008.  
Acceptance rate: 23%
53. Layman, L., Nagappan, N., Guckenheimer, S., Beehler, J., Begel, A., "Mining Software Effort Data: Preliminary Analysis of Visual Studio Team System Data" Proceedings of the 5th Working Conference on Mining Software Repositories (MSR '08), pp.43-46, Leipzig, Germany, 2008.

54. Nagappan, N., Murphy, B., Basili, V., "The Influence of Organizational Structure on Software Quality: An Empirical Case Study", Proceedings of the International Conference on Software Engineering (ICSE 2008), pp.521-530, Leipzig, Germany, 2008.  
Acceptance rate: 15%
55. Zimmermann, T., Nagappan, N., "Predicting Defects using Social Network Analysis on Dependency Graphs" Proceedings of the International Conference on Software Engineering (ICSE 2008), pp.531-540, Leipzig, Germany, 2008  
Acceptance rate: 15%
56. Walia, G., Carver, J., Nagappan, N., "The Effect of the Number of Inspectors on the Defect Estimates Produced by Capture-Recapture Models", Proceedings of the International Conference on Software Engineering (ICSE 2008), pp.331-340, Leipzig, Germany, 2008  
Acceptance rate: 15%
57. Nagappan, N., Williams, L., Vouk, M., Osborne, J., "Using In-Process Testing Metrics to Estimate Post-Release Field Quality of Java Programs", Proceedings of the International Symposium on Software Reliability Engineering (ISSRE 2007), pp. 209-214, Trollhattan, Sweden, 2007.  
Acceptance rate: 33%
58. Zimmermann, T., Nagappan, N., "Predicting Subsystem Defects using Dependency Graph Complexities", Proceedings of the International Symposium on Software Reliability Engineering (ISSRE 2007), pp.227-236, Trollhattan, Sweden, 2007.  
Acceptance rate: 26%
59. Nagappan, N., Ball, T., "Using Software Dependencies and Churn Metrics to Predict Field Failures: An Empirical Case Study", Proceedings of the Empirical Software Engineering and Measurement Conference (ESEM 2007), pp. 364-373, Madrid, Spain, 2007.  
Acceptance rate: 41%
60. Begel, A., Nagappan, N., "Usage and Perceptions of Agile Software Development in an Industrial Context: An Exploratory Study", Proceedings of the Empirical Software Engineering and Measurement Conference (ESEM 2007), pp. 255-264, Madrid, Spain, 2007.  
Acceptance rate: 41%
61. Bhat, T., Nagappan, N., "Building Scalable Failure-proneness Models Using Complexity Metrics for Large Scale Software Systems", Proceedings of the Asia-Pacific Software Engineering Conference (APSEC 2006), pp.361-366, Bangalore, India, December 2006.  
Acceptance rate: 19%
62. Kudrjavets, G., Nagappan, N., Ball, T., "Assessing the Relationship between Software Assertions and Code Quality: An Empirical Investigation", Proceedings of the *IEEE International Symposium on Software Reliability Engineering* (ISSRE 2006), pp. 204-212, Raleigh, NC, November 2006.  
Acceptance rate: 37%

63. Nagappan, N., Ball, T., Murphy, B., "Using Historical In-Process and Product Metrics for Early Estimation of Software Failures", Proceedings of the *IEEE International Symposium on Software Reliability Engineering* (ISSRE 2006), pp. 62-74, Raleigh, NC, November 2006.  
Acceptance rate: 37%
64. Bhat. T., Nagappan, N., "Evaluating the Efficacy of Test-Driven Development: Industrial Case Studies", Proceedings of The International Symposium on Empirical Software Engineering (ISESE 2006), pp. 356-363, Rio de Janeiro, Brazil, September 2006.  
Acceptance rate: 46%
65. Nagappan, N., Ball, T., Zeller, A., "Mining Metrics to Predict Component Failures", Proceedings of *The International Conference on Software Engineering* (ICSE 2006), pp. 452-461, Shanghai, China, May 2006.  
Acceptance rate: 18%
66. Nagappan, N., Williams, L., Osborne, J., Vouk, M., Abrahamsson, P., "Providing Test Quality Feedback Using Static Source Code and Automatic Test Suite Metrics", Proceedings of the *IEEE International Symposium on Software Reliability Engineering* (ISSRE 2005), pp. 85-94, Chicago, IL, November 2005.  
Acceptance rate: 33%
67. Nagappan, N., Ball, T., "Use of Relative Code churn Measures to Predict System Defect Density", Proceedings of *The International Conference on Software Engineering* (ICSE 2005), pp. 284-292, St. Louis, MO, May 2005.  
Acceptance rate: 14%
68. Nagappan, N., Ball, T., "Static Analysis Tools as Early indicators of Pre-Release Defect Density", Proceedings of *The International Conference on Software Engineering* (ICSE 2005), pp. 580-586, St. Louis, MO, May 2005.  
Acceptance rate: 19%
69. Nagappan, N., Williams, L., Hudepohl, J., Snipes, W., Vouk, M., "Preliminary Results On Using Static Analysis Tools For Software Inspection", Proceedings of the *IEEE International Symposium on Software Reliability Engineering* (ISSRE 2004), pp 429-439, St. Malo, France. November 2004.  
Acceptance rate: 33%
70. Davidsson, M., Zheng, J., Nagappan, N., Williams, L., Vouk, M., "GERT : An Empirical Reliability Estimation and Testing Feedback Tool", Proceedings of the *IEEE International Symposium on Software Reliability Engineering* (ISSRE 2004), pp 269-280, St. Malo, France. November 2004.  
Acceptance rate: 33%
71. Williams, L., McDowell, C., Nagappan, N., Fernald, J., Werner, L., "Building Pair Programming Knowledge through a Family of Experiments", Proceedings of *IEEE International Symposium on Empirical Software Engineering*, (ISESE 2004) pp 143-152. Rome, Italy, September 2003.  
Acceptance rate: 46%

72. Nagappan, N., Williams, L., Wiebe, E., Miller, C., Balik, S., Ferzli, M., Petlick, J., "Pair Learning: With an Eye Toward Future Success", *Proceedings of XP Agile Universe (XP/AU 2003)*, Springer LNCS 2753, pp 185-198. New Orleans, LA, August 2004.  
Acceptance rate: 50%
  
73. Stotts, D., Williams, L.A., Nagappan, N., Baheti, P.P., Jen, D.S., Jackson, A., "Virtual Teaming: Experiments and Experiences with Distributed Pair Programming", *Proceedings of XP Agile Universe (XP/AU 2003)*, Springer LNCS 2753, pp 129-141. New Orleans, LA, August 2004.  
Acceptance rate: 50%
  
74. Weibe, E., Williams, L. A., Petlick, J., Nagappan, N., Balik, S., Miller, C., and Ferzli, M., "Pair Programming in Introductory Programming Labs," *Proceedings American Society for Engineering Education Annual Conference and Exposition*, (ASEE 2003), 2003.
  
75. Nagappan, N., Williams, L., Ferzli, M., Yang, K., Wiebe, E., Miller, C., Balik, S., "Improving the CS1 Experience with Pair Programming", *Proceedings of ACM Special Interest Group in Computer Science Education*, (SIGCSE 2003), pp 359-362. Reno, NV, February 2003.  
Acceptance rate: 32%

#### **SHORT PAPERS, WORKSHOP, DOCTORAL SYMPOSIUM, FAST ABSTRACT PUBLICATIONS**

1. Rastogi, A., Thummalapenta, S., Zimmermann, T., Nagappan, N., Czerwinka, J., "Ramp-up Journey of New Hires: Do strategic practices of software companies influence productivity?" *ISEC 2017*, pp. 107-111, Jaipur, India, 2017.
  
2. Herzig, K., Nagappan, N., "The Impact of Test Ownership and Team Structure on the Reliability, Effectiveness of Quality Test Runs", *Multikonferenz der GI-Fachbereiche Softwaretechnik (SWT) und Wirtschaftsinformatik (WI)*, pp. 105-106, Dresden, Germany.
  
3. Das, S., Zimmermann, T., Nagappan, N., Phillips, B., Harrison, C., *Revival Actions in a Shooter Game*, in the *Proceedings of Design and Evaluation of Sociability in Online Games workshop*, co-located with CHI 2013, Paris, France, 2013.
  
4. Huang, J., Zimmermann, T., Nagappan, N., Phillips, B., Harrison, C., *Influence of Gameplay on Skill in Halo Reach*, in the *Proceedings of Design and Evaluation of Sociability in Online Games workshop*, co-located with CHI 2013, Paris, France, 2013.
  
5. Zimmermann, T., Phillips, B., Nagappan, N., Harrison, C., *Data-Driven Games User Research*, in *Proceedings of the CHI Workshop on Game User Research (CHI-GUR 2012)*, May 2012
  
6. Bird, C., Murphy, B., Nagappan, N., Zimmermann, T., *Empirical software engineering at Microsoft Research*, in *Proceedings of the ACM Conference on Computer Supported Cooperative Work (CSCW)*, pp. 143-150, Hangzhou, China, 2011.
  
7. Hullett, K., Nagappan, N., Schuh, E., Hopson, J., *Data analytics for game development*. In *Proceedings of the International Conference on Software Engineering – New and Emerging Results Track*, (ICSE NIER), pp. 940-943, Hawaii, USA, 2011.

8. Das, R., Czerwinka, J., Nagappan, N., "Finding Dependencies from Defect History", Industry Paper, Proceedings of the IEEE International Symposium on Software Reliability Engineering, Mysore, India, 2009.
9. Sarbu, C., Winter, S., Suri, N., Nagappan, N., OS Driver Test Effort Reduction via Operational Profiling", FastAbstract, Proceedings of the IEEE International Symposium on Software Reliability Engineering, Mysore, India, 2009.
10. Zimmermann, T., Nagappan, N., "Predicting Defects with Program Dependencies", Short paper, Proceedings of the ACM/IEEE Empirical Software Engineering and Measurement Conference (ESEM), Orlando, FL, 2009.
11. Begel, A., Nagappan, N., Poile, C., Layman, L., "Coordination in Large-Scale Software Teams" Second Workshop on Cooperative and Human Aspects of Software Engineering, Vancouver, BC, Canada. May 2009.
12. Godefroid, P., Nagappan, N., "Concurrency at Microsoft - An Exploratory Survey", Proceedings of the Workshop on Exploiting Concurrency Efficiently and Correctly -- (EC)<sup>2</sup>,collocated with the Computer Aided Verification conference (CAV 2008), Princeton, NJ, 2008.
13. Nagappan, N., Williams, L., Vouk, M., Osborne, J., "Early Estimation of Software Quality Using In-Process Testing Metrics: A Controlled Case Study", Third Software Quality Workshop, *co-located with the International Conference on Software Engineering (ICSE 2005)*, pp. 46-52, May 2005, St. Louis, MO.
14. Sherriff, M., Nagappan, N., Williams, L., Vouk, M., "Early Estimation of Defect Density Using an In-Process Haskell Metrics Model", Advances in Model based Software Testing (A-MOST) Workshop, co-located with the International Conference on Software Engineering (ICSE 2005), May 2005, St. Louis, MO.
15. Nagappan, N., Williams, L., Vouk, M., Osborne, J., "Using In-Process Testing Metrics to Estimate Software Reliability: A Feasibility Study", FastAbstract in supplementary proceedings, International Symposium on Software Reliability Engineering (ISSRE 2004), pp. 21-22, St. Malo, France, November 2004.
16. Nagappan, N., "Toward a Software Testing and Reliability Early Warning Metric Suite", Doctoral Symposium, Proceedings of the International Conference on Software Engineering (ICSE 2004), pp 60-62. Edinburgh, Scotland, May 2004.  
Acceptance rate: 31%
17. Nagappan, N., "Software Reliability Estimation using Internal Code Metrics", ACM Student Research Contest (SRC) co-located with ACM Special Interest Group in Computer Science Education, (SIGCSE 2004), Norfolk, VA, March 2004.
18. Nagappan, N., Williams, L., Vouk, M., "Towards a Metric Suite for Early Software Reliability Assessment", Fast Abstract, Supplementary proceedings of the International Symposium on Software Reliability Engineering, (ISSRE 2003), pp 238-239. Denver, CO. November 2003.



19. Nagappan, N., Williams, L., "A Software Reliability Estimation Framework for Extreme Programming", Student Paper in supplementary proceedings, International Symposium on Software Reliability Engineering. (ISSRE 2003), pp 315-316. Denver, CO. November 2003  
Acceptance rate: 38%
20. Nagappan, N., Williams, L., Vouk, M., "Good Enough" Software Reliability Estimation Plug-in for Eclipse", *IBM-Eclipse Technology Exchange (ETX) Workshop*, Co-located with Object Oriented Programming Systems Languages and Applications (OOPSLA 2003), October 2003. pp 36-40. Anaheim, CA, October 2003.  
Acceptance rate: 43%

## THESES

1. Nagappan, N., "A Software Testing and Reliability Early Warning (STREW) Metric Suite", PhD. Thesis, *North Carolina State University*, 2005.

## POSITION PAPERS AND OTHER REPORTS

1. Nagappan, N., "Potential of Open Source Systems as Project Repositories for Empirical Studies", Proceedings of the Dagstuhl Seminar on Empirical Software Engineering, Springer LNCS 4336, pp.126-131, 2007.
2. Nagappan, N., "Empirical Case Studies in Industry: Some Thoughts", Position paper, Proceedings of the Dagstuhl Seminar on Empirical Software Engineering, Springer LNCS 4336, pp.154, 2007

## SELECTED TECHNICAL REPORTS

1. Gupta, A., Zimmermann, T., Bird, C., Nagappan, N., Bhat, T., Emran, S., Detecting Energy Patterns in Software Development, Microsoft Research Technical Report, # MSR-TR-2011-106, November 2011.
2. Sherriff, M., Boehm, B., Williams, L., Nagappan, N., "An Empirical Process for Building and Validating Software Engineering Parametric Models", North Carolina State University Department of Computer Science, Raleigh, NC - CSC TR 2005-45.
3. Zheng, J., Williams, L., Nagappan, N., Hudepohl, J., Snipes, W., Vouk, M., Ngo, K., "On the Effectiveness of Static Analysis Tools for Fault-Detection", North Carolina State University Department of Computer Science, Raleigh, NC - CSC TR 2005-2.
4. Nagappan, N., Williams, L., Vouk, M., Osborne, J., "Initial Results of using in-process testing metrics to estimate software reliability", North Carolina State University Department of Computer Science, Raleigh, NC - CSC TR-2004-05.
5. Nagappan, N., Sherriff, M., Williams, L., "On the Feasibility of Using Operational Profiles to Determine Software Reliability in Extreme Programming", NCSU CSC TR-2003-015.
6. Nagappan, N., Williams, L., Baheti, P., Gehringer, E., Stotts, D., "Virtual Collaboration through Distributed Pair Programming", NCSU CSC TR-2003-02.

## REFEREED POSTERS

1. Nagappan, N., “Software Reliability Estimation using Internal Code Metrics” , ACM Student Research Contest, Co-located with the *ACM Special Interest Group in Computer Science Education*, (SIGCSE 2004), Norfolk, VA. March 2004.
2. Williams, L., Nagappan, N., “GERT- Good Enough Reliability Tool”, Poster at *IBM-Eclipse Technology Exchange (ETX) Workshop*, Co-located with the *International Conference on Software Engineering*, (ICSE 2003), Portland, OR, May 2003.

## PANELS

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The Impact of Assertion Research on Industrial Software Development – James C. Browne (Regents Chair in Computer Science – UT Austin), Gary T Leavens (Professor, Iowa State University), Nachiappan Nagappan (Microsoft Research), Sriram Sankar (Google)

Experimentation and Decision making in Software Engineering: How they are related? – Natalia Juristo (Professor, Univ Politecnica de Madrid), Nachiappan Nagappan (Microsoft Research), Forrest Shull (Fraunhofer-Center Maryland), Claes Wohlin (Professor and Deputy Vice-Chancellor, Blekinge Institute of Technology)

## SUPERVISION

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### Advisor

Ayushi Rastogi, IIT New Delhi. Primary advisor. (Co-advisor: Dr. Pankaj Jalote). Defense date: 8/2017. First position: Post-doc at UC Irvine with Dr. Andre Van der Hoek. Current Position: Post-doc at Delft Univ., Netherlands.

### Post-docs

Abraham Hindle, Visiting Researcher, University of Waterloo/ UC Davis, Jun 2011 – Sept 2011. Current affiliation: Associate Professor, CS Department, University of Alberta, Canada.

Martin Pinzger, Visiting Researcher, University of Zurich, Sep 2007- Dec 2007. Current affiliation: Professor, Alpen-Adria-Universität Klagenfurt, Austria

### Students

Song Wang, Research Mentor, Microsoft Research (May 2018- Aug 2018), PhD student at the University of Waterloo, ON, Canada.

Casey Casalnuovo, Research Mentor, Microsoft Research (May 2017- Aug 2017), PhD student at the University of California, Davis.

Denae Ford, Research Mentor, Microsoft Research (May 2016- Aug 2016), PhD student at North Carolina State University, Raleigh, NC.

Laura Inozemtseva, Research Mentor, Microsoft Research (May 2016- Aug 2016), PhD student at the University of Waterloo, ON, Canada. Current position: Ghost Locomotion.

Pavneet Singh Kochhar, Research Mentor, Microsoft Research (May 2015- Aug 2015), PhD student at SMU, Singapore. Current position: Microsoft Azure.

Erik Harpstead, Research Mentor, Microsoft Research (May 2014-Aug 2014), PhD student at CMU. Current position: Research Scientist – CMU.

Baishakhi Ray, Research Mentor, Microsoft Research (May 2013- Aug 2013), PhD student at UT Austin. Current Affiliation: Columbia University, NY

Alex Tarvo, Research Mentor, Microsoft Research (May 2012 – Aug 2012), PhD student at Brown University. Current affiliation: Google Research.

Kenneth Hullett, Research Mentor, Microsoft Research (May 2010 – Aug 2010), PhD student at UCSC. Current affiliation: Electronic Arts (EA)

Kalaikumaran Ramamurthy, Research Mentor, Microsoft Research (May 2010- Aug 2010). Undergraduate at National Institute of Technology, Tiruchirapalli, (Indian intern program). Current affiliation: Google SFO

Christian Bird, Research Mentor, Microsoft Research (May-Aug 2008) (Jun-Sep 2009), PhD student at University of California, Davis. Current affiliation: Microsoft Research

Lucas Layman, Research mentor, Microsoft Research (June-Aug 2007), PhD student at North Carolina State University. Current affiliation: Fraunhofer Center for Experimental Software Engineering.

Shipa Bugde, Research co-mentor (with Sriram Rajamani and Ganesan Ramalingam), (May-July 2007) MSR Bangalore. MBA student at Symbiosis Institute of Management. Current affiliation: Deloitte

Thomas Zimmermann, Research mentor, Microsoft Research, (May-Aug 2006). Doctoral student at Saarland University. Current affiliation: Assistant Professor at the University of Calgary, Canada → Microsoft Research.

Martin H.E. Davidsson, Undergraduate research, North Carolina State University (2004). Current affiliation: Graduate student at Stanford University.

## **INVITED AND CONFERENCE TALKS**

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### **Keynote Presentations**

TAP 2010 (Test Analysis and Proofs) Conference, Title: Myths in Software Engineering: From the other side, July 2, 2010, Malaga, Spain.

## **Invited Presentations**

ING Amsterdam, “Software Productivity and Empirical SE Studies”, 4/2019. Host: Dr. Hennie Huijgens.

Indian Institute of Technology, Madras, “Empirical Software Engineering and Data Analytics”, 8/2013. Host: Dr. Janakiram Dharanipragada.

Singapore Management University, “Empirical Software Engineering Research at Microsoft”, 7/2013. Host: Dr. David Lo.

National University of Singapore, “Empirical Software Engineering Research at Microsoft”, 7/2013. Host: Dr. Abhik Roychoudhury.

International Conference on Software Engineering, “Do Crosscutting Concerns Cause Defects?”. Invited TSE paper to a special session at ICSE 2009 in Vancouver, Canada. Co-presented with Gail Murphy.

University of British Columbia, Vancouver, Canada – “The Influence of Organizational Structure on Software Quality: An Empirical Case Study”, 4/2008. Host: Dr. Gail Murphy

Simula Research Labs and University of Oslo - “How dependencies predict failures”, 9/2007. Host: Dr. Lionel Briand.

University of Maryland, College Park – “Predicting Software Quality Using Organizational Metrics: An Empirical Case Study”, 8/2007. Host: Dr. Victor Basili.

Saarland University, Saarbrücken - “Early Estimation of Software Quality: An Insider View of Software Measurement at Microsoft”, 6/2006. Host: Dr. Andreas Zeller.

North Carolina State University, Raleigh - “Explaining Failures Using Software Dependences and Code Churn Metrics in Commercial Software Systems”, 6/2006. Host: Dr. Laurie Williams

## **Conference Presentations**

“Global Software Servicing: Observational Experiences at Microsoft”, ICGSE 2008, Bangalore, India (8/2008).

“The Influence of Organizational Structure on Software Quality: An Empirical Case Study”, ICSE 2008, Leipzig, Germany (5/2008).

“Using Historical In-Process and Product Metrics for Early Estimation of Software Failures”, ISSRE 2006, Raleigh, NC (11/2007).

“Assessing the Relationship between Software Assertions and Code Quality: An Empirical Investigation”, ISSRE 2006, Raleigh, NC (11/2007).

“Evaluating the Efficacy of Test-Driven Development: Industrial Case Studies”, ISESE 2006, Rio de Janeiro, Brazil (9/2006).

“Mining Metrics to Predict Component Failures”, ICSE 2006, Shanghai, China (5/2006)

“Models for identifying failure-prone binaries in Windows”, MSR Mind Swap, Shanghai, China (5/2006).

“Leveraging Software Metrics to Understand Failures”, Microsoft Research, Bangalore (2/2006)

“Providing Test Quality Feedback Using Static Source Code and Automatic Test Suite Metrics”, ISSRE 07, Chicago, IL (9/2005)

“Use of Relative Code churn Measures to Predict System Defect Density” ICSE 2005, St. Louis, MO (5/05)

“Static Analysis Tools as Early indicators of Pre-Release Defect Density” ICSE 2005, St. Louis, MO (5/05)

“A Software Testing and Reliability Early Warning (STREW) metric suite”, Microsoft Research, Redmond, WA (11/04).

“Preliminary Results On Using Static Analysis Tools For Software Inspection” ISSRE 2004, St. Malo, France (11/04).

“Use of Relative Code Churn Measures for Quantification of System Defect Density”, PPRC, Microsoft Research, Redmond, WA (07/04).

“Software Reliability Estimation using Internal Code Metrics” ACM Student Research Contest, Norfolk, VA (03/04).

“Pair Learning: With an Eye Toward Future Success”, Agile/XP Universe 2004. New Orleans, LA, (8/2004).

“Improving the CS1 Experience with Pair Programming”, SIGCSE 03, Reno, NV, (2/2003).

“Early Estimation of Software Quality Using In-Process Testing Metrics: A Controlled Case Study”, Third Software Quality Workshop, co-located with the International Conference on Software Engineering (ICSE 2005), St. Louis, MO, (5/2005)

“Using In-Process Testing Metrics to Estimate Software Reliability: A Feasibility Study”, (ISSRE 2004), St. Malo, France, (9/2004).

“Towards a Metric Suite for Early Software Reliability Assessment”, (ISSRE 2003), Denver, CO. (9/2003).

“A Software Reliability Estimation Framework for Extreme Programming”, (ISSRE 2003), Denver, CO. (9/2003)

“Good Enough” Software Reliability Estimation Plug-in for Eclipse”, *IBM-Eclipse Technology Exchange (ETX) Workshop*, Co-located with Object Oriented Programming Systems Languages and Applications (OOPSLA 2003), Anaheim, CA, (10/2003).

## **PROFESSIONAL ACTIVITIES**

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## Professional memberships

- ACM (Distinguished Scientist), ACM SIGSOFT, IEEE
- ISERN (International Software Engineering Research Network). Since 2006.

## Steering Committee Membership

- ESEM: Empirical Software Engineering and Measurement. (2008—2012)
- ISEC: India Software Engineering Conference. (2013-Present)

## Editorial activities

- Editorial Board, Springer Empirical Software Engineering journal (2009 – present)
- Information and Software Technology (2012- 2014)
- Guest editor (With Andreas Zeller and Thomas Zimmermann), IEEE Software, Special Issue on Software Mining, Jan-Feb 2009.

## Organizing activities

2017

- Publicity Co-chair, International Symposium on Software Reliability Engineering, (ISSRE), Toulouse, France, 2017

2013

- Program Co-chair, India Software Engineering Conference (ISEC), New Delhi, India, 2013.
- Organizer, International Workshop on the Engineering of Mobile-Enabled Systems (MOBS 2013), collocated with ICSE, San Francisco, CA, USA.

2012

- Program Co-chair, International Symposium on Software Reliability Engineering, (ISSRE), Dallas, Texas, USA, 2012

2010

- Program co-chair, ICSE 2010 NIER (International Conference on Software Engineering – New and Emerging Results track), Cape Town, South Africa.
- Program co-chair, ESEM 2010 (Empirical Software Engineering and Measurement), Bolzano, Italy

2009

- General Chair, ISERN 2009 (International Software Engineering Research Network Annual Meeting), Lake Buena Vista, Florida, co-located with ESEM 2009.
- Organizer, DEFECTS 2009 workshop, co-located with ISSTA (International Symposium on Software Testing and Analysis), Chicago, IL, 2009.

2008

- Organizer, DEFECTS 2008 workshop, co-located with ISSTA (International Symposium on Software Testing and Analysis), Seattle, WA, 2008.

2007

- Student papers Chair, IEEE International Symposium on Software Reliability Engineering (ISSRE) 2007, Trollhattan, Sweden.
- Short papers Chair, ACM-IEEE International Symposium on Empirical Software Engineering and Measurement (ESEM) 2007, Madrid, Spain.

## Program Committee Membership

### 2019

- ESEM 2019 - Empirical Software Engineering and Measurement
- ICSE 2019 - International Conference on Software Engineering

### 2018

- ESEM 2018 - Empirical Software Engineering and Measurement
- EASE 2017 - 21st International Conference on Evaluation and Assessment in Software Engineering
- CESI2017 - 5th International Workshop on Conducting Empirical Studies in Industry
- ICSE 2017 SEIP - Software Engineering in Practice Track @ the International Conference on Software Engineering 2017
- ISEC2017 - 10th Innovations in Software Engineering Conference

### 2017

- ESEM 2017 - Empirical Software Engineering and Measurement
- EASE 2017 - 21st International Conference on Evaluation and Assessment in Software Engineering
- CESI2017 - 5th International Workshop on Conducting Empirical Studies in Industry
- ICSE 2017 SEIP - Software Engineering in Practice Track @ the International Conference on Software Engineering 2017
- ISEC2017 - 10th Innovations in Software Engineering Conference

### 2016

- ICSE 2016 – Program Board – International Conference on Software Engineering, Austin, Texas
- EASE 2016 - 20th International Conference on Evaluation and Assessment in Software Engineering
- ESEM2016 - Empirical Software Engineering and Measurement 2016
- CESI2016 - 4th International Workshop on Conducting Empirical Studies in Industry

### 2015

- APSEC 2015 - The 22nd Asia Pacific Software Engineering Conference
- ESEM 2015 - 9th International Symposium on Empirical Software Engineering and Measurement
- EASE 2015 - 19th International Conference on Evaluation and Assessment in Software Engineering
- ICGSE2015 - International Conference on Global Software Engineering

### 2014

- DAPSE 2014 - 2nd International Workshop on Data Analysis Patterns in Software Engineering
- ICST 2014 - IEEE International Conference on Software Testing, Verification, and Validation
- ICSE2014 - demo track, 36th International Conference on Software Engineering - Formal Demonstrations
- ISEC 2014 - 7th India Software Engineering Conference 2014

### 2013

- ACM/IEEE Empirical Software Engineering and Measurement Conference (ESEM), Baltimore, MD, USA
- Workshop on Games and Software Engineering (GAS), collocated with ICSE, San Francisco, CA, USA.
- IEEE International Conference on Software Testing (ICST), Luxembourg.

- ACM/IEEE International Conference on Software Engineering (ICSE 2013), San Francisco, CA, USA.
- ACM/IEEE International Conference on Software Engineering (ICSE 2013) Workshops committee, San Francisco, CA, USA.

2012

- IEEE International Conference on Software Testing (ICST), Montreal, Canada
- ACM/IEEE Empirical Software Engineering and Measurement Conference (ESEM), Lund, Sweden.
- ACM Foundations on Software Engineering (ESEC/FSE) New and Emerging Results Track (NIER), Raleigh, NC, USA.
- Workshop on Games and Software Engineering (GAS), collocated with ICSE, Zurich, Switzerland.

2011

- ACM/IEEE Empirical Software Engineering and Measurement Conference (ESEM), Banff, Canada.
- IEEE International Symposium on Software Engineering (ISSRE), Hiroshima, Japan
- ACM European Conference on Software Engineering/ Foundations on Software Engineering (ESEC/FSE), Szeged, Hungary.
- Workshop on Developing Tools as Plug-ins (TOPI 2011), Hawaii, USA.
- ACM/IEEE International Conference on Software Engineering (ICSE 2010), Honolulu, Hawaii.

2010

- International Working Conference on Mining Software Repositories (MSR 2010), Cape Town, South Africa.
- ACM/IEEE International Conference on Software Engineering (ICSE 2010), Cape Town, South Africa.

2009

- ACM-IEEE International Symposium on Empirical Software Engineering and Measurement (ESEM 2009), Lake Buena Vista, Florida.
- International Working Conference on Mining Software Repositories (MSR 2009), Vancouver, Canada.
- Demo track, Automated Software Engineering (ASE 2009), Auckland, New Zealand.
- Second India Software Engineering Conference (ISEC 2009), Pune, India.

2008

- Integrated Support or Integrated Overhead? Infrastructure for Research in Collaborative Software Engineering, Workshop at Foundations of Software Engineering (FSE) 2008.
- IEEE International Conference on Software Reliability Engineering (ISSRE 2008), Redmond, WA, 2008
- ACM-IEEE Empirical Software Engineering and Measurement Conference (ESEM 2008), Kaiserslautern, Germany, 2008
- Workshop on Software Engineering with Computational Intelligence and Machine Learning (SECIML) 2008, Redwood city, CA.
- Twentieth International conference of Software Engineering Knowledge Engineering (SEKE 2008), Redwood city, CA.
- First India Software Engineering Conference (ISEC 2008), Hyderabad, India.

2007

- IEEE International Symposium on Software Reliability Engineering (ISSRE 2007), Trollhattan, Sweden.
- Fifth Workshop on Software Quality, Collocated with ICSE 2007, Minneapolis, MN.

2006

- IEEE International Symposium on Software Reliability Engineering (ISSRE 2006), Raleigh, NC.



- Fourth Workshop on Software Quality, Collocated with ICSE 2006, Shanghai, China.
- 2005
- Workshop on Software Assurance Tools, Techniques, and Metrics, Collocated with ASE 2005, Long Beach, CA.

#### Reviewer

- Funding  
National Science Foundation (2010- present)  
NSERC, Canada (2012 – Present)  
Microsoft PhD Fellowships (2008-Present)  
Microsoft New Faculty Fellowship (NFF) 2006 - Present
- Journal  
ACM Transactions on Software Engineering and Methodology (2006-present)  
IEEE Transactions in Software Engineering (2004 - Present)  
IEEE Transactions on Reliability (2004- Present)  
IEEE Software (2003 - Present)  
IEEE Computer (2003 - Present)  
Information and Software Technology, Elsevier (2006 - present)  
Empirical Software Engineering Journal (2006 - present)
- Conference (not on PC)  
International Conference on Object-Oriented Programming, Systems, Languages and Applications (OOPSLA) – 2008.  
Foundations of Software Engineering (FSE) - 2008  
Dependable Systems and Networks (DSN) - 2008  
International Symposium on Software Testing and Analysis (ISSTA) – 2007.  
International Conference on Software Engineering (ICSE) - 2004, 2006  
Programming Language Design and Implementation (PLDI) – 2006  
Workshop on Software Assurance Tools, Techniques, and Metrics (SATTM) – 2005  
Workshop on Software Quality, Collocated with ICSE 2006, Shanghai, China. - 2006  
ACM Special Interest Group in Computer Science Education (SIGCSE) - 2004, 2005

Student Volunteer: SIGCSE 2003, Reno, NV 2003, ICSE 2003, Portland, OR 2003, XP/AU, New Orleans, LA 2003.

## **SOFTWARE**

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**CODEMINE:** CODEMINE is a Software Analytics Data platform (CODEMINE) for collecting and analyzing engineering process data ranging from Source Code, Bug information, Test data, People and Organizational data, Process data like code review information, code velocity, Code Complexity information, Dependency data and usage telemetry data. All this data is collected for every MS system and is stored in a robust manner to use to make data driven decisions across the spectrum from optimizing builds to empirical questions regarding who should review a change. Published in IEEE Software.

**CRANE:** CRANE is a risk analysis and impact estimation tool for Windows. Windows invested headcount to build this and I was on loan from MSR to Windows for FY 2008 to build this tool. This tool was used for

bug triage, risk analysis and test prioritization for all fixes in Windows Vista SP2 on. [CRANE paper – ICST 2011]

**Little Brother:** Little Brother is a Failure-prediction tool built using organizational measures to predict failures. It generates easy to navigate reports that reflect the OS development by mining version archives, bug repositories and people management information. It scales to the entire Windows base. It is used in Windows. [Organizational Metrics paper ICSE 2008].

**GERT (Good Enough Reliability Tool):** GERT is a tool to complement the feedback loops created by continuous unit testing. The tool combines static source code metrics with dynamic test coverage for use throughout development to estimate the reliability for the system under development. Implemented as an open source plug-in to the Eclipse IDE, the tool facilitates the rapid transition between unit test case completions and testing feedback. The color-coded results highlight inadequate testing efforts as well as weaknesses in overall program structure. (With Martin Davidsson and Jiang Zheng – GERT paper ISSRE 2004).

**PET (Peer evaluation tool) V 1.0:** Used at NC State University by the classes CSC 116, CSC 326, CSC 517, ECE 521. (Tool used by approx.1000 students). Tool matches students based on their Myer Briggs personality profiles, skill level and compatibility. It allows students to evaluate their partners in order to evaluate equal sharing of load among programming partners [SIGCSE 2003 paper].

## **FUNDING ADMINISTRATION**

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SEIF Awards at Microsoft: Software Engineering Innovation Foundation (SEIF) Awards to support academic research in software engineering technologies, tools, practices, and teaching methods. Projects can be related to any of the core areas of interest in software engineering research and education. Co-ran with Dr. Judith Bishop with MSR external relations office. 10-12 awards each year. Ran the program for two years 2010 and 2011. Record proposals submitted both years.

## **REFERENCES**