Baishakhi Ray

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Research Interest

I am primarily interested in *Software Engineering* with a focus on *empirical studies*, *program analysis*, and *software evolution*. Using techniques from diverse domains including machine learning, natural language processing, and rigorous statistical modeling, I analyze large scale software repositories to understand ongoing software engineering practices. This data-driven knowledge helps me to build novel program analysis techniques and development tools to improve software quality and programmer productivity.

Education

Ph. D., Electrical & Computer Engineering, University of Texas, Austin.
August 2013 (GPA: 3.97)
Thesis: *Analysis of Cross-System Porting and Porting Errors in Software Projects*
Advisor: Miryung Kim

MS, Computer Science, University of Colorado, Boulder.
August 2009 (GPA: 4.0)
Thesis: *SecureWear: Securing Wearable Mobile Social Networks*
Advisor: Richard Han

B.Tech., Computer Science, Calcutta University, India.
B.Sc., Physics, Presidency College, Kolkata, India.
July 2004 (GPA: 3.84, Top 1% in University)

Honors

- Best Practical Paper Award, IEEE Symposium on Security and Privacy (S&P Oakland), 2014

- Nominated for Distinguished Paper Award, IEEE/ACM 28th International Conference on Automated Software Engineering (ASE), 2013.

- Google Summer of Code, 2012

- SIGSOFT FSE 2012 CAPS travel award

- Ranked 6th out of 15,000 students in B.Sc. Physics (Hons.) examination.

- Selected in Indian Institute of Technology (IIT, Kharagpur) for graduate study.

- Jawaharlal Nehru Summer Scholarship for Advanced Research, India 2001. (100 students are selected nationwide).

Academic Positions

University of Virginia, VA, USA
Assistant Professor   October 2015 - present

University of California Davis, CA, USA
Postdoctoral Research Fellow   October 2013 - September 2015
Advisor: Prem Devanbu

The University of Texas at Austin, TX, USA
Graduate Research Assistant   January 2011–May 2013
Adviser: Miryung Kim

Other Professional Experience

    Microsoft Research, Redmond, USA
    Research Intern   May 2013–August 2013
    Mentors: Christian Bird, Nachiappan Nagappan, Thomas Zimmermann

    Google Summer of Code, Google Inc.
    Research Intern   May 2012 – August 2012
    Mentors: Suzette Person, Neha Rungta, NASA

    Avaya Research Lab, Westminster, CO, USA
    Research Intern   May 2008 – Aug 2008

    Ericsson Pvt. Ltd. Boulder, CO, USA
    Software Engineer   February 2009–June 2010

    Ixia, **Sasken**, and **Texas Instruments, India**
    Software Engineer   August 2004–July 2007

Publications

1. *On the Naturalness of Buggy Code*. ***B. Ray**, *V. Hellendoorn, S. Godhane, Z. Tu, A. Bacchelli, P. Devanbu, *both are lead authors, 10 pages. In 38th International Conference on Software Engineering (ICSE'16), 10 pages, acceptance rate: 19%.

2. *Automatically Detecting Error Handling Bugs using Error Specifications*. S. Jana, Y. J. Kang, S. Roth, ***B. Ray**. In USENIX Security '16, 18 pages, acceptance rate: 15.5%.

3. *APEx: Automated Inference of Error Specifications for C APIs*. Y. J. Kang, ***B. Ray**, S. Jana. In 31st IEEE/ACM International Conference on Automated Software Engineering (ASE'16) , 10 pages, acceptance rate: 19.1%.

4. *Assert Use in GitHub Projects*. *C. Casalnuovo, P. Devanbu, A. Oliveira, V. Filkov, ***B. Ray**, *both are lead authors, 10 pages. In 37th International Conference on Software Engineering (ICSE'15), 10 pages, acceptance rate: 18.5%.

5. *Gender and Tenure Diversity in GitHub Teams*. B. Vasilescu, D. Posnett, **B. Ray**, M. Brand, A. Serebrenik, P. Devanbu, V. Filkov, In International Conference on Human Factors in Computing Systems (CHI'15), 10 pages, acceptance rate: 23%.

6. *A Large Scale Study of Programming Languages and Code Quality in Github*. **B. Ray** , D. Posnett , V. Filkov, P. T. Devanbu. In ACM SIGSOFT, 22nd International Symposium on the Foundations of Software Engineering (FSE'14), pages: 155-165, acceptance rate: 22%, **Selected for publication in the "Research Highlights" section of the CACM**.

7. *Using Frankencerts for Automated Adversarial Testing of Certificate Validation in SSL/TLS Implementations*. C. Brubaker, S. Jana, **B. Ray**, S. Khurshid, and V. Shmatikov. In 35th IEEE Symposium on Security and Privacy, 2014 (S&P Oakland'14), pages: 114-129, acceptance rate: 13%, **Best Practical Paper Award**.

8. *Detecting and Characterizing Semantic Inconsistencies in Ported Code*. **B. Ray**, M. Kim, S. Person, N. Rungta. In 28th IEEE/ACM International Conference on Automated Software Engineering, 2013 (ASE'13), pages: 367-377, acceptance rate: 23%, **Nominated for Distinguished Paper Award, invited for ASE journal special issue**.

9. *An Empirical Study of API Stability and Adoption in the Android Ecosystem*. T. McDonnell, **B. Ray**, M. Kim. In 29th IEEE International Conference on Software Maintenance, 2013 (ICSM'13), pages: 70-79, acceptance rate: 22%.

10. *A Case Study of Cross-System Porting in Forked Projects*. **B. Ray**, M. Kim. In ACM SIGSOFT, the 20th International Symposium on the Foundations of Software Engineering (FSE'12), pages: 53:1-53:11, acceptance rate: 17%.

11. *Repertoire: A Cross-System Porting Analysis Tool for Forked Software Projects*. **B. Ray**, C. Wiley, M. Kim. In ACM SIGSOFT the 20th International Symposium on the Foundations of Software Engineering, Formal Research Tool Demonstration (FSE'12), pages: 8:1-8:4.

12. *An Empirical Study of Supplementary Bug Fixes*. J. Park, M. Kim, **B. Ray**, D. Bae. In The 9th IEEE Working Conference on Mining Software Repositories (MSR'12), pages: 40-49, acceptance rate: 28% **Invited to the Special Issue of Journal of Empirical Software Engineering (EMSE)**.

13. *PTask: Operating System Abstractions To Manage GPUs as Compute Devices*. CJ. Rossbach, J. Currey, M. Silberstein, **B. Ray**, E. Witchel. In Proceedings of the 23rd ACM Symposium on Operating System Principles (SOSP'11), pages: 233-248, acceptance rate: 17%.

14. *Touch Me wE@r: Getting Physical with Social Networks*, A. Beach, **B. Ray**, L. Buechley. In 2009 Workshop on Sensor-based Models and Feedback Systems for Social Computing. Associated with SocialCom 2009, pages: 960-965.

15. *A Protocol for Building Secure and Reliable Covert Channel*. **B. Ray** and S. Mishra.
In 6th Annual Conference on Privacy, Security and Trust, 2008. (PST'08), pages: 246-253

16. *WhozThat?: Evolving an Ecosystem for Context-Aware Mobile Social Networks*. A. Beach, **B. Ray**, et al., In IEEE Network Magazine Special Issue on Composable context aware services, 2008, pages: 50-55.

Book Chapter

17. *A Large Ecosystem Study to Understand the Effect of Programming Languages on Code Quality*. **B. Ray**, D. Posnett. Perspectives on Data Science for Software Engineering, Morgan Kaufmann, 2016.

18. *SecureWear: A Framework for Securing Mobile Social Networks*. **B. Ray**, R. Han. Advances in Computer Science and Information Technology. Computer Science and Engineering, Vol. 85, Lecture Notes of the Institute for Computer Sciences, Social Informatics and Telecommunications Engineering, Springer Berlin Heidelberg, 2012, pages: 515-524.

Funding

- NSF CHS: Small: Translating Compilers for Visual Computing in Dynamic Languages.
- NSF TWC: Small: Collaborative: Automated Detection and Repair of Error Handling Bugs in SSL/TLS Implementations.

Software Releases

- Frankencerts, https://github.com/sumanj/frankencert.
  Framework to test certificate validation code in SSL/TLS implementations.
  Has received 51 github 'stars' as of October 2014.

- Repertoire, https://github.com/baishakhir/RepertoireTool.
  A cross-system porting analysis tool for forked software projects.
  Published in FSE'12 tool demo track.

Teaching Experience

Graduate Courses

- Data Science In Software Engineering.
- Software Engineering.

Guest Lecturer

- Introduction to Programming and Problem Solving, Fall 2014, University of California, Davis
- Software Engineering, Fall 2013, University of California, Davis
- Software Engineering and Design Laboratory, Fall 2013, The University of Texas at Austin

Academic Services

Program Committee

- **2017:** ASE (ERP), ICSE NIER, OOPSLA Onward, ICPC, MSR, ICSME.
- **2016:** ASE (ERP), MSR, ICSE Visions of 2025 and Beyond (V2025), ICSE Tool Demonstrations, FSE SRC, FSE NL+SE Workshop, ICSME Era, ISEC, APSEC.
- **2015:** MSR, MSR Challenge, ISEC.
- **2014:** FSE Artifact.
- **2013:** OOPSLA Artifact.

Journal Reviewer

- Transactions on Software Engineering (TSE)
- CSI Journal Computer Standards & Interfaces
- Information and Software Technology

Other

- Vice President, Graduate Women in Engineering, ECE Department, The University of Texas at Austin

Talks

A Case Study of Cross-Systems Porting in Forked Projects

- Mining Summer School MSR Vision 2020, August 2012, Kingston, ON, Canada.
- 20th International Symposium on the Foundation of Software Engineering (FSE), November 2012, Cary, North Carolina, USA.
- IBM Research, March 2013, Delhi, India.

Detecting and Characterizing Semantic Inconsistencies in Ported Code

- NASA Ames Research Center, Mountain View, CA, November 2013.
- 28th IEEE/ACM International Conference on Automated Software Engineering (ASE), Silicon Valley, CA, November 2013.

Analysis of Cross-System Porting and Porting Errors in Software Projects

- Fujitsu Laboratories America, Sunnyvale, CA, January 2014.

Media Coverage

- Language Study [1]: SlashDot, The Register, Reddit, InfoWorld, Hacker News.
- Frankencerts [2]: Reddit, Golem, Heise.

References

Premkumar T. Devanbu
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Miryung Kim
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