Ana L. Milanova

Curriculum Vitae
October 2023

I. Personal Information

I.A. Contact Information

Current Rank: Associate Professor at Rensselaer Polytechnic Institute
Department: Computer Science
School**:** School of Science
Email: milanova at cs dot rpi dot edu
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I.B. Professional Experience

Associate Professor, Rensselaer Polytechnic Institute, August 2009 to present
Assistant Professor, Rensselaer Polytechnic Institute, August 2003 to July 2009
Consultant, Stealth Software Technologies, July 2019 to June 2020

I.C. Educational Preparation

PhD in Computer Science, Rutgers University, October 2003
MS in Computer Science, Rutgers University, October 1999
BA in Computer Science and in Business Administration, American University in Bulgaria, 1997

II. Teaching, Mentoring and Advising

II.A Courses Taught

2559 students in total (at semester end), 142 per year on average; 2226, 178 per year since tenure. Color coding separates academic years.

36. CSCI 4967/ITWS 4967, Modern Binary Exploitation, Fall 2023
35. CSCI 4430, Programming Languages, Fall 2022 (Sole instructor)
34. CSCI 4450/6550, Principles of Program Analysis, Spring 2022.
33. CSCI 4967/ITWS 4967, Modern Binary Exploitation, Fall 2021
32. CSCI 4450/6550, Principles of Program Analysis, Spring 2021
31. CSCI 4430, Programming Languages, Fall 2020 (Lead instructor, with Prof. Kuzmin)
30. CSCI 4450/6550, Principles of Program Analysis, Spring 2020
29. CSCI 4967/ITWS 4967, Modern Binary Exploitation, Fall 2019
28. CSCI 4450/6550, Principles of Program Analysis, Spring 2019

27. CSCI 4430/6430, Programming Languages, Fall 2018 (Sole instructor)
26. CSCI 4450/6550, Principles of Program Analysis, Spring 2018
25. CSCI 2600, Principles of Software, Fall 2017
24. CSCI 4430/6430, Programming Languages, Spring 2016
23. CSCI 2600, Principles of Software, Fall 2015
22. CSCI 2600, Principles of Software (pilot), Spring 2015
21. CSCI 2600, Principles of Software (pilot), Fall 2014
20. CSCI 4430/6969, Programming Languages, Spring 2014
19. CSCI 4430/6969, Programming Languages, Fall 2013
18. CSCI 6961/ECSE 6964, Software Engineering II, Spring 2013
17. CSCI 4430/6969, Programming Languages, Fall 2012
16. CSCI 6961/ECSE 6964, Software Engineering II, Spring 2012
15. CSCI 4430/6969, Programming Languages, Fall 2011
14. CSCI 6961/ECSE 6964, Software Engineering II, Spring 2011
13. CSCI 4430/6969, Programming Languages, Fall 2010
12. CSCI 6961/ECSE 6964, Software Engineering II, Fall 2009
11. CSCI 4430/6969, Programming Languages, Spring 2009
10. CSCI 4430/6969, Programming Languages, Fall 2008
9. CSCI 6961/ECSE 6964, Software Engineering II, Fall 2008
8. CSCI 4440 Software Design and Documentation, Fall 2007
7. CSCI 6961/ECSE 6964, Software Engineering II, Spring 2007
6. CSCI 4440 Software Design and Documentation, Fall 2006
5. CSCI 4967/6967, Program Analysis for Soft. Eng., Spring 2006
4. CSCI 4440 Software Design and Documentation, Fall 2005
3. CSCI 4440 Software Design and Documentation, Fall 2004
2. CSCI 4967/6967, Program Analysis for Soft. Eng., Spring 2004
1. CSCI 4440 Software Design and Documentation, Fall 2003

II.B. Advising

II.B.1 Graduate, PhD Advisor

7. Yue Zhou, PhD expected May 2027, My role: advisor
6. Linh Tran, PhD expected May 2026, My role: co-advisor with Prof. Stacy Patterson
5. Ingkarat (Bill) Rak-amnouykit, PhD expected May 2024 (passed candidacy), My role: advisor
4. Lindsey Kennard, PhD awarded December 2020, at a defense contractor, My role: advisor
3. Yao Dong, PhD awarded December 2017, at Microsoft, My role: advisor
2. Wei Huang, PhD awarded May 2014, at Google, My role: advisor
1. Yin Liu, PhD awarded May 2010, at Google, My role: advisor

II.B.2 Graduate, PhD Thesis Committee Member

11. Dongjie He, PhD May 2022, University of New South Wales Computer Science (UNSW), Australia, My role: external examiner
10. Daniel Park, PhD Spring 2021, RPI Computer Science, My role: committee member

9. Sang Hung Lee, PhD December 2019, RPI MANE, My role: external committee member
8. Jeremy Blackthorne, PhD student**,** RPI Computer Science, My role: committee member
7. Jon Eyolfson, PhD May 2018, Univ. Waterloo, Canada Computer Science, My role: external examiner
6. Charles Hathaway, PhD May 2018, RPI Computer Science, My role: committee member
5. Yue Li, PhD 2016. UNSW, Australia, Computer Science, My role: external examiner
4. Yulei Sui, PhD 2014, UNSW, Australia, Computer Science, My role: external examiner
3. Justin LaPre, PhD December 2015, RPI Computer Science, My role: committee member
2. Wei-Jen Wang, PhD December 2006, RPI Computer Science, My role: committee member
1. Douglas Gregor, PhD May 2004, RPI Computer Science, My role: committee member

II.B.3 Graduate, MS Advisor

13. Jesse Huang, MS expected May 2024, My role: MS project advisor
12. Seth Laurenceau, MS awarded May 2023, My role: MS project advisor
11. Ben Sherman, MS awarded August 2022, My role: MS thesis advisor
10. Andrew Ma, MS awarded December 2019, My role: MS project advisor
9. Toshi Piazza, MS awarded May 2018, My role: MS thesis co-advisor (with Derek Bruening)
8. Alex Giris, MS awarded May 2017, My role: MS thesis advisor
7. Branden Clark, MS awarded December 2016, My role: MS thesis co-advisor (with Derek Bruening)
6. Shuran Li, MS awarded May 2016, My role: MS project advisor
5. Ben Kaiser, MS awarded May 2015, My role: MS thesis advisor
4. Benjamin Levinn, MS awarded May 2009, My role: MS thesis advisor
3. Orri Eiriksson, MS awarded December 2006, My role: MS thesis advisor
2. Shyam Sunder MS awarded July 2004, My role: MS thesis co-advisor (with Dave Musser)
1. James Lewis, MS awarded May 2004**,** My role: MS project advisor

II.B.3 Graduate, MS Thesis Committee Member

12. Andrew Wilkerson, MS expected December 2023, My role: thesis committee member
11. Andrew Showers, MS awarded April 2018, My role: committee member
10. Connor Hadley, MS awarded April 2018, My role: committee member
9. Mike Macalletti, MS awarded December 2017, My role: committee member
8. Zach Wimer, MS awarded April 2018, My role: committee member
7. Muhammad Ishaq, MS awarded April 2018, My role: committee member
6. Patrick Biernat, MS awarded December 2016, My role: committee member
5. Jeremy Blackthorne, MS awarded April 2015, My role: committee member
4. Matt Hancock, MS awarded April 2015, My role: committee member
3. Alexei Bulazel, MS awarded April 2015, My role: committee member
2. Phillip Kuang, MS awarded June 2014, My role: committee member
1. Ian Dunn, MS awarded April 2014, My role: committee member

II.B.2 Undergraduate

14. Brandon Fogg, URP Fall 2023; will continue as an RA in Spring 2024
13. Asher Gottlieb, URP Fall 2022

12. Benjamin Levy, Arch Away Fall 2021, URP Spring 2022 - Spring 2023 (his graduation); Research assistant Summer 2023 to present
11. Mike Yang, URP Spring 2021 and Arch Away Fall 2021
10. Daniel McCreven, URP Fall 2019 and Spring 2020
9. Collin Jones, URP Spring 2019
8. Elizabeth Dinella, URP Spring 2017 - Spring 2018 (her graduation); defended her PhD thesis at UPenn in September 2023
7. Alex Slanski, URP Summer 2016
6. Axue Jia, URP Spring 2016
5. Jon-Pierre Hanna URP June 2015
4. Cody Doyle, URP Fall 2014, Spring 2015
3. Raymond Jacobson URP Fall 2014
2. Zev Battad URP Spring 2014
1. Sam Rhody URP Spring 2014

II.C. Course and Curriculum Development

I have developed and taught the following courses at RPI.

4. **CSCI 4450/6450 Principles of Program Analysis**. The course covers major program analysis techniques and disciplines, including dataflow analysis, semantics and abstract interpretation, type systems, axiomatic semantics, and symbolic execution.

3. **CSCI 2600 Principles of Software**. This is the **required sophomore-level** Software Engineering class at RPI currently taken by about 400 students a year. Modeled after a course at the University of Washington by Prof. Michael Ernst, it covers reasoning about code, specifications, design patterns and principles, testing, and refactoring. It is fully integrated into the RPI Submitty platform. Currently taught by other instructors; I am in the rotation as well.

2. **CSCI 4430/6430 Programming Languages**. This is the **required upper-level** Programming Languages class at RPI. It covers basic parsing and compiler theory, data and control abstraction, functional programming, logic programming, and concurrency. It is fully integrated into the RPI Submitty platform with autograders for Prolog, Scheme, Haskell, Java, and Python homework. Currently taught every fall. I teach the class in the fall of even years.

1. **CSCI 6967 Program Analysis for Software Engineering**. This course (an earlier version of Principles of Program Analysis, and not taught anymore) focused on dataflow analysis, compiler optimization, and applications of program analysis to software tasks such as testing and understanding.

III. **Research and Scholarly Activity**

For my thesis work and for papers where I have led the projects, my name and my advisees' names are in **boldface**. As of September 2023, my papers have received 2,301 citations on Google Scholar with h-index 20. Links to the ACM DL pages of 5 publications are included.

III. A. Books, Monographs

None

III.B. Refereed Articles in Journals

7. **Ingkarat Rak-amnouykit**, **Ana Milanova**, Guillaume Baudart, Martin Hirzel, and Julian Dolby, **"**Principled and Practical Static Analysis for Python: Weakest Precondition Inference of Hyperparameter Constraints", *to appear in Wiley Software: Practice and Experience (SPE).*

6. **Ana Milanova**, "FlowCFL: Generalized Type-Based Reachability Analysis: Graph Reduction, and Equivalence of CFL-Based and Type-Based Reachability", *In Proc. ACM Programming Languages 4 (OOPSLA'20)*, November 2020. (Acceptance rate 36%, 109/306).

5. **Ana Milanova**, "Composition Inference for UML Class Diagrams", *International Journal of Automated Software Engineering (JASE)*, vol. 14, issue 2, pp. 179-213, June 2007. Kluwer Academic Publishers.

4. Chen Fu, Ana Milanova, Barbara Ryder, and David Wannacott, "Robustness Testing of Java Server Applications", *IEEE Transactions on Software Engineering (TSE)*, vol. 31, no. 4, pp. 292-311, April 2005.

3. **Ana Milanova**, Atanas Rountev, and Barbara G. Ryder, "Parameterized Object Sensitivity for Points-to Analysis for Java", *ACM Transactions on Software Engineering and Methodology (TOSEM)*, vol. 14, no. 1, pp. 1-41, January 2005.

2. Atanas Rountev, Ana Milanova, and Barbara G. Ryder, "Fragment Class Analysis for Testing of Polymorphism in Java Software", *IEEE Transactions on Software Engineering (TSE)*, vol. 30, no. 6, pp. 372-387, June 2004.

1. Ana Milanova, Atanas Rountev, and Barbara G. Ryder, "Precise Call Graphs for C Programs with Function Pointers", *International Journal of Automated Software Engineering (JASE)*, special issue on source code analysis and manipulation, volume 11, issue 1, pages 7-26, January 2004. Kluwer Academic Publishers.

III.C. Refereed Articles in Conferences and Workshops

44. **Benjamin Levy**, Muhammad Ishaq, **Ben Sherman**, **Lindsey Kennard**, **Ana Milanova**, and Vassilis Zikas, "COMBINE: COMpilation and Backend-INdependent vEctorization for Multi-Party Computation", to appear in ACM SIGSAC Conference on Computer and Communication Security (CCS 2023) (CCS 2023 B acceptance rate 20%, 158/785), 15 pages.

43. Linh Tran, Timothy Castiglia, Stacy Patterson, and Ana Milanova, "Privacy Tradeoffs in Vertical Federated Learning", in Federated Learning Systems (FLSys 2023), Workshop @MLSys, 10 pages. **Received a Best paper award.**

42. **Ingkarat Rak-amnouykit**, **Ana Milanova**, Guillaume Baudart, Martin Hirzel, and Julian Dolby, "The Raise of Machine Learning Hyperparameter Constraints in Python Code", in ACM SIGSOFT International Symposium on Software Testing and Analysis (ISSTA 2022) (acceptance rate 24%, 61/250), 12 pages. **Received an ACM SIGSOFT Distinguished paper award (5 awards given at the conference).**

41. **Mike Yang**, **Ana Milanova**, and Martin Hirzel, "Complex Python Features in the Wild", in Mining Software Repositories Conference (MSR 2022) (acceptance rate 33%, 45/137), 10 pages.

40. **Ingkarat Rak-amnouykit**, **Ana Milanova**, Guillaume Baudart, Martin Hirzel, and Julian Dolby, "Extracting Hyperparameter Constraints from Code", in Workshop on Security and Safety in Machine Learning Systems, ICLR Workshops 2021, 4 pages.

39. **Ingkarat Rak-amnouykit**, **Daniel McCrevan**, **Ana Milanova**, Martin Hirzel, and Julian Dolby, "Python 3 Types in the Wild: A Tale of Two Type Systems", in ACM SIGPLAN Dynamic Languages Symposium (DLS 2020), 14 pages.

38. **Matthew Obetz**, Stacy Patterson, and **Ana Milanova**, "Formalizing Event-Driven Behavior of Serverless Applications", in European Conference on Service-Oriented and Cloud Computing (ESOCC 2020), 11 pages.

37. **Lindsey Kennard** and **Ana Milanova**, "SecureMCMR: Computation Outsourcing for MapReduce Applications", in International Symposium on Cyber Security Cryptography and Machine Learning (CSCML 2020), 24 pages.

36. Mohammed Ishaq, **Ana Milanova**, and Vassilis Zikas, "Efficient MPC via Program Analysis: A Framework for Efficient Optimal Mixing", in ACM SIGSAC Conference on Computer and Communication Security (CCS 2019) (CCS 2019 A acceptance rate 14%, 32/225), 18 pages.

35. **Matthew Obetz**, Stacy Patterson, and **Ana Milanova**, "Static Call Graph Construction in AWS Lambda Serverless Applications", in 11th USENIX Workshop on Hot Topics in Cloud Computing (HotCloud 2019) (acceptance rate 37%, 22/59), 6 pages.

34. **Ana Milanova,** "Definite Reference Mutability", in European Conference of Object-Oriented Programming (ECOOP 2018) (acceptance rate 39%, 26/66), 25 pages.

33. **Yao Dong**, **Ana Milanova**, and Julian Dolby, "SecureMR: Secure MapReduce Computation Using Homomorphic Encryption and Program Partitioning", in Symposium and Bootcamp on Hot Topics in the Science of Security (HotSoS 2018) (acceptance rate 31%, 9/29), 13 pages.

32. **Ana Milanova** and **Yao Dong**, "Inference and Checking of Object Immutability", in the 13th International Conference on Principles and Practices of Programming on the Java Platform: Virtual Machines, Languages, and Tools (PPPJ 2016), 12 pages.

31. **Yao Dong**, **Ana Milanova**, and Julian Dolby, "JCrypt: Towards Computation over Encrypted Data", in the 13th International Conference on Principles and Practices of Programming on the Java Platform: Virtual Machines, Languages, and Tools (PPPJ 2016), 12 pages.

30. **Wei Huang**, **Yao Dong**, **Ana Milanova**, and Julian Dolby, "Scalable and Precise Taint Analysis for Android", in ACM SIGSOFT International Symposium on Software Testing and Analysis (ISSTA 2015) (acceptance rate 28%, 33/119), 12 pages.

29. **Ana Milanova**, **Wei Huang**, and **Yao Dong**, "CFL-reachability and Context-sensitive Integrity Types" in 11th Conference on the Principles and Practices of Programming on the Java Platform (PPPJ 2014), 12 pages.

28. **Wei Huang**, **Yao Dong**, and **Ana Milanova**, "Type-based Taint Analysis for Java Web Applications", in 17th International Conference on Fundamental Approaches to Software Engineering (FASE 2014) (acceptance rate 23%), 15 pages.

27. **Ana Milanova** and **Wei Huang**, "Composing Information Flow Systems with Reference Immutability", in Workshop on Formal Techniques for Java-like Programs (FTfJP) at ECOOP (FTfJP 2013) (acceptance rate 50%, 7/14), 7 pages.

26. **Ana Milanova** and **Wei Huang**, "Dataflow and Type-based Formulations for Reference Immutability", in 19th Workshop on the Foundations of Object-Oriented Languages at OOPSLA (FOOL 2012) (acceptance rate 63%, 10/16), 6 pages.

25. **Wei Huang** and **Ana Milanova**, "Inferring AJ Types for Concurrent Libraries", in 19th Workshop on the Foundations of Object-Oriented Languages Workshop at OOPSLA (FOOL 2012) (acceptance rate 63%, 10/16), 6 pages.

24. **Ana Milanova** and **Wei Huang**, "Inference and Checking of Pluggable Types", in ACM SIGSOFT Symposium on the Foundations of Software Engineering (FSE 2012) New Ideas and Emerging Results Track (acceptance rate 20%, 12/59), 4 pages.

23. **Wei Huang**, **Ana Milanova**, Werner Dietl, and Michael D. Ernst, "ReIm and ReImInfer: Checking and Inference of Reference Immutability and Method Purity", in ACM SIGPLAN Conference on Object-Oriented Programming Systems, Languages and Applications (OOPSLA 2012) (acceptance rate 25%, 57/228), 18 pages.

22. **Wei Huang**, Werner Dietl, **Ana Milanova**, and Michael D. Ernst, "Inference and Checking of Object Ownership", in European Conference on Object-Oriented Programming (ECOOP 2012) (acceptance rate 21%, 30/140), 26 pages.

21. **Ana Milanova** and **Wei Huang**, "Static Object Race Detection", in Asian Symposium on Programming Languages and Systems (APLAS 2011) (acceptance rate 36%, 23/64), 17 pages.

20. **Wei Huang** and **Ana Milanova**, "Towards Effective Inference and Checking of Ownership Types", in International Workshop on Aliasing, Confinement and Ownership at ECOOP (IWACO 2011), 11 pages. **Studentship award to Wei Huang to attend conference and present paper.**

19. **Ana Milanova** and Jan Vitek, "Static Dominance Inference", in TOOLS Europe (TOOLS 2011) (acceptance rate 28%, 19/66), 17 pages.

18. **Ana Milanova** and **Yin Liu**, "Static Analysis for Understanding the Structure of Shared Objects in Open Concurrent Java Programs", in IEEE Working Conference on Program Comprehension (WCRE 2010) (acceptance rate 31%, 21/67), 10 pages.

17. **Yin Liu** and **Ana Milanova**, "Static Information Flow Analysis with Handling of Implicit Flows and a Study of the Effect of Implicit vs Explicit Flows", in European Conference on Software Maintenance and Reengineering (CSMR 2010) (acceptance rate 26%, 21/80), 10 pages.

16. **Yin Liu** and **Ana Milanova**, "Practical Static Analysis for Inference of Security-Related Program Properties", in IEEE International Conference on Program Comprehension (ICPC 2009) (acceptance rate 27%, 20/74), 10 pages.

15. **Ana Milanova** and **Yin Liu**, "Static Ownership Inference for Reasoning Against Concurrency Errors", in ACM SIGSOFT/IEEE International Conference on Software Engineering (ICSE 2009) Track on New Ideas and Emerging Results (acceptance rate 33%, 39/119), 4 pages.

14. **Yin Liu** and **Ana Milanova**, "Static Analysis for Inference of Explicit Information Flow", in ACM SIGPLAN-SIGSOFT Workshop on Program Analysis for Software Tools and Engineering (PASTE 2008) (acceptance rate 50%, 13/26), 7 pages.

13. **Ana Milanova**, "Static Inference of Universe Types", in International Workshop on Aliasing, Confinement and Ownership in Object-oriented Programming at ECOOP (IWACO 2008) (acceptance rate 63%, 7/11), 9 pages.

12. **Ana Milanova**, "Light Context-sensitive Points-to Analysis for Java", in 7th ACM SIGPLAN-SIGSOFT Workshop on Program Analysis for Software Tools and Engineering (PASTE 2007) **(**acceptance rate 31%, 11/35), 7 pages.

11. **Yin Liu** and **Ana Milanova**, "Ownership and Immutability Inference for UML-Based Object Access Control", in 29th ACM/IEEE International Conference on Software Engineering (ICSE 2007) (acceptance rate 15%, 50/334), 10 pages.

10. Ana Milanova, Sonia Fahmy, David Musser, and Bulent Yener, "A Secure Programming Paradigm for Network Virtualization", in 3rd International Conference on Broadband Communications, Networks and Systems (BROADNETS 2006) (invited paper), 10 pages.

9. **Yin Liu** and **Ana Milanova**, "Static Analysis for Dynamic Coupling Measures", in 16th IBM Centers for Advanced Studies Annual International Conference on Computer Science and Software Engineering (CASCON 2006) (acceptance rate 27%, 24/90), 12 pages**. Runner-up for Best Student Paper Award.**

8. **Ana Milanova**, "Precise Identification of Composition Relationships for UML Class Diagrams", in 20th IEEE/ACM International Conference on Automated Software Engineering (ASE 2005) (acceptance rate 10%, 28/291), 10 pages. **Nominated for ACM SIGSOFT Distinguished Paper Award (6 nominations).**

7. **Ana Milanova** and Barbara Ryder, "Annotated Inclusion Constraints for Precise Flow Analysis", in 21st IEEE International Conference on Software Maintenance (ICSM 2005) (acceptance rate 31%, 55/180), 10 pages.

6. Chen Fu, Barbara G. Ryder, Ana Milanova, and David Wonnacott, "Testing of Java Web Services for Robustness", in ACM SIGSOFT International Symposium on Software Testing and Analysis (ISSTA 2004) (acceptance rate 28%, 26/93), 12 pages. **Invited for a special issue of the IEEE Transactions on Software Engineering as one of the best papers at ISSTA'04.**

5. Atanas Rountev, Ana Milanova, and Barbara G. Ryder, "Fragment Class Analysis for Testing of Polymorphism in Java Software", in 25th ACM/IEEE International Conference on Software Engineering (ICSE 2003) (acceptance rate 13%, 42/324), 11 pages. **Invited for a special issue of the IEEE Transactions on Software Engineering as one of the best papers at ICSE'03.**

4. Ana Milanova, Atanas Rountev, and Barbara G. Ryder, "Precise Call Graph Construction in the Presence of Function Pointers", in 2nd IEEE International Workshop on Source Code Analysis and Manipulation (SCAM 2002), 6 pages. **Invited for a special issue of the Journal of Automated Software Engineering as one of the best papers at SCAM'02.**

3. **Ana Milanova**, Atanas Rountev, and Barbara G. Ryder, "Constructing Precise Object Relation Diagrams", in 18th IEEE International Conference on Software Maintenance (ICSM 2002) (acceptance rate 47%, 61/127), 10 pages.

2. **Ana Milanova**, Atanas Rountev, and Barbara G. Ryder, "Parameterized Object Sensitivity for Points-to and Side-Effect Analyses for Java", in ACM SIGSOFT International Symposium on Software Testing and Analysis (ISSTA 2002) (acceptance rate 18%, 18/99), 11 pages. **Invited to the ACM Transactions on Software Engineering and Methodology as one of the best papers at ISSTA'02.**

1. Atanas Rountev, **Ana Milanova**, and Barbara G. Ryder, "Points-to Analysis for Java Using Annotated Constraints", in ACM SIGPLAN Conference on Object-Oriented Programming Systems, Languages and Applications (OOPSLA 2001) (acceptance rate 19%, 27/145), 13 pages.

III.D. Refereed Short Articles, Posters, Demos, and Artifacts; Other Articles

15. **Lindsey Kennard**, **Ana Milanova**, and Julian Dolby: "Secure Multi-cloud Computation", in European Conference of Object-Oriented Programming (ECOOP 2018) Doctoral Symposium.

14. **Ana Milanova**, and **Wei Huang**, "Definite Reference Mutability (Artifact)", *Dagstuhl Artifact Series (DARTS)*, Volume 4(3): 07:1-07:3 (2018).

13. **Yao Dong**, **Ana Milanova**, and Julian Dolby, "Poster: SecureMR: Secure MapReduce Computation Using Homomorphic Encryption and Program Partitioning", in ACM Conference on Principles and Practice of Parallel Programming (PPoPP 2018), 2 pages.

12. Sam Breese, Evan Maicus, Barb Cutler, Elizabeth Dinella, Buster Holzbauer, and Ana Milanova, "Program Analysis Tools in Automated Grading of Homework Assignments", in ACM Conference on Computer Science Education (SIGCSE 2018) Poster.

11. Sam Breese, Evan Maicus, Barb Cutler, Matt Peveler, Buster Holzbauer, and Ana Milanova, "Supporting Team Submissions and Peer Grading within Submitty", in ACM Conference on Computer Science Education (SIGCSE 2018) Demonstration Track.

10. Sam Breese, Barb Cutler, and Ana Milanova, "Using Static Analysis for Automated Assignment Grading in Introductory Programming Classes", in ACM Conference on Computer Science Education (SIGCSE 2017), Poster.

9. Barb Cutler, Matt Peveler, Jeramay Tyler, and Ana Milanova, "Submitty: An Open Source, Highly-Configurable Platform for Grading of Programming Assignments", in ACM Conference on Computer Science Education (SIGCSE 2017) Demonstration Track.

8. **Yao Dong**, **Ana Milanova**, and Julian Dolby, "Static Analysis and Program Transformation for Secure Computation on the Cloud", in ACM SIGSOFT International Symposium on Software Testing and Analysis (ISSTA 2016) Doctoral Symposium.

7. **Wei Huang** and **Ana Milanova**, "ReImInfer: Method Purity Inference for Java", in ACM SIGSOFT Symposium on the Foundations of Software Engineering (FSE 2012) Tool Demonstration Track (acceptance rate 54%, 13/24), 4 pages.

6. **Wei Huang** and **Ana Milanova**, "On Optimality of Ownership Type Inference", Poster at ECOOP 2011, July 25-29, Lancaster, UK.

5. **Yin Liu** and **Ana Milanova**, "Static Information Flow Analysis for Java", in Mid-Atlantic Student Workshop on Programming Languages and Systems (MASPLAS 2008), Princeton University, Princeton, NJ, April 26, 2008.

4. **Yin Liu** and **Ana Milanova**, "Ownership and Immutability Inference for UML-based Object Access Control", Poster presentation at the *CRA-W/CDC Programming Languages Summer School*, University of Texas at Austin, Austin, TX, May 7-9, 2007.

3. **Yin Liu** and **Ana Milanova**, "Static Analysis for Dynamic Coupling Measures", Poster presentation at the Mid-Atlantic Student Workshop on Programming Languages and Systems (MASPLAS 2006), Rutgers University, Piscataway NJ, April 29, 2006**.**

2. Atanas Rountev, **Ana Milanova**, and Barbara G. Ryder, "Points-to Analysis for Java Using Annotated Constraints", in Mid-Atlantic Student Workshop on Programming Languages and Systems (MASPLAS 2001), IBM T.J. Watson Research Center, Hawthorne, NY, April 14, 2001.

1. **Ana Milanova**, "Precise and Practical Flow Analysis of Object-Oriented Software", Ph.D. thesis, Department of Computer Science, Rutgers University, Number DCS-TR-539, October 2003.

IV. Research Grants and Contracts

IV.A. Proposals Approved and Funded

External funding: $2,042,400; $1,600,000 after tenure, includes AIRC. All as single RPI PI.

9. **NSF award #2232061** **04/2023 - 03/2026**
   Project Title: "Compilation and Backend-Independent Optimization for Multi-Party Computation"
   Role: single PI
   Amount: $599,039

8. **Rensselaer-IBM Artificial Intelligence Research Collaboration** **09/2019 - 12/2020**
   Project Title: "Extracting Types from Python Machine Learning Libraries"
   Role: RPI PI with IBM PIs Martin Hirzel and Julian Dolby
   Amount: $150,000

7. **NSF award #1814898** **09/2018 - 08/2023**
   Project Title: "Program Analysis and Transformations for Secure Computation on the Cloud"
   Role: single PI
   Amount: $483,038

6. **RPI Seed Fund** **06/2016 - 05/2017**
   Project Title: "Immersive Code Review for Effective Problem Solving"
   Role: Co-PI with PI Barb Cutler and Co-PI Sibel Adali
   Amount: $20,000

5. **NSF award #1319384** **09/2013 - 08/2016**
   Project Title: "Inference and Checking of Context-Sensitive Pluggable Types"

Role: single PI
Amount: $315,000

4. **Google Faculty Research Awards** **03/2013 - 02/2014**
Project Title: "Modular and Compositional Information Flow Analysis for Android"
Role: single PI
Amount: $61,350

3. **NSF REU Supplement to award #0642911** **08/2012 - 07/2014**
Project Title: "A Tool for Interactive Visualization of Race Reports"
Role: single PI
Amount: $16,000

2. **NSF CAREER award #0642911** **06/2007 - 05/2014**
Project Title: "A Framework for Customizable Program Flow Analysis"
Role: single PI
Amount: $400,000

1. **IBM Eclipse Innovation Awards** **2006**
Project Title: "Verifying Ownership and Immutability with Eclipse"
Role: single PI
Amount: $18,000

IV.B. Current Research Interests

General area: programming languages, software engineering, and compilers.

Current research interests fall into three areas:
1. Program analysis and its applications to security, specifically, compilation and optimization for multi-party computation (MPC).
2. Program analysis for dynamic languages with applications to the specification and verification of machine learning libraries.
3. Practical type systems and type-based program analysis, particularly reference immutability and taint analysis.

V. Service and Outreach

V.A. Conference Reviewing

PC = Program Committee
ERC = External Review Committee. An extension of the PC primarily reviewing PC papers.
RC = Review Committee. This is a larger PC.
AEC = Artifact Evaluation Committee

4. AEC co-chair at ACM SIGPLAN Conference on Object-oriented Programming Systems, Languages and Applications (OOPSLA), 2022

3. AEC co-chair, ACM SIGPLAN Conference on Object-oriented Programming Systems, Languages and Applications (OOPSLA), 2021
2. Student Research Competition co-chair at <Programming>, 2019
1. Workshops co-chair at ACM SIGSOFT International Symposium on Software Testing and Analysis (ISSTA), 2016

60. PC member, ACM SIGSOFT International Symposium on Software Testing and Analysis (ISSTA) 2024
59. PC member, ACM SIGPLAN Conference on Object-oriented Programming Systems, Languages and Applications (OOPSLA), 2024
58. PC member, European Conference on Object-Oriented Programming (ECOOP), 2023
57. PC member, ACM SIGPLAN Conference on Object-Oriented Programming Systems, Languages and Applications (OOPSLA) 2023
56. PC member, Conference on Compiler Construction (CC), 2023
55. PC member, ACM/IEEE International Conference on Software Engineering (ICSE), 2023
54. PC member, Conference on Managed Programming Languages and Runtimes (MPLR), 2023
53. PC member, Conference on Managed Programming Languages and Runtimes (MPLR), 2022
52. PC member, IEEE Secure Development Conference (SecDev), 2022
51. PC member, ACM SIGPLAN Conference on Programming Languages Design and Implementation (PLDI), 2022
50. RC member, ACM SIGPLAN Conference on Object-oriented Programming Systems, Languages and Applications (OOPSLA), 2022
49. PC member, Symposium on Cyber Security, Cryptology and Machine Learning (CSCML), 2021
48. PC member, ACM SIGSOFT Conference on the Foundations of Software Engineering (FSE), 2021
47. PC member, ACM/IEEE Conference on Automated Software Engineering (ASE), 2021
46. PC member, ACM/IEEE Conference on Automated Software Engineering (ASE), 2020
45. RC member, ACM SIGPLAN Conference on Object-oriented Programming Systems, Languages and Applications (OOPSLA), 2020
44. PC member, Conference on Managed Programming Languages and Runtimes (MPLR) (formerly ManLang and PPPJ), 2019
43. PC member, ACM SIGPLAN HOPL IV: History of Programming Languages (HOPL), 2020
42. PC member, ACM SIGSOFT Conference on the Foundations of Software Engineering (FSE), 2019
41. ERC member, European Conference on Object-Oriented Programming (ECOOP), 2019
40. PC member, ACM/IEEE Conference on Automated Software Engineering (ASE), 2018
39. ERC member, ACM SIGPLAN Conference on Object-oriented Programming Systems, Languages and Applications (OOPSLA), 2018
38. PC member, ACM/IEEE International Conference on Software Engineering (ICSE), 2017
37. PC member, ACM SIGPLAN Conference on Object-oriented Programming Systems, Languages and Applications (OOPSLA), 2017
36. PC member, ACM/IEEE International Conference on Software Engineering (ICSE), 2017
35. PC member, ACM SIGSOFT International Symposium on Software Testing and Analysis (ISSTA), 2017
34. PC member, European Conference on Object-Oriented Programming (ECOOP), 2016

33. PC member, ACM SIGSOFT International Symposium on Software Testing and Analysis (ISSTA), 2015
32. PC member, ACM SIGSOFT Conference on the Foundations of Software Engineering (FSE), 2015
31. PC member, ACM SIGPLAN Conference on Programming Languages Design and Implementation (PLDI), 2015
30. PC member, ACM SIGSOFT Conference on the Foundations of Software Engineering (FSE), Tool Demo Track, 2014
29. PC member, ACM SIGSOFT International Symposium on Software Testing and Analysis (ISSTA), Tool Demo Track, 2014
28. PC member, Workshop on the Foundations of Object-Oriented Languages at OOPSLA (FOOL), 2013
27. PC member, European Conference on Object-Oriented Programming (ECOOP), 2014
26. PC member, Asian Programming Languages Symposium (APLAS), 2013
25. PC member Student Research Competition at OOPSLA, 2013
24. PC member, Static Analysis Symposium (SAS), 2013
23. PC member, ACM SIGPLAN-SIGSOFT Workshop on Program Analysis in Software Testing and Engineering (PASTE), 2013
22. PC member, ACM SIGSOFT Symposium on the Foundations of Software Engineering (FSE), 2012
21. PC member, IEEE International Conference on Software Maintenance (ICSM), 2011
20. PC member, IEEE International Conference on Software Maintenance (ICSM), 2010
19. PC member ACM SIGPLAN Conference on Programming Language Design and Implementation (PLDI), 2010
18. PC member, International Workshop on Aliasing, Confinement and Ownership (IWACO), 2009
17. PC member, Workshop on Dynamic Analysis (WODA), 2009
16. PC member, Static Analysis Symposium (SAS), 2009
15. PC member, IEEE Working Conference on Source Code Analysis and Manipulation (SCAM), 2008
14. PC member, IBM Centers for Advanced Studies Conference (CASCON), 2008
13. PC member, ACM SIGSOFT International Symposium on Software Testing and Analysis (ISSTA), 2008
12. PC member, Conference on Compiler Construction (CC), 2008
11. PC member, Eclipse Technology eXchange Workshop at OOPSLA (ETX), 2007
10. ERC member, IEEE/ACM Conference on Automated Software Engineering (ASE), 2007
9. PC member, IBM Centers for Advanced Studies Conference (CASCON), 2007
8. PC member, ACM SIGPLAN Conference on Object-Oriented Programming, Systems, Languages and Applications (OOSPLA), 2007
7. PC member, IEEE Working Conference on Source Code Analysis and Manipulation (SCAM), 2007
6. PC member, IEEE International Conference on Software Maintenance (ICSM), 2007
5. PC member, Workshop on Dynamic Analysis (WODA), 2007
4. PC member, ACM SIGSOFT International Symposium on Software Testing and Analysis (ISSTA), 2007
3. PC member, IBM Centers for Advanced Studies Conference (CASCON), 2006

2. PC member, IEEE International Conference on Software Maintenance (ICSM), 2006
1. PC member, ACM Symposium on Applied Computing (SAC), Programming Languages Track, 2006

V.B. Journal Reviewing

Note: nearly all journal reviewing is before tenure.

5. IEEE Transactions on Software Engineering; Publisher: IEEE
4. ACM Transactions on Programming Languages, Systems and Applications; Publisher: ACM
3. ACM Transactions on Software Engineering and Methodology; Publisher: ACM
2. Journal of Information and Software Technology; Publisher: Elsevier
1. Journal of Object Technology; Founder: Bertrand Meyer; Publisher: AITO (Germany)

V.C. Grant Reviewing

4. NSF: served on multiple panels since 2007
3. New Zealand's Marsden Fund: served as expert reviewer on one proposal in 2008
2. DOE: served on one panel in 2012
1. NSERC: served as reviewer on multiple proposals since 2017

V.D Service to University

V.D.1. Departmental Committees

2. Chair of Graduate Admissions Committee, Academic year 2021/22 to present
1. Chair of Web Committee, Academic years 2012/13, 2013/14, 2014/15

4. Hiring Committee, Year 2023/24
3. Undergraduate Curriculum Committee, Years 2006/07 to 2021/22
2. Graduate Admissions Committee, Years 2004/05, 2005/06, 2019/20, 2020/21
1. Programming Languages Qualifying Exam Committee: Years 2003/04 to present

VI. Professional and Public Lectures

VI.A. Contributed Conference and Workshop Presentations

14. "FlowCFL: Generalized Type-Based Reachability Analysis: Graph Reduction, and Equivalence of CFL-Based and Type-Based Reachability" in ACM SIGPLAN Conference on Object-Oriented Programming Systems, Languages and Applications (OOPSLA 2020), online.

13. "Definite Reference Mutability", in European Conference on Object-Oriented Programming (ECOOP 2018), Amsterdam, Netherlands, July 2018.

12. “Composing Information Flow Systems with Reference Immutability”, in Session # of the Workshop on Formal Techniques for Java-like Programs (FTfJP 2013), Montpelier, France, July 2013.

11. “Dataflow and Type-based Formulations for Reference Immutability”, in Session #4 of the Workshop on the Foundations of Object-oriented Languages (FOOL 2012), Tucson, Arizona, October 2012.

10. “Inference and Checking of AJ Types for Concurrent Libraries”, in Session #4 of the Workshop on the Foundations of Object-oriented Languages (FOOL 2012), Tucson, Arizona, October 2012.

9. “Static Dominance Inference”, in Session #3 of the TOOLS Europe Conference (TOOLS 2011), ETH Zurich, Switzerland, June 2011.

8. “Static Inference of Universe Types”, in Session “Ownership” of the International Workshop on Aliasing, Confinement and Ownership in object-oriented programming (IWACO 2008), Paphos, Cyprus, July 2008.

7. “Light Context-Sensitive Points-to Analysis for Java”, in Session 2 of the ACM SIGPLAN-SIGSOFT Workshop on Program Analysis for Software Tools and Engineering (PASTE 2007), San Diego, California, June 2007.

6. “Precise Identification of Composition Relationships”, in Session “Program Understanding” of the IEEE/ACM International Conference on Automated Software Engineering (ASE 2005), Long Beach, California, November 2005.

5. “Annotated Inclusion Constraints for Precise Flow Analysis”, in Session “Source Code Analysis” of the IEEE International Conference on Software Maintenance (ICSM 2005), Budapest, Hungary, September 2005.

4. “Constructing Precise Object Relation Diagrams”, in Session “Source Code Manipulation” of the IEEE International Conference on Software Maintenance (ICSM 2002), Montreal, Canada, October 2002.

3. “Precise Call Graph Construction in the Presence of Function Pointers”, in Session “Dependence Graphs, Static Analysis” of the Second IEEE International Workshop on Source Code Analysis and Manipulation (SCAM 2002), Montreal, Canada, October 2002.

2. “Parameterized Object Sensitivity for Points-to and Side-effect Analyses for Java”, in Session “Static Analysis of Java Programs” of the International Symposium on Software Testing and Analysis (ISSTA 2002), Rome, Italy, July 2002.

1. “Points-to Analysis for Java Using Annotated Constraints”, Mid-Atlantic Student Workshop on Programming Languages and Systems (MASPLAS 2001), IBM T.J. Watson Research Center, April 2001.

VI.B. Invited Talks

9. “Compilation and Backend-Independent Optimization for MPC”, Invited speaker at PLCrypt 2022 workshop, SRI Menlo Park, CA, May 2022. (Organizers: Elaine Shi and Andrew Myers)

8. “How to Choose Your Advisor”, Programming Languages Mentoring Workshop at OOPSLA, Vancouver Canada, October 2017.

7. “Inference and Checking of Context-Sensitive Pluggable Types” Dagstuhl Seminar on Pointer Analysis, Schloss Dagstuhl, Germany, April 2013.

6. “Practical Information Flow Typing for Java and Android”, March 2013, Google (via Google+, audience of about 10-15 researchers from the Security group at Mountain View).

5. “Inference and Checking of Pluggable Types”, IFIP WG 2.4 meeting, Cape May, NJ, September 2011.

4. “Practical Specification and Verification of Security Properties”, invited speaker at the “State of the Art in Software Engineering Day”, Rutgers University, New Brunswick, NJ, March 2008.

3. “Getting Started in Program Analysis Research”, invited speaker at the CRA-W/CDC Programming Languages Summer School, University of Texas at Austin, Austin, TX, May 2007.

2. “Beyond Points-to Analysis: Static Analysis for Understanding, Testing and Debugging of Software“, Computer Science Seminar Series, Union College, Schenectady, NY, April 2007.

1. “Constructing Precise Object Relation Diagrams”, Advanced Seminar on Compilation and Run-time Systems for Object-Oriented Languages, McGill University, Montreal, Canada, October 2002.

VII. Honors and Awards

10. Best paper award at FLSys workshop, 2023
9. ACM SIGSOFT Distinguished paper award at ISSTA, 2022
8. Google Faculty Research Award, 2013
7. Honored at the 2013, 2009 and 2007 RPI Trustees Celebrations of Faculty Achievement
6. NSF CAREER Award, 2007
5. IBM Eclipse Innovation Award, 2006
4. Nominated for the ACM SIGSOFT Distinguished paper award at ASE, 2005
3. Best paper selection at ISSTA, 2002 and 2004
2. Best paper selection at ICSE, 2003

1. Best paper selection at SCAM, 2002

VIII. Sabbatical leaves, off-campus study programs, foreign professional travel

Sabbatical leave for academic year 2016/2017
Leave Spring 2010
Maternity leave Spring 2005

Date **Signature**