Curriculum Vitae of

Komondoor V Raghavan

raghavan@iisc.ac.in • https://www.csa.iisc.ac.in/~raghavan

Research Interests

My research interests are broadly in the areas of programming languages, program analysis, and software engineering. I am particularly interested in developing automated, semantics-based tools that help programmers understand, verify, and evolve programs, in an agile and reliable manner. Most of my research is centered around static and dynamic analysis of programs, program transformations, as well as analysis and verification of formally specified requirements and designs.

Education

PhD in Computer Sciences GPA: 3.85 / 4
Univ. of Wisconsin-Madison. Date: Aug. '03
Thesis: Identifying and eliminating duplication in source code.
Adviser: Prof. Susan Horwitz.

Master of Technology in Computer Sciences Avg. Grade: 9.76 / 10
Indian Institute of Technology, Bombay, India. Date: Jan '96
Thesis: System for automatically generating code optimizers.
Adviser: Prof. D. M. Dhamdhere.

Bachelor of Engineering in Computer Sciences Avg. Marks: 85%
Government College of Tech., Coimbatore, India. Date: May '94
Thesis: Implementation of a run-time debugger.

Work and Research Experience

- Associate Professor at *Indian Institute of Science, Bangalore* (Jul. '15 to present).
- Visiting Faculty at *IIT Madras* (June '24 to July '24).
- Visiting Faculty at *IIT Bombay* (May '19 to June '19).
- Visiting Faculty at *National University of Singapore* (Aug. '16 to Jan. '17).
- Assistant Professor at *Indian Institute of Science, Bangalore* (Aug. '08 - Jun. '15).
- Research Staff Member at *IBM India Research Lab, New Delhi* (Oct. '05 - Jul. '08).
- Postdoc Researcher at *IBM T. J. Watson Research Center*, with Advanced Programming Tools group (Dr. John Field) (Sep. '03 - Sep. '05).
- Summer Intern at *IBM T. J. Watson Research Center*, with Advanced Programming Tools group (June - Aug. '02).
- Summer student at *IBM Toronto Lab* (Sep. - Dec. '00, June - Aug. '01).
- Summer Intern at *Lucent Bell Labs*, with Databases group (Dr. Rajeev Rastogi) (June - Aug. '98).
- Project Engineer at *Indian Institute of Technology, Bombay*, with Prof. S. Sudarshan (Jan '96 - July '97).

Last updated 2025/05/22

Students graduated from thesis-based programs

1. Geetam Chawla, MTech (Research), 2021
2. Snigdha Athaiya, PhD, 2020
3. K. Vasanta Lakshmi, PhD, 2018
4. Girish M. Rama, PhD, 2018
5. M. Raveendra Kumar, PhD, 2018
6. Himanshu Arora, MSc Engg., 2018
7. Pallavi Chugh, MSc Engg., 2016
8. Tejas Patil, MSc Engg., 2015
9. Aravind Acharya, MSc Engg., 2014
10. Amogh Margoor, MSc Engg., 2013

Courses taught or co-taught

- Program Analysis and Verification, in IISc.
- Principles of Distributed Software, in IISc.
- Formal methods in software engineering, in IISc.
- Topics in Program Analysis, in IISc.
- Topics in Program Analysis (4 credits), offered in Summer 2024 in IITM as a visiting faculty.
- Advanced Programming Tools (1 credit), offered in 2007 in IITD as a visiting faculty.

Activities and Awards

- Program committee chair positions:
  - Program Committee Co-Chair, 23rd International Symposium on Automated Technology for Verification and Analysis (ATVA), 2025.
  - Area Chair of Trustworthy Systems, Innovations in Software Engineering Conference (ISEC), 2023
  - Chair of PhD Symposium committee of India Software Engineering Conference (ISEC), 2020
- Program committee memberships and chair positions:
  - Int. Conf. on Software Engg. (ICSE): 2018, 2021, 2023, 2024, 2025.
  - Int. Symp. on Software Testing and Analysis (ISSTA): 2022
  - Innovations in Software Engineering Conference (ISEC): 2010-2013, 2015, 2020, 2022, 2023.
  - IARCS Annual Conference on Foundations of Software Technology and Theoretical Computer Science (FSTTCS): 2020
  - IEEE/ACM International Conf. on Automated Software Engineering (ASE): 2019, 2020.
  - IEEE Int. Conf. on Software Analysis, Evaluation, and Reengineering (SANER): 2019.
  - Int. Conf. on Software Engg. (ICSE) – Workshops Track: 2019.

  - IEEE International Conference on Software Maintenance and Evolution (ICSME): 2011, 2012, 2018, 2019.
  - IEEE Int. Working. Conf. on Source Code Analysis and Manipulation (SCAM): 2014, 2015, 2016, 2018.
  - 33rd IEEE/ACM International Conf. on Automated Software Engineering (ASE) – Tool Demo Track: 2018.
  - Int. Symp. on Automated Technology for Verification and Analysis (ATVA): 2017.
  - Inter-Research-Institute Student Seminar in Computer Science (IRISS): 2015, 2016, 2017.
  - Int. Conf. on Software Engg. (ICSE) – Software Engineering in Practice (SEIP) Track: 2014, 2016.
  - IEEE Int. Conf. on Software Analysis, Evaluation, and Reengineering (SANER) – Industry Track: 2016.
  - ACM India Compute: 2015.
  - Asia-Pacific Software Engineering Conference (APSEC): 2015.
  - ACM Symposium on Principles of Programming Languages (POPL) – External Review Committee: 2015.
  - ACM Symp. on Applied Computing (SAC): 2009-2011, 2015.
  - Int. Conf. on Program Comprehension (ICPC) – Industry Track: 2014.
  - Working Conference on Reverse Engineering (WCRE): 2013, 2014.
  - Asian Symp. on Programming Langs. and Systems (APLAS): 2008, 2014.

- Sponsored projects
  - Siemens India (2019-2021)
  - Tata Consultancy Ltd. (2017-2021)
  - Nucleus Software Exports Ltd. (2015-2018)
  - Indo-German Max Planck Center for Computer Science (2011-2016)
  - ISRO-IISc Space Technology Cell (2012-2013)
  - Infosys Ltd. (2010-2012)

- Research grants
  - IBM Research India (2021-23)
  - Microsoft Research India grant (2009, 2013)
  - IBM Faculty Award (2008)

- Consultancy projects on software development and analysis
  - Sirpi Products and Services Ltd. (2025)
  - Flytxt Ltd. (2018)
  - Tarang Ltd. (2013)

- Awards
  - Commendation certificate given to my M.Tech (Research) student Geetam Chawla in 2023 in recognition of an excellent M. Tech (Research) thesis.

  - Distinguished reviewer award by Program Committee of IEEE/ACM Int. Conf. on Automated Software Engineering (ASE), 2019.
  - Distinguished reviewer award by Program Committee of Working Conf. on Reverse Engineering (WCRE), 2013.
  - My paper in ICSME 2015 titled "Program Specialization and Verification using File Format Specifications" was nominated for a best paper award.

- Events organized or co-organized
  - Organizing Co-chair, Innovations in Software Engineering Conference (ISEC 2024)
  - Software Engineering Research in India (SERI 2022-23) online talk series
  - Workshop on Research Highlights in Programming Languages (co-located with FSTTCS 2020).
  - 1st Software Engineering Research in India (SERI) Update Meeting, July 2019.
  - Joint workshop by IISc, Microsoft Research, and U. Pennsylvania on Programming Languages, Formal Methods, and Cyber-Physical Systems, January 2019.
  - Winter School in Software Engineering, organized by ACM iSoft, December 2017.
  - IMPECS-POPL Workshop on Emerging Research & Development Trends in Programming Languages, January 2015.
  - Future of Debugging, as part of the *Mysore Park Series*, 2012.

- Member of Boards of Studies of Colleges
  - Vel Tech Rangarajan Dr. Sagunthala R&D Institute of Science and Technology, 2022-24
  - PSG College of Technology, 2020-22
  - KPR Institute of Engineering and Technology, 2019-21
  - Bannari Amman Institute of Technology, Anna University Nominee, 2015-17

- Member of ICMR-NCIDR Scientific Advisory Committee, since June 2023.

- Fellowships (during PhD study)
  - IBM PhD Fellowship (2002)
  - IBM CAS Fellowship (2000-2001)

- Helped write Instructors Manual for "Database System Concepts", 3rd Edition, McGraw-Hill, by Silberschatz, Korth, and Sudarshan.

Software tools released as open-source

- A semantics-based tool for detecting duplicated code fragments in C programs `https://www.csa.iisc.ac.in/~raghavan/software/clones-impl-distrib.tar.gz`.This paper is described in our SAS 2001 paper. A number of researchers in various universities have contacted me about this tool and have used it for their research purposes.

- A tool *PageModeler* `https://www.csa.iisc.ac.in/~raghavan/software/PageModels/README.html`, for end-to-end analysis of J2EE based web applications that use JSP for view scripting. This tool is described in our ISSTA 2017 paper.

- A tool *ORMInfer* `https://doi.org/10.6084/m9.figshare.19087814`, for summarization of database-accessing ORM code. This tool is described in our ICSE 2022 paper.

  This tool and the tool mentioned above (PageModeler) are being used within TCS R&D for their research purposes. Please see further details in the section below.

- A tool *NPEDetector* `https://www.csa.iisc.ac.in/~raghavan/software/NPE-VirtualBox/README.html`, for null-dereference analysis in Java programs. This tool is described in our OOPSLA 2011 paper.

- A tool *Ross* `https://www.csa.iisc.ac.in/~raghavan/software/Ross/GettingStarted.html`, for precise points-to analysis for Java programs as well static safety checking of downcast sites. This tool is described in our OOPSLA 2018 paper.

- A tool *DFAS* `https://github.com/SnigdhaAthaiya/DFAS`, for data-flow analysis and verification of asynchronous programs. This tool is described in our ESOP 2021 paper.

- A tool *GenSys* `https://github.com/stanlysamuel/gensys`, for synthesis of winning strategies for infinite state games. This tool is described in our FSE Tool 2021 and our ASE 2023 papers.

Publications

Refereed conference and workshop publications

1. Aniket Modi, Rohan Tikmany, Tanu Malik, Raghavan Komondoor, Ashish Gehani, and Deepak D'Souza. Kondo: Efficient Provenance-Driven Data Debloating. To appear in *40th IEEE Int. Conf. on Data Engineering (ICDE)*, May 2024.

2. Sajiv Kumar J S, Raghavan Komondoor. Controller synthesis for reactive systems with communication delay by formula translation. In *International Symposium on Automated Technology for Verification and Analysis (ATVA)*, October 2023.

3. Stanly Samuel, Deepak D'Souza, and Raghavan Komondoor. Symbolic Fixpoint Algorithms for Logical LTL Games. In *Int. Conf. on Automated Software Engineering (ASE)*, September 2023.

4. Rupashree Rangaiyengar, Raghavan Komondoor, Raveendra Kumar Medicherla. Multi-Layer Observability for Fault Localization in Microservices Based Systems. To appear in *Tool Track, Proc. 30th IEEE Int. Conference on Software Analysis, Evolution, and Reengineering (SANER) Tool Track*, March 2023.

5. Vini Kanvar, Srikanth Tamilselvam, and Raghavan Komondoor. Handling Memory Pointers in Communication Between Microservices. In *Proc. IEEE Int. Conf. on Web Services (ICWS)*, pages 85-90, July 2022.

6. Geetam Chawla, Navneet Aman, Raghavan Komondoor, Ashish Bokil, and Nilesh Kharat. Verification of ORM-based Controllers by Summary Inference. To appear in *Proc. 44th International Conference on Software Engineering (ICSE)*, May 2022.

7. Stanly Samuel, Deepak D'Souza, and Raghavan Komondoor. GenSys: A Scalable Fixed-point Engine for Maximal Controller Synthesis over Infinite State Spaces. In *Demonstrations Track, Proc. the ACM Joint European Software Engineering Conference and Symposium on the Foundations of Software Engineering (ESEC/FSE)*, August 2021.

8. Snigdha Athaiya, Raghavan Komondoor, and K. Narayan Kumar. Data Flow Analysis of Asynchronous Systems using Infinite Abstract Domains. In *Proc. 30th European Symposium on Programming (ESOP)*, Apr. 2021.

9. Raveendra Kumar Medicherla, Raghavan Komondoor, and Abhik Roychoudhury. Fitness Guided Vulnerability Detection with Greybox Fuzzing. In *Proc. 13th Intl. Workshop on Search-Based Software Testing (SBST)*, Oct. 2020.

10. Himanshu Arora, Raghavan Komondoor, and G. Ramalingam. Checking Observational Purity of Procedures. In *Proc. Fundamental Approaches to Software Engineering (FASE)*, Apr. 2019.

11. Girish M. Rama, Raghavan Komondoor, and Himanshu Sharma. Refinement in object-sensitivity points-to analysis via slicing. In *Proc. ACM SIGPLAN Splash Conference (OOPSLA)*, Nov. 2018.

12. Girish M. Rama and Raghavan Komondoor. Detecting Full Initialization Points of Objects to Support Code Refactorings. In *Proc. 24th Asia-Pacific Software Engineering Conference (APSEC)*, Dec. 2017.

13. Snigdha Athaiya and Raghavan Komondoor. Testing and Analysis of Web Applications using Page Models. In *Proc. Int. Symp. on Software Testing and Analysis (ISSTA)*, July 2017.

14. Tejas Patil, Raghavan Komondoor, Deepak D'Souza, and Indrajit Bhattacharya. An Optimization Approach for Matching Textual Domain Models with Existing Code. In *Proc. 32nd Int. Conf. on Software Maintenance and Evolution (ICSME)*, October 2016.

15. R. K. Medicherla, R. Komondoor, and S. Narendran. Program Specialization and Verification using File Format Specifications. In *Proc. 31st IEEE Int. Conf. on Software Maintenance and Evolution (ICSME)*, September 2015.

16. R. K. Medicherla and R. Komondoor. Precision vs. Scalability: Context Sensitive Analysis with Prefix Approximation. In *Proc. 22nd IEEE Int. Conference on Software Analysis, Evolution, and Reengineering (SANER)*, March 2015.

17. G. M. Rama and R. Komondoor. A dynamic analysis to support object-sharing code refactorings. In *Proc. 29th IEEE/ACM Int. Conf. on Automated Software Engineering (ASE)*, September 2014.

18. K. Vasanta Lakshmi, A. Acharya, and R. Komondoor. Checking liveness properties of Presburger counter systems using reachability analysis. In *Proc. 19th Int. Symp. on Formal Methods (FM)*, May 2014.

19. R. Komondoor, I. Bhattacharya, D. D'Souza, and S. Kale. Using Relationships for Matching Textual Domain Models with Existing Code. In *Proc. Working Conf. on Reverse Engineering (WCRE)*, October 2013.

20. R. Komondoor. Precise slicing in imperative programs via term-rewriting and abstract interpretation. In *Proc. Static Analysis Symp. (SAS)*, June 2013.

21. R. Komondoor, V. K. Nandivada, S. Sinha, and J. Field. Identifying services from legacy batch applications. In *Proc. India Software Engg. Conf. (ISEC)*, 2012.

22. R. Komondoor, K. V. Lakshmi, D. P. Seetharam, and S. Balodia. Packet flow analysis in IP networks using data-flow analysis. In *Proc. India Software Engg. Conf. (ISEC)*, 2012.

23. R. Madhavan and R. Komondoor. Null dereference verification via over-approximated weakest pre-conditions analysis. In *Proc. ACM Symposium on Object Oriented Programming Systems, Languages, and Applications (OOPLSA)*, October 2011. *Acceptance rate:* 36%.

24. H. S. Gupta, D. D'Souza, R. Komondoor, and G. M. Rama. A case study in matching service descriptions to implementations in an existing system. In *Proc. 26th IEEE Intl. Conf. on Softw. Maintenance (ICSM)*, September 2010. *Acceptance rate:* 27%.

25. R. Komondoor, and G. Ramalingam. Recovering Data Models via Guarded Dependences. In *Proc. 14th Working Conf. on Reverse Engg. (WCRE)*, October 2007, pages 110–119. *Acceptance rate:* 31%.

26. S. Sinha, G. Ramalingam, and R. Komondoor. Parametric Process Model Inference. In *Proc. 14th Working Conf. on Reverse Engg. (WCRE)*, October 2007, pages 21–30. *Acceptance rate:* 31%.

27. G. Ramalingam, R. Komondoor, J. Field, and S. Sinha. Semantics-based Reverse Engineering of Object-Oriented Data Models. In *Proc. 28th International Conference on Software Engineering (ICSE)*, May 2006, pages 192–201. *Acceptance rate:* 9%.

28. R. Komondoor, G. Ramalingam, S. Chandra, and J. Field. Dependent Types for Program Understanding. To appear in *Proc. 11th International Conference on Tools and Algorithms for the Construction and Analysis of Systems (TACAS)*, Apr. 2005, pages 157–173. *Acceptance rate:* 24%.

29. R. Komondoor and S. Horwitz. Effective, Automatic Procedure Extraction. In *Proc. 11th International Workshop on Program Comprehension (IWPC)*, pages 33-43, May 2003.

30. R. Komondoor and S. Horwitz. Using Slicing to Identify Duplication in Source Code. In *Proc. Int. Symposium on Static Analysis (SAS)*, pages 40-56, July 2001. *Acceptance rate:* 34%.

31. R. Komondoor and S. Horwitz. Tool Demonstration: Finding duplicated code using program dependences. In *Proc. European Symp. on Programming (ESOP)*, April 2001.

32. R. Komondoor and S. Horwitz. Semantics-Preserving Procedure Extraction. In *Proc. ACM Symposium on Principles of Programming Languages (POPL)*, pages 155-169, Jan. 2000. *Acceptance rate:* 20%.

33. Y. Breitbart, R. Komondoor, R. Rastogi, S. Seshadri, and A. Silberschatz. Update Propagation Protocols for Replicated Databases. In *Proc. ACM SIGMOD International Conference on Management of Data*, pages 97-108, June 1999. *Acceptance rate:* 20%.

Refereed journal publications

1. A. Margoor, and R. Komondoor. Two techniques to improve the precision of a demand-driven null-dereference verification approach. In *Science of Computer Programming (SCP)*, 98:645-679, 2015.

2. S. Chandra, J. de Vries, J. Field, H. Hess, M. Kalidasan, K. V. Raghavan, F. Nieuwerth, G. Ramalingam, and J. Xue. Technical Forum Article: Using logical data models for understanding and transforming legacy business applications. IBM Systems Journal, 45(3):647–655, 2006.

Invited Talks and Tutorials

1. *Abstract interpretation – a framework for verifying correctness of programs.* Keynote address at symposium conducted by PMC College of Technology, March 2025.

2. *Abstract interpretation – a framework for verifying correctness of programs.* Workshop on Present and Future Computing Systems, Dept. of Computer Science and Automation, IISc, January 2024.

3. *Technology sourcing support available from R&D Institutions.* Faculty Development Program on Entrepreneurship, Sponsored by Dept. of Science and Technology, Govt. of India, organized by Mannar Thirumalai Naicker College, Madurai, March 2021.

4. *Analysis and synthesis of software systems for uncertain environments.* Second Workshop on Software Engineering for an Uncertain World, co-located with Innovations in Software Engineering Conference (ISEC), February 2020.

5. *Refinement in object-sensitivity points-to analysis via slicing.* Celebration of Automated Software Engineering (ASE), co-located with IEEE/ACM Int. Conf. on Automated Software Engineering (ASE), San Diego, USA, November 2019.

6. Keynote talk on abstract interpretation. 5th IEEE International Conference on Advances in Computing and Communication Engineering, at Bannari Amman Institute of Technology, April 2019.

7. *Abstract interpretation – a framework for program analysis and verification.* 6th Undergraduate Summer School, organized by Dept. of CSA, IISc, July 2018.

8. *Abstract interpretation – a framework for program analysis and verification.* Summer School on Theoretical Foundations of Computer Science, organized by IIIT Bangalore, June 2018.

9. *Static analysis to enable verification and transformation of data-intensive business applications.* Workshop on Formal Methods for Analysis of Business Systems (Formabs), Singapore, Sep. 2016.

10. *Null-dereference analysis using weakest pre-conditions.* Int. Conference on Computational Methods and Software Engineering, organized by College of Engineering, Guindy, Chennai, 2015.

11. *Null-dereference analysis using weakest pre-conditions.* Workshop on Research Issues in Computer Science and Engineering, organized by Ballari Institute of Technology and Management, Ballari, 2015.

12. *Introduction to abstract interpretation.* Continuing Education Programme, Defense Research and Development Organization (DRDO) – Center for Artificial Intelligence and Robotics (CAIR), Bangalore, 2014.

13. *Null-dereference analysis using weakest pre-conditions.* 7th National Workshop on Recent Trends in Software Testing (RTST 2014), organized by NIT Rourkela, 2014.

14. *Precise slicing using term-rewriting and abstract interpretation.* 32nd CREST Open Workshop, organized by University College London (UCL), 2014.

15. *Null-dereference analysis using weakest pre-conditions*, and *Precise slicing using term-rewriting and abstract interpretation.* Software Engineering Workshop, organized by NITK Surathkal, 2014.

16. *Introduction to conceptual modeling using Alloy.* Workshop on Industry Oriented Software Engineering, organized by Siddaganga Institute of Technology, Tumkur, sponsored by TEQIP – AICTE, 2013.

17. *A survey on program slicing techniques.* Formal Methods Update Meeting, organized by Formal Methods in India group at IIT Delhi, 2013.

18. *Introduction to program verification using SpecSharp.* Staff Development Program (SDP), sponsored by AICTE, organized by PSG College of Technology Coimbatore, in 2013.

19. *Null-dereference analysis using weakest pre-conditions.* Workshop on "Making Formal Verification Scalable and Usable", organized by Chennai Mathematical Institute, 2013.

20. *Introduction to program verification using SpecSharp.* PG Lecture Series, sponsored by Karnataka Science and Technology Academy (KSTA), held in SJCE College Mysore, 2012.

21. *Introduction to conceptual modeling using Alloy.* School on Software Engineering, co-located with 9th Int. Colloquium on Theoretical Aspects of Computing (ICTAC), Bangalore, 2012.

22. *Introduction to program verification using SpecSharp.* ISRO's Structured Training Program on Software Engineering, Trivandrum, 2012.

23. *Recovering logical data models from legacy systems.* TCS Ltd.'s internal conference TacTics, 2012.

24. *Introduction to program verification using SpecSharp*, and *Introduction to conceptual modeling using Alloy.* Vellore Institute of Technology (VIT)'s faculty development program, 2011.

25. *Recovering logical data models from legacy systems.* India Workshop on Reverse Engg. (IWRE), 2011.

26. *Bug detection using FindBugs.* International Symp. on Software Reliability and Engg. (ISSRE), Mysore, 2009.

27. *A survey of techniques for formal analysis of loops in programs.* IBM India Research Lab's annual technical event (I-CARE), 2009.

28. *Introduction to abstract interpretation.* The "Ramanajun Rediscovered" conf. on Mathematics and Information Technology, organized by IIIT Bangalore and Indian Mathematical Society, 2009.

Patents

1. S. Chandra, J. Field, R. Komondoor, G. Ramalingam, and S. Sinha. System and Method for a Logical-Model based Application Understanding and Transformation. *Granted* US Patent #7,509,298, 2006.

2. Y. Breitbart, R. Komondoor, R. Rastogi, S. Seshadri, and A. Silberschatz. Timestamp-based System and Method for Serializing Updates in a Distributed Database. *Granted* US Patent #6,502,095, 2002.

3. YJ Breitbart, R. Komondoor, R. Rastogi, S. Seshadri, A. Silberschatz. System and method for serializing lazy updates in a distributed database without requiring timestamps. *Granted* US Patent #6,381,609, 2002.