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Kartik Nagar

Experience

2020-Present **Assistant Professor**, *IIT Madras*, Chennai, India

2016-2019 **Postdoctoral Research Associate**, *Purdue University*, West Lafayette, USA
Mentor : Suresh Jagannathan

Education

2012-2016 **Ph.D**, *IISc*, Bangalore
- Thesis : Precise Analysis of Private and Shared caches for tight WCET Estimates.
- Advisor : Y.N. Srikant

2010-2012 **M.E**, *IISc*, Bangalore

2006-2010 **B.Tech.**, *DAIICT*, Gandhinagar

Research Interests

Formal Methods, Automated Verification, Program Analysis, Programming Languages, Concurrent and Distributed Systems, Real-time Systems.

Publications

1. **[JAR-25]** A Mechanically Verified Garbage Collector for OCaml.
   Sheera Shamsu, Dipesh Kafle, Dhruv Maroo, Kartik Nagar, Karthikeyan Bhargavan, KC Sivaramakrishnan.
   Accepted in Journal of Automated Reasoning (JAR).
2. **[OOPSLA-25]** Automatically Verifying Replication-aware Linearizability.
   Vimala Soundarapandian, Kartik Nagar, Aseem Rastogi and KC Sivaramakrishnan.
   Accepted in OOPSLA 2025.
3. **[OOPSLA-24]** Automated Robustness Verification of Concurrent Data Structure Libraries against Relaxed Memory Models.
   Kartik Nagar, Anmol Sahoo, Romit Roy Chowdhury and Suresh Jagannathan.
   PACMPL 8(OOPSLA2) 2024: 2578-2605.
4. **[FMCAD-23]** Automating Cutoff-based Verification of Distributed Protocols.
   Shreesha Bhat, Kartik Nagar.
   FMCAD 2023: 75-85.
5. **[PLDI-22]** Certified Mergeable Replicated Data Types.
   Vimala Soundarapandian, Adharsh Kamath, Kartik Nagar and KC Sivaramakrishnan.
   ACM SIGPLAN Conference on Programming Language Design and Implementation (PLDI), 2022: 332-347.

6. **[PLDI-21]** Repairing Serializability Bugs in Distributed Database Programs via Automated Schema Refactoring.
   Kia Rahmani, Kartik Nagar, Benjamin Delaware and Suresh Jagannathan.
   ACM SIGPLAN Conference on Programming Language Design and Implementation (PLDI), 2021: 32-47.
7. **[DISC-21]** Brief Announcement: Automating and Mechanising Cutoff Proofs for Parameterized Verification of Distributed Protocols.
   Shreesha Bhat, Kartik Nagar.
   DISC 2021: 48:1-48:4.
8. **[CAV-20]** Semantics, Specification and Bounded Verification of Concurrent Libraries in Replicated Systems.
   Kartik Nagar, Prasita Mukherjee and Suresh Jagannathan.
   International Conference on Computer-Aided Verification (CAV), 2020: 251-274.
9. **[OOPSLA-19]** CLOTHO: Directed Test Generation for Weakly Consistent Database Systems.
   Kia Rahmani, Kartik Nagar, Benjamin Delaware and Suresh Jagannathan.
   PACMPL 3(OOPSLA), 117:1-117:28, 2019.
10. **[CAV-19]** Automated Parametrized Verification of CRDTs.
    Kartik Nagar and Suresh Jagannathan.
    International Conference on Computer-Aided Verification (CAV), 2019: 459-477.
11. **[CONCUR-18]** Automated Detection of Serializability Violations under Weak Consistency.
    Kartik Nagar and Suresh Jagannathan.
    International Conference on Concurrency Theory, 2018, 41:1-41:18.
12. **[POPL-18]** Alone Together: Compositional Reasoning and Inference for Weak Isolation.
    Gowtham Kaki, Kartik Nagar, Mahsa Najafzadeh and Suresh Jagannathan.
    PACMPL 2(POPL), 2018, 27:1-27:34
13. **[TECS-17]** Refining Cache Behaviour Prediction using Cache Miss Paths.
    Kartik Nagar and Y.N. Srikant.
    ACM Transactions on Embedded Computing Systems 16(4), 103:1-103:26, 2017
14. **[TECS-16]** Fast and Precise Worst Case Interference Placement for Shared Cache Analysis.
    Kartik Nagar and Y.N. Srikant.
    ACM Transactions on Embedded Computing Systems 15(3), 45:1-45:26, 2016.
15. **[VMCAI-15]** Path-sensitive Cache Analysis using Cache Miss Paths.
    Kartik Nagar and Y.N. Srikant.
    International Conference on Verification, Model Checking, and Abstract Interpretation, 2015, 43-60.
16. **[RTAS-14]** Precise Shared Cache Analysis using Optimal Interference Placement.
    Kartik Nagar and Y.N. Srikant.
    IEEE Real Time and Embedded Technology and Applications Symposium, 2014, 125-124.
17. **[MEMOCODE-12]** Interdependent Cache Analyses for better precision and safety.
    Kartik Nagar and Y.N. Srikant.
    ACM/IEEE International Conference on Formal Methods and Models for Codesign, 2012, 99-108.

Current Students

- **Ph.D.:** Vimala S, Sheera Shamsu, Divya Rathore, Nitish Yadav
- **M.S.:** Divyanshu Upadhyay, Jay Rathi

Professional Activities

- Organizer of Workshop on Research Highlights in Programming Languages (RHPL), 2023, 2024
- Program Committee Member:
  - 2025: OOPSLA, PaPoC, ATVA
  - 2024: VSTTE, ISEC, VMIL
  - 2023: PaPoC
  - 2022: VSTTE, PaPoC

Funding

- Unified Vulnerability and Security Analysis Of Operating System and Web Based Applications (co-PI). INR 5.52 Crores, 2023-28.
- Cybersecurity Center CoE (co-PI). INR 5 Crores, 2023-26.

Selected Talks

- *Automated Robustness Verification of Concurrent Data Structure Libraries against Relaxed Memory Models*, OOPSLA 2024, Pasadena, USA, October 2024.
- *Certified Mergeable Replicated Data Types*
  - IARCS Verification Seminar Series, Online, June 2024
  - Cambium Seminar Series, INRIA, Online, June 2022.
  - Microsoft Research India, Online, May 2022.
- *Semantics, Specification and Bounded Verification of Concurrent Libraries in Replicated Systems*, International Conference on Computer-Aided Verification (CAV), 2020, Online, July 2020.
- *Automated Parametrized Verification of CRDTs*, International Conference on Computer-Aided Verification (CAV), 2019, New York, USA, July 2019.
- *Automated Detection of Serializability Violations under Weak Consistency.*, International Conference on Concurrency Theory (CONCUR) 2018, Beijing, China, September 2018.