Ankit Kumar

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Professional Summary

Experienced Applied Scientist with a background in finance and tech industries, having worked at Rivos, Amazon, Morgan Stanley and Olacabs. During my tenure as a software developer in India, I was highly interested in types and property based testing. Pursuing this passion, I earned a PhD in formal methods, equipping myself with tools and techniques required to ensure software reliability and correctness. I am now eager to leverage my academic expertise and industry experience to implement formal methods in practical applications, driving innovation and enhancing software quality in real-world projects.

Education

Northeastern University **Boston, MA, USA**
PhD in Computer Science *2018–2024*
Applied theorem proving, counter-example generation and the theory of refinement to analyze the Gossipsub P2P protocol. Also worked on automated feedback for homework submissions, proof checking and decision procedures for solving string equations.

Thesis: Refinement based reasoning of P2P protocols is feasible and useful

IIT Kanpur **Kanpur, UP, India**
M.Tech in Computer Science *2015–2017*

IIT (BHU) Varanasi **Varanasi, UP, India**
B.Tech in Electrical Engineering *2006-2010*

Professional Experience

Rivos Inc. **Portland, OR, USA**
Member of Technical Staff, Intern *Summer 2023*
Formalized and proved security properties about the page walk algorithm and certain chip components using the ACL2s theorem prover.

Amazon **Minneapolis, MN, USA**
Applied Scientist Intern *Summer 2022*
Proposed and demonstrated using taint-analysis for cloud level tracking of critical data across AWS resources.

Olacabs **Bengaluru, KA, India**
Software Development Engineer II *2012-2014*
Wrote the first version of the Olacabs android consumer app. Worked on performance enhancement of the Olacabs driver app which sends the location of cab to backend services. Worked on cashless payment and online wallet systems.

Morgan Stanley Advantage Services **Mumbai, MH, India**
Associate *2010-2012*

Planned and enabled the Third Party Derivatives trading platform at Morgan Stanley to be rolled out to new markets by making its code region aware, modular and pluggable.

Publications

Ankit Kumar, Max von Hippel, Panagiotis Manolios & Cristina Nita-Rotaru (2023): *Verification of GossipSub in ACL2s*. In: *Proceedings of the 18th International Workshop on the ACL2 Theorem Prover and Its Applications*, doi:10.4204/EPTCS.393.10. Available at `https://doi.org/10.4204/EPTCS.393.10`.

Ankit Kumar, Max von Hippel, Panagiotis Manolios & Cristina Nita-Rotaru (2024): *Formal Model-Driven Analysis of Resilience of GossipSub to Attacks from Misbehaving Peers*. In: *2024 IEEE Symposium on Security and Privacy (SP)*, doi:10.1109/SP54263.2024.00017. Available at `https://doi.ieeecomputersociety.org/10.1109/SP54263.2024.00017`.

Ankit Kumar & Panagiotis Manolios (2021): *Mathematical Programming Modulo Strings*. In: *2021 Formal Methods in Computer Aided Design (FMCAD)*, doi:10.34727/2021/isbn.978-3-85448-046-4. Available at `https://doi.org/10.34727/2021/isbn.978-3-85448-046-4_36`.

Ankit Kumar, Andrew Walter & Panagiotis Manolios (2023): *Automated Grading of Automata with ACL2s*. *Electronic Proceedings in Theoretical Computer Science*, doi:10.4204/eptcs.375.7. Available at `http://dx.doi.org/10.4204/EPTCS.375.7`.

Andrew T. Walter, Ankit Kumar & Panagiotis Manolios (2023): *Calculational Proofs in ACL2s*. *CoRR* abs/2307.12224, doi:10.48550/ARXIV.2307.12224. arXiv:2307.12224.

Andrew T. Walter, Ankit Kumar & Panagiotis Manolios (2023): *Proving Calculational Proofs Correct*. In: *Proceedings of the 18th International Workshop on the ACL2 Theorem Prover and Its Applications*, doi:10.4204/EPTCS.393.11. Available at `https://doi.org/10.4204/EPTCS.393.11`.

Computer Skills

C, C++, Java, Lisp, ACL2, ACL2s, Coq, Haskell, Emacs, Git, LaTeX

Awards and Honors

Fellowship: Dissertation Completion Fellowship during Summer 2024.

Invited Talk - Syracuse University 2024: Formal Model-Driven Analysis of Resilience of GossipSub to Attacks from Misbehaving Peers

Award: Best Student Paper Award for our paper "Verification of GossipSub in ACL2s" at ACL2 Workshop 2023.

Invited Talk - IPFS Camp at Lisbon, 2022: Formal Analysis of GossipSub : Property Driven Dev for Security

Fellowship: Student Travel Fellowship to attend PLMW at POPL 2019 conference.

Award: First Prize at Droidcon India - Bangalore 2013 Hackathon