Aalok Thakkar

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RESEARCH STATEMENT

My research focuses on integrating **formal methods** and **artificial intelligence**. In particular, I have worked on applying formal methods in the context of synthesis of declarative programs, synthesis of reactive programs, bounded model checking, and verification of smart contracts.

EMPLOYMENT

Ashoka University Sonipat, Haryana
Assistant Professor · Computer Science *August 2024 - Present*

· Leading a research project on program synthesis with hard and soft specifications in collaboration with IIT Delhi, exploring advanced methods in automated synthesis.

· Collaborative research with ISI Kolkata on compositional verification of Large Language Models (LLMs), focusing on ensuring model reliability and correctness.

Aptos Labs and Movement Labs Seattle, WA
Research Scientist · Programming Languages *Jul 2023 - May 2024*

· Designed specifications for 24 foundational Aptos Framework modules (with 106 functions), and verified them by through preconditions and post-conditions, aborts-if clauses, and loop invariants.

· Facilitated deployment throughout a range of projects across verification, compilation, and the VM groups.

· Lead programming language research on the Fractal interpreter that supports seamless deployment of Solidity smart contracts on Movement Lab's M1 and other Move-based chains.

· Implemented iterator loops in the Move Programming language; one of the most requested features in Move.

Amazon Web Services Boston, MA
Research Intern · Automated Reasoning Group (ARG) *Jun 2021 - Aug 2021*

· Implemented verification of loop contracts in C Bounded Model Checker (CBMC) by adding support for checking loop invariants, and assignment for loop history variables and ghost variables.

· The implementation was merged into the open-source project.

TEACHING

Trustworthy AI Ashoka University
Graduate · Elective *Jan 2025 - May 2025*

Introduction to Computer Science Ashoka University
Undergraduate · Core *Jan 2025 - May 2025*

Symbolic Logic and Applications Ashoka University
Undergraduate/Graduate · Elective *August 2024 - December 2024*

Programming in Rust Ashoka University
Undergraduate/Graduate · Elective *August 2024 - December 2024*

EDUCATION

University of Pennsylvania Philadelphia, PA
Doctor of Philosophy (PhD) in Computer and Information Science *Aug 2018 - May 2023*
Thesis: Example-guided Synthesis of Relational Queries

Chennai Mathematical Institute Chennai, India
Bachelor of Science (BSc with Honours) in Mathematics and Computer Science *Jun 2015 - Apr 2018*