Aaryan **Patel**

Madison, Wi

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Education

University of Wisconsin-Madison *Madison, WI*

Ph.D. in Computer Science *August 2023*

- Research Interests: Systems Verification

The Pennsylvania State University *University Park, PA*

B.S. in Computer Science, Minor in Economics *Aug 2019 - May 2023*

- Research Interests: Formal verification, differential privacy

Research

Verifying consensus algorithms for distributed systems using separation logic *Madison, WI*

Supervisor: Dr. Tej Chajed *January 2024 - Present*

- Used Grove, a separation logic library within Coq to verify consensus algorithms for distributed systems like Raft or Delos

charDP: Extending randomness alignment for approximate differential privacy *Remote, US*

Supervisor: Dr. Danfeng Zhang *April 2022 - Present*

- Extended the powerful proof technique for differential privacy - randomness alignment for approximate differential privacy
- Extended the language introduced in lightDP along with a novel type system for supporting approximate-DP
- Formally verified, using Dafny, the Gaussian mechanism - basic building block for approximate-DP
- Verified differentially private gradient descent - which is the basic building block for differentially private deep learning
- Proved the soundness of the type system (handwritten proofs)

Grammar constrained decoding for large language models *Madison, WI*

Supervisor: Dr. Loris D'Antoni *August 2023 - January 2024*

Teaching

University of Wisconsin-Madison *Madison, Wi*

Graduate Teaching Assistant *Aug. 2023 - Present*

- Comp Sci 240 - Discrete Mathematics
- Hold office hours, lead discussion sections

Penn State *University Park, PA*

Undergraduate Teaching Assistant *Aug. 2020 - Present*

- Helped students in understanding the material and graded homework, quizzes, and exams
- Acted as a teaching assistant for Data Structures and Algorithms (×1), Theory of Computation (×3), and Calculus 2 (×1)
- Held weekly/bi-weekly office hours to work with students

Honors & Awards

2023	**Finalist**, Student Research Competition at ACM Conference on Programming Language Design and Implementation (PLDI)'23	*Orlando, FL*
2023	**Recipient for travel grant**, Programming Language Mentoring Workshop at ACM Conference on Programming Language Design and Implementation (PLDI)'23	*Orlando, FL*
2021	**Schreyer Honor Scholar**, Computer Science and Engineering at Penn State University	*University Park, PA*
2021	**Member**, Institute of Electronic and Electrical Engineers Honor Society - Eta Kappa Nu	*University Park, PA*

Publication

2023	**Penn State Schreyer Honor College**, Formal verification of approximate differential privacy via the characteristic function

Industry

Black Knight FS.   *Remote, US*
SOFTWARE DEVELOPMENT INTERN   *May. 2022 - July 2022*
- Added new feature to toggle between light/dark mode on servicing platform, implemented using react and MUI
- Wrote Gherkin for service tests in accordance with business requirements as suggested by the product owner
- Implemented Gherkin using Java and integrated these tests with CI/CD pipeline
- Wrote Unit tests for REST API endpoints and browser stack tests for the feature
- Analyzed security bugs in the code and took action appropriately

Service

ACM Conference on Programming Language Design and Implementation'23   *Orlando, FL*
STUDENT VOLUNTEER   *June 2023*

IEEE-Eta Kappa Nu (HKN)   *University Park, PA*
PRESIDENT   *Oct. 2021 - Present*
- Decided the general direction of the professional honors society and led a group of six officers to accomplish professional and social goals of the club
- Worked with other student organizations, alumni, and corporate partners to host events
- Organized events to promote research within EECS and information sessions on graduate school

EECS Undergraduate Student Advisory Committee   *University Park, PA*
MEMBER   *October 2022- Present*
- Met with EECS administration a couple of times during the academic year to discuss student issues
- Worked with other student leaders to create a collaborative environment

Coursework

Graduate Programming languages, Program Verification and Synthesis, System Verification, Security and Privacy in Machine Learning, Advanced Algorithm, Advanced Operating Systems

Skills

Programming C, C++, Go, Python, Racket, JavaScript, Java
Verification Dafny, Coq, Iris, Lean, CPAChecker
Tools Git, AWS, Kuberneties, CLI, Docker, LaTeX
Languages English, Gujarati, Hindi, Spanish

Projects

Dynamic Memory Allocator   *University Park, PA*
                                                                               January 2022

- Implemented a dynamic memory allocator - Malloc using C Programming
- Achieved maximum throughput and improved utilization by 60% through a doubly circularly linked list

C File System   *University Park, PA*
                                                                               Jan. 2021 - May 2021

- Implemented File System on x86_64 bit architecture using C Programming
- Implemented read and write with cache functionality for an improved response time of 87%
- Modified the code to read and write the data over a server and implemented client side server in this project
- Ran unit tests on several workloads of varying complexities

Channel Synchronization Primitive   *University Park, PA*
                                                                               February 2022

- Implemented a synchronization primitive-Channel that transfers data between threads
- Used a linked list API for implementing a thread-safe transferring of data using POSIX semaphore library