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# Shaurya Gomber

## Education

2024–Present **Ph.D. in Computer Science**, *University of Illinois Urbana-Champaign*, USA
GPA: 4.0/4.0; *Advisor*: Prof. Gagandeep Singh

2022–2024 **M.S. in Computer Science**, *University of Illinois Urbana-Champaign*, USA
GPA: 4.0/4.0; *Advisor*: Prof. Gagandeep Singh

2016–2020 **B.Tech. in Computer Science**, *Indian Institute of Technology Guwahati*, India
GPA: 9.66/10.0 (Institute Rank 3)

## Research Interests

My current research focuses on building automated program analyzers based on abstract interpretation, with the goal of making them more effective and adaptable across diverse analysis scenarios by leveraging symbolic reasoning and learning-based techniques. More broadly, I am interested in automated reasoning, including tools such as SAT and SMT solvers, and the analysis and use of neuro-symbolic systems.

## Publications

### Drafts & Preprints

**Universal Synthesis of Differentiably Tunable Numerical Abstract Transformers**
Shaurya Gomber, Debangshu Banerjee, Gagandeep Singh
Arxiv

**Efficient Ranking Function-Based Termination Analysis with Bi-Directional Feedback**
Yasmin Sarita, Avaljot Singh, Shaurya Gomber, Mahesh Viswanathan, Gagandeep Singh
Arxiv

### Workshops & Posters

VerifAI ICLR'25 **Neural Abstract Interpretation**
SRC PLDI'24 Shaurya Gomber, Gagandeep Singh
Paper | Poster

### Thesis

MS CS UIUC **Neural Abstract Interpretation: Leveraging neural networks for automated, efficient and differentiable abstract interpretation**
Shaurya Gomber
🏆 David J. Kuck Outstanding MS Thesis Award
Thesis Link

## Awards & Fellowships

2024 **David J. Kuck Outstanding Master's Thesis Award, UIUC** Link
2024 **Richard T. Cheng Endowed Fellowship, UIUC** Link
2019 **Institute Merit Scholarship, IIT Guwahati** Link
2016 **KVPY Government of India Scholarship** Link

## Work Experience

Summer 2023 **Applied Scientist Intern**, *Automated Reasoning Group @ Amazon Web Services*, Santa Clara, CA, USA

- Worked on Zelkova, a tool for reasoning about AWS access policies via SMT-based verification.
- Used SMTO (SMT with Oracles) to design efficient SMT encodings for hard-to-model *type-casting semantics*, such as numeric comparisons over strings (e.g., allowing access if a string-valued attribute is less than 42).
- Our technique solved ∼30k previously-unsolved production queries, with average solving time of ∼1 minute per query.
- Contributed to *CVC5*'s SMTO solver by fixing bugs and improving the I/O interface for oracles.
- Tech Stack: Java, Scala, Python, SMT Solvers (Z3, CVC5, etc.)

2020-2022 **Senior Member of Technical Staff**, *D.E. Shaw & Co.*, Hyderabad, India

- Enhanced the firm's low-latency trading system (processing terabytes of data daily) with on-demand data computation features to optimize trader workflows.
- Reviewed major projects, contributed to design discussions for core trading system components, and mentored two new SDE-1s.
- Tech Stack: Java & C++ (backend), React (frontend), Git, Bash, Grafana, Numpy, Matplotlib.

Summer 2019 **Software Engineering Intern**, *D.E. Shaw & Co.*, Hyderabad, India

Implemented a *type-safe low-latency API* in Java to read and write on the firm's database, achieving a 60x run-time improvement in production-critical scripts, leading to a Pre-Placement Offer.

## Teaching Experience

Fall '23 Teaching Assistant, CS421 Programming Languages & Compilers, UIUC

Spring '23 Teaching Assistant, CS421 Programming Languages & Compilers, UIUC

Fall '22 Teaching Assistant, CS225 Data Structures & Algorithms, UIUC

## Talks

May 2025 **Multi-Network Relational Verification and Certifiable Training** Slides
CS584 Embedded System Verification, Spring 2025, UIUC

Apr 2024 **Neural Abstract Interpretation** Slides
Formal Methods Seminar, Spring 2024, UIUC

Nov 2023 **Verification and Certified Training of PINNs** Slides
CS598 Scientific Machine Learning, Fall 2023, UIUC

Nov 2023 **Satisfiability and Synthesis Modulo Oracles** Slides
Formal Methods Seminar, Fall 2023, UIUC

May 2023 **Neural Approximations of Abstract Transformers** Slides
CS477 Formal Software Development Methods, Spring 2023, UIUC

Mar 2023 **Synthesizing Abstract Transformers** Slides
Formal Methods Seminar, Spring 2023, UIUC

Nov 2022 **Monotonic Neural Networks** Slides
CS521 Trustworthy AI Systems, Fall 2022, UIUC

## Academic Service

Artifact Evaluation Committee PLDI '25, PLDI '24

## Mentorship

- **Mentored CSE freshers** under the Mentor-Mentee program of the SAATHI Counselling Club of IIT Guwahati.
- **Placement Lectures Coordinator, IITG:** Organized the lectures (content, schedule etc.) and taught Data Structures & Algorithms to the candidates appearing for placements.
- **Treasurer, CSEA (2019-20):** Served as the treasurer of the Computer Science and Engineering Association, IIT Guwahati, and was responsible for the fund management and allocation for the CSEA events.

## Selected Distinctions

- **Microsoft Code.Fun.Do 2019:** National finalist (top 10 out of 300+ teams); project on Blockchain-based Voting System.
- **Inter IIT Tech Meet 2018:** Represented IIT Guwahati in the coding hackathon event held at IIT Bombay.
- **ACM ICPC 2018:** Qualified for India regionals; represented IITG at Amritapuri, Kerala.
- **KVPY 2015:** AIR 178 among 1.5 million candidates (top 0.01%) in the national science aptitude exam by IISc Bangalore.
- **IIT JEE Advanced 2016:** AIR 902 among 1.5 million candidates (top 0.06%) in the final phase of India's engineering entrance exam.
- **IIT JEE Mains 2016:** AIR 2323 among 1.5 million candidates (top 0.15%) in India's engineering entrance prelims.