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# HARSH TIWARY

(201)-744-3091 | [htiwary2@illinois.edu](mailto:htiwary2@illinois.edu) | [github.com/notnotharsh](https://github.com/notnotharsh) | [linkedin.com/in/harsh-tiwary](https://linkedin.com/in/harsh-tiwary)

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## EDUCATION

### University of Illinois at Urbana-Champaign

*Bachelor of Science in Engineering Mechanics, minor in Computer Science*

*Aug 2021 – Dec 2024*

- **Relevant Coursework:** Algorithmic Programming (CS 491), Numerical Analysis (CS 450), Computational Mechanics (TAM 470), Partial Differential Equations (MATH 442), Algorithms & Methods of Computation (CS 374), System Programming (CS 341)

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## PROFESSIONAL EXPERIENCE

### Qualcomm

San Diego, CA

#### *Software Engineer Intern, Data Platforms*

*May 2024 – Aug 2024*

- Developed a data pipeline to process over one million records of company-wide information on processor services through AWS Glue, DynamoDB, and Amazon Redshift, as well as Apache Kafka for data input and Apache Airflow for workflow orchestration
- Engineered an internal wrapper for a Python module to facilitate asynchronous execution of callables, enabling parallel querying for a Flask-based internal search tool and using Locust for load testing, achieving 99.99% reliability
- Automated the AWS infrastructure deployment of all pipelines across the enterprise data platform by generating Terraform configurations and CI/CD pipelines to provision and populate S3 buckets, Redshift clusters, and DynamoDB stores

### Synchrony Financial

Champaign, IL

#### *Quantitative Developer Intern, Credit Modeling*

*May 2023 – May 2024*

- Engineered PySpark pipeline to merge tokenized account data for 130 million credit accounts with credit bureau variables to test and streamline clustering process via decision trees, reducing latency and driving development of the account level analytics system
- Automated a comprehensive comparison analysis between development and operations runs of a credit forecasting engine on Amazon EMR, creating Spark-based functionality to process over 20 million data points based on platform and product type

#### *Software Engineer Intern, Security DevOps*

*Jan 2022 – May 2023*

- Reduced cyber-restricted country detection process latency by 95% by pulling 10 million data points per day from Okta MFA/Zscaler and engineering response pipeline to detect and disable all affected company-wide assets
- Strengthened cyber defenses for 12.5% of total company-wide infrastructure by creating NTLM relay pentests on Kali Linux VMs, writing shell scripts, and using low-level Python and C++ functionality to MS-RPCs to authenticate with a domain controller
- Stabilized and enhanced data loss prevention infrastructure by identifying and addressing critical data parsing issues between security components, leading to automated detection of 2500+ annual data loss incidents
- Conducted comprehensive research on AWS-based cloud security attacks resulting from leaked root accounts, informing cloud strategies against defense evasion, lateral movement, and persistence to a team of 20+ threat detection engineers
- Eliminated false positives for credential sharing violations by modifying company-wide SIEM-based architecture and tuning ML-based expressions for unwanted behavior using Splunk's TensorFlow ML toolkit, saving \$18K annually in incident response

### University of Illinois Urbana-Champaign

Champaign, IL

#### *Undergraduate Researcher, Energy Transport Research Lab*

*Jan 2024 – Present*

- Programming a series of finite element simulations in C++ to solve the incompressible Navier-Stokes partial differential equations with heat conduction to optimize parameters of velocity, pressure, and geometry of a two-phase liquid cooling system
- Applying physics-informed neural networks to reconstruct mathematical models of bubbles from videos and examine effects of surface geometry on nucleation and bubble dynamics in cooling systems

#### *Undergraduate Research Assistant, Spectral Element Analysis Lab*

*Feb 2023 – Jan 2024*

- Developed and implemented rapid-convergence algorithms to solve Poisson and Laplace partial differential equations and measured conditioning of solutions on deformed mesh domains in MATLAB, resulting in improved numerical stability and accuracy
- Extended planar Navier-Stokes solutions to three dimensions through comprehensive analysis of recent fluid dynamics papers and integrated the solution into a Fortran-based high-performance spectral element solver

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## LEADERSHIP AND INVOLVEMENT

### Association for Quantitative Trading Education

Champaign, IL

#### *President*

*Aug 2021 – May 2024*

- Spearheaded and led projects to prototype complex trading strategies in Python, leveraging advanced techniques such as FFTs, hidden Markov models, and recurrent neural networks to analyze microsecond-level tick data from a high-frequency stock exchange
- Implemented above trading strategies in C++ using industry-grade backtesting software to maximize throughput, leading cross-functional teams of 15+ engineers and researchers to execute rigorous testing of trading algorithms

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## SKILLS

- **Programming Languages:** C++, Python, Java, SQL, MATLAB, Fortran, JavaScript, Shell Scripting, PHP, Dart, R, IDL
- **Frameworks and Applications:** NumPy, SciPy, pandas, PySpark, AWS, Terraform, Splunk, Linux, Node.js, Express, Agile

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## HONORS

- Top 650 Participant in MAA Putnam Competition
- Four-time AIME Qualifier (2018-2021)

*Dec 2021*

*Mar 2021*