

CURRICULUM VITAE  
**Tarun Kumar Allamsetty**

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## EDUCATION

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**M.S. in Electrical and Computer Engineering (Quantum Computing Track)** *Aug 2025 – Present*  
Duke University

**B.Tech in Electronics and Telecommunication Engineering** *Aug 2018 – May 2022*  
College of Engineering Pune, Technological University

## RESEARCH INTEREST

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Interested in the experimental realization of quantum computers, with a focus on how qubits are physically built, controlled, and stabilized. My goal is to contribute to lab-based hardware research, particularly the design, operation, and calibration of quantum devices that advance scalability and reliability.

## PROJECTS

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### Open source contributions

#### *PennyLane*

- **Enhanced** the unit testing suite for a library with **200+ contributors** by refactoring operator-equality method to return detailed mismatch explanations. This improved **developer experience** by replacing simple boolean outputs with actionable debugging context ([PR #5780](#)).
- **Implemented** the `QutritChannel` operation ([PR #5793](#)), extending the noise-modelling framework from qubits to qutrits. The feature is fully documented and part of the public API ([docs](#)).
- **Optimized** internal sampling logic in `shots.bins()` ([PR #5476](#)), achieving a **50% performance increase** in shot-sampling efficiency.
- **Extended** the measurement framework by implementing `process.counts` ([PR #5256](#), [PR #5395](#)), enabling PennyLane to ingest count-dictionary data directly from external quantum devices.

#### *Amazon Braket Python SDK*

- **Resolved** a naming conflict by enforcing validation against OpenQASM-reserved identifiers, eliminating runtime errors and ensuring reliable execution of parameterized circuits ([Issue #603](#), [PR #999](#)).

#### *Qiskit*

- Contributed to fixing [Issue #12106](#), addressing `synth_cnot_count_full_pmh` for synthesizing linear reversible circuits.

#### *Qbraid-Qir*

- Identified that qbraid-qir generated QIR using a custom profile rather than the expected Base Profile; raised a GitHub issue [#215](#) to highlight the missing support, which later implemented by the community.

## Quantum Tic Tac Toe

- Developed Quantum Tic Tac Toe, an educational game integrating quantum mechanics concepts like superposition, entanglement, and measurement into classic tictactoe gameplay to enhance understanding of quantum principles
- Deployed the game on a [website](#) for easy access and containerized it with Docker, enabling players to run it locally on their machines.
- [Link](#) to source code.

## PROFESSIONAL EXPERIENCE

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### ION Group

*Jun 2022 – Jun 2025*

#### *Foundation*

- Optimized file reading in a data load process after analyzing performance issues using flame graphs, reducing load time from 21 minutes to 7.5 seconds.
- Designed and implemented support for Excel-based import/export in Foundation applications, enabling clients to manage complex nested entities through a tabular format with upsert functionality.
- Developed a wrapper tool for Ion-Foundation to convert Excel-based entity definitions into Java meta-models, allowing non-technical users to auto-generate fully functional CRUD applications without writing code.

#### *iCM-Limits - Core Maintainer*

- Developed core components of a new in-memory calculation engine for computing availability (Limit + Utilization), consumed by FNMA to auto-generate DLOD reports.
- Contributed to implementation of real-time APIs that validate incoming transactions and flag potential limit breaches before persisting to the system.
- Designed and optimized initialization of calculation matrices, eliminating redundant structures to improve memory efficiency and reduce computation time.
- Built rule-based filter matching logic to classify and aggregate transactions per account and date, enabling flexible and extensible business configurations.
- Implemented rule-based timezone assignment for accounts, supporting attribute-based matching with implicit priority resolution.
- Integrated cross-currency calculations by interfacing with FX conversion components and applying approximation policies to ensure accurate limit evaluations.
- Integrated diagnostics into the calculation engine to explain calculation failures (e.g., missing opening balances), improving debuggability for support teams.
- Optimized Java `HashMap` usage in critical calculation paths, reducing iteration latency from 6µs to 300ns per cycle.
- Implemented logging assertions in the testing infrastructure to detect silent exceptions and validate expected log outputs during end-to-end flows.
- Achieved 92% code coverage with 1000+ Cucumber test cases; FNMA reported zero bugs post-production, demonstrating delivery quality and system reliability.
- Contributed to a shared code review framework adopted by all developers, reducing dependency on architects and improving code consistency.

#### *iCM-RefData – Core Maintainer*

- Architected a reusable approval workflow adopted by 5 teams, enabling faster development and consistent business logic implementation.
- Refactored Angular front-end, eliminating 2000+ lines of duplicate code and standardizing UI components for better maintainability.
- Implemented audit history tracking with Hibernate Envers, allowing users to view change logs directly in the UI.
- Developed a Cucumber-based integration testing framework, reducing manual testing efforts during upgrades and accelerating release cycles.
- Reviewed code across a shared codebase used by 5 teams, ensuring code quality and enforcing best practices.
- Collaborated with platform teams to propose enhancements to the Ion-Foundation framework and led multiple upgrade rollouts.

- **Engineered** Python tools to parse XML security policy data across **hundreds of configurations**, generating detailed Excel reports that accelerated the identification of inconsistent attributes and improved policy-alignment accuracy.
- **Designed** a proof-of-concept Flask web interface for Artemis, creating a central submission system for Indicators of Compromise (IOCs). The architecture stored IOC metadata as JSON for queued processing and implemented foundational HTTP authentication for system security and scalability.

- Designed the event's website section as part of the web development team.
- Collaborated on an Android app that achieved over 1,000 downloads within a week.

## TEACHING AND MENTORSHIP EXPERIENCE

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- Conducted onboarding sessions for new undergraduate hires for 3 consecutive years, delivering talks on **SOLID principles** and **Clean Code**.
- Mentored new team members in iCM.Limits teams by explaining the architecture of the **iCM.Limits** product and pairing with them on initial tasks; all became independent within 3 sprints.

- Delivered a technical session explaining the **EfficientNet** paper, covering hyperparameter tuning in CNNs to help juniors understand modern research in deep learning.

## WORKSHOP, SCHOOLS AND CERTIFICATIONS

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- Earned an Advance badge in the IBM Quantum Explorer program. ([Certificate link](#))
- Finished among the top 100 in coding challenges at QHack 2024. ([Certificate link](#))
- Successfully completed four bounties under the UnitaryHack. ([Link to contributions](#))
- Completed IBM Quantum Challenge 2024. ([Link to badge](#))
- Attended the Qiskit Global Summer School 2024. ([Certificate link](#))

## SCHOLARSHIPS

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- Awarded \$3,386 per semester for all three full-time semesters at Duke.