

CURRICULUM VITAE
Tarun Kumar Allamsetty

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EDUCATION

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

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

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

ION Group

Foundation

Jun 2022 – Jun 2025

- 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.

Securonix
Security Software Engineer Intern

May 2021 – Aug 2021

- **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.

MindSpark'19, COEP
Web Developer

May 2019 – Oct 2019

- 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

ION Group

- 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.

DSAI Club, COEP

- 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

- 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

Duke ECE merit award

Aug 2025 – Dec 2026

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