

# Sai Anurudh Reddy Peduri

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## Education

### Ruhr University Bochum

Bochum, Germany

DOCTOR OF PHILOSOPHY (PHD) IN COMPUTER SCIENCE (ONGOING, EXPECTED JAN 2026)

Aug 2022 - Present

Supervised by Prof. Dr. Michael Walter and Prof. Dr. Gilles Barthe

**Working Title:** Programming Languages and Formal Methods for Quantum Computing

**Research Interests:** Quantum {Algorithms, Formal Verification and Logic, Programming Languages and Compilers}.

### International Institute of Information Technology, Hyderabad (IIIT-H)

Hyderabad, India

MASTER OF SCIENCE (MS) BY RESEARCH IN COMPUTER SCIENCE

Aug 2019 - Apr 2022

Supervised by Dr. Kannan Srinathan and Prof. Tobias Grosser (UoE)

**CGPA: 9.75/10**

**Thesis:** SSA-based Compilation and Optimization of Hybrid Quantum-Classical Programs

### International Institute of Information Technology Hyderabad (IIIT-H)

Hyderabad, India

BACHELORS IN TECHNOLOGY (WITH HONORS) IN COMPUTER SCIENCE AND ENGINEERING (B.TECH IN CSE)

Aug 2015 - July 2019

**CGPA - 8.09/10** (In-major - 8.66/10)

**Relevant Courses :** Advanced Algorithms, Compilers, Complexity Theory, Graph Theory, Linear Algebra, Principles of Programming Languages, Quantum Information and Computation

## Publications and Manuscripts

### TRAQ: Estimating Quantum Cost of Classical Programs

2025

Anurudh Peduri, Gilles Barthe, and Michael Walter. Pre-print. [\[github\]](#)

### Expressing and Analyzing Quantum Algorithms with Qualtran

PLanQC 2025

M.P. Harrigan, T. Khattar, C. Yuan, A. Peduri, N. Yosri, F.D. Malone, R. Babbush, N.C. Rubin. Poster at PLanQC 2025. [\[arXiv\]](#) [\[github\]](#)

### QbC: Quantum Correctness by Construction

OOPSLA 2025

Anurudh Peduri, Ina Schaefer, and Michael Walter. Accepted at OOPSLA 2025. Talk at PLanQC 2024. [\[doi\]](#)

### Quantum Regularized Least Squares

Quantum 2023

Shantanav Chakraborty, Aditya Morolia, and Anurudh Peduri. Accepted in Quantum Journal. Poster at QIP 2023. [\[doi\]](#)

### QSSA: An SSA-based IR for Quantum Computing

CC 2022

Anurudh Peduri, Siddharth Bhat, and Tobias Grosser. Accepted at ACM SIGPLAN 2022 International Conference on Compiler Construction. [\[doi\]](#) [\[github\]](#)

## Projects

### traq

Dec 2024 - Present

A Haskell framework for estimating input-dependent quantum cost of classical programs, and evaluating and compiling high-level programs. [\[github\]](#)

### QUALTRAN

Dec 2023 - Present

Contributor. Implemented Generalized Quantum Signal Processing [arxiv:2308.01501], and Quartic speedups for planted inference [arxiv:2406.19378]. [\[github\]](#)

### Qubrabench

Mar 2023 - Jun 2024

A python library to benchmark query complexities of classical algorithms utilizing quantum subroutines. [\[github\]](#)

### QMLIR

Aug 2020 - Mar 2021

An SSA-based quantum intermediate representation. Contains dialects for quantum circuits and ZX calculus, along with analysis and optimization passes. [\[github\]](#).

## Skills

**Programming Languages** C/C++, Python, Haskell, Rust.

**Quantum Frameworks** Cirq, Qualtran, Quipper, Q#.

**Compiler Frameworks** LLVM, MLIR.

**Theorem Provers** Rocq (formerly Coq), Lean.

# Experience

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## Student Researcher, Google Quantum AI, Los Angeles

Jun - Aug 2024

- Contributed to the Qualtran library for analysing fault tolerant quantum algorithms. [\[arxiv\]](#) [\[github\]](#)
- Implemented the paper [Quartic speedups for planted inference](#) in Qualtran.

## Reviewer

2022 - Present

- Reviewed research papers for OOPSLA 2025, STOC 2025, QIP 2024, ICALP 2023, IFM 2023, QIP 2023.

## Thesis Supervisor, Ruhr University Bochum

2023-2025

- Co-supervised Master Thesis on *Variable Time Quantum Algorithms* by Amalia Boettger, RUB 2023.
- Co-supervised Bachelor Thesis on *Type Systems for Amortized Resource Analysis* by Luca Witt, RUB 2023.
- Co-supervised Bachelor Thesis on *Adversary Method in Quantum Query Complexity* by Erwin Tang, RUB 2024.
- Co-supervised Bachelor Thesis on *Rust Programming Language* by Glenn Hannig, RUB 2025.

## Teaching Assistant, Ruhr University Bochum

Oct 2022 - Present

- Teaching Assistant: *Quantum Information and Computation* (Winter '22/23, Winter '23/24, Winter '25/26), *Modern Programming Languages* (Winter '22/23, Winter '24/25).
- The role involves conducting tutorials and labs for undergraduate and graduate students. Also involved in setting and evaluating assignments and exams.
- TA for *Quantum Quest 2023* - a web-course for high-school students to learn about quantum computing.

## Research Assistant, IIIT-H

July 2021 - July 2022

- Worked on Quantum Algorithms Research, supervised by Dr. Shantanav Chakraborty.
- Efficient Quantum Algorithms for Linear Regression problems and Analysis of mixing times of Quantum Walks.

## Research Intern, University of Edinburgh

June 2020 - June 2021

- At the Compilers and Runtime Systems Lab at UoE, supervised by Prof. Tobias Grosser.
- Worked on compilation techniques for hybrid quantum-classical programs for master's thesis. [\[arxiv\]](#) [\[github\]](#)

## Teaching Assistant, IIIT-H

Aug 2017 - Dec 2019

- Teaching Assistant for *Discrete Mathematics* (Monsoon 2017), *Data Structures* (Spring 2018), *Linear Algebra* (Monsoon 2018), *Principles of Information Security* (Spring 2019), *Algorithms* (Monsoon 2019)
- The role involves conducting tutorials and labs for undergraduate students. Was also involved in setting and evaluating assignments and exams.

## Club Coordinator, IIIT-H

Monsoon 2016 - Spring 2020

- Programming Club: Organized programming contests. Gave talks on topics such as Graph Theory, Computational Geometry, Flows and Fourier Analysis.
- Theory Reading Group (Co-founder): Hosted a reading group for Quantum Field Theory, and one for Quantum Computing. Gave talks on Quantum Algorithms and Complexity Theory. We had weekly meets to discuss the topics.
- Chess Club: Hosted online and on-the-board intra-college tournaments.

## Competitive Programming

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- Co-organized WINOI - an initiative in 2020-2021 to get more school girls interested in programming, and preparing them for the Informatics Olympiad. Conducted lectures and discussion sessions.
- Problem tester for the [Indian IOITC 2021 Team Selection Test](#). The IOITC selects the team representing India at the International Olympiad for Informatics.
- Helped in problem setting and testing for [CodeCraft '18](#). Tasks involved writing and verifying solutions, generating strong test-data, and overseeing the contest (answering clarifications etc.). CodeCraft is IIIT-H's annual algorithmic programming competition.

# Achievements

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## International Collegiate Programming Contest (ICPC)

2017 - 2021

- ICPC 2020: Member of team [tesla\\_protocol](#) which placed **46th** at the 44th Annual ICPC World Finals, held at Moscow, Russia. Qualified for the finals by placing **7th** at the Asia West Continent Finals. Also placed **6th** in the Asia Amritapuri Onsite Round and **4th** in the Asia Kanpur Onsite Round
- ICPC 2019: Member of team [tesla\\_protocol](#) which placed **3rd** in the Asia Gwalior-Pune Onsite Round and **5th** in the Asia Amritapuri Onsite Round.
- ICPC 2018: Member of team Tesla which placed **3rd** in the Asia Kharagpur Onsite Round and **4th** in the Asia Amritapuri Onsite Round.
- ICPC 2017: Member of team [tesla\\_protocol](#) which placed **8th** in the Asia-Amritapuri Onsite Round.
- The ICPC (previously ACM ICPC) is the most prestigious programming competition at the college level.

## Microsoft Q# Coding Contest

Summer 2018

- Placed **18th** out of **400** participants in the [Microsoft Q# Coding Contest](#), held on Codeforces. It featured problems on quantum algorithms and protocols.

## Codeforces

2015 - Present

- Handle: [codelegend](#). Peak rating: **2475** (Title: Grandmaster). **Top 5 in India** out of 17000+ users, and Top 400 in the world out of 70000+ users.
- Codeforces is a platform that regularly hosts algorithmic programming contests. Rating is based on performance in these contests.

## IOI Training Camp

2013, 2015

- Selected for the [International Olympiad in Informatics Training Camp 2015 \(IOITC-2015\)](#), held in Bangalore, India. 30 out of 1000+ students were selected.
- Selected for the [International Olympiad in Informatics Training Camp 2013 \(IOITC-2013\)](#), held in Bangalore, India. 22 out of 5000+ students were selected.
- The IOI is the most prestigious programming competition at the school level. The IOITC is a 10 day training camp on programming and algorithms.