# Syed Hudaifah

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LinkedIn — GitHub

## Education

**Indian Institute of Technology (IIT), Hyderabad**

*Master of Technology (M.Tech) in Quantum and Solid-State Devices* [Expected: June 2025]

- GPA: 8.56

- Relevant Coursework: Quantum Computing, Information Theory, Machine Learning, Convex Optimization, Many-Body Physics , Quantum cryptography, Quantum measurement and Sensing

**Kerala Technological University**

*Bachelor of Technology in Metallurgy and Material Science* [Graduated: 2022]

- GPA: 8.19

- Relevant Coursework: Solid State Devices, Optics, Thermodynamics , Spin Systems , Super-Conductivity

## Experience

**Teaching Assistant (High-Performance Computing Simulation)**

*IIT Hyderabad* [2024]

- Simulated quantum circuits using MPS and PEPS on tensor networks across 100+ nodes. - Optimized matrix operations with QSP and QSVT in large-scale simulations.

- Leveraged MPI for distributed computing, boosting simulation speeds and efficiency.

**Quantum Computing Intern**

*Creed and Bear, Abu Dhabi* [2024]

- Performed Quantum Distributing computing on several nodes and used flask API and Quantum Circuit simulations.

- Improved circuit optimization and distributed using hypergraph plane.

**SEM Intern**

*Carl Zeiss* [Summer 2022]

- Performed detailed SEM analysis to enhance material surface characterization.

- Improved analytical resolution and speed by optimizing SEM settings.

## Technical Skills

- **Quantum Computing**: Qiskit, PennyLane, Cirq, Tensorflow-quantum

- **Quantum Algorithms**: QAOA, Quantum Walks, Quantum Adiabatic Algorithm, Quantum Algorithms for Linear Systems, PCA, Quantum Linear Algebra (QSP, QSVT), Shor's, Grover's Search

- **High-Performance Computing**: MPI, Tensor Networks (MPS, PEPS), Distributed Computing

- **Computer Science**: Python, C++, MATLAB, Data Structures and Algorithms, NLP, JULIA

- **Machine Learning**: TensorFlow, PyTorch, Scikit-learn, ML for Signal Processing, Quantum ML models, Hugging face

- **Electronics Engineering**: Circuit Design, Embedded Systems, Microelectronics and Microsystems, PCB Design (AutoCAD), Fabrication of Devices.

- **Material Science**: OOMMF, SEM Analysis, Finite Element Analysis (FEA), OriginPro

- **Tools & Platforms**: Git, Linux, Jupyter Notebooks, MATLAB Simulink

## Research Projects

### Dimension Witness for Quantum Systems - (Abstract Accepted)

*Master's Research, IIT Hyderabad* [2024]

- Investigated quantum dimension witnesses to develop algorithms for self-testing and quantum state analysis, utilizing the **NPA hierarchy** and **See-saw method**.
- Applied **convex optimization** techniques to identify quantum correlations and validate dimension witness frameworks in various quantum states.
- Focused on efficient computation strategies to support fault-tolerant quantum systems and advance robustness in quantum measurement.

### AI-Powered Medical Chatbot

*Hackathon Project* [2024]

-Developed an AI-driven medical chatbot to assist users with preliminary health queries, symptom analysis, and guidance on seeking medical attention.
-Integrated natural language processing (NLP) for conversational flow, leveraging a robust medical knowledge base to ensure accurate and reliable responses. Implemented features for user-friendly interaction, personalized recommendations, and secure handling of sensitive health data.

### Quantum Machine Learning Optimizer

*Independent Research* [2024]

- Developed a quantum machine learning optimizer using **Cirq** and **TensorFlow Quantum**, focusing on quantum algorithms for linear systems and classification tasks.
- Integrated **quantum optimization algorithms** such as QAOA and quantum walks, achieving enhanced performance and computational efficiency.

### Piezoelectric Materials for Self-Sustaining Workplaces- (Funded Project)

*Sponsored Project, Kerala Technological University (I2U Program)* [2022]

- Designed and tested piezoelectric systems for energy harvesting in workplace settings. - Conducted FEA modeling for performance analysis and experimental validation of energy conversion efficiency.

## Achievements

- National Math Olympiad Qualifier

- Gold Medalist in Abacus

- Winner of International Model United Nations (MUN)

- Judge for National-Level Debate Competitions

## Leadership & Extracurricular Activities

### Head of Debate Team

*IIT Hyderabad* [2024]

- Led the team, fostering skills in public speaking and strategic thinking through regular workshops.

### Placement Coordinator

*IIT Hyderabad* [2024]

- Managed communication between students and recruiting companies, ensuring smooth placement processes.