

Shivaprasad Umesh Hulyal

Curriculum Vitae

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"When you change the way you look at things, the things you look at change." - Max Planck

Education

- 2019–2023 **Bachelor of Technology (B.Tech)**, Indian Institute of Technology (IIT) Madras, Chennai.
CGPA : 9.25/10.00, Engineering Physics
- 2017–2019 **Higher Secondary School Certificate**, Army Public School, Bangalore.
96.2 % , Class XII, Central Board of Secondary Education
- 2015–2017 **Secondary School Certificate**, The Hindu Senior Secondary School, Chennai.
CGPA : 10/10, Class X, Central Board of Secondary Education

Professional Experience

- August 2022–Present **Dual unitary gates and quantum circuits** *Prof. Arul Lakshminarayan,*
Physics Department, IIT Madras.
I am working on theoretical Quantum Information and Computing for my year long B.Tech Thesis. I use Unitary-Brick Wall diagrams to understand the dynamics and space-time duality in these circuits .
- July 2022 - September 2022 **High frequency superconducting qubits design** *Prof. Rainer Dumke,*
Centre for Quantum Technologies, Nanyang Technological University (NTU), Singapore, Online.
Worked on understanding the design limitations of high-frequency superconducting qubits. Studied challenges of TLS defects in transmon qubits. simulate different qubit designs on Ansys and Qiskit Metal to obtain more resilient cavity designs.
- May 2022 - July 2022 **Ultrafast electro-optical signal processing in quantum communication** *Prof. Roberto Morandotti,*
Institut national de la recherche scientifique (INRS), Montreal, Canada, In-person.
Worked on improving the efficiency of fiber to chip coupling using edge coupling. Performed classical and quantum measurements to determine the chip performance metrics such as losses and temporal features. The internship program was supported by MITACS.
- September 2021 - May 2022 **Simulating black holes using matrix models on quantum computer** *Prof. Ayan Mukhopadhyay,*
Physics Department, IIT Madras.
A year-long programme with paid monthly honorarium, provided research guidance by IITM faculty and participating in interactive lecture series on research skills. In this project, a matrix model was built to simulate the black hole on a quantum computer and measure the outgoing Hawking radiation. I simulated and studied how a typical black hole microstate behaves in real time.
- May 2021 – October 2021 **Quantum Error Correction using Cellular Automaton Decoders** *Prof. Pradeep Kiran Sarvepalli,*
Electrical Engineering Department, IIT Madras.
Analysed the topological Cellular Automaton Decoders using only local update rules and its application in Quantum Error Correcting Codes. I simulated for different architectures and designs in the stabilizer formalism on the Toric Code and applied sweep rules to get a high threshold rates.
- Dec 2020 – March 2021 **Programming of Quadrupole mass analyzer** *Prof. G Aravind,*
Physics Department, IIT Madras.
Worked under Prof. G Aravind to program Quadrupole Mass Spectrometer (QMS) for analysing Interstellar Medium Ions using Iontrap. Designed the LabVIEW interface for measurements and correlation parameters and understood the various interconnections between the hardware FPGA's and software in a team of four.

Patents

- Enhanced Linear Induction Motor (LIM) with a modified end-teeth design
Nikhil Yelamarthy, Parth Shah, Shivaprasad Hulyal, Kishan Thakkar, Dr. Satyanaryanan Chakravarthy
(Patent Application No: 202241024672, Filed 27th April 2022)

Presentations

- Shivaprasad Hulyal, Vishnu Jejjala , Tanay Kibe, Ayan Mukhopadhyay and Rishi Raj. Simulating quantum black holes with matrices. Poster presented at: Young Research Fellows Event; August 2022; Chennai [poster]

Scholastic Achievements

- Awarded the prestigious IITM **Young Research Fellowship** 2021 to work on a research project under the research guidance of a IITM Faculty in Physics Dept. throughout the year.
- Runner Up: The 2021 **Tayur Prize**. Demonstrated and solved the Quadratic Knapsack Problem (QKP) using Graver Augmented Multiseed algorithm (GAMA) and Quantum Annealing. Showed that it can match the commercially best solvers in accuracy, and importantly, without the rapid increase in time as the density of graph increases. [\[report\]](#)
- Nominated for **KVPY** Fellowship 2018, by Department of Science and Technology, Government of India. **(All India Rank 447)** Top 0.2% among 150 thousand applicants.
- JEE Advanced 2019 **All India Rank: 2360**
It is one of the most selective engineering entrance exams in the world, with an acceptance rate of less than 1% into the prestigious Indian Institute of Technology (IITs)
- Awarded CBSE Merit Certificate for being among top **0.1%** successful candidates in CBSE Higher Secondary Physics Board Exam.
- **National Talent Search Examination** - Successfully cleared **NTSE** stage – I in 2017 organized by Government of India. In top 500 students in the state of Tamil Nadu.

Skills

- **Programming Languages:** Python, C++
- **Softwares:** COMSOL Multiphysics, Ansys, LabVIEW, Mathematica, MATLAB, Verilog, Spice, Qiskit
- **Documentation:** \LaTeX
- Certified **Machine Learning** and **Deep Learning Scientist** from Stanford University Online by Prof. Andrew Ng. Certificate can be found [here](#).
- **Languages known:** English, Hindi, Sanskrit, Tamil, Kannada, Telugu, German (Level A1)

Relevant Course Work

- Quantum Photonics Devices & Technology
- Computational Physics
- Quantum Computation & Quantum Information
- Quantum Mechanics
- Digital Signal Processing
- Experimental techniques for quantum computation & metrology
- Electromagnetics & Applications
- Quantum Integer Programming
- Statistical Physics & Applications
- Classical Dynamics
- Analog Systems & Lab
- Superconductivity & Applications

Co-Curricular Activities

- June 2021 – Present **Science Communicator** *Physics Department, IIT Madras.*
Organize weekly hour-long sessions to discuss & explain recent and intriguing scientific research results such as those of Nobel Prize winners to students so as to encourage students to take up reading research papers and brainstorm new ideas from them.
- Oct 2020 – July 2021 **Centre for Innovation, IIT Madras** *Team Avishkar Hyperloop,*
Project Member of Propulsion System.
Designed and conducted time-dependent simulations using COMSOL Multiphysics for the Linear Induction Motor by which the Hyperloop is powered for [European Hyperloop Week](#) competition 2021. We won the most scalable Hyperloop Design Award and were among the top 5 nominees for various subsystem designs among 20 other international teams. My subsystem won the the best propulsion system award among all the international teams. We were [featured](#) in many newspapers and journals across India.

Extracurricular Activities

- 2019-2023 **National Cultural Association** *IIT Madras.*
Learnt Music and Electronic Keyboard
- 2014-2016 **Painting and Pencil Shading.**
Learnt different styles of pencil shading and sketching.
- 2011-2013 **Trinity College of London** *Electronic Keyboard.*
Awarded Grade 1 Examination in Music Performance.