



## EDUCATION

Year	Degree/Exam	Institute	CGPA/Marks
2026	M.TECH Dual Degree 5Y	IIT Kharagpur	9.15 / 10
2021	Higher Secondary Examination (MH-HSC)	Alpha Junior College of Science and Commerce, Mumbai	88.67%
2019	Indian Certificate of Secondary Education (ICSE)	Lakshadham High School, Mumbai	97.7%

## INTERNSHIPS

## Fiber Optics, Nano &amp; Quantum Photonics Group (FONQP)

Jul 2022 - Present

Advanced Photonics Laboratory, Indian Institute of Technology Kharagpur

Advisor: Dr. Shailendra K. Varshney

- Constructed **physics informed neural networks** for inverse designing of metamaterials and resonator graphs with **400x speedup** over adjoint optim.
- Devised **online randomness extractors** & conditioners for in-house QRNG architectures (entangled pair, femtosecond lasers, optoelectronic chaotic)
- Created electromagnetic simulation tools in C and Python with **distributed computing** enabled scheduling algorithm for parallel pipelining
- NU-TMM analytical studies aided with FDTD simulations of hBN and graphene-integrated Microring Resonators for photonic quantum computing

## Autonomous Ground Vehicles Research Group (AGV), IIT Kharagpur

Jun 2022 - Present

- Worked on reinforcement learning based **Decision Diffuser** and **Game Theoretic Planner** for F1 Tenth format in-house autonomous vehicles
- Adaptive **Extended Kalman Filter** for SoC Determination, implementation of MPC, LQR controllers & path planning on **ROS2**-based navigation stack

## PROJECTS

## Field: High Performance/Multi-node Compute Management

May 2024

- Created a **Tauri** desktop application to remotely manage and monitor personal compute nodes/clusters and services for all kinds of OS environments
- Backend in **Rust** & interface in **Next.js** with **PostgreSQL** DB to monitor system logs, manage compute jobs and deploy services/containers remotely

## Utilizing Hadoop Ecosystem to Implement RAG for Chain of Thought Reasoning in LLMs | DBMS Laboratory

Apr 2024

- Deployed six **Hadoop Solr/Zookeeper** nodes (**Docker**) as an indexer to a knowledge graph in order to implement **Chain of Thought** in Gemini Pro
- Scalability prioritised and monitored using **Prometheus/Grafana** nodes & integrated the **Retrieval Augmented Generation** pipeline using **LangChain**
- Reverse proxied the Flask app on **Apache HTTP** server. Input sanitised to prevent SQL injection attacks, and the server was secured against **CSRF**

## 32-bit RISC Processor | Computer Organization &amp; Architecture Laboratory

Nov 2023

- Designed and synthesized 32-bit **MIPS** like ISA with 4GB of memory and deployed on **Arty A7-100T FPGA** Board with a Python3 based cross-compiler

## Multithreaded PPT Gesture Control | Technology Robotix Society

Jul 2023

- Used **Agile development** philosophy to guide juniors in accomplishing the CV and hardware stack, which is actively deployed for our on-stage events
- Multithreading for pose estimation and hand gesture recognition over a custom network stack and API to minimise processing latency

**Other:** Numerous scrapers, crawlers, automation, system administration scripts & websites. Various demonstration **robots** for Technology Robotix Society events. Coursework including **SMTP/POP3** stack, **MMU** and **Shell** in C, **TCP/IP** from scratch, projects revolving around **PostgreSQL/JDBC**, etc.

(Projects index: <https://cse.iitkgp.ac.in/~prasannabp/Projects.html> for more details)

## SKILLS AND EXPERTISE

**Languages:** Rust, C, C++ 23, Python, Java, JavaScript, Verilog, x86-64 **Frameworks:** UWP, ROS2, Burp Suite, Tauri, Comsol Multiphysics, LangChain

**Libraries:** JAX, PyTorch, CUDA, OpenCV, AVR C, Qiskit, Angr, GNU libC **Miscellaneous:** Capture the Flags, Codeforces handle - PrasanpaPaithankar

## COMPETITION/CONFERENCE

## Maths Olympiad General Championship | Azad Hall of Residence, IIT Kharagpur

Jan 2024

## Lunar T-GAN for Super-Resolution and Atlas Stitching | Inter IIT Tech Meet 11.0 (Solo Gold)

Feb 2023

- A novel **GAN** architecture (Lunar T-GAN) with Turing test based adversaries for accurate reconstruction of craters and hills, achieving SSIM of 0.794 on increasing image spatial resolution from 5m - 30 cm per pixel (16x) through a modified pipeline of **HAT**, **RealESRGAN** and sharpening algorithms
- Developed a Lunar Atlas by transformed **coordinate stitching** together individual image patches (> 2TB image data) from the **Chadrayaan-2** TMC

## Kishore Vaigyanik Protsahan Yojana (KVPY) Fellowship | IISC Bangalore

2020 &amp; 2021

## PUBLICATIONS

## [1] Post-Processing Free True Random Number Generator and Method Thereof (Patent filed)

April 2024

Prasanna Paithankar, Amritash Sharma, Shailendra K. Varshney

Intellectual Property India

## [2] Femtosecond Laser based Post-Processing Free True Random Number Generator

Oct 2023

Prasanna Paithankar\*, Amritash Sharma\*, Shailendra K. Varshney

FIO LS 2023, Washington, USA

## [3] Microring Resonators and its Applications

Jun 2023

Sauradeep Kar, Sridhar Singhal, Prasanna Paithankar, S. K. Varshney

IJPAP 61(7), 601-621

## [4] Tunable Graphene Integrated Cascaded Silicon Microring Resonators

Nov 2022

Prasanna Paithankar, et. al.

COPaQ 2022, Indian Institute of Technology Roorkee

## [5] Markovian Decision Process in Bipedal Locomotion (Stochastic Processes Handout)

Apr 2023

## COURSEWORK INFORMATION

Statistical Learning Theory | Information & Systems Security | Stochastic Processes | Algorithms-II | Operating Systems | Computer Networks | Photonic Quantum Information Technologies | Database Management Systems | Computer Organization & Architecture | Compilers | Systems Programming | Switching Circuits & Logic Design | Software Engineering | Linear Algebra, Numerical & Complex Analysis | Formal Language & Automata Theory

## POSITIONS OF RESPONSIBILITY

## Coordinator | Technology Robotix Society

January 2022 - Present

- Involvement in conducting Robotix 2023, Winter School of AI and Robotics ('22, '23), Makerspace ('22, '23), K.R.A.I.G. (101, 201, 301) and hackathons
- Algorithms team lead of cube solving bot (RubixBot), made various robots, computer vision applications and took multiple lectures on CV and ML