



EDUCATION

Year	Degree/Exam	Institute	CGPA/Marks
2024	M.TECH Dual Degree 5Y	IIT Kharagpur	7.95 / 10
2017	AISSEE	Delhi Public School, Ruby Park	95.2%
2019	AISSE	Delhi Public School, Ruby Park	9.8 / 10

INTERNSHIPS AND PROJECTS

Summer of Nix | New Generation Internet [July '23 - Present]

(Packaging open source projects for compatibility with Nix, a package manager, across platforms)

- Packaged 4 projects: **KiKit**, **mCaptcha**, **Rosenpass** and **GNU Taler** and added the package modules and their dependencies to **ngipkgs**
- Developed a **flake** based **mono-repo** that aims to expose a repository for all open source projects funded **New Generation Internet**
- Worked in a **mob programming format**, teaming up with 4 fellow programmers from all around the world to work on improving Nix

Google Summer of Code | Matrix | Nico Werner [Jun '22 - Sept '22]

(VoIP support and features for the open source Matrix client, Nheko)

- Improved **webRTC** and **gstreamer** based **VoIP** in the client to support specification changes to the **decentralised** Matrix protocol
- Implemented **Trickle ICE** support and designed improved signalling to accelerate the process of establishing a session and resolve **glare**
- Added improved functionality to allow seamless call transfers between users, voice & video calls, muting & noise cancellation and self calls
- Refactored the **C++** based client API library called **mtxclient** to allow universal portability to other Matrix clients willing to build on C++

Google Summer of Code | OpenCV | Vitaly Tuzov [Jun '21 - Aug '21]

(Cross-platform implementation and documentation of OpenCV optimization libraries)

- Implemented a **2D convolution** in the **spatial domain** for images with multiple channels and optimised it to exploit maximum CPU
- **Vectorized** algorithms to improve runtime by over 100% over the **SSE** instruction set using **AVX** and **AVX512** compatible registers
- Authored 3 tutorials explaining the **Parallel_for_** utility and introduced SIMD Intrinsics and their use to parallelize cross-platform code
- Documented the **Universal Intrinsic** module and explained the use of internal Intrinsic functions for better backend implementation

ICMR Vaccine Delivery Drone | Prof. Somesh Kumar | Aerial Robotics Kharagpur [Mar 21 - Jun 21]

(Research and development of autonomous drone for vaccine delivery in unfavorable terrains)

- Developed and finalized the delivery of a light wt. hexacopter sporting a **carbon-fiber** chassis and a parachute-based safety mechanism
- Designed a 3D environment in **Unreal Engine 4.0** to simulate real world fail-safe circumstances during vaccine delivery (10 vials / 2kg)
- Implemented a **LIDAR based** navigation system for ensuring a safe buffer distance from ground level, to aid with obstacle avoidance
- Created a **GUI** interface for the Mission Planner software allowing intuitive and trivial operation, making it feasible for regional operators

SKILLS AND EXPERTISE

Courses: Database Management Systems | Computer Organisation and Architecture | Operating Systems | Algorithms 1 & 2 | CNN for Computer Vision | Probability & Statistics | Computer Networking | High Performance Parallel Programming | Social Computing | Graphical and Generative ML | Stochastic Analysis and Applications | Time-series Analysis | Basic Economics | Introduction to Financial Instruments
Languages: C | C++ | Python | Nix **Libraries:** C++ STL | NumPy | Pandas | Matplotlib | PyTorch | git **Codeforces:** 1958

POSITIONS OF RESPONSIBILITY

Event Captain | Drona Aviation | Inter IIT Tech Meet 11.0 | IIT Kanpur [Dec '22 - Mar '23]

- Lead all logistical and budget-related undertakings, mentored second years, and synergised with seniors to produce excellent results
- Conducted upwards of **250 interviews**, to shortlist and select **15** team members, **10** forming the **core**, and **5 supporting** members
- Coordinated alongside the design and dev teams to facilitate effective communication between the event members and the contingent
- Designated a team of **10** for the offline presentation held in IIT Kanpur, and secured first position in the InterIIT event, Drona Aviation

COMPETITION/CONFERENCE

Solo Gold | DRDO | Inter IIT Tech Meet 10.0 | IIT KGP [Jan '21 - Mar '22]

(UAV based planning and UGV navigation over mountainous terrains in low visibility)

- Awarded **Solo Gold** for the highest pts. in the mid-prep InterIIT event DRDO UAV-UGV Navigation Challenge, among a pool of **22 IITs**
- Developed a **depth map based** path detection model to evaluate feasible states and allow accurate planning over low visibility terrains
- Generated a final path using **Extended Kalman Filter** over the originally obtained points to ensure feasible traversal and sensor fusion
- Implemented and tuned **Model Predictive Control (MPC)** based controller to navigate a **sensorless UGV** along the generated path

Gold | Drona Aviation | Inter IIT Tech Meet 11.0 | IIT Kanpur [Dec '22 - Mar '23]

(Localisation and control of a proprietary quadcopter using ArUco tags)

- Secured a **Gold**, alongside IIT Roorkee in the high-prep InterIIT Tech event Drona Aviation UAV Challenge, among a pool of **22 IITs**
- Developed an **RGB** based vision module, using the **Realsense D435i**, which localised the drone with respect to multiple **ArUco** tags
- Implemented a **depth based** tracker as a fail-safe mechanism for allowing the drone to return when it leaves the RGB frame of view
- Implemented and tuned a **PID** based controller creating a **closed-form** feedback loop with the localisation module to navigate the drone

EXTRA CURRICULAR ACTIVITIES

Actor, English Technology Dramatics Society: Encore

- Acted in 4 dramatic productions, 2 of which were online, as a result of the pandemic, and performed for the campus community
- Participated in scriptwriting and co-directed multiple original projects and mentored first years as foundational members of an online era
- Co-directed and performed in an original Nukkad (Street Play) with a team of 25, in Spring Fest '20, the annual socio-cultural fest of IITKGP

Sports, Inter Hall, LBS Football Team

- Represented the Gold Winning Lal Bahadur Shastri Hall of Residence football team in the General Championship 2022