

Shivank Garg

Major in Electrical Engg | Minor in Computer Systems

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EDUCATIONAL QUALIFICATIONS

Year	Degree	Institute	CPI / %
2021*	B. Tech+M.Tech, EE	Indian Institute of Technology, Kanpur	BT: 8.0 MT: 9.3
2016	Class XII, CBSE	Emmanuel Mission School, Kota	93.6%
2014	Class X, CBSE	St. Francis School, Hathras	10

- Secured **All India Rank 729** in Joint Entrance Examination (JEE Advanced) 2016 among 200,000 students
- Secured **All India Rank 2190** in Joint Entrance Examination (JEE Mains) 2016 among 1,300,000 students

INTERNSHIP EXPERIENCE

- Memory Management in NVMM** | *Intel Labs, Architecture Research, Bangalore* Sep'20 - Present
M.Tech Thesis: Prof. Debadatta Mishra, CSE, IIT Kanpur and Aravinda Prasad, Intel Labs
 - Optimizing the **Linux memory allocator** to efficiently utilize high memory capacity offered by **Intel Optane DC** persistent memory
 - Benchmarking the Intel NVMM performance for **huge page management** and identifying & fixing the **overheads/bottlenecks**
- Audit(4) support for NFS in FreeBSD** Apr'20 - Aug'20
Google Summer of Code'20: *The FreeBSD Project*
 - Designed and implemented support for event audit in NFS for **advanced security** to meet requirements of **CC/CAPP** evaluation
 - It permits sysadmin to have **selective, fine-grained** and, **configurable logging** for monitoring all NFS activities within the network
 - Used **libnfs** low-level library and **ATF-Kyua** framework to write the **NFSAuditTestSuite** for unit-testing each NFS audit event
- NVMe Linux Host Drivers** | *Samsung Semiconductor India R&D, Bangalore* May'19 - July'19
Offered to join as a full-time employee
 - Proposed an alternative NVMe host driver design in Linux to support the **qualification** and **validation** of Samsung SSD devices
 - Completed **POC** for an alternative approach of command submission and completion to NVMe SSD devices with better control
 - Modified **nvme-cli** userspace tool for testing the correctness of modified kernel device driver by passing custom **ioctl** commands
- Mandatory Access Control policy for FreeBSD Jail: mac_ipacl** May'19 - Aug'19
Google Summer of Code'19: *The FreeBSD Project*
 - Designed & wrote an **LKM** with **mac(9)** to restrict network stack privileges of **VNET** jails, an ATF based **TestSuite** & a **man page**
 - mac_ipacl(4)** allows the root of the host to impose **runtime-configurable** access control policy rules tunable with **sysctl(8)** interface
- LoRaWAN Implementation for Soil Monitoring** May'18 - July'18
Kritsnam Technologies Pvt. Ltd. and Prof. Ketan Rajawat, Department of EE, IIT Kanpur
 - Studied different **LPWAN** technologies and **LoRaWAN MAC layer** for development of soil monitoring wireless sensor network
 - Set-up environment for **PyCom LoRa** nodes, gateways, and server & optimized its **Power consumption, ADC, and Range** issues

TECHNICAL PROJECTS

- PCI Linux Device Driver for CryptoCard** Feb'20 - Apr'20
Supervisor, CS730A: Prof. Debadatta Mishra, Department of CSE, IIT Kanpur
 - Designed and wrote a PCI device driver and a userspace library to configure the qemu-device parameters using **sysfs(5)** interface
 - Implemented **multi-thread support, interrupt handling** for efficiency, & I/O features like **MMIO** and **DMA** for communication
- Cryptographically Secure Key-Value Store** Feb'19 - Apr'19
Supervisor, CS628A: Prof. Pramod Subramanyan, Department of CSE, IIT Kanpur
 - Designed a user-authenticated(**RSA**), encrypted & secure file-store given an **untrusted storage** server & a trusted **PublicKey** server
 - Implemented (in **Golang**) **efficient** operations (multilevel block structure) to store, retrieve, fast-append, share or revoke file access
- Computer Network Design and a TCP/IP based Application** Sep'18 - Nov'18
Supervisor, CS425A: Prof. Dheeraj Sanghi, Department of CSE, IIT Kanpur
 - Provided a design solution on efficient, reliable, & scalable **computer network architecture** planning for lecture hall complex
 - Designed and wrote a **TCP/IP** based python application for facilitating **Collaborative Painting** to multiple users in real-time
- Dual Foot-Mounted Inertial Navigation System** June'18 - July'18
Supervisor, CS664A: GT Silicon Pvt. Ltd. and Prof. Amey Karkare, Department of CSE, IIT Kanpur
 - Fused the **PDR** data of two motion-sensing oblu devices to reduce the systematic heading drift error and track the real-time path
 - Integrated **Firebase** and **AWS EC2** with **ESP8266** wifi module for real-time processing of oblu motion-sensing data on the cloud

TECHNICAL SKILLS & COURSES

Programming: C, C++, Python, Golang, Bash

OS and Platforms: Linux, FreeBSD, Arduino, ESP8266, RPi

> Data Structures and Algorithms > Operating Systems
> Computer Systems and Security > Computer Networks
> Digital Signal Processing > IoT System Design

Tools: Git, Vim, GDB, L^AT_EX, Keras, AWS

Software: MATLAB, MS Office, NetSim, NS3

> Machine Learning for Signal Processing > Linear Algebra
> Linux Kernel Programming > Digital Electronics
> Communication Systems > Blockchain

POSITION OF RESPONSIBILITY AND MISCELLANEOUS

- Secretary, Robotics Club, IIT Kanpur** Apr'17 - Apr'18
 - Organized workshops, lectures and competitions to promote robotics as a hobby among the IITK campus community
 - Handled a budget of **₹2,00,000** for maintenance of club machinery, inventory, club event conduction, & funding new projects
- Teaching Assistant, ESC201A**, Introduction to Electronics: Assisting Course Instructor in managing the course & helping students
- FOSS contribution:** Active contributions to the open-source organization - *The FreeBSD Project*
- Blockchain Project**, CS731A: Designed and wrote an **ethereum based voting system** & deployed it over the **Ropsten** Test Network
- Building gemOS**, CS330A: Implemented various **POSIX syscalls** for **process & virtual memory management** in minimal gemOS
- Prayas**, An IIT Kanpur Initiative - Collaborated with a team of 40+ volunteers, aimed to provide free education to marginalized kids