# 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: **8.1** \| 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** | *Processor Architecture Research (PAR) Lab, **Intel**, Bangalore* *Sep'20 - Jun'21*
  **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-graded** 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: *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: *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: *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: *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
**Tools:** Git, Vim, GDB, perf, ftrace, Keras, AWS
**Software:** MATLAB, MS Office, LaTeX, NetSim, NS3

> Data Structures and Algorithms
> Operating Systems
> Machine Learning for Signal Processing
> Linear Algebra
> Computer Systems and Security
> Computer Networks
> Linux Kernel Programming
> Digital Electronics
> Digital Signal Processing
> IoT System Design
> 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