Shivank Garg

Senior Undergraduate | Dual-Degree
Major in Electrical | 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	8.2/10
2016	Class XII, CBSE	Emmanuel Mission School, Kota	93.6%
2014	Class X, CBSE	St. Francis School, Hathras	10/10

ACADEMIC ACHIEVEMENTS

- 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

TECHNICAL SKILLS

Programming: C, C++, Python, Golang, Bash
OS and Platforms: Linux, FreeBSD, Arduino, ESP8266, RPi
Tools: Git, Vim, GDB, LaTeX, Keras, AWS
Software: MATLAB, MS Office, NetSim, NS3

INTERNSHIP EXPERIENCE

- **NVMe Linux Host Drivers** | *Samsung Semiconductor India R&D, Bangalore* *May'19 - July'19*
  Received Pre-Placement Offer
  - Proposed an alternative NVMe linux kernel driver design to support **qualification** and **validation** of Samsung SSD Devices with **better control on command submission** and bypass the block layer multi-queue scheduling
  - Completed **POC** for admin and I/O commands by modifying open-source NVMe linux kernel module
  - Implemented an **efficient** mechanism for management of available command slots for the NVMe host driver
  - Modified the **nvme-cli** application to be compatible with the new kernel module for testing purposes.
- **Mandatory Access Control policy for FreeBSD Jail: mac_ipacl** *May'19 - Aug'19*
  Google Summer of Code'19: *The FreeBSD Project*
  - Designed and wrote a **FreeBSD kernel module** with **mac(9)** as access control framework to restrict network stack privileges of **VNET jails**, to allow the root of the host to impose policy rules on jails for setting IPv4/v6 addresses
  - mac_ipacl has **flexibility** of tuning policy parameter like jail id, interface, and set of allowed/denied IP address
  - Designed **TestSuite** scripts based on **ATF and Kyua** framework and wrote mac_ipacl(4) **man page** for module
- **LoRaWAN Implementation for Soil Monitoring** *May'18 - July'18*
  Kritsnam Technologies Pvt. Ltd. and Prof. Ketan Rajawat, Department of EE, IIT Kanpur
  - Compared different **LPWAN** technologies for the development of soil monitoring wireless sensor network
  - Studied **LoRaWAN MAC layer** and set up an environment for LoRa Nodes, Gateways, and Server
  - Optimized the PyCom LoRa Modules on issues related to **Power consumption**, **ADC** and **Range**

TECHNICAL PROJECTS

- **Cryptographically Secure Key Value Store** *Feb'19 - Apr'19*
  Supervisor: *Prof. Pramod Subramanyan, Department of CSE, IIT Kanpur*
  - Designed and implemented (in **Golang**) a secure key-value store under the assumption storage server is malicious
  - Features include **confidentiality** and **integrity** of data with **sharing** semantics (among different users)
  - Used a multi-level block structure (with encrypted metadata) for efficient implementation of file operations
- **GemOS: Operating System** *Aug'19 - current*
  Supervisor: *Prof. Debadatta Mishra, Department of CSE, IIT Kanpur*
  - Implemented system calls like **mmap**, **munmap** and **mprotect** for virtual memory operations in minimal gemOS
  - Implemented **UNIX file operations** syscalls like open, read, write, dup, pipe, fork, etc. on **posix** compliance
  - Implemented **grep**, **tee**, etc. shell commands and piping output using fork, pipe and other basic system calls

- **Blockchain based Voting System with Biometric Verification** *Feb'19 - Apr'19*
  Supervisor: *Prof. Sandeep Shukla, Department of CSE, IIT Kanpur*
  - Designed an **Ethereum** based blockchain voting system and deployed it over the Ethereum Ropsten Test Network
  - Experimented with **Fuzzy-hashing** on fingerprint minutiae data (from fingerprint reader) for voter authentication
  - Wrote **solidity contracts** for the voting system (with fallback to **LDAP** credentials)
- **Computer Network Design and a TCP/IP based Application** *Sep'18 - Nov'18*
  Supervisor: *Prof. Dheeraj Sanghi, Department of CSE, IIT Kanpur*
  - Provided the design solution on **Computer Network Architecture** for lecture hall complex at IIT Kanpur
  - Designed a TCP/IP based Python application for **Collaborative Painting** that runs on Client-Server architecture
  - The application allow multiple users to share a drawing canvas in real-time and paint simultaneously
- **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 device to reduce the systematic heading drift error
  - Integrated **Firebase** and **AWS EC2** with **ESP8266** for real-time processing of motion sensing data on cloud
  - Used **matplotlib** to track real-time path and comparison of raw and corrected PDR data for benchmarking purpose
- **Robotic Prosthesis Arm** *May'17 - July'17*
  Robotics Club, Science and Technology Council, IIT Kanpur
  - Designed an artificial 3D printed gripper based on concept of prosthesis using Autodesk **Fusion360**
  - Used **flex** sensor and **servos** for controlling gripper movement and **Bluetooth** Module for communication
  - Represented IITK in **Inter IIT Tech Meet** and also awarded with **Best Social Project** by SnT Council, IIT Kanpur

RELEVANT COURSES

Computer Science	Data Structures and Algorithms | Operating Systems | Computer Networks | Blockchain Technology | IoT System and Design | Computer Systems and Security
Mathematics	Probability and Statistics | Linear Algebra | Complex Variables | Differential Equations
Electrical, Electronics & Communication	Machine Learning for Signal Processing | Communication Systems | Digital Electronics | Digital Signal Processing | Autonomous Unmannes Aerial Systems

POSITION OF RESPONSIBILITY AND SOCIAL INITIATIVES

- **Secretary, Robotics Club, IIT Kanpur** *Apr'17 - Apr'18*
  - Organized workshops, lectures and competitions to promote robotics as a hobby among IITK community
  - Handled a budget of **₹2,00,000** for maintenance of club machinery, inventory and club event conduction
- **Prayas**, *An IIT Kanpur Initiative* - Collaborated with a team of 40+ volunteers, aiming to solve educational, health and financial problems of about **60** marginalized kids

EXTRA CURRICULAR

- **Cultural Activities -** Participated in Inter-Hall cultural events of Hindi Sahitya Sabha and Debating Society, IITK
- **Senior Election Officer**, *General Election'18* - Worked in a three-tier team for successful conduction of free and fair elections among the campus community

INTERESTS

- Low-level Systems - File Systems and Network
- Operating Systems and Systems Security
- Internet of things
- Open Source Software (recently contributed to FreeBSD Organisation)
- Macroeconomics