



SWAPNEEL LAYEK

IIT KHARAGPUR | Mechanical Engineering

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INTERNSHIPS

Full Stack Intern, Terracis, Quantela Inc.

[June 2024]

Individually developed a remote employee connectivity platform using MongoDB, ReactJS, and ExpressJS, supporting **50+** employees
Implemented token-based authorization using expiring cookies with JWT for secure authentication and bcrypt for password hashing
Developed real-time chat functionality using Socket.IO, supporting both team and private messaging with a notification system

Front End Developer, Renew Heat

[April 2024]

Enhanced seller engagement by optimizing the dashboard interface for a campus thrift store start up with advanced NextJS components
Integrated features such as dynamic pagination, state-toggle dropdown menus for order status updates, and search algorithms
Worked on a real-time Web Socket-powered chat functionality, enabling direct and seamless communication between buyers and sellers

PROJECTS

AI chess Engine | Self Project

- Developed an AI model trained on a meticulously curated dataset of 10,000 games sourced from Lichess, capturing diverse skill levels.
- Utilized Amazon Web Services (AWS) for efficient data pre-processing, model training, and validation, a maximum chess rating of **1900** and achieving an impressive accuracy rate of **75%** in replicating typical human moves.
- Integrated the Lc0 chess engine seamlessly into multiple platforms, enabling interactive gameplay and real-time analysis capabilities for users.

Repair Suite | Full Stack Web Application

- Repair booking site for iPhone repairs built on the MERN (MongoDB, Express.js, React.js, Node.js) stack made from scratch
- Designed the entire website including the landing page and booking page, loaded with animations and site architecture
- Consisted of an Admin panel to view any booking, add various phones, change the price of repair or add/delete any time of repair

Pairs Trading Algorithm | Research Intern

[Jan 2023]

- Attained CAGR of 12.5%, Sharpe Ratio of **0.95** and max drawdown of **15%** by taking long and short positions using z-score values
- Applied Kalman Filter for dynamically keeping the spread stationary which increased the Sharpe Ratio to 1.25 and CAGR by 10%

Computer Architecture and Operating Systems| Summer Project

[March 2023]

- Developed a single-cycle RISC processor with MIPS-like instruction set architecture and implemented it on an FPGA with Verilog HDL
- Tested the processor on physical hardware through programs written using the custom instruction set on a Xilinx Artix 7 FPGA
- Wrote a shell in C++, extensively using the POSIX interface and implemented piping, I/O redirection, and wildcard expansions
- Implemented **Dijkstra's algorithm** on graphs in shared memory, with safe multi-threading using mutexes & condition variables
- Programmed a memory allocator in C++ that used First Fit and Best Fit strategies for managing a memory arena used

SKILLS AND EXPERTISE

Software Development: Python | JavaScript | Java | C++ | SQL | Django | Flask | React.js | Node.js | Git | Docker | Kubernetes

Cyber Security: Penetration Testing | Metasploit | Burp Suite | Nmap | Incident Response | Forensic Analysis | GDPR | HIPAA

Miscellaneous: Postman | Prisma | MongoDB | Firebase | NodeJS | Vercel | Render | Figma

COURSEWORK INFORMATION

Courses: Programming and Data Structures | Engineering Drawing and Computer Graphics | Basic Electronics | Linear Algebra, Numerical and Complex Analysis | Theory of Partial Differential Equations | Transform Calculus

MOOCs: Machine Learning (Coursera) | Algorithms (edX) | Cloud Computing Fundamentals (Udacity) | Ethical Hacking (PortSwigger Academy) | Web Development (Codecademy)

EXTRA CURRICULAR ACTIVITIES

- Bass Guitarist at **Classical Band**: Participated in the inter-college competition, Sargam. IIT Kharagpur Spring Fest (2023)
- IFSAA Traders Cup**: Competed in a trading competition with a team of 6 members from various colleges (2024).
- Innovators Hive "Next Big Thing" Hackathon by **Google Cloud**: Successfully participated in a hackathon competition focused on innovative solutions for crafting the prompts required to train an AI agent (September 2022)
- Member of **Robosoccer Students' Group**, IIT Kharagpur: Selected 50 members from a pool of 1000+ applicants during 2023-24 by conducting group discussions and personal interviews. Also conducted Fresher's production with participation of 80+ members, handled design and delivery of society merchandise to 100+ members
- Logistics Head | Spectra (Fine Arts and Design Society) IIT Kgp : Overlooked a team of 40+ students, managed a budget of INR 1,50,000, conducted auditions for 1000+ applicants, and boosted media outreach by 300% Trained 200+ novice artists and designersthrough 5+ year-round internal and external workshops