SOMYAJEET GUPTA CHOWDHURY

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Education

Indian Institute of Technology Kharagpur   **2021 − 2025**
Bachelor of Technology in Mechanical Engineering   *8.01/10*

Experience

Software Engineer - 1   **July 2024 − Present**
Weilliptic, Inc   *California, United States - Remote*
- Developed an e2e C++ SDK with WASM interaction, leveraging **smart pointers** for efficient memory management
- Improved performance of DuckDB database systems by introducing **batching** of queries and connection **pooling**
- Prepared a faucet by leveraging **Bloom filters** with **murmur hash** to track token requests in an optimized manner
- Created a mobile wallet using React Native to extend usage of platform on Android and iOS devices

Backend and Infrastructure Developer Intern   **Dec 2024 − Jan 2025**
Panora Exchange   *Bangalore, India - Remote*
- Setup docker containers on **AWS EC2** instances and optimized the Dockerfile using multi-staged builds
- Wrote **CI-CD** scripts for automated deployments using github actions, reducing deployment times by more than **50%**
- Wrote **web socket** apis for realtime price updates, with caching in **redis**, and wrote scripts for stress testing
- Configured nginx for URL-based load balancing, optimizing traffic distribution for mission-critical applications

Machine Learning Intern   **May 2024 − July 2024**
National Payments Corporation of India   *Hyderabad, India*
- Detected multiple fraudulent transaction patterns in **45 crore+** rows of daily UPI data using **SQL** and Python
- Automated feature selection using **Multi-Armed Bandit** algorithm, thus reducing the training time of classifiers
- Improved clustering of highly unbalanced fraud data by using **Graph Laplacian Networks** for propagation of labels
- Desgined and implemented **AutoEncoder** models to detect anomalies in transactions data resulting in **90 %** accuracy

Software Engineering Intern   **Feb 2024 − June 2024**
Dendrite.ai   *Oregon, United States - Remote*
- Enhanced Stripe payment gateway by using **webhooks** to efficiently sync payment transactions with database
- Developed an end-to-end Time Series Module, including techniques like ARIMA, etc. and visualizations of forecasts
- Used **pyodide** and **WASM** to execute and validate python syntax in the client browser itself, thus reducing server calls
- Improved backend calls with **graphql** queries , thus heavily reducing the overall payload size and time for retrieval
- Integrated Ad-Sense into the UI of the application, thus allowing for commerce in the platform by displaying ads

Projects

Realtime Collaborative Whiteboard | *React, Typescript* | ⚫ Link   **Dec'23**
- Developed a seamless HTML **canvas** element for writing, editing, deleting and saving drawings on the screen
- Leveraged web sockets to allow multiple users to simultaneously edit the screen, with efficient **realtime updates**
- Created user authentication, authorization, SSO, IAM and secured routes using a docker instance of Keycloak service

Video Calling Application | *React, WebRTC* | ⚫ Link   **Apr'24**
- Created a media sharing application by leveraging Peerjs, which acts as a **STUN** server to share SDPs between clients
- Created a socket server to work as a selective forwarding unit, allowing multiple clients to share media
- Utilized DaisyUI and tailwind in the frontend to style components and socket.io to enable communication with server

Airline management system | *Nodejs* | ⚫ Link   **Jun '23- Jul '23**
- Designed a scalable **microservice** architecture with **MVC** pattern comprising booking, creating and reminder services
- Leveraged Sequelize ORM to and made associations between the models, ensuring database **normalization**
- Implemented **ACID** properties in transactions, by creating row-locks to improve overall reliability of the system
- Built an API gateway for rate-limiting, authorization, route management and to act as a **reverse proxy server**

Caching Library | *Python* | ⚫ Link   **Jun '24**
- Built a caching library supporting multiple eviction policies like **LRU, LFU, FIFO,** etc. supporting multithreading
- Made the cache thread safe by adding thread **mutex** locks, and wrote unit tests for ensuring coverage of edge cases

Competitions and Conferences

InterIIT Tech Meet 12.0 | *Aptos*   **Oct'23 - Dec'23**
- Developed a highly secure and performant decentralized social media allowing media sharing and NFT marketing
- Leveraged metamask **snaps**, extending the power of smooth transaction even with non-EVM blockchains
- Restructured the backend contract, reducing complexity of retrievals from **quadratic** to **linear** time

Smart India Hackathon | *Indian Space and Research Organization*   **Nov'24 - Dec'24**
- Built a custom firewall with **kernel-level** packet inspection, managing IP tables and network accesses
- Configured OS-level policies for Windows and Linux, ensuring application-aware filtering and network isolation
- Implemented dynamic rule enforcement while maintaining centralized administrative control on a local area network

Kharagpur Data Science Hackathon | *Zelta Labs*   **Jan'24**
- Implemented a LSTM-GRU forecaster for Bitcoin-USDT market, with frequencies between 6 hours and 3 minutes
- Devised a trading strategy with **400%** returns using SMA, RSI, MACD and ADX indicators with risk management
- Backtested the model to achieve a sharpe ratio of **1.52**, Risk-Reward Ratio of **1.13**, and max dropdown of **3.67**

ETHGlobal | *Ethereum*   **Aug '24- Sep '24**
- Designed an AI-operated social media + crowdsourcing platform using Lit Protocol and Galadriel's AI agent
- **Distributor end:** Automated post creation on the platform based on users personality and budget via cron jobs
- **Worker end:** Secure sign in, voting on posts, and budget tracking and reliable payouts using Solidity smart contracts
- Utilized shadcn and Aceternity UI for sleek interface, and Postgres with Prisma for data persistence

ML Challenge | *Amazon*   **Sep '24**
- Developed an **OCR** pipeline to extract dimensional information from product images with varying orientations
- Implemented thresholding, inclination correction using Hough Line Transform and multi-angle OCR for data extraction
- Applied regex-based filtering and metadata extraction techniques to process images, and normalizing numeric content

Achievements and Distinctions

- Secured a rank among top **1.78%** candidates in JEE-Advanced '21 and among top **0.18%** in JEE-Main mathematics
- Attained a maximum rating of **1474** in Codeforces (Specialist) and **1620** in Codechef platforms
- Achieved a Global Rank of **68** in Codechef Starters 96 and a Global Rank of **875** in Codeforces Round 881 Div-2
- Created Campus Connect, a plaform powering realtime communication and collaboration over **300+** users Link
- Published an npm package complex-algebra, a cli tool for complex number operations with **100+** downloads
- Secured a place among top **300** students globally as part of **Amazon Summer of Machine Learning** 2023
- Led the technical teams of Communique, Spring Fest and Shaurya of IIT KGP, enusuring flawless events yearlong
- Developed **50+** DSA questions at **InterviewBit**, integrating real-world software engineering scenarios into problems

Research Experience

Physics Informed Neural Networks | *Bachelor's Thesis Project*   **June '24-Present**
- Developed deep neural network architecture to predict highly **non-linear** and turbulent fluid flows using sparse datasets
- Improved training time and accuracy by incorporating physical constraints to loss functions like Navier Stokes equations
- Demonstrated improved accuracy even with smaller datasets as compared to traditional numerical methods

Technical Skills

Languages: Javascript, Typescript, Python, Rust, C, C++, Golang, x86 Assembly, Zig, HTML, Solidity, C#
Databases/ORMs: SQL, MongoDB, Postgres, Redis, Cassandra, DuckDB, Sqlite, Prisma, Sequelize
Devops/Cloud: Linux, Docker, Kubernetes, AWS(S3, Sagemaker, EC2, Lambda, RDS), Nginx, Git, YAML, Terraform

Coursework

Scholastic: Programming and Data Structures, Linear Algebra, Probability and Statistics, Stochastic Calculus, Partial Differential Equations, Soft Computing, Optimization Techniques, Operations Research, Data Analysis and Visualization of Physical Systems, Advanced Calculus, Introduction to AR-VR, Computational Fluid Dynamics
MOOCs: AlgoZenith: Competitive Programming, Fundamentals of Backend Engineering, Network Engineering Fundamentals, Operating Systems, Fundamentals of Database Engineering, Quantitative Finance, Cryptography Essentials