Smarak Kanjilal

Computer Science and Engineering (M.Tech Dual Degree 5Y)
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EDUCATION

M.Tech Dual Degree - Computer Science and Engineering	IIT Kharagpur	8.85/10	2021-2026
Indian Certificate of Secondary Education(ISC)	The Modern Academy	98.4%	2021

SKILLS SUMMARY

Technical Skills: Robotics, Microcontroller Programming, Verilog, Robot Operating System(ROS), Git, Latex, MATLAB, PyTorch, OpenAI Gym
Languages: C, C++, Python, Java, Javascript, Bash, PHP, HTML, CSS, SASS
Libraries: OpenCV, Numpy, Matplotlib, Pandas, Keras, ReactJs, Redux, Scikit, Django, Express.js, AJAX, NodeJs, Tensorflow

WORK EXPERIENCE

Kharagpur RoboSoccer Student's Group | Software Team | Prof. Alok Kanti Deb *Aug 2022 - Present*
- Developed OpenAI Gym environment for Nao-v40, applying **Reinforcement Learning** algorithms (PPO, SAC), boosting low level skill execution by 30%
- Optimized inverse kinematics for soccer maneuvers using **Overlapped Layered Learning** (OLL) and **CMAES**, achieving a 25% increase in walking speed
- Integrated **ROS** with overhead camera, managing a distributed system of 5 robots, achieving **95% localization accuracy** using image segmentation
- Deployed a system with parallel communication among 5 autonomous bots and a central server using **UDP**, achieving a **98%** data delivery success rate
- Optimized parallel execution of robot strategy modules using **multithreading** and **mutex** locks, in order to minimise latency achieving real time execution

Mitacs Globalink Research Intern | Toronto Intelligent Systems Lab, University of Toronto | Prof. Igor Gilitschenski *May,2024 - Present*
- Developed tasks to probe 3D understanding in **Video Generative Models**(Stable Video Diffusion, VJEPA) by Novel View Synthesis, depth map estimation
- Built a robust pipeline for **distributed training** on multiple GPUs and evaluation on datasets of size upto **500GB**, handling data processing and inference
- Implemented robust model checkpointing and efficient garbage collection during training, optimizing GPU usage with **30%** reduction in memory overhead

Web Coordinator | International Relations Cell, IIT Kharagpur *Aug 2022 - Present*
- Developed a Foreign Training Application Portal streamlining the process of application for Research Internships in **50+** institutes of eminence abroad
- Created a user-friendly platform using the Django Framework, with over **220 active users**, resulting in a **40%** boost in the number of applications submitted
- Engineered a Request a Topic feature, allowing users to suggest topics and dynamically estimating demand on each topic, improving topic relevance
- Implemented **automated Git** operations and version control using **webhooks** for remote system management reducing maintenance time by 40%

Software Developer Intern | Narrato *May,2023 - July,2023*
- Developed and deployed to production a **Google Docs add-on** to generate AI briefs, improving content creation efficiency by **30%** using **App Scripts**
- Implemented multithreaded execution of **ChatGPT API** queries for AI Content creation with Non-Blocking I/O, reducing processing time by **50%**
- Engineered a robust system for queuing batches of tasks in **parallel threads**, improving execution speed and efficient allocation of resources in the system

Data Science Intern | Stanford University | Prof. Pascal Geldsetzer *Jan,2023 - Aug,2023*
- Estimation of maternal and child health indicators including undernutrition, mortality, healthcare availability using **Machine Learning** on satellite images
- Reduced feature set from demographic surveys with **11,945 variables** resulting in **80%** reduction in dimensionality maintaining high predictive performance
- Implemented **Deep Learning** models, **ensemble** architectures achieving an acceptable average **RMSE score of 2.53** in predicting healthcare parameters

PROJECTS

Stock Market Simulator | Hack-an-Intern | Density.ai
- Developed a Stock Market Simulator, using **React**, **Redux**, and **Django** for market simulation and transaction tracking through data visualisations
- Implemented multithreaded **database management** for market and limit orders, ensuring integrity with **priority queues** for timely, efficient execution
- Integrated real-time data streaming and **WebSocket** connections to deliver low latency market data, ensuring instantaneous reflection of market conditions

CollabConnect | Kshitij Webathon 2023 | 24 HR Onsite Hackathon (link)
- Developed a platform to connect individuals with similar interests and skillsets facilitating collaboration and team formation to work towards unified goals
- Created an interactive frontend using **React** framework incorporating efficient monitoring of project goal timelines, deadlines and team strength management
- Implemented backend system using **ExpressJs** for data handling with **MongoDB** database and integrated **collaborative filtering** for relevant suggestions
- Utilised **server-side pagination** for fast and efficient web application rendering while searching through a large user database ensuring scalability

EventEase | Prof. Pabitra Mitra | IIT Kharagpur(link)
- Built an event management platform using Django for management of diverse events including user registrations, live notifications and hierarchical organisation
- Optimized schema achieving **Normal Form** for efficient operations minimizing redundancy and implemented drivers for access to **PostgreSQL** database
- Designed and implemented dynamic user interface with **Role-based access** control, enabling management and display of only relevant event information

COMPETITIONS

Gold Medal | Software Team | InterIIT Tech Meet 12.0 | Mphasis
Optimize passenger reallocation for disrupted flights to existing flights of limited vacancies using quantum computing methods considering priority of passengers
- Developed algorithms **10M+** reallocating passengers across **2000** flights using quantum computing and classical algorithms (**knapsack**,**flow algorithms**)
- Implemented a **C++** backend for multi-objective constrained optimization, using integer programming solvers including **Gurobi** and **CPLEX** libraries
- Built a **GRPC** pipeline to integrate **Django** and **C++** backends, creating a unified API interface for testing and comparing performance of algorithms
- Designed an intuitive user interface using **React.js** and **Tailwind** CSS framework, with visualisation of 10+ insightful metrics from uploaded input data

Humanoid Simulation League | Robocup BrazilOpen 2022
Achieved **7th** place globally in the Humanoid Simulation League at RoboCup BrazilOpen 2022, being a part of the only selected undergraduate team
- Implemented strategy modules for coordinated decision-making among bots based on dynamic field conditions in an accurately simulated soccer environment
- Developed an adaptive dribble algorithm using potential field methods, allowing robots to skillfully avoid up to **3** opponent bots with a **75%** success rate
- Enhanced team coordination plays for executing complex soccer tactics by implementing encoded audio message protocols to signal specific targeted actions

RELEVANT COURSEWORK

Computer Science: Algorithms, Software Engineering, Computer Organization and Architecture, Cryptography and Network Security, Operating Systems Machine Learning, Switching Circuits and Logic Design, Compilers, Computer Networks, CS229(Stanford), Deep Learning Specialisation(Coursera)
Mathematics: Probability and Statistics, Advanced Calculus, Linear Algebra, Linear Algebra for AI and ML

ACADEMIC ACHIEVEMENTS

- Recipient of Jagadish Bose National Science Talent Search Senior Scholarship selected among **top 10** applicants out of **1.5M** students for academic excellence
- Secured an All India Rank of **394** in JEE-Mains and All India Rank of-**794** in JEE-Advanced among **2M** candidates and **1M** qualified candidates respectively
- Secured **All India Rank 5** in ICSE among **250K+** candidates, recognized by the state government, awarded the Swami Vivekananda Merit Scholarship
- Achieved top academic standing at IIT Kharagpur in first year, ranking among **top 12** students approved for department change to Computer Engineering