SATYAM KUMAR | 20CE36014

CIVIL ENGG. ENVIRONMENTAL ENGG. AND MANAGEMENT (M.Tech Dual5Y)
MICRO SPL. in ENTREPRENEURSHIP AND INNOVATION, ARTIFICIAL INTELLIGENCE AND APPLICATIONS

EDUCATION

Year	Degree/Exam	Institute	CGPA/Marks
2025	M.TECH Dual Degree 5Y	IIT Kharagpur	7.87 / 10
2020	HSC (XII)	Pace Junior Science College, Powai	88.15%
2018	AISSE (X)	Kendriya Vidyalaya IIT Powai	93.60%

PUBLICATIONS

- **Satyam Kumar**, Nathinee Theinnoi, **"Bees Algorithm for Hyperparameter Search with DL to Estimate RUL of Bearings"** *(Forthcoming)*
- **Satyam Kumar,** Asrun Harun Ismail, D. T. Pham, **"Implementation of Bees Algorithm for UAV Mission Planning "** *(Forthcoming)*

INTERNSHIPS

Computer Vision Intern | Quidich Innovation Labs **Feb'24 - Aug'24**

Project 1 | Cricket Scene Analysis: Iterative Development of Object Detection and Segmentation Models

- Annotated 10k high-quality cricket images using **Roboflow** and **Voxel51**, creating a robust dataset for bat, ball, pitch, and stump detection
- Developed a **YOLOv8** object detection model achieving **80.9%** accuracy, and implemented **YOLOv8-seg, SAM** for efficient segmentation
- Engineered an **iterative training pipeline** for seamless data integration and model refinement, boosting segmentation accuracy to **59%**

Project 2 |Advanced Bat Tracking in Cricket: Comparative Analysis of Multi-Model Approaches

- Integrated **Co-Tracker** and developed **custom algorithms** for precise bat tracking, building upon detection models from previous work
- Implemented **YOLOv8-pose**, achieving **3 times faster processing** with comparable accuracy to Co-Tracker for bat movement analysis
- Evaluated tracking methods across DRS angles using **IoU** and **mAP**, achieving **87% accuracy** on a diverse test set of 1000+ video frames

COMPETITION/CONFERENCE

Sales Analytics and Forecasting Project | World Wide Technology | Trilytics Case Competition **Jun'24 - Jul'24**

Forecast sales using 18 months of historical data, recommending optimal store locations

- Time series forecasting using Meta **Prophet model** and **regressors**, achieving **92.44% accuracy** with MAPE of **9.36%** and MdAPE of **5.76%**
- Developed an interactive Dashboard application with **Plotly** and **callbacks**, featuring sales trend analysis and 90-day forecasts for stores
- Conducted extensive **market segmentation analysis,** providing actionable insights on promotional strategies and inventory optimization

Compliance Enforcement with Language Models | Information Security | Flipkart Grid **Jul'23 - Sep'23**

Analyse logs, system configurations, access controls, and privileges for security policy and standards compliance using LLM

- Secured a **top-4** spot amongst **20k+** applicants to qualify for the **National Finale** to showcase the solution to domain experts at Flipkart
- Deployed **Semantic search (Vector Embedding)** to find relevant policy-log pairs; used **Bert Sequential Classifier** to check for compliance
- Hypertuned the Bert Transformer model's output layer and achieved a **12% increment** in accuracy performance on log-policy compliance

AWS DeepRacer Student League Competition | Semi-Finalist **Jul'22 - Aug'22**

Reward Function Optimization Using Proximal Policy Optimization (PPO) Algorithm

- Developed and optimized a **PPO-based reward function**, to improve the lap time of RL car model to **17.728 seconds** (**+2.868s gap to 1st**)
- Employed various parameters, including **steering angle**, **distance from center**, and **heading angle** to design more robust reward function
- Ranked **18th** out of **3000+** participants in the first round; advanced to **semi-finals**, securing **49th** place against top competitors nationwide

PROJECTS

Autonomous Driving in F-1/10th Vehicle **Sep'22 - Nov'22**

Course Project: Computational Foundations of Cyber Physical Systems | Prof. Soumyajit Dey

- Executed a **pure pursuit controller** for precise steering angle calculation and velocity control in AVs, ensuring accurate track following
- Utilized **colour thresholding**, **canny edge detection**, **hough line transform** and curve fitting for precise centerline trajectory generation
- Implemented integrated **LIDAR** sensor data processing utilizing low-pass and high-pass filters for **obstacle avoidance** and lane following

ESCOIN: Efficient Inferencing for GPUs **Feb'22 - Apr'22**

Course Project: High Performance Parallel Programming | Prof. Soumyajit Dey

- Designed an efficient **sequential implementation** for specified convolution on 6x6 input feature maps, enhancing computational efficiency
- Optimized CNN pipelines by applying efficient 3x3 **sparse convolution filters** to the input feature maps, enhancing overall performance
- Achieved a speedup of **1.6 times** over **CUBLAS** on multiple GPUs, proving the potency of the improved **AlexNet CNN inference pipeline**

SKILLS AND EXPERTISE

Programming Languages: Python | C++ | C | MATLAB | SQL | Bash | CUDA
CV &Robotics: OpenCV | ROS | Gazebo
Data Analysis &Visualization: Pandas | Matplotlib | Plotly | Prophet | Streamlit
DevOps: Git | GitHub | Docker | Linux
ML &DL: NumPy | TensorFlow | Scikit-learn | nltk | FAISS | ChromaDB
DL Models: SAM | Florence 2 | Llama | Co-Tracker | YOLO

COURSEWORK INFORMATION

High Performance Parallel Programming • Computational Foundations of Cyber Physical Systems • Image Processing • Programming and Data Structures (Theory and Lab) • Probability and Statistics • Artificial Intelligence: Foundation and Applications • Advanced Calculus

AWARDS AND ACHIEVEMENTS

- Awarded the **Chanakya Fellowship** in 2024 by **AI4CPS**, recognizing outstanding contributions in the field of AI and cyber-physical systems
- Achieved a **top 10** standing in the AIITRA Robotics Challenge 2021, ranking in the **top 4%** and showcasing exceptional robotics expertise
- Successfully qualified for **RMO** in two consecutive years (2018, 2019) after qualifying Pre-RMO, demonstrating mathematical aptitude

EXTRA CURRICULAR ACTIVITIES

- Actively **r**epresented IIT Kharagpur in **Chess Master Premier League 2023** where we successfully secured **2nd place out of 64 colleges**
- Practiced playing electronic keyboard for 3+ years and also officially certified by **Trinity College of London** on completing my 1st grade

!Self declared by the student, CDC could not verify the relevant documents