Soumojit Bhattacharya

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3rd Year Undergraduate

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Academic Qualifications

Year	Degree/Certificate	Institute	CPI/%
2021 - Present	B.Tech.	Indian Institute of Technology, Kharagpur	8.85/10
2021	HSC(XII)	Pace, Andheri	93.66%
2019	ICSE(X)	Lokhandwala Foundation School, Mumbai	97.4%

Experience

- **Undergraduate Research Intern** (*May'23-Aug'23*)
  Prof Arpita Sinha, ARMS Lab, Indian Institute of Technology Bombay
  - Worked on Path Planning and decision making for connected autonomous vehicles.
  - Implemented papers on RSS(Responsibility-Sensitive Safety) rules for autonomous vehicles and lane change methods for connected autonomous vehicles on CARLA simulator.
  - Mail ID of supervisor: arpita.sinha@iitb.ac.in
  - `https://docs.google.com/presentation/d/1mXKA1h_s2dgp2jsp7AwG45XPN17uAIMJlsiju77vd-Q/edit#slide=id.g242909f5157_0_12`
- **Undergraduate Researcher** (*July'22-Present*)
  Autonomous Ground Vehicles Group, Indian Institute of Technology, Kharagpur
  - Implemented SLAM algorithms such as ICP and global registration using FPFH and RANSAC.
  - Implemented controls algorithms such as pure pursuit and Linear Quadratic Regulator.
  - Inducted a team of freshmen after rigorous task rounds; guiding the SLAM and RL Module for F1Tenth.
  - Supervisor: Professor Debashish Chakraborty, Indian Institute of Technology Kharagpur
- **Founding Member** (*June'23-Present*)
  Student Satellite Program, Indian Institute of Technology Kharagpur
  - Played a pivotal role in the CubeSat design, overseeing communication and sensor-related tests, including the launch of a sensor-equipped structure to an altitude of 2 km.
  - Achieved successful communication system setup, utilising the LORA RFM95PW module with a spring antenna on the satellite and a Yagi antenna for the Ground station.
- **Founding Executive** (*Nov'23-Present*)
  Brain Computer Interaction Research Group, Indian Institute of Technology Kharagpur
  - Global Finalist at International NeuroTechX Hackathon 2023 representing India

Projects

- **TOTO : A Real Robot Learning Benchmark Challenge NeurIPS 2023** PS report site (*Sep-Dec'23*)
  - Developed DiffClone for solving robotic control task of pouring and scooping in an offline RL setup with a sparse reward structure.
  - Utilized a Momentum Contrast fine-tuned ResNet50 encoder for robust representations, combined with a DDPM-based behavioral cloning agent for precise action prediction in complex multi-modal environments.
  - Experimented with point cloud based methods to improve representations.
  - Achieved a 92% success rate and a mean reward of 51 for pouring, surpassing existing benchmarks in the simulation setup and won first prize.
  - Site Link: https://sites.google.com/view/iitkgp-nips23toto/home
- **Implemented reinforcment learning algorithms on multiple different environments** link (*Jun-Aug'23*)
  - Implemented Q-learning, A2C and PPO on open-ai gym environments such as Atari games, Cart-Pole and Lunar Lander as part of a hugging-face course.
  - Implemented Multi agent POCA with self-play on a 2v2 soccer environment.
- **Camera Calibration and Pose Estimation** (*July'22*)
  - Obtained intrinsic matrices and distortion coefficients through camera calibration utilizing Charuco boards.
  - Performed pose estimation to predict distance between two ARUCO tags using the intrinsic matrices.
- **Localization and Mapping of an Autonomous Racing Car** link (*September'22*)
  - Used PointCloud and Odometry data from Carla Simulator and generated PCD files of the map in Open3D.

  - obtain the local map of the autonomous racing vehicle to optimize ICP and used registration to localize the vehicle and achieved an improvement of 20cm over odometry data.

- **Accessible Beaker for Visually Impaired People** link (*Oct'22*)
  - Built a computer vision application using OpenCV for measuring liquid volume in a beaker by looking for signs of refracion in the pictures.
  - This model was then integrated with a Web App using HTML, CSS and javaScript.
- **Affects of action noise on exploration in reinforcement learning** (*Dec'23-Present*)
  - Investigated effects that time correlated action noise has on learning in a variety of environments.
  - Tried out an adaptable action noises based on the number of simillar visited states.
  - Paper currently under review.
- **Self supervised representation learning from SEEG data** (*Jan'24-Present*)
  - Exploring techniques to learn task agnostic representations from intracranial electrode data.
  - Using the learnt representations for multiple tasks such as sentence-onset, speech among other tasks.

Awards

- Ranked among the top 0.6% of the 150,000 candidates who took Joint Entrance Examination Advanced 2021.
- Bronze, Open IIT Product Design-2022: Technology Students' Gymkhana, IIT Kharagpur
- Winner of Student Design Challenge: Empower Conference, IIT Madras (Product Design Competition)
- First prize in the ToTo challenge, NeurIPS 2023

Technical Skills

- **Programming Languages:** C, C++, HTML, Python, Bash, Matlab, Verliog
- **Developer Tools:** Git, Google Cloud Platform, VS Code, PyCharm, Kaggle, Google Colab, Linux, Fusion 360, AutoCad
- **Libraries:** Numpy, OpenCV, ROS, Scikit-Learn, Pandas, Open3D, Matplotlib, Pytorch, Lightning, Weights and Biases, Huggingface, Stable-Baselines4, Optuna, Gradio **Others:** LaTex

Extra Curricular Activities

- Student Member of NSS(National Service Scheme) Unit-7, IIT Kharagpur
- Editor at The Scholar Avenue, where I wrote creative pieces and articles revolving around happenings in the campus

Relevant Courses

Linear Algebra	Advance Calculus
Probability and Statistics	Theory of Partial Differential Equation
Programming and Data Structures(CS10003)	Programming and Data Structures Lab(CS19003)
Neural Networks and Deep Learning by Andrew NG	Machine Learning.AI (IIT Guwahati)
Linear Algebra and Optimization	Systems and Controls
Neuronal Coding and Sensory Information	Natural Language Processing
Digital Communication	Analog Communication