

Soumojit Bhattacharya

+91-7045358969 | ✉ soumojit048@kgpian.iitkgp.ac.in | 🗺 BabaYaga840 | 🌐 <https://babayaga840.github.io/>

Education

| | |
|---|--|
| Indian Institute of Technology, Kharagpur BTech in Electronics and Electrical Communication Engineering | Sept 2021 – May 2025 GPA: 8.87/10.0 |
|---|--|

Experience

| | |
|---|---------------------|
| I3D Lab — IISC Bangalore Research Intern | July 2024 – Present |
|---|---------------------|

- Setup a RL pipeline using SAC and a Behaviour Cloning pipeline for exploration of unknown objects and surfaces using only tactile information.
- Modelled the tactile exploration problem as a sequential decision process and a dual controller.
- Helped set up the Xarm6 lite manipulator to work with the DIGIT tactile sensor.
- Currently working on a more efficient method for transferring tactile information to pointclouds.

| | |
|---|--------------------|
| CVC Lab — UT Austin Undergraduate Researcher | Sep 2024 – Present |
|---|--------------------|

- Designed a deep RL algorithm for visual tracking of dynamic objects based on a POMDP formulation.

| | |
|--|---------------------|
| Autonomous Ground Vehicles Group, IIT, Kharagpur Undergraduate Researcher | July 2022 – Present |
|--|---------------------|

- Inducted a team of freshmen after rigorous task rounds; guiding the SLAM and RL Module for F1Tenth.
- Implemented SLAM algorithms such as ICP and global registration using FPFH and RANSAC and controls algorithms such as pure pursuit and Linear Quadratic Regulator.

| | |
|--|----------------------|
| Student Satellite Program IIT Kharagpur Founding Member | June 2023 – Aug 2024 |
|--|----------------------|

- 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.

| | |
|--|----------------------|
| Cognitive Learning for Vision and Robotics Lab, KAIST Visiting Student Researcher | May 2024 – July 2024 |
|--|----------------------|

- Implemented LSTM-based encoder and a PPO based agent for task-specific representation learning.
- Proposed ideas on adaptive robot learning for long horizon non stationary environments

| | |
|--|---------------------|
| ARMS Lab IIT Bombay Undergraduate Research Intern | May 2023 – Aug 2023 |
|--|---------------------|

- 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.

Publications

| | |
|---|----------|
| Blind Tactile Exploration for Surface Reconstruction | Sep 2024 |
|---|----------|

Submitted to ICRA 2025

| | |
|---|----------|
| Curvature Informed Furthest Point Sampling | Nov 2024 |
|---|----------|

Submitted to CVPR

| | |
|--|----------|
| DiffClone: Enhanced Behaviour Cloning in Robotics with Diffusion-Driven Policy Learning | Dec 2023 |
|--|----------|

arXiv.2401.09243

Projects

| | |
|---|------------|
| Curvature Informed Furthest Point Sampling | Jun-Nov'24 |
|---|------------|

- Proposed a method that enhances traditional furthest point sampling (FPS) by integrating curvature information, using reinforcement learning to optimize point selection.
- Designed and integrated the REINFORCE-based ratio estimator, improving the downsampling process for better geometric representation.
- Formulated the problem as a Markov Decision Process (MDP) and developed visualizations to effectively

demonstrate the method's performance across various datasets.

- The REINFORCE-based ratio estimator reduced Chamfer-L1 distance by 22% (from 1.8 to 1.4) and Hausdorff distance by 15% (from 2.3 to 1.95) compared to CFPS without it, improving geometric detail retention.

Skill-Based Coordination in Multi-Agent Reinforcement Learning (Bachelor's Thesis) [link](#) Aug'24-Present

- Implemented a system where agents utilize learned skills as communication strategies to enhance coordination in environments with partial observability.
- Implemented a custom MARL pipeline, to analyze the impact of agent communication strategies under partial observability.

Scalable Multi Agent Robot Swarm Navigation in Dynamic Environments Nov-Dec'24

- Worked on an end to end pipeline for a multi agent robot problem statement:
<https://drive.google.com/file/d/1ypvKRjFO_mypkRwqEISF64W SLN DvsXpy/view?usp = sharing>
- Experimented with multiple reinforcement learning methods for the multi agent pathfinding problem

TOTO : A Real Robot Learning Benchmark Challenge NeurIPS 2023 [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.

Implemented reinforcement learning algorithms for multiple environments Jun-Aug'23

- Developed RL-based control strategies using Monte Carlo and Policy Iteration algorithms to navigate a toy car around a grid, as part of an RL course at IIT Kharagpur. [link](#)
- Implemented Q-learning, A2C and PPO on open-ai gym environments such as Atari games, Cart-Pole and Lunar Lander as part of the hugging-face Deep RL course.
- Implemented Multi agent POCA with self-play on a 2v2 soccer environment. [link](#)

Affects of action noise on exploration in reinforcement learning [link](#) Jan-Feb'24

- Led a comprehensive analysis of time-correlated action noise types, across multiple distinct environments. Came up with intuitions for how noise characteristics influenced exploration patterns
- Designed an adaptive spatio-temporal noise model based on state visitation, enhancing performance by 8% over other baselines such as OU noise, pink noise and white noise.

Localization and Mapping of an Autonomous Racing Car [link](#) Sep'22

- Used PointCloud and Odometry data from Carla Simulator and generated PCD files of the map in Open3D.
- Obtained 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.

Awards

Ranked among the top 0.6% of the 150,000 candidates who took Joint Entrance Examination Advanced 2021

Came first in the Train Offline Test Online Workshop Competition(TOTO), NeurIPS 2023

Bronze, Open IIT Product Design-2022: Technology Students' Gymkhana, IIT Kharagpur

Winner of Student Design Challenge: Empower Conference, IIT Madras (Product Design Competition)

Technical Skills

Languages: C, C++, Python, Bash, Matlab, Verilog

Simulators: Openai gym, Pybullet, Mujoco, CARLA, Petting Zoo, TACTO, MVSIM

Miscellaneous: ROS, orch-geometri, Raspberry pi, Arduino

Extra Curricular Activities

Student Member of NSS(National Service Scheme) Unit-7, IIT Kharagpur

Editor at The Scholars Avenue, where I wrote creative articles revolving around happenings in the campus

Senior Member at ProDEX, IIT Kharagpur, where I led and mentored student teams in product design competitions.