Navpreet Singh

14navpreetsingh@gmail.com • linkedin.com/in/nsingh14/ • github.com/realnav1234 • (516) 513-9279

Education

Massachusetts Institute of Technology (MIT) Cambridge, MA
Candidate for Bachelor of Science in Artificial Intelligence and Decision Making (Computer Science) May 2025

Coursework: Deep Learning (Graduate); Representation, Inference, and Reasoning in AI (Graduate); Intro. to Machine Learning; Algorithms I; Inference; Linear Algebra and Optimization; Robotics I (Automation); Elements of Software Construction; Fundamentals of Programming; Computer Graphics; Computation Structures; Intro. to Microeconomics

Professional Experience

Lockheed Martin – Sikorsky Aircraft Stratford, CT
Autonomy Software Intern May 2023 – August 2023

- Engineered and deployed real-time **LiDAR** data processing frameworks, leveraging **Potree** to efficiently organize and process 500,000-1,000,000 data points per second into a hierarchical **octree** structure. Integrated **PointNet** and other **deep learning** models to extract crucial features from the LiDAR point cloud data.
- Developed a LiDAR raycasting simulator in **C++** within **osgEarth**, enabling rapid analysis of various terrains and providing 4000 vertical and horizontal clearances per second at any specified 3-dimensional coordinates.
- Designed and implemented a mission debugger using **OpenGL** and **Dear ImGui**, offering real-time visualization of simulated aircraft mission stacks, enhancing debugging capabilities and overall project efficiency.

MIT Computer Science and Artificial Intelligence Laboratory Cambridge, MA
Artificial Intelligence Researcher February 2023 – Present

- Conducting research in **Natural Language Processing** (NLP), focusing on the evaluation of **Large Language Models** (LLMs) for diverse use cases and the design of a comprehensive framework to assess model performance, privacy, and bias.
- Currently developing a suite of metrics, including **perplexity**, **BLEU score**, **METEOR score**, and **context-aware exposure**, to measure the quality and contextual appropriateness of **LLM**-generated text and translations. Benchmark datasets will cover a wide range of language understanding and generation tasks, ensuring consistent evaluation of LLMs' performance.
- Implemented a context-aware **Named-Entity Recognition** (NER) framework with **SpaCy** and **Pandas** to extract metadata from unstructured text, enhancing exposure metrics for a synthetic dataset generation pipeline employing **Generative Adversarial Network** (GAN) technology.

MIT Media Lab – City Science Group Cambridge, MA
Undergraduate Researcher February 2023 – August 2023

- Developed a user-friendly application using **OpenCV** and Meta AI's **Segment Anything Model** (SAM) to provide real-time water tank volume estimation within 5% accuracy. Successfully integrated image processing capabilities to deliver precise results, enhancing the user experience.
- The project paper was published as *Sensor platform for assessment of water usage patterns in informal settlements* in **Scientific Reports**, a **Nature** publication.

Projects and Leadership

Autonomous Racing Robot Cambridge, MA
Robotics, Science, and Systems February 2023 – May 2023

- Developed a competitive, **Ackermann-steering** robot, which utilized diverse path-planning algorithms, including **A***, **Rapidly Exploring Random Trees** (RRT), and **RRT*,** while incorporating **LiDAR** data, to efficiently navigate a 2D probabilistic occupancy grid map. Leveraged LiDAR technology to avoid obstacles in the configuration space.
- Utilized advanced color segmentation techniques in **OpenCV** to enable efficient line following and accurate **object detection** in autonomous robot systems. Integrated OpenCV with **ROS**, allowing seamless data flow and rapid decision-making for dynamic and adaptive navigation in diverse scenarios.
- Employed **Monte Carlo Localization** (MCL) for **Simultaneous Localization and Mapping** (SLAM) to achieve robust and real-time localization of the autonomous robot.

MIT Global Teaching Labs – Arab World Cambridge, MA
Artificial Intelligence Educator December 2022 – February 2023

- Developed and delivered a comprehensive AI curriculum to 150+ students at prestigious institutions, covering topics like models of inference, **PyTorch**, **Deep Learning** with Neural Networks, **and Natural Language Processing**.

Skills

Languages: Python, C, C++, C#, JavaScript, TypeScript, SQL (Postgres), Java, Bash, MATLAB

Libraries/Frameworks: PyTorch, TensorFlow, CUDA, XGBoost, OpenCV, Pandas, NumPy, SpaCy, Node.js, React, Angular, OpenGl, Dear ImGui, Potree, Arduino, Linux, Jupyter Notebooks