

SIDDHARTH NAYAK

550 Memorial Drive, Cambridge, MA 02139

☎ +1 (857)-999-6856 ✉ sidnayak@mit.edu 💻 [nsidn98](https://www.linkedin.com/in/nsidn98) 🔄 [nsidn98](https://www.github.com/nsidn98) 🌐 [nsidn98.github.io](https://www.github.com/nsidn98) 📄 [nsidn98](https://www.github.com/nsidn98)

🎓 Education

Massachusetts Institute of Technology

PhD. Candidate, Dept. of Aeronautics and Astronautics

Jun 2022 – Present

Cambridge, MA

Massachusetts Institute of Technology

Master of Science, Dept. of Aeronautics and Astronautics

Sept. 2020 – May 2022

Cambridge, MA

Indian Institute of Technology Madras

Bachelor of Technology in Electrical Engineering

Jul. 2016 – May 2020

Chennai, TN

📖 Publications

- [Under Review] **Siddharth Nayak**, Kenneth Choi, Wenqi Ding, Sydney Dolan, Karthik Gopalakrishnan, Hamsa Balakrishnan, “Scalable Multi-Agent Reinforcement Learning through Intelligent Information Aggregation” [PDF]
- [Under Review] Sydney Dolan*, **Siddharth Nayak***, Hamsa Balakrishnan, “Satellite Navigation and Coordination with Limited Information Sharing” [PDF]
- [NeurIPS 22] Hyewon Jeong*, **Siddharth Nayak***, Taylor Killian, Sanjat Kanjilal, Marzyeh Ghassemi, “Identifying Disparities in Sepsis Treatment using Inverse Reinforcement Learning”
- [AAAI 22] Luke Kenworthy, **Siddharth Nayak**, Christopher Chin, Hamsa Balakrishnan, “NICE: Robust Scheduling through Reinforcement Learning-Guided Integer Programming.” [PDF]
- [ECCV 20] **Siddharth Nayak**, Balaraman Ravindran, “Reinforcement Learning for Improving Object Detection.” [PDF]
- [AAAI 20] Richa Verma, Aniruddha Singhal, Harshad Khadilkar, Ansuma Basumatary, **Siddharth Nayak**, Harsh Vardhan Singh, Swagat Kumar, Rajesh Sinha, “A Generalized Reinforcement Learning Algorithm for Online 3D Bin-Packing.” [PDF]

🏢 Experience

DINaMo Lab, MIT, *Graduate Research Assistant*

Sept 2020 – Present

- Created a novel graph neural network-based architecture for scaling multi-agent reinforcement learning to larger systems for navigation tasks.
- Investigating usage of offline-reinforcement learning to speed up large combinatorial problems.
- Co-developed a hybrid approach which integrates reinforcement learning with integer programming to create schedules for the crew-scheduling problem which have 33% - 48% fewer disruptions than the baseline formulation.

RISE Lab, IIT Madras, *Undergraduate Research*

Aug 2019 – Apr 2020

- Worked on using reinforcement learning to apply suitable digital transformations to images to extract the maximum object detection performance from a pre-trained object detection network.
- Worked on using graph neural networks for molecule property prediction. Used feature engineering along with Graph Attention Networks to obtain 0.807 ROC-AUC on the Psuedomonas dataset. Our submission ranked 13 in the world in the MIT AI Cures Challenge [Leaderboard](#).

Tata Consultancy Services RnI, *Summer Research Intern*

May 2019 – Jul 2019

- Co-developed a heuristic + reinforcement learning-based method for the online version of 3D-bin packing problem to improve the packing efficiency by 3% over heuristic-based methods.
- Improved the speed by a factor of 6 and the packing efficiency of the bin-packing algorithm by 2%.
- Experimented with a behavioural cloning + heuristics model to achieve 100% packing efficiency (maximum) and an average of 85% efficiency.

Daimler AG R&D, *Summer Research Intern*

May 2018 – Jul 2018

- Worked with the “Autonomous Parking Division” to find the dependence of on-board vehicle camera parameters: *Shutter Speed* and *Voltage Gains* on the performance of pre-trained object detection neural networks.
- Created a performance matrix to choose the most optimal combination of shutter speed and voltage gain to maximise the F1-score of a pre-trained object detection network.

⚙️ Technical Skills

Languages: Python, Julia, C, C++, L^AT_EX, Bash, MATLAB

Libraries: PyTorch, TensorFlow, Keras

Technologies: Git, Slurm, Robot Operating Software (ROS), AutoCAD

📖 Relevant Coursework

Parallel Computing and Scientific Machine Learning, Visual Navigation for Autonomous Vehicles, Computational Sensorimotor Learning, Intelligent Robotic Manipulation, Underactuated Robotics, Principles of Autonomy and Decision Making, Reinforcement Learning, Advanced Topics in Artificial Intelligence, Convex Optimisation

Extracurricular/Interests

- Sports:- Cricket: State Level U-16 Cricket Player, Waterpolo: State Level Player, follow Formula 1, Soccer and Tennis.
- Music:- Trained Harmonium player (Level 3), Pianist and Classical Hindustani Singing
- Art:- [Sketching](#)