Rohan Banerjee

Address: 349 Gates Hall, 107 Hoy Road, Cornell University, Ithaca, NY 14853
Phone: (703)-743-4178 E-Mail: rbb242@cornell.edu

EDUCATION

Cornell University   **Ithaca, NY**

Ph.D. Student, Computer Science, GPA: 3.94/4.0   September 2020 – present (expected: September 2025)

Relevant Coursework: Model-Based State Estimation, Robot Manipulation, Machine Learning Theory, Deep Probabilistic and Generative Models, Matrix Computations

Massachusetts Institute of Technology (MIT)   **Cambridge, MA**

M.Eng. in Electrical Engineering and Computer Science, GPA: 4.5/5.0   June 2019
S.B. in Electrical Engineering and Computer Science, GPA: 4.9/5.0   June 2018

Relevant Coursework: Statistical Learning Theory and Applications, Robotics: Science and Systems, Bayesian Modeling and Inference, Machine Learning, Inference and Information, Design and Analysis of Algorithms, Computational Cognitive Science, Discrete-Time Signal Processing, Elements of Software Construction, Computation Structures

Thomas Jefferson High School for Science and Technology   **Alexandria, VA**

SAT: 2400, GPA (weighted): 4.538/4.0   September 2010 – June 2014

Relevant Coursework: Artificial Intelligence, Parallel Computing

RESEARCH EXPERIENCE

Cornell University   **Ithaca, NY**
Ph.D. Student   September 2020 – present
- Principal Investigators: Prof. Sarah Dean and Prof. Tapomayukh Bhattacharjee (March 2023 – present)
- Conducting research as a member of the EmPRISE (EMpowering People with Robots and Intelligent Shared Experiences) lab
- Research area: Developing contextual bandit algorithms with human querying and human cognitive load modeling in-the-loop for robot-assisted bite acquisition
- Principal Investigator: Prof. Mark Campbell (September 2020 – October 2022)
- Conducted research as a member of the ASL (Autonomous Systems Laboratory) group
- Research area: Developing reinforcement learning (RL) algorithms for the autonomous navigation domain that are robust to variations in the surrounding environment

Massachusetts Institute of Technology   **Cambridge, MA**
Research Engineer   June 2019 – June 2020
- Conducted research as a member of the DRL (Distributed Robotics Laboratory) group at CSAIL (Computer Science and Artificial Intelligence Laboratory)
- Refined autonomous driving simulation platform based on CARLA open-source driving simulator
- Validated research algorithms in simulation for vehicle navigation, dynamic obstacle avoidance, and end-to-end learning
- Supported research in language understanding and human-robot interaction involving the Toyota Human Support Robot platform

Massachusetts Institute of Technology   **Cambridge, MA**
M.Eng. Researcher   March 2018 – June 2019
- Principal Investigator: Prof. Daniela Rus
- Conducted research as a member of the DRL (Distributed Robotics Laboratory) group at CSAIL (Computer Science and Artificial Intelligence Laboratory)
- Thesis Title: "Development of a Simulation-Based Platform for Autonomous Vehicle Algorithm Validation"
- Developed autonomous vehicle simulation platform based on CARLA open-source driving simulator
- Investigated learning algorithms for LIDAR-based rural road detection

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Massachusetts Institute of Technology <div align="right">**Cambridge, MA**</div>
UROP (Undergraduate Research Opportunities Program) <div align="right">November – December 2017</div>
- Principal Investigator: Prof. Jonathan How
- Conducted research as a member of the ACL (Aerospace Controls Laboratory) group
- Contributed to the development of a tripod-based sensor platform for pedestrian localization and intention recognition
- Calibrated webcams and LIDAR (Velodyne VLP-16), and investigated power management options for tripod platform

Massachusetts Institute of Technology <div align="right">**Cambridge, MA**</div>
SuperUROP Advanced Undergraduate Research Program <div align="right">September 2016 – May 2017</div>
- Principal Investigator: Dr. Jim Glass
- Conducted research as member of the SLS (Spoken Language Systems) group at CSAIL (Computer Science and Artificial Intelligence Laboratory)
- Contributed to the development of a conversational robotic system that can acknowledge speaking subjects
- Converted offline Voice Activity Detector module into real-time streaming module
- Researched techniques for integrating visual face detection and audio source localization

George Mason University <div align="right">**Fairfax, VA**</div>
Applied Mathematics Intern, Aspiring Scientists Summer Internship Program <div align="right">June – August 2012, June – August 2013</div>
- Principal Investigator: Prof. Padmanabhan Seshaiyer
- Developed MATLAB simulation of 1D Euler-Bernoulli Beam PDE system (2012); Modeled deformation of 2D membrane PDE system in COMSOL (2013)
- Simulated lung tissue fluid-structure interaction in MATLAB and developed lung tissue edge detection Python program: Pneumothorax Modeling and Diagnosis (2012)

THESES

R. Banerjee, "Development of a Simulation-Based Platform for Autonomous Vehicle Algorithm Validation". MIT, 2019.

PUBLICATIONS

T. Ort, K. Murthy, **R. Banerjee**, S.K. Gottipati, D. Bhatt, I. Gilitschenski, L. Paull, and D. Rus, "MapLite: Autonomous Intersection Navigation Without a Detailed Prior Map," *IEEE Robotics and Automation Letters*, vol. 5, no. 2, pp. 556–563, 2020.

A. Amini, I. Gilitschenski, J. Phillips, J. Moseyko, **R. Banerjee**, S. Karaman, and D. Rus. "Learning Robust Control Policies for End-to-End Autonomous Driving From Data-Driven Simulation," *IEEE Robotics and Automation Letters*, vol. 5, no. 2, pp. 1143–1150, 2020.

R. Banerjee & P. Seshaiyer. "Computational Mechanics of a Coupled Flow-Structure Interaction Problem with Applications to Bio-Inspired Micro Air Vehicles," *International Journal of Aerospace and Lightweight Structures (IJALS)*, vol. 3, no. 3, pp. 399-407, 2013.

A.R. Bhandarkar, **R. Banerjee** & P. Seshaiyer, "On the Stability of Lung Parenchymal Lesions with Applications to Early Pneumothorax Diagnosis," *Computational and Mathematical Methods in Medicine*, vol. 2013, pp. 1-12, 2013.

INDUSTRY EXPERIENCE

Autoliv (now Veoneer) <div align="right">**Lowell, MA**</div>
Intern, Advanced Sensing Group <div align="right">June – August 2017</div>
- Developed mapping algorithm for LIDAR data (Velodyne HDL-64) using point cloud registration to maintain coherent point cloud history and advance lane/object tracking algorithms

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- Investigated mapping/registration techniques with lower-resolution (Velodyne VLP-32) LIDAR data to improve point cloud data resolution
- Investigated ego-motion estimation techniques with VLP-64 data to support vehicle localization

Northrop Grumman   **San Diego, CA**
Intern, Systems Integration, Test & Evaluation   June – August 2016
- Supported Systems Integration, Test & Evaluation for the Triton UAV (Unmanned Aerial Vehicle) program
- Developed Python test automation script for Triton test-bench landing test
- Co-developed SQL database for automated processing of Triton System Test Requests
- Improved upon Excel database for tracking flight requirements and test points
- Researched test automation methods for future modular hot-bench

NASA Goddard Space Flight Center   **Greenbelt, MD**
Intern, Mission Engineering and Systems Analysis Division   January 2015; June – August 2015; January 2016
- Contributed to the NICER (Neutron Star Interior Composition Explorer)/SEXTANT (Station Explorer for X-Ray Timing and Navigation) mission
- Updated 1PPS signal interrupt handler Linux kernel module for hardware timing and synchronization
- Co-developed simulator of bi-directional science and telemetry packet transmission with another intern

HONORS AND AWARDS

- Member, IEEE-HKN (Eta Kappa Nu), inducted 2018
- Fourth Place in Category: Mathematical Sciences, Intel International Science and Engineering Fair, Phoenix, 2013
- Regional Finals participant, Siemens Competition in Math, Science, and Technology, Atlanta, 2012

TEACHING EXPERIENCE

Cornell University   **Ithaca, NY**
Teaching Assistant, Foundations of Artificial Intelligence (CS 4700)   February – May 2021
- Developed problem set and exam questions
- Recognized by Prof. Haym Hirsh at Cornell CS Student Recognition Event (May 2021)

Cornell University   **Ithaca, NY**
Teaching Assistant, Introduction to Machine Learning (CS 4780)   September – December 2020
- Developed problem sets in coordination with undergraduate TAs
- Conducted office hours to assist students with concepts and problem sets

Massachusetts Institute of Technology   **Cambridge, MA**
Teaching Assistant, Introduction to Probability (6.041/6.431)   September – December 2018, February – May 2018
- Taught weekly tutorial problem-solving sessions to small student groups
- Conducted office hours to assist students with concepts and problem sets

Massachusetts Institute of Technology   **Cambridge, MA**
Lab Assistant, Introduction to Electrical Engineering and Computer Science I (6.01)   February – May 2015
- Assisted students with in-class Software Labs and engineering Design Labs

SERVICE

- Participated in Cornell Student-Applicant Support Program, assisting 2 prospective PhD applicants with preparing application materials (2022)

PROJECTS

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Generating Simulated Environments for 2D Path Planning Using Deep Conditional Generative Models   Ithaca, NY
Class Project, Deep Probabilistic and Generative Models (CS 6783)   February 2021 – May 2021
- Explored the application of deep generative models to the problem of generating simulated 2D map environments
- Experimented with conditional variational autoencoder (CVAE) and PixelCNN architectures on a synthetic 2D dataset

3D Point Cloud Clustering Using Small-Variance Asymptotics   **Cambridge, MA**
Class Project, Bayesian Modeling and Inference (6.882)   March 2018 – May 2018
- Explored Bayesian non-parametric clustering of 3D point cloud data using small-variance asymptotics approximate inference algorithms
- Implemented Kulis and Jordan (2012) small-variance asymptotics algorithm for DP-GMM and Straub et al. (2015) algorithm for DP-vMF-MM in Python

MIT Unmanned Aerial Vehicle Team   **Cambridge, MA**
Student Participant   September 2014 – September 2017
- Developed refined 2D simulator of competition arena and agent dynamics for the International Aerial Robotics Competition as simulation team lead
- Managed development of computer vision gridline and circle detection Python programs as computer vision team lead
- Co-developed Python simulator of competition arena and contributed to UAV path planning algorithms as member of artificial intelligence team

SKILLS

Programming Languages: Python, MATLAB, C++, Java, C, HTML, LaTeX
Frameworks/Libraries: PyTorch, ROS, Scikit-learn