

Rohan Banerjee

Address: 2907 Blue Holly Lane, Oak Hill, VA 20171

Phone: (703)-743-4178 E-Mail: rbb242@cornell.edu

EDUCATION

Cornell University

Ph.D. Student, Computer Science, GPA: 4.0/4.0

Ithaca, NY

September 2020 – present (expected: September 2025)

Relevant Coursework: Deep Probabilistic and Generative Models, Matrix Computations

Massachusetts Institute of Technology (MIT)

M.Eng. in Electrical Engineering and Computer Science, GPA: 4.5/5.0

S.B. in Electrical Engineering and Computer Science, GPA: 4.9/5.0

Cambridge, MA

June 2019

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

SAT: 2400, GPA (weighted): 4.538/4.0

Alexandria, VA

September 2010 – June 2014

Relevant Coursework: Artificial Intelligence, Parallel Computing

RESEARCH EXPERIENCE

Cornell University

Ph.D Student

Ithaca, NY

September 2020 – present

- Currently working with Prof. Mark Campbell as a member of the ASL (Autonomous Systems Laboratory) group
- Research area: Applying Bayesian reinforcement learning (RL) algorithms to the problem of autonomous agent navigation in the presence of uncertain knowledge about the environment

Massachusetts Institute of Technology

Research Engineer

Cambridge, MA

June 2019 – June 2020

- Conducting research as a member of the DRL (Distributed Robotics Laboratory) group at CSAIL (Computer Science and Artificial Intelligence Laboratory)
- Refining autonomous driving simulation platform based on CARLA open-source driving simulator
- Validating research algorithms in simulation for vehicle navigation, dynamic obstacle avoidance, and end-to-end learning
- Supporting research in language understanding and human-robot interaction involving the Toyota Human Support Robot platform

Massachusetts Institute of Technology

M.Eng. Researcher

Cambridge, MA

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

Massachusetts Institute of Technology

UROP (Undergraduate Research Opportunities Program)

Cambridge, MA

November – December 2017

- 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

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Massachusetts Institute of Technology

SuperUROP Advanced Undergraduate Research Program

Cambridge, MA

September 2016 – May 2017

- 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

Applied Mathematics Intern, Aspiring Scientists Summer Internship Program

Fairfax, VA

June – August 2012, June – August 2013

- 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)

INDUSTRY EXPERIENCE

Autoliv (now Veoneer)

Intern, Advanced Sensing Group

Lowell, MA

June – August 2017

- 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
- 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

Intern, Systems Integration, Test & Evaluation

San Diego, CA

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

Intern, Mission Engineering and Systems Analysis Division

Greenbelt, MD

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

Intel International Science and Engineering Fair

Fourth Place in Category: Mathematical Sciences

Phoenix, AZ

May 2013

Siemens Competition in Math, Science, and Technology

Selected for Regional Finals at Georgia Tech for biophysics project

Atlanta, GA

November 2012

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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.

TEACHING EXPERIENCE

Cornell University

Teaching Assistant, Foundations of Artificial Intelligence (CS 4700)

Ithaca, NY

February – May 2021

- Developed problem set and exam questions
- Recognized by Prof. Haym Hirsh at Cornell CS Student Recognition Event (May 2021)

Cornell University

Teaching Assistant, Introduction to Machine Learning (CS 4780)

Ithaca, NY

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

Teaching Assistant, Introduction to Probability (6.041/6.431)

Cambridge, MA

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

Lab Assistant, Introduction to Electrical Engineering and Computer Science I (6.01)

Cambridge, MA

February – May 2015

- Assisted students with in-class Software Labs and engineering Design Labs

PROJECTS

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

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MIT Unmanned Aerial Vehicle Team

Student Participant

Cambridge, MA

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