# Hardik Gupta


Contact Information

University of Minnesota
Twin Cities, MN, USA

Email : gupt0414@umn.edu
Links : LinkedIn, Webpage


## Education

**University of Minnesota, Twin Cities** *Aug 2023 - Present*
*Master of Science (M.Sc.) in Robotics*
**Courses** : Artificial Intelligence, Machine Learning, Computer Vision, Security in Computing, DSA

**Birla Institute of Technology and Science (BITS), Pilani** ; India *Jun 2023*
*Bachelor of Engineering (B.E.) in Mechanical Engineering & Master of Science (M.Sc.) in Biological Sciences*
**Courses** : Robotics, Autonomous Mobile Robotics, Engineering Optimization, Vibrations and Control

## Publications

**The Phylogenetic Study of the CRISPR-Cas System in Enterobacteriaceae** *Apr 2023*
*Springer - Current Microbiology*
We systematically investigate the evolutionary framework of the CRISPR-Cas system in six Enterobacteriaceae species and its evolutionary association with housekeeping genes as determined by the gyrB phenogram. These results advance our understanding of the dynamics of the CRISPR-Cas system.

## Projects

**Cluster neuron morphologies via hand-drawn sketching** *Jan 2024 - Present*
*Under the supervision of Prof. Qianwen Wang*
Studying and Clustering Neuron Morphologies from large microscopy datasets via hand-drawn sketching. We are actively looking to different clustering algorithms and dimension reduction to process that. After Feature Extraction to extract relevant features and performing clustering and integration of hand drawn sketches for the same.

**Apple Counting and Detection** *Dec 2023*
*In-fulfillment of the course Computer Vision*
The project is broken into reconstruction, detection, filtering and counting. we reconstruct the scene in 3 dimensions. Using these segmentations and 3-dimensional reconstructions, filter out apples that are not within our region of interest (ground, etc.). Given regions of interest containing apples, count the number of apples are within each region.

**Solving Crossword using Constraint Satisfaction Problem** *Dec 2023*
*In-fulfillment of the course Artificial Intelligence*
Solving and filling the crossword using the list of words (dictionary of words) fulfilling unary, binary constraints and enforcing AC-3 and backtracking.

**Conversion of RGB to Thermal Images using GANs** *May 2021*
*Contributed to the team at CSIR - CEERI*
Formulated a Generative Adversarial Network using the CycleGAN pipeline for the conversion of RGB Images to Thermal Images and analyzed the cross-modality of both images for object detection for use in the autonomous vehicles industry.

## Experience

**Union Bank of Switzerland** Mumbai, India
*Finance Analyst Intern* *Feb 2023 - Jun 2023*

- Automated the analysis of Pension IPV, prepared the CPV graphs for clients increasing the efficiency of the team.
- Worked with Python & its essential libraries and also used several internal UBS reporting tools, Totem and Bloomberg to report and analyse various financial figures.
- Led a training session on Technology in Finance for 18 senior team members, focusing on NumPy libraries used in finance.

## Research

**MARMOT Lab, National University of Singapore** — Singapore
*Under the supervision of Prof. Sartoretti Guillaume and Prof. Saket Verma* — *Sep 2022 - Dec 2022*

- Programmed the Nonlinear Model Predictive Control of the single robotic system for collision avoidance in a dynamic obstacle environment.
- Simulated the problem of MAV reactive collision avoidance by employing a model-based controller and scaled the system to a two-robot system

**BRAIL Lab, Indian Institute of Technology** — Guwahati, India
*Under the supervision of Prof. Shyamanta M. Hazarika* — *May 2022 - Jul 2022*

- Analyzed Force-Signals using Haar Wavelet Transform to detect slip and load, which identified the appropriate force range for grasping
- Embedded Force-sensing resistors, encoders, and DC motors for the model to identify prosthetic grasping slip and load
- Currently working on a review article for grasping and its implications on prosthetics and robotics as the first author under the supervision