

VISWESH N

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Education

Indian Institute of Technology Kharagpur

April 2024

Major: B.Tech. Electrical Engineering | **Specialization:** Artificial Intelligence and Applications

GPA - 8.56/10.0

Research Interests

Robotics | Reinforcement Learning | Motion Planning | Perception | Optimal Control | Automation

Publications

1. [RE] "From Goals, Waypoints & Paths To Long Term Human Trajectory Forecasting" [Link](#)

Accepted at ReScience C 2022

2. [RE] "Cross Layer Refinement Network for Lane Detection" [Link](#)

Submitted at ML Reproducibility Challenge 2022

Experience

University of Toronto

Toronto, Ontario

Research Intern under | [Prof. Igor Gilitschenski](#)

May 2023 – Present

- Implemented a 2 stage pipeline for online dynamics estimation of an autonomous vehicle in unforeseen environments
- Optimized the pipeline to achieve MSE values of 0.0037 for short term prediction and 0.0069 for long term prediction
- Benchmarked the results on a 1/10th scale autonomous car and implemented the ROS stack to visualize the results

University of California, Berkeley

Berkeley, California

Research Intern | [Mechanical Systems Control Lab](#)

Oct 2022 – Present

- Working on a novel pipeline to devise a scalar metric to quantify similarities among multi agent RL environments
- Implemented Population play and Fictitious Co play multi agent methods to obtain rewards of 118 and 124 on meltingpot
- Reproduced the results of the overcooked-ai work aimed to demonstrate behaviour cloning in Human - AI coordination

Indian Institute of Science Bangalore

Bangalore, India

Research Intern | [Stochastic Robotics Lab](#)

Apr 2022 – Present

- Benchmarked the Soft Actor Critic algorithm on the Stochlite quadruped in Isaac Gym to achieve a reward of over 350
- Worked on the ROS framework, Gazebo and RViz visualization of the Stochlite quadruped to implement off policy ARS

Drive Analytics

Chennai, India

Deep Learning and Computer Vision Intern | [\[Certificate\]](#)

Dec 2021 – Feb 2022

- Developed an end-to-end pipeline for the detection of basketballs using YOLOv5 in real-time to obtain an mAP of 80%
- Generated a dataset using tracking algorithms and benchmarked several object detection algorithms on the same

Autonomous Ground Vehicle Research Group

IIT Kharagpur

Undergraduate Researcher | [\[Certificate\]](#)

May 2021 – Present

- Benchmarked basic planning and path tracking algorithms such as Stanley, Pure pursuit for traversal on turtlebot3
- Implemented and tested various CNN architectures including ENet, UNet, VGGNet and AlexNet on standard datasets
- Inducted a team of freshmen after rigorous task rounds; guiding the trajectory prediction and control systems module

Projects

Reinforcement Learning for bipedal walking | [\[Presentation\]](#) [\[Paper\]](#) [\[Video\]](#) **August 2022 – October 2022**

- Implemented reward shaping and integrated with ray rllib to ensure stable convergence using 5 different seeds
- Implemented the Proximal Policy Optimization algorithm on the BipedalWalker-v environment on OpenAI Gym
- Performed hyperparameter search and implemented generalized advantage estimation to achieve average reward of 386

Reproduction of a trajectory prediction architecture

October 2021 – February 2022

Machine Learning Reproducibility Challenge 2022 | [Guide: Dr. Debashish Chakravarty](#)

- Reproduced the results of a paper based on Y Net, a trajectory prediction architecture for pedestrians
- Performed ablation studies, hyperparameter search and preprocessed raw InD, ETH/UCY and SDD datasets
- Proposed a novel transfer learning experiment that improved on state of the art methods to achieve an ADE of 4.59

Localization and Mapping of an Autonomous Racing car | [\[Github\]](#)

July 2021 – August 2021

Indy Autonomous Challenge 2021 | [Guide: Dr. Debashish Chakravarty](#)

- Used PointCloud and Odometry data from Carla Simulator and generated PCD files of the map in Open3D
- Implemented KD-tree search algorithm to obtain the local map of the autonomous racing vehicle to optimize ICP
- Implemented ICP Algorithm to localize the vehicle and achieved an improvement of 20cm over Odometry data

Unmanned Rover for Astronaut Assistance

May 2021 – December 2021

University Rover Challenge 2022 | [Guide: Dr. Debashish Chakravarty](#)

- Developed the ROS2 packages to implement the Ackermann steering drive system for an unmanned rover
- Performed static and dynamic simulations of the rover to optimise for load carrying, gradeability and handling.

Hand Gesture controlled bot | [\[Github\]](#) [\[Presentation\]](#) [\[Video\]](#)

June 2021 – July 2021

- Used Mediapipe to translate over 6 hand gestures into translation and rotational actuations of a two-wheeled robot
- Benchmarked on hardware successfully to achieve translation, rotation clawing of objects for industrial manipulation

Technical Skills

Languages and Frameworks: C, C++, Python, MATLAB, Git, ROS, ROS2, RViz, Gazebo

Libraries: Eigen, PyTorch, Numpy, TensorFlow, OpenCV, matplotlib, pandas, Arduino, Open3D, PCL, wandb

CAD/CAE: Simulink, TinaTI, LTSpice, Proteus, Solidworks, AutoCAD, Circuit Maker

Simulations: Gazebo, CARLA, OpenAI Gym, NVIDIA Isaac Gym **Others:** LaTeX,

Relevant Coursework

Software: Deep Learning, Convolutional Neural Networks, Recurrent Neural Networks, Programming and Data Structures, Artificial Intelligence, Reinforcement Learning

Mechatronics: Signals and Systems, Basic Engineering Mechanics, Analog Electronic circuits, Digital Electronic circuits, Control Systems Engineering, Digital Signal Processing

Robotics: Programming for Robotics- ROS, [Autonomous Robotics](#)

Mathematics: Advanced calculus, Linear Algebra, Numerical analysis, Probability and Statistics, Stochastic Processes

Teaching Experience

Mechatronics and Deep Learning Mentor

IIT Kharagpur

Autonomous Ground Vehicle Research Group

May 2022 - Present

- Mentoring a team of 18 freshmen on introductory robotics work in the domain of computer vision and control systems

Student Mentor, Electrical Engineering

IIT Kharagpur

Student Welfare Group, IIT Kharagpur

Nov 2022 - July 2023

- Mentored 4 freshmen of the Electrical Engineering department at IIT Kharagpur for improved academic performance

Autonomous Robotics Mentor

IIT Kharagpur

IEEE Winter Workshop | [\[Certificate\]](#)

April 2022

- Mentored 160+ first year students in robotics by teaching them about ROS, RViz, Gazebo and Arduino basics

Achievements

- Received the prestigious **MITACS GRI 2023** scholarship and a grant of over 9000 CAD to pursue summer research internship at the **Toronto Intelligent Systems Lab** at **University of Toronto** under **Prof. Igor Gilitschenski**
- Among the **25** Indian recipients of the **DAAD Wise 2023** scholarship to conduct research at **TU Darmstadt**
- Invited for a poster presentation at **NeurIPS 2022** for winning the **ML Reproducibility Challenge 2022**
- Awarded the **IIT Kharagpur Foundation Scholarship** to pursue research internship at **UC Berkeley**
- Ranked **in the top 10%** in major in the department of Electrical Engineering among 200+ undergraduate students
- Participated in **Google Hash Code 2021** | [\[Certificate\]](#)
- Ranked among the top **0.19%** out of over 1.3 million candidates in the Joint Entrance Examinations 2020
- Ranked among the top bracket of students in the National Standard Examination in Physics 2019
- Received Subject topper awards in Computer Science in AISSCE examinations 2020, scoring 99%
- Secured Rank 1 in the Computer Science stream in Grade 11, scoring 94%
- Received cash prizes of upto 20,000 INR for Mathematics contests throughout high school

Extracurriculars

- Member at English Dramatics Society and Debating Society IIT Kharagpur
- Member of the Football team and Athletics team at Meghnad Saha hall, IIT Kharagpur
- Recipient of the Black Belt in Isshinryu Karate
- Participated and won several prizes in Model United Nations conferences, including the prestigious Chennai Model United Nations hosted by the American International School, Chennai; active member of football team at School
- Volunteer and National Service Scheme, IIT Kharagpur (2020 - 2022)