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 - 9.07

Chettinad Vidyashram **2020**
CBSE Class XII , PCM + Computer Science 98.2%

Vidya Mandir Senior Secondary School **2018**
CBSE Class X 94.8%

Research Interests

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

Publications

Review of "From Goals, Waypoints & Paths To Long Term Human Trajectory Forecasting"
ReScience C 2022 | *Link*

Authors :, Abhishek Shukla*, Sourya Roy*,Yogesh Chawla*,Avi Amalanshu*,Shubhendu Pandey*, Rudransh Agrawal*, Aditya Uppal*, **Viswesh N***, et.al [Accepted]

* - equal contribution

Experience

University of California, Berkeley **California, USA**
Research Intern | *Mechanical Systems Control Lab* *Oct 2022 – Present*

- Working on implementing Fictious Co play, a method to improve Human-AI coordination in multi agent benchmarks
- 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*

- Working on a novel endfoot trajectory generation method for stone stepping in robotic quadruped locomotion
- 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 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

Perception and Control of a mobile robot **September 2022 – Present**
Intelligent Ground Vehicle Challenge 2023 | Guide: Dr. Debashish Chakravarty

- Designing a perception and control pipeline for the autonomous navigation and tracking of GPS waypoints
- Implemented a PID controller for precise speed control with a velocity-steer profile to be integrated with a path tracker

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

- 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 Reproduciblity 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

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

- Ranked **in the top 10%** in major in the department of Electrical Engineering among 200+ undergraduate students
- Particpated 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, IIT Kharagpur
- Member at 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 quizzes; Finalist in the Landmark Independence Day Quiz
- Particapted 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)