NAVODIT CHANDRA

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EDUCATION

Carnegie Mellon University   Pittsburgh, USA
Master of Science in Mechanical Engineering - Advanced Study   Dec 2022
GPA: 3.97/4.0
Selected Coursework: Machine Learning and Artificial Intelligence, Deep Learning, Computer Vision, Trustworthy AI Autonomy, Numerical Methods in Engineering, Linear Control Systems

Indian Institute of Technology Kanpur   Kanpur, India
Bachelor of Technology in Mechanical Engineering | Graduated with Distinction   May 2021
CPI: 9.1/10.0
Selected Coursework: Fundamentals of Computing, Robot Motion Planning

SKILLS

Programming Languages: *Proficient*: Python, C++, *Familiar*: SQL, Java, HTML
Libraries: PyTorch, OpenCV, Gym, NumPy, Pandas, Matplotlib, Scikit-learn
Software and Tools: Linux (Ubuntu), CARLA, MATLAB, MAPLE, Arduino, Git, AutoCAD, Latex

RESEARCH EXPERIENCE

Carnegie Mellon University   Pittsburgh, USA
Graduate Researcher, Mechanical and Artificial Intelligence Lab   May 2022 - Dec 2022
- Generated a dataset consisting of **RGB images** and **LIDAR point cloud** in autopilot mode on CARLA simulator
- Refined **image** and **point cloud** feature maps processed by ResNet neural network architecture by introducing **Convolutional Block Attention Module**
- Improved **Driving Score** evaluation metric by **9.5%** by implementing **Additive Attention** for computation of alignment scores in **transformer block** used to combine intermediate image and LiDAR feature maps
- Experimented model performance in simulation by replacing **Self-Attention module** with **Cross-Attention module**

Indian Institute of Technology Kanpur   Kanpur, India
Students-Undergraduate Research Graduate Excellence Fellow, Energy Conservation & Storage Lab   May 2019 - July 2019
- Studied effects of gas velocity, operating current, surface wettability and capillary number on a **PEM Fuel Cell** operation by means of a **parametric study**

RELEVANT PROJECTS

End to End Learning for Self-Driving Cars   Feb 2022 - Apr 2022
- Predicted **steering angle** of a self-driving car from images captured by it by developing an **end-to-end** learning pipeline
- Accomplished reasonably good performance on training and testing tracks by executing **CNN** and **CNN-LSTM** neural network topologies in a team of 2

Modeling and Study of Adversarial Attacks Arising from Deceiving Perception in Car Autopilot   Feb 2022 - Apr 2022
- Collaborated in a team of 3 and simulated a **real-life incident** of tricking a self-driving car to misidentify **moon** as a **yellow traffic light** deploying a targeted **adversarial attack algorithm**
- Executed **PGD algorithm** to trick autopilot system and carried out adversarial training as an effective **adversarial defensive technique** to avert such safety-critical scenarios

Seven Segment Digit Recognition using Computer Vision   Mar 2022 - Apr 2022
- Collaborated with 2 colleagues and developed an **algorithm** to take readings from electronic devices
- Enhanced **accuracy** by **7.8%** and **speeded up** process of taking readings by **10.4 times** in comparison to average computer typists by utilizing **image processing** operations and **computer vision techniques**

Depth Estimation leveraging Stereo Vision and Generation of 3D Point Cloud   Apr 2022 - Apr 2022
- Found **depth** of each pixel from a **disparity map** produced by a pair of parallel **stereo images** to calculate distance of objects present
- Generated colored **3D point cloud** for visualization and verification of correctness of scaling ratio used to estimate depth

Identification of Abnormal Breasts as Potential Cancers using Machine Learning   Oct 2021 - Dec 2021
- Applied **feature engineering** leveraging **shallow machine learning** algorithms in a joint effort with 2 colleagues to estimate **minimum** number of **features** to predict whether tumors were malignant or benign
- Achieved an **implementation time** of **4.61 ms** and an **accuracy** of **100%** using a single feature with the K-Nearest Neighbor algorithm found to be best at making predictions

Controllers for Unmanned Ground Vehicle   Nov 2021 - Dec 2021
- Designed **longitudinal PID** and **lateral PID**, full **state feedback** and **optimal controllers** in Python and simulated the path followed by vehicle on Webots simulator
- Bagged position in **top 20%** in terms of **completion time** of track by implementing A* **path planning algorithm** and **EKF SLAM** to control the vehicle in absence of sensor input