NAVODIT CHANDRA

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EDUCATION

Carnegie Mellon University (CMU) Pittsburgh, USA
Master of Science | GPA: 3.97/4.00 Dec 2022
Relevant Coursework: Machine Learning & Artificial Intelligence, Deep Learning, Computer Vision, Trustworthy AI Autonomy, Numerical Methods, Linear Control Systems, Robot Dynamics & Analysis

Indian Institute of Technology (IIT) Kanpur Kanpur, India
Bachelor of Technology | GPA: 9.1/10.0 May 2021

SKILLS

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

Identification of Abnormal Breasts as Potential Cancers using Machine Learning (CMU) 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

Prediction of House Price Residual Error (CMU) Nov 2021 - Nov 2021

- **Loaded** and **visualized real world dataset**, performed **data cleaning**, applied **non-linear regression** models and implemented **k-fold cross validation** to prevent overfitting

End to End Learning for Self-Driving Cars (CMU) 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 & Study of Adversarial Attacks Arising from Deceiving Perception in Car Autopilot (CMU) 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 (CMU) Mar 2022 - Apr 2022

- Collaborated with 2 colleagues and developed an **algorithm** to take readings from electronic devices making use of seven-segment display
- 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 (CMU) Mar 2022 - Apr 2022

- Found **depth** of each pixel from **disparity map** produced by a pair of **parallel stereo** images to calculate **distance** of objects present
- Generated a **3D point cloud** for visualization and verification of correctness of **scaling ratio** used to find depth

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