NAVODIT CHANDRA

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EDUCATION

Carnegie Mellon University (CMU) Pittsburgh, PA
Master of Science in Mechanical Engineering - Advanced Study Dec 2022
GPA: 4.0/4.0
Selected Coursework: *Machine Learning and Artificial Intelligence, Deep Learning, Computer Vision, Trustworthy AI Autonomy*

Indian Institute of Technology Kanpur (IIT Kanpur) Kanpur, India
Bachelor of Technology in Mechanical Engineering | Graduated with Distinction May 2021
GPA: 9.1/10.0

SKILLS

Programming Languages: *Advanced***:** Python, *Intermediate*: C/C++, *Familiar***:** SQL, Java, HTML
Libraries: PyTorch, TensorFlow, 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, PA
Graduate Researcher, Mechanical and Artificial Intelligence Lab May 2022 - Present

- Generated a dataset consisting of **RGB images** and **LiDAR point cloud** operating autopilot mode on CARLA simulator
- Refined **image** and **point cloud** feature maps processed by ResNet neural network architecture by introducing **Convolutional Black Attention Module**
- Improved **driving score** 1.5 times and **route completion score** 2 times by replacing **self attention** module by **cross attention** module in transformer block used to combine intermediate feature maps
- Researching different kinds of **attention mechanisms** which could lead to optimal driving performance of vehicle

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**
- **Presented** work as **first author** at 25th National and 3rd International ISHMT-ASTFE Heat and Mass Transfer Conference **(IHMTC-2019)** in Dec 2019

ACADEMIC PROJECTS

Carnegie Mellon University Pittsburgh, PA

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 devices using 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 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 a colored **3D point cloud** for visualization and verification of correctness of scaling ratio used to find depth

Edge Detection Apr 2022 - Apr 2022

- Detected edges in images by implementing a **Sobel filter** from **scratch** and applying **Canny edge detection** with **increased performance** by tuning parameters

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

Prediction of House Price Residual Error 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