

Farhan Rahman

CONTACT INFORMATION	Graduate Student University of Toronto Toronto, Canada.	Phone: (+1) 6479362933 E-mail: farhanrahman.rahman@mail.utoronto.ca Website: Farhan Rahman
SUMMARY	I am a passionate graduate student at University of Toronto well-versed in Deep Learning and Computer Vision. My previous experiences assisted me to develop a good grasp in practical implementation of both supervised and unsupervised learning. My interests are inclined towards developing ML/Deep Learning and computer vision pipelines for application purposes. Looking forward to expand my skills and contribute to my best abilities.	
EDUCATION	University of Toronto , Toronto, Canada Master of Engineering(Electrical and Computer) Vellore Institute of Technology , Chennai, India Bachelor's in Technology(Electronics and Communication)	January 2021– Present (GPA 4.0/4.0) June 2016 – August 2020 (GPA 3.89/4.0)
TECHNICAL SKILLS	Programming and Scripting Languages: Python, C, C++, SQL, HTML, XML, Java Operating Systems: Windows, Linux, Mac OSX Tools and Skills: Google Tensorflow, Tensorflow lite, PyTorch, Caffe, SpaCy, NetSim, GNS3, Python Flask, Amazon Web Services, Heroku, OpenCV, Git, Trello, CUDA, IBM Watson, Flutter, Latex, MATLAB, LT Spice, PSpice, Arduino, Seed, Azure Studio, Hadoop, Apache Spark, Google Cloud AutoML, React js, R, Tableau, Power BI, HTML, CSS. Database Tools: Oracle, MySQL, MongoDB, Firebase	
TEACHING EXPERIENCE	University of Toronto , Toronto, Canada. MIE253H1-Data Modelling <ul style="list-style-type: none"> • Conducting office hours for an assigned group of students. • Designed course material for the course which comprised of data base management. • Grading assignments and quiz for the students. University of Toronto , Toronto, Canada.	January 2022 – May 2022 January 2022 – May 2022
EXPERIENCE	Lawrence S. Bloomberg Faculty of Nursing , Toronto, Canada. Computer Vision Engineer <ul style="list-style-type: none"> • Working as Computer Vision Engineer under the supervision of Dr. Charlene Chu. • Designed a pose estimation for detecting recovery rate in patients. • Created a website to host the computer vision model to have inference on images and videos. • Managed the website traffic load and implemented an API for live camera inference. Dalla Lana School of Public Health , Toronto, Canada.	May 2022 – Present January 2022 – Present
	Computer Vision Developer <ul style="list-style-type: none"> • Working as Computer Vision pipeline developer under the supervision of Dr. Elham Dolatabadi and Dr. Allan Kember. • Data cleaning and extraction from raw EEG/ECG and SpO2 levels in patients. • Working in the physiology phase of the sleep study in pregnant women during trimester phase. • Deployed model for human movement tracking like FlowNet, RAFT and DeepFlow. • Designed a custom computer vision algorithm for Obstructive Sleep Apnea Prediction using Infrared Cameras. Jacobb , Montreal, Canada.	April 2022 – Present
	Computer Vision Engineer <ul style="list-style-type: none"> • Visualised a 3D scene in GTLF format and carried out data transformation. • Deployed a pre trained object detection model for 3D mesh. 	

- Assisted in the pipeline development while suggesting the best way to carry out mesh completion in a 3D scene.
- Data Manipulation for converting 3D objects into different formats like .obj, .glp format.

Axibo, Cambridge, Canada.

January 2022 – Present

Software Engineer

- Curated a custom dataset for object detection for wide angle camera images.
- Designed a Computer Vision API to detect objects using openCV and deep learning models for object detection.
- Deployed low latency and scalable machine learning models to be deployed in TPU and mobile phones.
- Worked on integrating the detection pipeline into the company software to facilitate the company hardware.
- Developed a pipeline for Human pose estimation and to identify a person out of multiple subjects using state of art models like DeepSort, Sort and YoloV4.

Cilia AI, Montreal, Canada.

February 2022 – Present

Project Intern(Computer Vision)

- Designing Machine Learning pipeline for artwork detection in Museums.
- Using models which can be deployed on a server and used by client on a low end mobile device.
- Designed the user and the admin interface for the web application.
- Building on self supervised and semi supervised learning for object detection which can be customised to delete data and to update a dataset.

MemeSpeak, Toronto, Canada.

September 2021 – December 2021

Freelance Deep Learning Intern

- Designed custom temporal Generative Adversarial Network(GAN) to generate speech driven animation of talking heads.
- Successfully used audio clip to synchronize with the viseme head motions with a framing window of 5ms.
- With the help of custom layers designed the autoencoders to get the speech feature vector and learned the model parameters by back propagating through them.
- Used GRID, CREMA and LSW dataset for model training to get an accuracy of 93%.
- Achieved an accuracy of 95.89% to get talking head for audio-video synchronisation.

Signals Multimedia and Security Lab, Toronto, Canada.

August 2021 – Present

Graduate Student Researcher

- Incorporating deep learning models in the field of antenna communication.
- Replacing classical numerical methods with machine learning models.
- Using quantized model for unsupervised learning to optimize the beam forming vector in a communication channel.

University of Toronto, Toronto, Canada.

January 2021 – June 2021

Deepa Kundur Research Group(Electric Vehicle Security)

- Assessed real world problems in Electric Vehicle Security during charging in the CAN(Control Area Network) bus data.
- Generated synthetic data using Generative adversarial network (GAN) and carried out classification task.
- Deployed anomaly detection LSTM (Long short Term Memory) Recurrent Neural network (RNN) for supervised deep learning of time sequence data with over 87% accuracy.
- Implemented multi-class classification and categorized the attacks as DoS, fuzzy, impersonation and no attacks with accuracy of 96% in python using tensorflow backend.

Yuan Ze University, Taoyuan City, Taipei, Taiwan.

June 2020 – July 2020

Deep Learning Intern

- Extracted raw EEG/ECG data from over 50 patients from National Taiwan University Hospital.
- Converted the raw time sequence data into spectrogram images using image processing techniques in MATLAB and R to carry out novel Deep Learning Models.
- Successfully generated image classification of patients into different levels of Depth of Anesthesia using libraries like OpenCV.

- Created a VGG16 Convolutional Neural Network for feature detection and medical image analysis with accuracy of 96%.

ERNET India, Chennai, Tamil Nadu, India.

Nov 2019 – April 2020

Research Intern

- Deployed multi-sensor fusion for air quality index calculation in public transportation.
- Created a Narrow Bandwidth Internet of Things(Nb-IoT) system with Wio LTE Nb-IoT board, which was the primary goal of the startup project.
- Attained an accuracy of 98% with Naive Bayes and Deep Neural Network Model implemented using python libraries such as NumPy, SciKit-Learn, matplotlib and keras.

PROJECTS

BreatheEZ: Estimating Pose for Enhancing your Immunity

[Link](#)

- Received grant from University of Toronto towards Student Engagement Award.
- Generated a web application for patients recovering from COVID-19.
- Deployed pose estimation models with the help of mediaPipe Libraries for detecting the correct pose of the patients during breathing exercises.

Deep Query Attack: Reinforcement Learning approach

[Link](#)

- Proposed a query attack to generate adversarial examples.
- Used actor/critic policy to get rewards and possible outcomes and successfully perturbed images using a tiling approach.

BOSCH Future Mobility Challenge

Ongoing

- Implementing algorithms for autonomous driving.
- Successfully implemented object recognition models like YOLO and edge detection for image segmentation.
- Incorporated SLAM and other area localisation algorithms and attained parallel computing of different modules in the vehicle.
- Using computer vision extracting the path to be followed by the vehicle.

3D GraphNet for traffic inflow prediction

[Link](#)

- Designed a 3D stack convolutional layer model for GraphNet incorporation.
- Used real time datasets like TAXI-NY and PEMS-Bay for model implementation.
- Learned the feature dependencies successfully between the traffic flow.

Analyzing the Brain MRI scan images

[Link](#)

- Using the health care image dataset, successfully designed a classification task for samples that were malicious.
- Deployed various Deep Neural Network- Convolutional Neural Network for learning the internal features and characteristics of the images.
- Designed a VGG16 CNN with 98.7% accuracy for the classification task.

Pre-processing and generating spectrograms of EEG/ECG signals

[Link](#)

- Used framing window to generate inference data set in MATLAB.
- Replaced missing values with valuable data from the existing data set.
- Generated Spectrogram plots which depicts the concentration of anesthesia in each patient using pyTorch framework.

Face Modifier using StyleGAN

[Link](#)

- Implemented a face modifier based on stylegan2encoder.
- Successfully eliminated the occurrence of artifacts and distortion in the picture.
- Added features like changing the age, race and features of the test input.

3D Photography using Context-aware Layered Depth Inpainting

[Link](#)

- Estimated the depth with MiDaS and created Layered Depth Image(LDI) representation.
- Detected regions with high depth difference(context/synthesis region).
- Merged the background and the cut objects into new LDI.

RESEARCH
PORTFOLIO

- Farhan Rahman, Mossadek Kamal Tushar Hossain, Deepa Kundur. “Detection and Generation of attacks in CAN BUS using a Generative Adversarial Network and LSTM”. (*Ongoing*)
- Ravichandra Madanu, Farhan Rahman, Maysam F. Abbod, Shou-Zen Fan, Jiann-Shing Shieh. “Depth of anesthesia prediction via EEG signals using convolutional neural network and ensemble

- empirical mode decomposition ". *Mathematical Biosciences and Engineering*, May 2021.
- Farhan Rahman, Siddharth Singh. "Enhancement of A5/1 Stream Cipher with Non-Linear Function using MOSFET", *International Journal of Engineering and Advanced Technology (IJEAT)*, December 2019.