

William C Francis

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EDUCATION

University of Pennsylvania M.S.E. IN ROBOTICS

Graduation data: May 1, 2023
Start availabiltiy: May 22, 2023
| Philadelphia, USA

VIT University

B.TECH IN ELECTRICAL AND
ELECTRONICS,
MINOR IN COMPUTER SCIENCE
June 2020 | Chennai, India
CGPA: 8.99 / 10

COURSEWORK

Graduate

Machine Learning
Applied Machine Learning (TA)
Principles of Deep Learning
Deep Learning in Data Science
Graph Neural Networks
Computer Vision
Advanced Topics in Computer Vision
Learning in Robotics
Autonomous Racing

Undergraduate

Machine Learning
Neural Networks
Data Structures & Algorithms
Python & C Programming
Object Oriented Programming
Computer Architecture
Statistics

SKILLS

Languages

Python • C++ • MATLAB • C • JAVA
• C# • \LaTeX • SQL • R • Octave

Frameworks & Libraries

Pytorch • Tensorflow • Keras
• FastAI • OpenCV • Pandas • NumPy
• Matplotlib • AWS Cloud • ROS2 • Linux
• Git • scikit-learn • LightGBM

PUBLICATION

- [1] W. C. Francis, G. Kanimozhi, and C. Umayal. **Brain-Computer Interfacing for Wheelchair Control by Detecting Voluntary Eye Blinks.** *Indonesian Journal of Electrical Engineering and Informatics*, June 2021, DOI: 10.52549/ijeei.v9i2.2749.

EXPERIENCE

xLab, GRASP Lab, UPenn | GRADUATE RESEARCH ASSISTANT Dec 2021 – June 2022 | Philadelphia, USA

- Designed camera-based and LIDAR-based cone detection, obstacle avoidance, and Extended Kalman Filtering algorithms for **Autonomous GoKart** and deployed code on NVIDIA Jetson Xavier
- Competed in Autonomous evGrandPrix at Purdue, Indiana in May 2022

Vision Cultura | MACHINE LEARNING INTERN Dec 2019 - Feb 2020 | Bangalore, India

- Led a team that built a Convolutional Neural Network - Cloud pipeline for monitoring plant growth, flowers and pests, through aerial image recognition
- Introduced improvements to boost efficiency, and studied feasibility of different algorithms (VGG19, ResNet & Inception) for flower recognition

PROJECTS

AI-Based Speed Control Using Traffic Sign Recognition

- Built a ConvNet using Tensorflow and Open-CV to detect and classify 43 traffic sign classes to keep the vehicle speed below recognized speed limit
- Used data augmentation and applied SMOTE to tackle class imbalance, achieving the **4th highest global accuracy** of 99.4% on the GTSRB dataset

Brain-Controlled Wheelchair for the Quadriplegic

- Designed a Deep Neural Network in Python using Pytorch to detect eye-blinks from EEG signals based on Kurtosis coefficients
- Developed a Brain-Controlled wheelchair with a collision avoidance system and GUI using Python, MATLAB and Open-CV

Image Super-Resolution using Generative Networks

- Implemented the Enhanced Super-resolution GAN model from the 2021 paper
- Discovered novel techniques that improved the performance of the model and stabilized the training process, producing images with a better perceptual quality than ones produced by ESRGAN

Blind Motion Deblurring using Deep Learning

- Implemented Wiener Deconvolution algorithm from scratch to deblur license plate images to make them legible
- Formulated a novel deep learning technique to convert this non-blind algorithm into a single shot blind motion-deblurring algorithm by estimating inputs

Visual Question Answering

- Developed a Deep Learning pipeline (CNN+LSTM) that considers an image and a question about the image and outputs an answer.

Robot Localization using PF-LSTM in Habitat AI

- Implemeted a PF-LSTM to estimate the location of an AI agent based on its actions and observations in Habitat AI 3D environment

Grasp-and-Lift EEG Detection

- Implemented a ConvNet and 9 other ML algorithms including LR, LDA, QDA, SVM, Random Forests, PCA and their ensembles to detect the type of hand movements from EEG signals
- Demonstrated how it can be used to control prosthetic arms