William C Francis

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EDUCATION AND HONORS

University of Pennsylvania Philadelphia, PA
Dual Masters in Robotics and Computer Science May 2023

- Cumulative GPA: 3.8/4.0
- Coursework: Applied Machine Learning (Teaching Assistant), Machine Learning, Principles of Deep Learning, Computer Vision, Advanced Computer Vision, Deep Learning in Data Science, Learning in Robotics, Graph Neural Nets, Autonomous Vehicles

Vellore Institute of Technology Chennai, India
Bachelor of Technology in Electrical and Electronics, Minor in Computer Science June 2020

- Cumulative GPA: 9/10, Minor GPA: 9.2/10, Dean's List
- VITEEE Scholarship ($1000 awarded for top 2% of program)

PROFESSIONAL EXPERIENCE

xLAB, University of Pennsylvania Philadelphia, PA
Graduate Research Assistant, Autonomous Go-kart project December 2021 - May 2022

- Developed lane segmentation and obstacle avoidance algorithms using Python and Pytorch to improve the autonomous Go-kart's ability to navigate through complex racing tracks, resulting in a 40% improvement in obstacle avoidance rate
- Optimized code for speed using C++, resulting in 15% reduction in response time and real-time processing on Jetson AGX
- Led the Autonomous Go-kart team to a top-5 finish in the Autonomous evGrandPrix and presented at International Conference on Robotics and Automation (ICRA), securing sponsorship from the Autoware Foundation

Vision Cultura Bangalore, India
Machine Learning Intern December 2019 – May 2020

- Redesigned AI-based farming solution utilizing Pytorch and IoT integration, resulting in 18% crop yield increase and 90% labor cost reduction through real-time monitoring of sunshine, water, and nutrient levels for each plant
- Deployed models using AWS SageMaker and monitored data in real-time using CloudWatch for optimal analysis
- Upgraded the perception stack using advanced object detection models (YOLO, RetinaNet, Faster R-CNN) leading to 33% boost in sales team productivity, translating to 100K increase in revenue, earning recognition as outstanding intern

SKILLS

- **Programming Languages:** Python, C++, Java, SQL, R, MATLAB, ROS
- **Tools & packages:** Pytorch, TensorFlow, Keras, PostgreSQL OpenCV, NumPy, Scikit-learn, SciPy, Matplotlib, Pandas, Tableau, Fast.ai, XGBoost, Seaborn, AWS, Apache Kafka, GCP, Git, Linux, WandB, MLflow
- **Technologies:** A/B testing, Agile, Predictive Modelling, Recommenders, OOP, RNN, CNN, LSTM, PCA, Ensemble Trees, Random Forests, Linear/Logistic Regression, Classification, Clustering, Dataset Building, Data Analysis

PUBLICATION

Brain-Computer Interfacing for Wheelchair Control by Detecting Voluntary Eye Blinks June 2021
Indonesian Journal of Electrical Engineering and Informatics, DOI: 10.52549/ijeei.v9i2.2749

- Engineered TensorFlow-based deep neural network for blink detection in EEG signals, resulting in 25% increase in signal-to-noise ratio for Brain-Controlled Wheelchair with camera-based collision avoidance
- Implemented adaptive algorithm for personalized blink detection and control sensitivity, leading to enhanced user experience

PROJECTS

Location-Based Panoptic Segmentation / *Pytorch, Image Segmentation, Model Enhancement* Dec 2022

- Devised the 1st-ever location-based panoptic segmentation method for autonomous vehicles, using SOLOv2 as instance head
- Reduced computational resources by 28% while achieving high performance by implementing Dice Loss and Focal Loss
- Achieved 7% increase in accuracy and 44.9 panoptic quality measure on Cityscapes, outperforming state-of-the-art methods

EEG Prosthetic Arm Control / *Scikit-learn, Classification, Machine Learning* May 2022

- Evaluated 15 algorithms including Linear/Logistic Regression, SVM, Random Forests, PCA, etc. to detect the type of hand movements from EEG signals
- Demonstrated its application in controlling a prosthetic arm with 96 AUC-ROC, showcasing potential in neuroprosthetics

Blind Motion Deblurring for Legible License Plates / *TensorFlow, Computer Vision* Dec 2021

- Formulated a deep learning-based, single-shot motion deblurring algorithm that estimates blur angle and length, achieving 90% increase in legibility and eliminating manual input for improved efficiency
- Created and deployed an interactive Gradio application on HuggingFace Spaces