John Liu

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Education

University of Waterloo *2021 – 2022*
Master of Engineering – MEng, Electrical and Computer Engineering
Specialization in Artificial Intelligence and Machine Learning

University of Waterloo *2015 – 2020*
Bachelor of Applied Science – BASc, Honours Mechanical Engineering (With Distinction)

Skills

Languages Python, C++, JavaScript/TypeScript, SQL, MATLAB, HTML, CSS
Libraries/Tools PyTorch, TensorFlow, Keras, Scikit-Learn, React, AWS, Pandas, NumPy, Docker, Git, Linux OS, LaTeX, CAD
Applications Data & Quantitative Analysis, Deep Learning, Supervised/Unsupervised Learning, Reinforcement Learning, NLP, Predictive Analysis/Modeling, Clustering and Classification, ML Algorithms, Data Structures

Projects

MIT-PITT-RW (MIT Driverless) | **Software Engineer** (Plotly, Pandas, NumPy, SciPy, Docker) *July 2022 – Present*
- Created an application to generate vehicle race lines allowing for safe attacking and defending maneuvers which enabled autonomous vehicle passing at 150mph+ during the Las Vegas Motor Speedway competition
- Race lines created using Python by calculating cubic spline representation of track waypoints and optimization by re-evaluating the polynomial derivate to return smoother splines and used Plotly to create an interactive plot UI for ease of use
- Developed collision checking and path cost functions scripts as part of a Model Predictive Path Integral (MPPI) controller using C++ resulting in better autonomous pathing decisions

Slime Simulation (Python, NumPy, SciPy, Pillow) *Nov 2022 – Dec 2022*
- Used Python to create a swarm intelligence simulation to mimic the growth and development of slime mold
- Simulation created by defining thousands of agents controlled independently through a simple set of rules to interact using the principle of stigmergy resulting in the spontaneous emergence of organic behaviours and patterns
- Post processing using the Pillow library to allow for smooth visualization of the simulation even with low hardware specifications

Sentiment Analysis on Movie Reviews and Classifier (Pytorch, Keras, Scikit-learn, Pandas, NumPy) *June 2022*
- Developed an NLP model to predict positive and negative movie reviews on the IMDb movie review dataset (84% accuracy)
- Preprocessed data using Bag of Words before using a Word2Vec approach to train a custom designed neural network using Pytorch and Keras
- Classification on various data sets and data analytics using Scikit-learn to perform PCA, K-means clustering, DBScan, and T-SNE

Aerial Manipulator (MATLAB, Simulink, OpenCV) *Sep 2019 – May 2020*
- Autonomously controlled drone modified with a manipulator attachment to grab objects from front and retract to the center
- Implemented object detection using onboard camera through colour and edge detection as well as QR code and AprilTag detection
- Winner of award for Best Engineering Design Process

Work Experience

The Woodbridge Group | **Mechanical Engineering** *Sep 2018 – Dec 2018*
- Successfully led the conceptualization and constrcu of a pour head test system allowing for less downtime during routine inspections resulting in significant cost savings (>$50,000 per hour of downtime)
- Detailed P&ID design in AutoCAD and modeling in SOLIDWORKS of pour head assembly and components

Nytric Ltd. | **Product Development Engineering** *Jan 2018 – Apr 2018*
- Created simulation system allowing for detailed analysis of product performance and capabilities based on optics calculations
- 3D CAD modelling of touchscreen enclosures for injection molding with focus on DFM and DFA
- Developed a script to streamline company design procedures by automating product and CAD model revision changes
- Designed cost optimization script which realized the use of more cost-efficient components (>50% cheaper)

HubHead Corp. | **Systems Engineering** *May 2017 – Aug 2017*
- Worked directly with clients to create and organize enterprise asset management demos in order to optimize management procedures

Tyco Security Products | **Mechanical Designer** *Aug 2016 – Dec 2016*
- Performed detailed CAD design in Creo and 3D printed product prototypes to test for tolerances, quality, and functional capabilities