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++, SQL, JavaScript/TypeScript, HTML, CSS, MATLAB
Libraries/Tools Pandas, NumPy, AWS, Node.js, React, PyTorch, TensorFlow, Keras, Scikit-Learn, Docker, Git, Linux

Projects

MIT-PITT-RW (MIT Driverless) | **Software Engineer** (Plotly, Pandas, NumPy, SciPy, Docker) *July 2022 – Present*
- Created an application to generate vehicle race lines for an autonomous racecar which enabled self driving attacking and defending maneuvers at 150mph+ during the Indy Autonomous Challenge (IAC) competition
- Race lines created using Python by calculating cubic spline representation of track waypoints and further curvature optimization to return smoother lines allowing for higher vehicle speeds 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 vehicle path prediction controller using C++ resulting in better autonomous pathing decisions

Slime Artificial Life Simulation (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 (Pytorch, Scikit-learn, Pandas, NumPy) *June 2022*
- Developed and trained an NLP model to predict and differentiate positive and negative movie reviews with high accuracy (87%)
- Preprocessed data using Bag of Words before using a Word2Vec approach to train a custom designed neural network using Pytorch
- Additional image classification on various data sets using custom CNNs 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 the front and retract back 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 construction of a pour head test system allowing for less downtime during routine inspections resulting in significant cost savings of more than $50,000 per hour of plant line downtime
- Refined and accelerated data management process using VBA to create an interactive spreadsheet used by company branches

Nytric Ltd. | **Product Development Engineering** *Jan 2018 – Apr 2018*
- Wrote a program using VBA to simulate touch screen performance and cost metrics which lead to the realization of a more cost-efficient solution allowing for more than a 50% cost reduction by using alternative components
- Developed a script to streamline company design procedures by automating product and CAD model revision changes
- 3D CAD modelling of touch screen enclosures for injection molding with focus on DFM and DFA

HubHead Corp. | **Systems Engineering** *May 2017 – Aug 2017*
- Created scripts in VBA to automatically aggravate and organize client data to be used company asset management software
- Gained excellent communication skills by directly working with clients to create and organize enterprise asset management demos

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