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, Scikit-Learn, React, Pandas, NumPy, Docker, Git, Linux OS, Arduino, LaTeX, CAD
Applications Data & Quantitative Analysis, Supervised/Unsupervised Learning, Reinforcement Learning, Predictive Analysis/Modeling Clustering and Classification, ML Algorithms, Data Structures

Projects

MIT Driverless | **Planning Software Developer** (Plotly, Pandas, NumPy, SciPy, Docker) *July 2022 – Present*
- Wrote and tested software for an autonomous racecar capable of reaching speeds of 140mph+ for the Indy Autonomous Challenge
- Generated vehicle pathing using cubic spline models allowing for safe attacking and defending maneuvers of the vehicle which enabled autonomous vehicle passing at 80mph at the Texas Motor Speedway competition
- Optimized racing lines for shortest distance and minimum lap times taking in account of vehicle dynamics and environmental factors to ensure ideal maneuvering around the racetrack

Slime Simulation (Python, NumPy, SciPy, Pillow) *Nov 2022 – Dec 2022*
- Wrote software to develop a swarm intelligence simulation to demonstrate the complex behaviour and pattern formation of slime mold
- The program consists of thousands of agents defined by a simple set of instructions that when interacting together via stigmergy, produce organic global behaviours that closely mimic the growth and movement of real-life slime molds
- Post processing using the Pillow library to allow for smooth visualization of simulation even with low hardware specifications

Sentiment Analysis on Movie Reviews and Classifier (Pytorch, Scikit-learn, Pandas, NumPy) *June 2022*
- Developed neural network architecture to predict positive and negative movie reviews on IMDb review dataset (84% accuracy)
- Preprocessed data using Word2Vec and Bag of Words (BoW) techniques before training custom designed neural network models
- 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 center
- Implemented object detection using onboard camera through colour and edge detection as well as QR code and AprilTag detection
- Winner of design award for Best Engineering Design Process

Work Experience

The Woodbridge Group | **Mechanical Engineering** *Sep 2018 – Dec 2018*
- Led the concept generation and prototype build 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