

**TECHNICAL SKILLS**

- Machine Learning, Deep Learning
- Imitation Learning
- Reinforcement Learning
- Visual Learning and Recognition
- Computer Vision
- Robotics Perception and Planning
- Robotics Control and Modeling
- Stochastic Systems, SLAM
- Python, MATLAB, C/C++
- SQL, AWS, RaspberryPI, Arduino
- TensorFlow, Keras, PyTorch
- OpenCV, scikit-learn, Pandas, Git

**INDUSTRY EXPERIENCE**

**AI Illuminated**, Newark, DE

AI Engineer

Aug 2019 - Present

- Co-directed the business and software development operations and established core infrastructure for proprietary applications which produced a million in revenue during the first year of operation
- Developed deep learning empowered conversational robots (ChatBots) that apply knowledge graph for self-learning online education and trainable/deployable machine learning devices for embedded AI education
- Designed interactive devices which enable user interactions through gestures and poses by using computer vision

**MiCareo**, Taipei, Taiwan

Automation Engineer

June 2014 - July 2017

- Led the instrument control software team to advance the company’s technology from prototype to product which met the commercial needs and the medical device safety requirements
- Designed the control system which integrates a FPGA-based real-time sorting system, a machine vision & motion system and a microfluidic control system to achieve full automation of the medical instrument
- Designed the machine vision & motion system which controls LEDs, a motion stage and a camera to achieve functions of autofocus, pattern locating, and line scanning with LabVIEW programming

**PROJECTS**

**RL-Music**

Aug 2020 - Present

- Generate innovative music in desired styles and rules by utilizing Imitation Learning, Reinforcement Learning (RL), Generative Adversarial Networks (GANs) and the Transformer architecture
- Produce unique and creative music with only few human demos. Generated samples: [kuanholao.com/rl-music](http://kuanholao.com/rl-music)

**Deep Reinforcement Learning of Collision-Free Actions for Quadcopters**

Nov 2017 - Dec 2019

- Proposed a framework that trained a quadcopter to learn to use visual information to navigate to the target zone without collisions to the dynamic obstacles. This framework successfully solved complicated tasks which require continuous 3D motions in 3D environments, and the quadcopter is able to learn from scratch without handcrafted motions
- Designed a crash-avoidance controller by using the DDPG method with SNNs. The quadcopter successfully learned to avoid crashing from random initialization, and the controller is robust to disturbances
- Learning from scratch: <https://youtu.be/osArncgu7y8>; Robust to disturbances: <https://youtu.be/xU7oMwSQsw8>; Utilizing vision to perform nimble movements in a dynamic environment: <https://youtu.be/Bs78spTN0Nk>

**Phones Finder - Visual Object Detection with Deep Learning**

Mar 2019

- Detected and located phones on a messy floor by implementing YOLO3 and ResNet

**Visual Odometry for Autonomous Cars**

Feb - May 2018

- Reconstructed the 3D motion of a car from the video of the driving recorder by detecting and matching SURF features in consecutive frames with KLT method and solving the fundamental matrix and the essential matrix

**Traffic Signs Learning and Detection**

Feb - May 2018

- Detected traffic signs from the video of a driving recorder by extracting MSER features to detect the possible regions, and learned a SVM model with HOG features to classify the signs in these regions

**EDUCATION**

**University of Maryland - College Park**, Master’s in Robotics, GPA 3.84/4.00

Dec 2018

**National Taiwan University**, Master’s in Applied Mechanics

June 2012

**National Cheng Kung University**, Bachelor’s in Systems and Naval Mechatronic Engineering

June 2010