

# FELIX YANWEI WANG

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## EDUCATION

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### Northwestern University

*M.S. Robotics*

- GPA: 4.0
- Reinforcement Learning, Active Learning, Probabilistic Robotics, Robotic Manipulation, Swarm Robotics

**Evanston, IL**

*Expected December 2018*

### Middlebury College

*B.A. Physics & Minor in Computer Science*

- GPA: 3.75
- Fluid Dynamics, Quantum Mechanics, Machine Learning, Computer Vision

**Middlebury, VT**

*2012 – 2017*

## EXPERIENCE

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### Deep Reinforcement Learning Project (Prof. Mitra Hartmann)

*DQN to model active whisking of rat whiskers for shape detection*

- Modeled rats' whisking behavior to sense objects as optimizing a distance measurement sequence with a sensor model of outward radially positioned laser array; abstracted task to identify 2D triangles and hexagons
- Built randomly positioned and oriented shape dataset and visualization tool for observing the measurement
- Pre-trained a LSTM that predicts shape based on a measurement sequence; approximated the probability of current guess matching ground truth as well as the reward of an action using the LSTM loss
- Trained a DQN to optimize the measurement sequence based on past observations; shaping the reward with an entropy term that characterizes the diversity of whiskers in contact leads to biologically realistic behaviors

**Evanston, IL**

*2018 – Current*

### Auris Surgical Robotics

*Computer Vision Engineer*

- Collected, processed and annotated endoscopic images of porcine anatomy for an anomaly instance dataset
- Implemented a Fully Convolutional Network (FCN) to test semantic segmentation of the dataset; experimented with different max pooling strides to preserve size of the feature map
- Researched on Mask-RCNN based and Regional-FCN based methods to design an instance segmentation network; adopted Feature Pyramid Network (FPN) to handle low image resolution
- Extended instance segmentation capability to instance tracking by comparing segmented instance mask
- Built an instance tracking pipeline and trained on the dataset I produced via transfer learning to track anomaly
- Undergoing patent application

**Redwood City, CA**

*Summer 2018*

### Active Learning Project (Prof. Todd Murphey)

*Infotaxis and Ergodic Exploration for target localization*

- Limited the search problem to no gradient information and only an imperfect sensor model on a grid world
- Implemented Infotaxis that maximizes information gain based on current posterior to search for single target
- Extended to multiple targets search where Infotaxis fails; adopted Ergodic metric to ration exploration time proportional to the current posterior to ensure coverage and avoid getting stuck at a single target location

**Evanston, IL**

*Spring 2018*

### Swarm Robotics Project (Prof. Michael Rubinstein)

*Multi-agent simulation and hovercraft localization*

- Implemented coordination, segregation and locomotion of a robot swarm with Kilobot simulation engine
- Simulated a rotating hovercraft using one light sensor to localize at the center of a triangle of light sources
- Designed, 3D printed and built a lightweight hovercraft with one Arduino Trinket controller, one light sensor, one rotor for hovering rotation and another rotor for thrust force to realize the simulation on hardware

**Evanston, IL**

*Spring 2018*

### Convolutional Neural Network Project

*LIV Net for facial feature preference*

- Prepared 110 multi-ethnic faces from the "Ethnic Origins of Beauty" project and averaged them to create another 76 faces; created survey app and generated preference data for all image pairs from the face dataset
- Extracted features of image pairs with VGG-Face and computed distance metric by way of Siamese Network
- Trained logistic regression and SVM classifiers to predict preference for a feature vector within a pair

**Middlebury, VT**

*Summer 2017*

## SKILLS

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**Computer Skills:** Python, C++, ROS, TensorFlow, Keras

**Language Skills:** Native Chinese, Fluent English