

# FELIX YANWEI WANG

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## EDUCATION

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### Northwestern University

*M.S. Robotics*

**Evanston, IL**

*Expected December 2018*

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

### Middlebury College

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

**Middlebury, VT**

*2012 – 2017*

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

## EXPERIENCE

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

**Evanston, IL**

*Deep Q-Network to model active whisking of rats for shape detection*

*2018 – Current*

- 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 a dataset of randomized shapes and a visualization tool for observing measurements
- Pre-trained a Long Short Term Memory (LSTM) network to predict shape based on a measurement sequence
- Trained a Deep Q-Network (DQN) to optimize a measurement sequence based on past observations using LSTM loss as reward; shaping the reward with an entropy term that characterizes the diversity of whiskers in contact leads to biologically realistic behaviors

### Auris Surgical Robotics

**Redwood City, CA**

*Computer Vision Engineer*

*Summer 2018*

- 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

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

**Evanston, IL**

*Infotaxis and Ergodic Exploration for target localization*

*Spring 2018*

- Framed a search problem with no gradient information and only an imperfect sensor model on a grid world
- Implemented Infotaxis maximizing information gain based on current posterior to search for a 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

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

**Evanston, IL**

*Multi-agent simulation and hovercraft localization*

*Spring 2018*

- 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

### Computational Fluid Dynamics Project (Prof. Richard Wolfson)

**Middlebury, VT**

*Physics thesis: simulating airflow around a novel wind generator*

*2016 – 2017*

- Modeled the lift and drag forces on Dual Wing Generator, a bio-inspired generator that reverse engineers bird flight to extract wind energy made by Festo
- Simulated the air flow around generator blades using COMSOL's Computational Fluid Dynamics package
- Verified the higher efficiency of Dual Wing Generator in low wind environments compared to wind turbines

## SKILLS

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

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