SEMINAR ANNOUNCEMENT

DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING
Faculty of Engineering
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Area: Signal Analysis & Machine Intelligence

Host: Prof Li Haizhou

Research Seminar

TOPIC	**:**	**Deep Learning In Vision-Based Deformable Object Manipulation**
SPEAKER	**:**	**Dr Yan Mengyuan** **Stanford University**
DATE	**:**	**Thursday, 24 September 2020**
TIME	**:**	**10.00M to 11.00AM**
WEBINAR	**:**	**Join Zoom Meeting** **https://nus-sg.zoom.us/j/4156763801?pwd=NUwzUWhwdlZIcGt3cmhyTzFId1V0QT09** **Meeting ID: 415 676 3801** **Password: 662108**

ABSTRACT

Vision-based autonomous rope manipulation, for example, knot tying, is an important but Vision-based autonomous rope manipulation, for example, knot tying, is an important but challenging task in robotics. Ropes have a high-dimensional state space which makes visual perception challenging. Their dynamics is much more complex compared to rigid objects, commonly approximated by Finite Element Methods. When a robot manipulates a rope, the robot faces a high-dimensional action space and under-actuation of the rope, making common planning algorithms either non-applicable or computationally expensive. In this talk I will present learning-based methods for the perception, dynamics modeling, and motion planning for rope manipulation and knot tying. Data efficiency is a significant challenge due to high dimensionality. We observe structures in the perception and dynamics modeling of ropes, and encode them as induction biases in the learning algorithm. More importantly, we propose a self-supervised learning objective that enables continuous, self-supervised training of rope state estimation on real images, eliminating the need for very expensive annotations. When planning for the robot motions to achieve knotting tasks, we propose a two-level hierarchical planner, and learn a collection of topological motion primitives which ground high-level abstract steps to concrete robot motions. The learning algorithm is designed to facilitate generalization to new rope configurations and new knotting tasks.

BIOGRAPHY

Mengyuan Yan just received her Ph.D. degree in the Department of Electrical Engineering at Stanford University. During her Ph.D she has worked with Prof. Leo Guibas on 3D computer vision, and with Prof. Jeannette Bohg on developing deep learning methods for vision-based robotic manipulation, especially the manipulation of deformable objects such as ropes. Prior to her Ph.D., Mengyuan received her Bachelor's degree from the Department of Physics, Peking University.