

## SEMINAR ANNOUNCEMENT

DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING  
COLLEGE OF DESIGN AND ENGINEERING  
Website: <https://cde.nus.edu.sg/ece>

**Area: Control, Intelligent Systems & Robotics (CISR)**

**Host: Asst Prof Armin Lederer**

<b>TOPIC</b>	:	<b>Towards Trustworthy Learning-Based Spacecraft Attitude Control for On-Orbit Servicing Mission</b>
<b>SPEAKER</b>	:	<b>A/Prof Yuhan Liu Associate Professor, Department of Control Science and Engineering, Harbin Institute of Technology (HIT)</b>
<b>DATE</b>	:	<b>Thursday, 2 July 2026</b>
<b>TIME</b>	:	<b>4:00PM-5:00PM</b>
<b>VENUE</b>	:	<b>E5-03-20</b>

### ABSTRACT

On-orbit servicing missions are driving new demands for autonomous and trustworthy spacecraft attitude control. After capturing a noncooperative target, a servicing spacecraft may need to take over the attitude control of a combined system with uncertain inertia, unknown disturbances, and changing dynamics. Meanwhile, servicing and mission spacecraft are often equipped with large flexible appendages, making attitude maneuvers strongly coupled with structural vibrations. These features make accurate modeling difficult, while closed-loop stability, constraint satisfaction, and onboard computational efficiency remain essential.

This talk will introduce recent research progress on learning-based spacecraft attitude control under such dynamic uncertainties. The focus is on how Gaussian process learning, Koopman-based representations, and direct data-driven methods can be integrated with physical modeling, uncertainty quantification, and stability analysis to address post-capture attitude takeover and flexible spacecraft maneuvering. These studies aim to move toward trustworthy learning-based control methods that are adaptive to uncertain spacecraft dynamics while remaining interpretable, control-oriented, and suitable for safety-critical space applications.

### BIOGRAPHY

Yuhan Liu is an Associate Professor in the Department of control science and engineering at Harbin Institute of Technology (HIT). She was selected for the 2024 National High-Level Young Talent Program and is a recipient of the HIT "Young Shenzhou Scholar" distinction. Prior to joining HIT, she was a Postdoctoral Researcher in the Control Systems Group at Eindhoven University of Technology (TU/e), the Netherlands.

Her main research interests are in data-driven modeling and control of nonlinear dynamical systems, developing machine learning methods with performance and stability guarantees for modeling and control, model predictive control, and behavioral system theory, with a particular focus on fundamental connections between control theory and machine learning.

On the application side, her research focuses on advancing reliability and autonomy of spacecraft systems through integrated perception, prediction, decision-making, and control frameworks structured around the Observe–Orient–Decide–Act (OODA) loop, with emphasis on safety-critical and uncertain operational environments.

She serves as a Youth Editorial Board Member of Advances in Astronautics and is a member of the IEEE CSS Technical Committee on System Identification and Adaptive Control and the IFAC TC 1.1: Modelling, Identification and Signal Processing and TC 1.2: Adaptive and Learning Systems. Her research is supported by the National Natural Science Foundation of China, European research programs, and aerospace research institutes.

