

## 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 Jin Yueming**

<b>TOPIC</b>	:	<b>Federated Learning in Surgical Videos</b>
<b>SPEAKER</b>	:	<b>Mr Fang Zheng Graduate Student, ECE Dept, NUS</b>
<b>DATE</b>	:	<b>Friday, 10 January 2025</b>
<b>TIME</b>	:	<b>11:00AM-12:00PM</b>
<b>VENUE</b>	:	<b>Join Zoom Meeting <a href="https://nus-sg.zoom.us/j/2986586531?pwd=d0NuckVOUVNGRHJmY3d0SU9URIJ6UT09&amp;omn=88051854354">https://nus-sg.zoom.us/j/2986586531?pwd=d0NuckVOUVNGRHJmY3d0SU9URIJ6UT09&amp;omn=88051854354</a> Password: 820585</b>

### ABSTRACT

The surgical instrument segmentation, a crucial issue of robot-assisted surgery (RAS), is currently restricted by privacy sensitivity and data silos. Federated Learning (FL), with its privacy protection and collaborative learning capabilities, has the potential to enable joint training of a surgical instrument segmentation model across various sites.

However, the application of FL to the surgical instrument segmentation is challenged by:

(1) Background diversity. The same surgical instruments are applied in various surgical scenarios. It is difficult to ensure the same representation of the surgical instrument from the diverse background in FL. (2) Limited Data availability. There is a significant variation in the number, type, and frequency of surgeries performed at each site. This brings inconsistent convergence of local site models, which affects the model fusion efficiency in FL. We propose a novel PFL framework, Spatial-Temporal Decoupled Enhancement in federated surgical instrument segmentation (FedSTD). FedSTD identifies an instrument consistent representation by motion model and textual guided channel selection to guide each site focusing on the instrument rather than the different backgrounds in FL. FedSTD defines an explicit representation target based on synthetic data to synchronize the model convergence during fusion.

### BIOGRAPHY

Fang Zheng is currently a MEng student supervised by Asst Prof Yueming Jin.

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