# Jieming Yu (Irene)

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## EDUCATION

**The Chinese University of Hong Kong** **Hong Kong**
*B.Eng in Artificial Intelligence: Systems & Technologies* *September 2021 - June 2025*

## PUBLICATION

- ***Adapting SAM for Surgical Instrument Tracking and Segmentation in Endoscopic Submucosal Dissection Videos*** *(Best Poster Award at ICRA 2024 C4SR+ Workshop)*

  **Jieming Yu**, Long Bai, Guankun Wang, An Wang, Xiaoxiao Yang, Huxin Gao, Hongliang Ren

- ***SAM 2 in Robotic Surgery: An Empirical Evaluation for Robustness and Generalization in Surgical Video Segmentation*** *(preprinted)*

  **Jieming Yu**, An Wang, Wenzhen Dong, Mengya Xu, Mobarakol Islam, Jie Wang, Long Bai, Hongliang Ren

- ***Surgical Blender: A Synthetic Dataset Generator for Robot-Assisted Surgery*** *(submitted to CBM)*

  Mengya Xu, **Jieming Yu**, Muhammad Omer Raza, An Wang, Minghong Ma and Hongliang Ren

## RESEARCH EXPERIENCE

**Robotics, Embodied AI, Navigation in VIVO Lab - Research assistant intern**
*Supervisor: Prof. Hongliang Ren, Dr. Mengya Xu* *June 2022 - Now*

- **Tracking and Segmentation of Surgical Videos**
  Enhanced the Segment Anything Model (SAM) by refining its image and mask encoders with LoRA, which significantly boosted efficiency and accuracy of labelling. Implemented XMem++ to overcome SAM's limitations in video applications, leading to a marked improvement in video data processing capabilities. By fine-tuning on surgical datasets, the ungraded model demonstrated a 40% performance increase compared to the baseline.
- **Syn-ISS Challenge (MICCAI 2023 Sub-Challenge)**
  Trained and evaluated various state-of-the-art (SOTA) segmentation models on a synthetic dataset. Conducted model comparisons using multiple evaluation metrics and cross-validation. Selected the Transformer-based SegNext model for training, which achieved 84.41 composite score (Hausdorff Distance and Dice Similarity Coefficient) in Task 1 and 82.69 composite score in Task 2. We secured eighth place in the competition and presented our findings at the MICCAI 2023 conference.
- **Synthetic Dataset Generation**
  Developed synthetic datasets with segmentation annotations using 3D design software such as Unity, Blender, and SOFA. This included modelling surgical instruments, controlling scene variables, setting object properties, generating bleeding and smoking effects, and automating the motion trajectories of 3D surgical tools through programming to improve the efficiency and scale of dataset generation. The usability of the synthetic dataset has been verified on multiple state-of-the-art image segmentation models.

## PROFESSIONAL EXPERIENCE

**SenseTime - Algorithm researcher intern**
*Supervisor: Dr. Xinjiang Wang* *July 2024 - Now*

- **Evaluation and Enhancement of Large Language Model**
  Continuously optimized model performance and security using Direct Preference Optimization (DPO) and supervised fine-tuning (SFT) techniques. Collaborated with the data team to annotate Cantonese datasets, significantly enhancing the model's fluency and nativeness. Developed an autonomous evaluation pipeline to effectively assess model performance in terms of nativeness, Retrieval-Augmented Generation (RAG), and adherence to specific instructions, achieving an accuracy of 90% when compared to human judgment.

## PROJECTS

* **Location Tracking Application for the Elderly**
  Conducted market research to profile user groups, identified their needs and expectations for location tracking software. Designed features such as location tracking, call functionality, and emergency contact interface. Optimized interaction processes and interface layout to ensure user experience.
* **Breast Cancer Type Prediction through Gene Data Analysis**
  Used Python for data pre-processing, feature selection, model training, and optimization. Applied various machine learning models for data analysis, including but not limited to SVM, Random Forest, and Neural Networks. Used Matplotlib and Seaborn for data visualization. Successfully trained a model with 97% accuracy in predicting breast cancer types.
* **Discord AI Voice Conversion Interactive Bot**
  Collected audio data and trained multiple voice models for anime and real-life characters. Developed an interactive bot on the Discord platform, allowing users to choose voice models and interact with the bot by sending audio files, video files, and links. The bot automatically generated voice conversion results.
* **Flappy God Game Development and AI Player Training**
  Designed graphical interface, user interaction, and game mechanics, and implemented them through programming. Used reinforcement learning to train AI player for the Flappy God game. Through interaction with the game environment, the AI player gradually learned to make decisions autonomously to maximize the reward.

## EXTRACURRICULAR ACTIVITIES

**AI Student Developer Club - Commitee Member**
*The Chinese University of Hong Kong* *Oct 2023 - Now*

## AWARDS & SCHOLARSHIPS

Honours at Entrance
Dean's List
Admission Scholarship
Store Friendly Admission Scholarship for Engineering Student
New Asia College Alumni Scholarship
Mr. Arturo Y and Ms. Carmen C Scholarship
Centaline Property Scholarship

## SKILLS

**Languages**: Toishanese (Native), Mandarin (Native), Cantonese (Native), English (Fluent, IELTS 7.5, DSE 5)
**Programming Languages**: Python, C, Latex, Shell
**Machine Learning Frameworks**: PyTorch, TensorFlow
**Computer Vision**: Object detection, Image classification, Image captioning, Image Segmentation
**Computer Music**: Digital Signal Processing, Feature Selection, Sound Synthesis
**Simulation Software**: SOFA, Unity, Blender