

# WEICHEN FAN

📍 Shanghai, China 📞 (86)13699011987

💻 <https://weichenfan.github.io/Weichen> 🌐 <https://github.com/weepiess>

✉ fanweichen2383@gmail.com

## EDUCATION

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<b>National University of Singapore, Singapore</b> <i>Master of Electrical and Computer Engineering CAP:3.75/5.0</i>	<i>Aug 2020 - Aug 2022</i>
<b>University of Electronic Science and Technology of China, China</b> <i>Bachelor of Integrated Circuit Design and Integrated System GPA:3.65/4.0</i>	<i>Sep 2017 - June 2021</i>
<b>University of Electronic Science and Technology of China, China</b> <i>Minor in Robotics Engineering GPA:3.82/4.0</i>	<i>Dec 2017 - June 2020</i>

## WORK EXPERIENCE

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### Sensetime

#### **Computer Vision Researcher**

*July 2022 - Present*

- Conducting research on foundation models for general 3D object generation.
- Conducting research on AI for Assembly Sequence Planning(ASP).
- Created a generic Sim2Real data engine that can be used for autonomous driving, gaming, and healthcare.
- Participating in research of SLAM especially in VO and 3D reconstruction.
- Collaborating with labs: MMLab@CUHK, S-Lab@NTU, etc.
- Mentoring interns on diverse research topics.

#### **Research Intern**

*May 2021 - July 2022*

- Participating in research of Transfer Learning algorithm especially in Domain Adaptation and Domain Generalization.
- Conducting research on out-of-distribution(OOD) detection.

### Taobao, Alibaba

#### **Research Intern**

*Dec 2019 - July 2020*

- Conducting research on 3D face reconstruction, proposed **Pixel-Face**, a large-scale benchmark for 3D face reconstruction.
- Participating in research and development of 3D vision algorithm for structured light AI chip.

### DJI Innovation

#### **Computer Vision Engineer Intern**

*June 2019 - Aug 2019*

- Co-developed **Robot-OS**, an open-source software stack for robot development based on ROS.

## RESEARCH EXPERIENCE

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### Lab Ren, National University of Singapore

#### **Research Assistant**

*Aug 2020 - Aug 2022*

- Conducting research on visual based autonomous control for surgical robots. Paper published at **IEEE T-ASE**.
- Co-developed a minimally invasive surgical robot for gastrointestinal endoscopy.

### Machine Sensing and Intelligent Systems Research Center, UESTC

#### **Research Assistant**

*Jan 2018 - Nov 2019*

- Conducting research on human posture estimation for the diagnosis of human scoliosis.

## PUBLICATIONS

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- [1]. H. Gao\*, **Fan, W.\***, L. Qiu, X. Yang, Z. Li, X. Zuo, Y. Li, H. Ren, "SAVANet: Surgical action-driven visual attention network for autonomous endoscope control", IEEE Transactions on Automation Science & Engineering (**T-ASE**), 2022.
- [2]. **Fan, W.**, H. Gao, Z. Qin, J. Liu, R. Zhao, H. Ren, H. Li. (2023). G2L-6D: Global-to-Local Self-supervised

Framework for Monocular 6D Pose Estimation in Industry. Proceedings of the **ICCV** 2023.

[3]. **Fan, W.**, Chen, J., J. Liu, R. Zhao, Hou, J, S. Yi, Z. Liu. (2023). Hierarchy Flow For High-Fidelity Image-to-Image Translation. Proceedings of the **ICCV** 2023.

[4]. **Fan, W.**, Chen, J., Ma, J., Hou, J., & Yi, S. (2022). StyleFlow For Content-Fixed Image to Image Translation. arXiv preprint arXiv:2207.01909.

[5]. **Fan, W.**, Yang, Y., Qiu, K., Wang, S., & Guo, Y. (2022). InvNorm: Domain Generalization for Object Detection in Gastrointestinal Endoscopy. arXiv preprint arXiv:2205.02842.

## PROJECTS

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### - 2022:

#### [SenseTime] AIGC in 3D Object Design:

Our proposed model for image-to-brick generation utilizes a novel **diffusion-based** approach and is trained on a large image-brick paired dataset using CLIP. Additionally, we utilize deep reinforcement learning (DRL) for assembly sequence planning. Our approach demonstrates superior performance compared to existing methods on benchmark datasets and has the potential for applications in robotics, automation, and construction.

#### [SenseTime] Industrial 6D Pose Estimation:

Our proposed self-supervised framework for 6D pose estimation addresses industrial scenes with limited data and heavy occlusions. By leveraging self-supervision and image-to-image translation techniques, our framework enables more accurate and efficient pose estimation, providing a valuable tool for a wide range of industrial applications.

### - 2021:

#### [SenseTime] Sim2Real Data Engine:

We have developed a novel pipeline for robust data augmentation through unsupervised generation of previously unseen domain data. Our approach has demonstrated significant potential for reducing the cost associated with data collection, with a potential cost reduction of up to 99% in certain applications. Additionally, our method has been patented as an invention, reflecting its innovative and original contributions to the field.

#### [Lab Ren, National University of Singapore] Task-driven Attention for Autonomous Object-centered Endoscopy:

Our project, which focused on the development of a robust pipeline for medical robot control, has been published in IEEE T-ASE. We have proposed a novel model for controlling medical robots, leveraging the power of visual attention through task-based saliency detection. With our proposed model, the robot is capable of autonomously performing complex tasks without requiring human interaction, reflecting a significant advancement in the field of medical robotics.

### - 2020:

#### [Taobao, Alibaba] 3D face Reconstruction:

Our project, supported by Alibaba and the Chinese Academy of Sciences, aims to build Asia's largest 3D face database Pixel-Face. We have developed a novel 3D face reconstruction method, implemented in a mobile app, with potential applications in security, healthcare, and entertainment.

### - 2019:

#### [Ubisoft Hacker Marathon] Rapid 3D Urban Reconstruction Based on Binocular Vision

Our project, backed by Ubisoft Entertainment, aims to rapidly reconstruct cities using low-cost binocular cameras and IMUs. We propose a pipeline to transfer real scenes to simulated environments (Unity3D) via dense point clouds and CycleGAN, with potential applications in game development and urban planning.

#### [Robocon Robotics Competition] Tracking High-Speed Soccer Ball in real time

Our project, supported by the Machine Sensing and Intelligent Systems Research Center at UESTC, aims to develop a commercial module for soccer robots. The module employs an improved FCN combined with ConvLSTM to recognize the ball and predict its motion trajectory.

#### [Robocon Robotics Competition] High-Precision Positioning Module

Our project, supported by the Machine Sensing and Intelligent Systems Research Center at UESTC, focuses on developing a multi-robot rescue system. We employ LoRa technology for communication and localization, and propose a new approach to optimize energy consumption through reinforcement learning.

**AWARD**

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- **Silver Award in EMEDIC GLOBAL 2021** — 2021
- **Best presentation in EMEDIC GLOBAL 2021** — 2021
- **Robomaster Robotics Competition** - First Prize (10/173 worldwide) — 2020
- **Robocon Robotics Competition** - First Prize — 2020
- **Robomaster Robotics Competition** - First Prize (3/173 worldwide) — 2019