# 崔屿杰

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## 教育背景

**同济大学** 自动化本科 *2021 年 9 月–2026 年 6 月（预计）*

- GPA: 89.38，**综合排名：1/68**，雅思：7.0
- 技能：嵌入式开发，ROS，SLAM，PyTorch，点云处理，CV，python/C++

## 荣誉奖励

**全国特等奖：**第十八届“挑战杯”全国大学生课外学术科技作品“黑科技”专项赛（**第一作者**） *2023 年 10 月*
**全国银奖：**中国国际大学生创新创业大赛（2024）（**第二作者**） *2024 年 10 月*
**我最喜爱的项目（20/250）：**第十七届全国大学生创新年会（**第一作者**） *2024 年 11 月*
**全国二等奖：**第七届全国大学生嵌入式芯片与系统设计竞赛 *2024 年 8 月*
**全国一等奖：**2025 中国机器人大赛暨 RoboCup 机器人世界杯中国赛 *2025 年 5 月*
**启迪奖学金（电信学院最高荣誉），同济大学一等奖奖学金，优秀学生，京川艺术奖学金**

## 项目经历

**三指灵巧手通用操作学习框架** *AIR/DISCOVER*，清华大学 *2025 年 1 月 - 至今*

- 设计同构三指灵巧手外骨骼与真机，实现无需遥操的便携数据采集与训练框架。完成外骨骼采集设备的嵌入式开发设计，ORB3-SLAM 的 VIO 手腕定位以及从外骨骼到真机的 ACT 模仿学习框架，同时搭建了 Mujoco 同构仿真平台，满足外骨骼设备对虚拟灵巧手的运动迁移。

**Dero——桥梁箱梁内部病害检测机器人** (DERO) 矩尺土木，同济大学 *2022 年 4 月–2024 年 4 月*

- **技术：**使用 STM32 与树莓派完成了桥梁箱梁内部检测机器人全栈开发，涵盖了建图、定位、数据采集、病害识别、网页展示与云台控制 APP 的开发，并进行了实桥实验。针对箱梁内部建图问题，设计退化环境检测算法，自适应调节 Cartographer 算法点云匹配环节参数。**发表一篇桥梁领域顶会文章，授权两项专利**。
- **商业：**进行成果转化与商业实践，包括市场调研、竞品分析、商业模式设计、产品路演与宣传以及意向投资与订单争取。三**大创新创业竞赛国奖**。

**基于自监督的 2D 激光点云权重预测（已被 IROS 2025 接收）LSW-Net** *RAIL*，同济大学 *2024 年 9 月-2025 年 3 月*

- 设计了一种基于自监督学习的二维点云重要性感知网络，使用融合对比损失提取点云权重，提升了 ICP，CSM 等点云匹配算法的精度。
- 提出了一种使用类 U-Net 结构与重建损失，联合时空编码的通用二维点云编码器，可有效挖掘二维点云特征。

**智绎心声——基于 STM32H7 的失语症患者辅助设备** (STM32H7 Aphasia Helper) 同济大学 *2024 年 3 月–2024 年 7 月*

- **人机交互：**基于 STM32H7 的失语症患者辅助设备，采用姿态传感选控 + 红外触控确认 + 多模态反馈的病患友好型交互方式。**获得嵌入式芯片与系统设计国赛二等奖**。
- **边缘 AI：**使用 X-CUBE-AI 将图像识别模型 MCUNet 量化压缩，并部署到 STM32H7，实现了在内存（1MB）以及 Flash(2MB) 受限的微控制器上进行 ImageNet 类别的实时推理。

## 文章发表

1. Haojie Dai*, **Yujie Cui***, Bowen Shi, Mazeyu Ji, Chengju Liu, Qijun Chen “LSW-Net: A Spatio-temporal Self-Supervised Framework for 2D LiDAR-Based Environment Perception”, IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2025.
2. **Yujie Cui**, Yue Pan, Dalei Wang, Mazeyu Ji, Sugong Cao “A smart robotic system for autonomous inspection of large-scale concrete girder,” International Association for Bridge Maintenance And Safety(IABMAS), 2024.

# Yujie Cui

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## Education

**Tongji University** *B.E in Automation* *Sep. 2021 –Jun. 2026(expected)*

- GPA: 89.38, **overall rank: 1/68**, IELTS: 7.0
- Skills: Embedded Development, ROS, SLAM, PyTorch, Point Cloud Processing, Computer Vision, Python/C++

## Selected Honors and Awards

**National Grand Prize** in Challenge Cup National College Student Curricular Academic Science and Technology Works Competition - Black Technology Track (**First Author**) *Oct. 2023*

**National Silver Award** in China International College Students' Innovation Competition 2024(**Second Author**) *Oct. 2024*

**Most Popular Project (20/250)** in National College Student Innovation Annual Conference 2024(**First Author**) *Nov. 2024*

**National Second Prize** in National College Student Embedded System Design Competition *Aug. 2024*

**National First Prize** in 2025 China Robotics Competition and RoboCup China Open *May. 2025*

**Qidi Scholarship (the highest honor of the School of EE), Tongji University First-Class Scholarship, Excellent Student, Jingchuan Art Scholarship**

## Project Experience

**Three-Fingered Dexterous Hand Universal Manipulation Interface** *AIR/DISCOVER, Tsinghua University Jan. 2024 - Current*

- Designed a homomorphic three-finger exoskeleton and real robotic hand, enabling portable data collection and training without teleoperation. Developed embedded systems, ORB3-SLAM-based wrist VIO, ACT imitation learning from exoskeleton to robot, and a Mujoco simulation for motion transfer.

**Dero——Bridge Box Girder Internal Detection Robot**(DERO) *Juchi Civil Engineer, Tongji University Apr. 2022 –Apr. 2024*

- **Technology:** Developed a full-stack bridge box girder internal detection robot using STM32 and Raspberry Pi, including mapping, localization, data collection, defect detection, web display, and gimbal control, with real-bridge testing. A degradation environment detection algorithm was designed to adjust point cloud matching parameters in the Cartographer algorithm for internal mapping. **Published a top-tier conference paper in the field of bridge engineering and granted two patents.**
- **Business:** Handled business practice, including market research, competitor analysis, business model design, product roadshows, and securing investments and orders. **Three National Innovation and Entrepreneurship Competition Awards.**

**Self-Supervised Laser Scan Weight Prediction(Accepted to IROS 2025)LSW-Net** *RAIL, Tongji University Sep. 2024 - Mar. 2025*

- Designed a self-supervised learning-based 2D point cloud importance perception network, using fused contrastive loss to extract point cloud weights, which improved the accuracy of point cloud matching algorithms such as ICP and CSM.
- Proposed a universal 2D point cloud encoder using a U-Net-like structure with reconstruction loss and spatiotemporal encoding to effectively extract features.

**STM32H7 based Aphasia Helper**(STM32H7 Aphasia Helper) *Tongji University Mar. 2024 –Jul. 2024*

- **Human-Computer Interaction:** Developed an STM32H7-based assistive device for aphasia patients, featuring patient-friendly interaction via gesture-based selection, infrared touch confirmation, and multimodal feedback.
- **Edge AI:** The image recognition model MCUNet was compressed and deployed on the STM32H7 with X-CUBE-AI, enabling real-time inference for ImageNet categories on a microcontroller with memory (1MB) and Flash (2MB) constraints.

## Publication

1. Haojie Dai*, **Yujie Cui***, Bowen Shi, Mazeyu Ji, Chengju Liu, Qijun Chen "LSW-Net: A Spatio-temporal Self-Supervised Framework for 2D LiDAR-Based Environment Perception", IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2025.

2. **Yujie Cui**, Yue Pan, Dalei Wang, Mazeyu Ji, Sugong Cao "A smart robotic system for autonomous inspection of large-scale concrete girder," International Association for Bridge Maintenance And Safety(IABMAS), 2024.