崔屿杰

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教育背景

同济大学 *2021 年 9 月–2026 年 6 月（预计）*

自动化本科

- GPA: 4.44/5.0　绩点排名：23/67　**学年综合排名：2/67**
- 辅修创新创业，2023 年参与意大利暑期夏令营

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*

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

Dero——桥梁箱梁胃镜机器人 (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。**

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，我提出项目创意，设计实现方案。负责开发了使用陀螺仪选择选项，红外传感器确认选项，蜂鸣器与振动马达反馈确认的病患友好型交互方案。**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。

基于自监督的 2D 激光点云权重预测（论文撰写中，即将开源） *RAIL*，同济大学

2024 年 9 月 - 至今

- 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。

基于 Diffusion 模型的 3D 激光点云生成算法的优化 (img2depth2Lidar) *RAIL*, 同济大学

2024 年 7 月–2024 年 10 月

- 将基于几何特征的约束，引入了 Diffusion 模型的一阶段点云编码环节，增强点云特征表示的置信度。将 Depth-Anything 模型引入二阶段，对图像进行深度估计，优化以图像为引导的生成点云质量。

文章发表

1. **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.

2. Mazeyu Ji, Wenbo Shi, **Yujie Cui**, Chengju Liu, Qijun Chen “Adaptive Denoising-Enhanced LiDAR Odometry for Degeneration Resilience in Diverse Terrains,” IEEE Transaction on Instrumentation and Measurement, 2024.

Yujie Cui

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Education

Tongji University *Sep. 2021 –Jun. 2026(expected)*

B.E in Automation

- GPA: 4.44/5.0 GPA rank: 23/67 **Academic year overall rank: 2/67**
- Minored in Innovation and Entrepreneurship, participated in the Italy Summer Camp in 2023.

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*

Tongji University First-Class Scholarship, Excellent Student, Jingchuan Art Scholarship

Project Experience

Dero——Bridge Box Girder Inspection 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.**

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. I proposed the idea, designed the plan, and created a patient-friendly interaction system using a gyroscope, infrared sensor, and feedback via a buzzer and vibration motor. **Won second prize in National Embedded System Design Competition.**
- **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.

Self-Supervised Laser Scan Weight Prediction (Paper in Progress) *RAIL, Tongji University Sep. 2024 - Current*

- 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.

Diffusion-based 3D LiDAR Point Cloud Generation(img2depth2Lidar) *RAIL, Tongji University Jul. 2024 –Oct. 2024*

- Introduced geometry-based constraints in the first-stage point cloud encoding of the Diffusion model to enhance feature representation. Used the Depth-Anything model in the second stage for depth estimation, improving image-guided point cloud generation.

Publication

1. **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.
2. Mazeyu Ji, Wenbo Shi, **Yujie Cui**, Chengju Liu, Qijun Chen "Adaptive Denoising-Enhanced LiDAR Odometry for Degeneration Resilience in Diverse Terrains," IEEE Transaction on Instrumentation and Measurement, 2024.