Tianxiong Zhang

Details

Address : No.46, Section 4, Nanchang Road, Guanghan City, Sichuan Province, China 618307
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[Personal Website]
[Google Scholar]

Language

Chinese (Native)

English (B2)

Skills

Python

Deep Learning

Computer Vision

ROS

Linux

IELTS Overall Band: 6.5

Education

Master's degree student of Transportation

Civil Aviation Flight University of China, Guanghan, China

Sep 2021 – Present (exp. Jul 2024) Supervisor: Prof. Xinping Zhu

- Ranked **#1** in academic performance in 2021, **#2** in 2022 and **#3** in 2023. (Total 69)
- GPA: 3.55/4

Bachelor of Transportation

Inner Mongolia University of Technology, Hohhot, China

Sep 2017 – Jul 2021

- GPA: 3.8/5 (Core course average: 84.80)

Research Experience

Project 1. Research on Perception and Control Framework for Airport Autonomous Vehicles and Robots

(Funded by the China Central Universities Basic Research Funds)

- **Objective:** Innovate apron operations by integrating autonomous vehicles, addressing the gap in research on their automated docking processes.
- **Methods:** Employed Lane Detection, Object Detection, and ROS-based Robot Motion Control.
- **Main works:** Enabled autonomous navigation on set routes, developed obstacle avoidance tactics, and implemented control mechanisms for vehicle docking.

Project 2. Research on Intra-aircraft stand Conflict Detection Based on Keypoint Detection

(Funded by the 2021 CAFUC Innovation and Entrepreneurship Project)

- **Objective:** Addressing the gap in existing research that fails to identify critical aircraft components and the lack of studies on collision warnings between aircraft and vehicles.
- **Methods:** Utilized Keypoint Detection, Instance Segmentation, and Kinematic Modeling.
- **Main works:** Developed an aircraft keypoint detection dataset, achieved accurate keypoint tracking and identification, modeled conflict scenarios, and formulated a strategy for resolving multiple conflicts.

Project 3. Detection of Unauthorized Intrusion in Aircraft Engine Sensitive Areas

(Funded by the 2023 CAFUC Graduate Student Research Innovation Program)

- **Objective:** To mitigate the risk of irreversible damage caused by aircraft engines to equipment and personnel, addressing the scarcity of research on visualizing engine danger zones and conflict prevention.
- **Methods:** Applied Object Detection, Keypoint Detection, and enhanced Neural Network architectures.
- **Main works:** Refined deep learning models, established engine zone conflict detection, and tested scenarios for system validation.

Project 4. Fine-grained 3D Reconstruction of Airport Global and Local Aircraft Stands

(Funded by the 2024 CAFUC Innovation and Entrepreneurship Project)

- **Objective:** Realize the high-precision 3D reconstruction of the aircraft stand, for the subsequent apron perception algorithm validation and three-dimensional simulation platform to provide the basis.
- **Methods:** 3D Gaussian Splatting, Colmap, and Unreal Engine 5.
- **Main works:** Realized 3D reconstruction of Chengde Airport based on point cloud, and realized high precision reconstruction of single aircraft stand based on 3DGS.

Master's Thesis: Research on Computer Vision Based Apron Activity Conflict Detection

Academic Achievements

Journals articles

- **Zhang T.**, Zhang Z., Zhu X., et al.: Aircraft Engine Danger Areas Incursion Detection Using Keypoint Detection and IoT. Alexandria Engineering Journal. 2024; 93:7-21. (IF=6.8) [LINK]
- **Zhang T.**, Zhang Z., Zhu X.: Detection and Control Framework for Unpiloted Ground Support Equipment within the Aircraft Stand. Sensors. 2024; 24(1):205. (IF=3.9) [LINK]
- **Zhang T.**, et al.: Research on Conflict Detection Model for Taxi-in Process on the Apron Based on Aircraft Wingtip Keypoint Detection. IET Intelligent Transport Systems. 2023 May;17(5):878-96. (IF=2.7) [LINK]
- **Zhang T.**, Zhang Z., Zhu X., Li J.: A Multi-Keypoint Detection Based Method for Conflict Determination between Aircraft and Vehicles on the Apron Gate. Journal of Transport Information and Safety. (In Chinese)
- Zhang Z., **Zhang T.**, Zhu X., et al.: SEHRNet: A Lightweight, High-resolution Network for Aircraft Keypoint Detection. IET Image Processing. 2024. (Co-First Author) (IF=2.3) [LINK]
- Zhao Q., **Zhang T.**, Yuan D., et al.: Monte Carlo Simulation-Based Risk Assessment for Unmanned Ground Equipment Taxiing Guidance. Journal of Electronics and Information Science. 2024; 9(2): 23-33. [LINK]
- Zhu X., **Zhang T.**, Li J., et al.: Wingtip Detection-based Aircraft Gate Taxi-in Conflict Determination. Journal of Safety and Environment. 2023,23(11):3848-3857.(Co-First Author)(In Chinese) [LINK]

Patents

- China Patent. CN115294805B. Jiajun Li, Xinping Zhu, **Tianxiong Zhang**, Chuan Xu, Jingjing Qu. A Video Image-based Airport Surface Aircraft Conflict Warning System and Method. 2023-05-16.
- China Patent. Xinping Zhu, **Tianxiong Zhang**, Zhiqiang Zhang, et al. A machine vision-based aircraft engine collision avoidance warning system and method in the airfield area.(Application in progress)
- China Patent. Xinping Zhu, **Tianxiong Zhang**, Zhiqiang Zhang, et al. A multi-keypoint detection-based conflict determination method between aircraft and vehicles within an apron.(Application in progress)

Awards

- **National Scholarship,** China. 2023.
- **Second prize**, "Huawei Cup" The 18th China Post-Graduate Mathematical Contest in Modeling. (National level). 2022.
- **Third prize**, "Huawei Cup" The 19th China Post-Graduate Mathematical Contest in Modeling. 2023.
- **Bronze Award**, The 8th Sichuan Province International "Internet+" Student Innovation and Entrepreneurship Competition. (Provincial level). 2022.
- **Special Scholarship for Graduate Students**, Civil Aviation Flight University of China. (**From 2021-2023, three consecutive years**).
- **Outstanding Graduates**, Civil Aviation Flight University of China. 2024.