Tianxiong Zhang

Details

Address : No.46, Section 4, Nanchang Road, Guanghan City, Sichuan Province, China 618307
Phone : +8615934146183
tianxiongzhang1221@163.com
[Personal Website]
[Google Scholar]

Language

Chinese

English

Skills

Python

Deep Learning

Computer Vision

ROS

Linux

IELTS Overall Band: 6.5

Hobbies

I am passionate about the transportation industry and enjoy riding all types of transportation and using various simulation software to simulate transportation systems. In addition, I am a big fan of cars and like to travel to different places. My favorite outdoor sport is jogging.

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 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 2. 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 3. Unmanned and Manned Target Mixed Operation Collaborative Scheduling and Conflict Detection Technology on the Apron Research

(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 4. Vision-Based Runway Intrusion Warning System

(Funded by the 2021 CAFUC Innovation and Entrepreneurship Project)

- **Objective:** Enhance airport safety by addressing runway intrusions with a cost-effective, vision-based detection system as an alternative to expensive SMR and MLAT systems.
- **Methods:** Integrated Object Detection and Camera Coordinate Conversion techniques.
- **Main works:** Created a comprehensive aircraft detection dataset, detected aircraft on runways and taxiways, and implemented over-the-line detection capabilities.

Master's Thesis Topic: Research on Computer Vision Based Apron Activity Conflict Detection (in progress)

Academic Achievements

International 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. [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. [LINK]
- **Zhang T.**, Zhu X., Li J., 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. [LINK]
- Zhang Z., **Zhang T.**, Zhu X., et al.: SEHRNet: A Lightweight, High-resolution Network for Aircraft Keypoint Detection. IET Image Processing. (Co-First Author)(Under Review)

National core journals articles

- **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)
- Zhu X., **Zhang T.**, Li J., Zhao Q., Xu H.: 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.
- **Second prize**, "Huawei Cup" The 18th China Post-Graduate Mathematical Contest in Modeling. (National level)
- **Third prize**, "Huawei Cup" The 19th China Post-Graduate Mathematical Contest in Modeling. (National level)
- **Bronze Award**, The 8th Sichuan Province International "Internet+" Student Innovation and Entrepreneurship Competition. (Provincial level)
- **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.