Tianxiong Zhang

Details

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[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:** Existing research does not enable identification of critical aircraft components. Few studies on collision warning between aircraft and vehicles.
- **Methods:** Keypoint Detection, Instance Segmentation, Kinematic Model
- **Main works:** Established an aircraft keypoint detection dataset; Achieved tracking and identification of aircraft keypoints; Modeling conflict detection between aircraft and aircraft and vehicles; Designed a multi-conflict determination strategy.

Project 2. Method and Software Development for Detecting Unauthorized Target Intrusion in the Engine Sensitive Area during Aircraft Taxi into the Gate

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

- **Objective:** Engines can cause irreversible damage to equipment and personnel on the apron, few studies visualize engine danger zones and conflict prevention.
- **Methods:** Object Detection, Keypoint Detection, Attention Mechanism.
- **Main works:** Improved the deep neural network; Established the engine danger zone conflict detection model; Designed and validated a typical conflict scenario.

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:** The use of autonomous driving vehicles for apron operations is the trend, currently there is less research on automated docking processes of airport vehicles.
- **Methods:** Lane Detection, Object Detection, ROS Robot Motion Control.
- **Main works:** Achieved autonomous vehicle driving along predetermined routes; Designed vehicle obstacle avoidance strategies; Realized vehicle motion control during docking.

Project 4. Research on Runway Intrusion Warning Based on Computer Vision

(Funded by the 2021 CAFUC Innovation and Entrepreneurship Project)

- **Objective:** Runway intrusion is a big threat to airport operation safety, while SMR,MLAT is costly, vision-based target detection can effectively solve the above problems.
- **Methods:** Object Detection, Camera Coordinate Conversion.
- **Main works:** Established aircraft object detection dataset; Realized the detection of aircraft on runways and entrance/exit taxiways; Achieved aircraft over-the-line detection.

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.: 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 T.**, Zhang Z., Zhu X., et al.: Aircraft Engine Danger Areas Incursion Detection Using Keypoint Detection and IoT. Alexandria Engineering Journal. (Under Review)
- 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.