Chenlong Zhang

Phone : +86 18810508200 | Email : cheslee_z@buaa.edu.cn
Personal Website : https://cheslee-z.github.io/
Research Interests: UAV Visual Navigation, SLAM

EDUCATION

Beihang University   Sep 2021 - Jun 2024

Master of Electronic Information   GPA:3.79/4.00 (Top 17%)

- **Thesis**: Visual Localization and Motion Planning of UAV in Dynamic Scenes
- **Relevant courses**: Computer Vision and Navigation Technology(96), Design and Analysis of algorithms(95), Intelligence Sensing and Autonomous System(93)

Beihang University   Sep 2017 - Jun 2021

Bachelor of Unmanned Aerial Vehicle System Engineering   GPA:3.54/4.00 (Top 25%)

- **Thesis**: Altitude-Speed Control and Route Tracking Guidance Algorithm Optimization of Small UAV
- **Relevant courses**: Pattern Recognition and Machine Learning(96), Design of UAV Autonomous Control and Management System(96), Introduction to Multicopter Design and Control(93)

PUBLICATIONS

- **Chenlong Zhang**, Dawei Li, Haodong Li (2022). Robust Coordinated Longitudinal Control of MAV Based on Energy State[C]. International Conference on Guidance, Navigation and Control. (**ICGNC2022**)[arXiv]
- Chunzheng Wang, Yunyi Zhang, **Chenlong Zhang**, et al. (2023). RBSAC: Rolling Balance Controller Based on Soft Actor-Critic Algorithm of the Unicycle Air Robot[C]. Accepted to **ICIRA2023**.
- Dawei Li, **Chenlong Zhang**, Jiong Yang, et al. A Simulation Method Based on UAV Cluster Semi-physical Simulation System [P]. Beijing: CN114063474B,2023-06-06. (Authorized)
- Dawei Li, **Chenlong Zhang**, Ming Wang, et al. Fixed-wing UAV Longitudinal Altitude-Speed Control System Based on Total Energy Control [P]. Beijing: CN113485406A,2021-10-08. (Accepted)
- Quan Quan, Dawei Li, Jiong Yang, et al. Multicopter: From Principle to Practice [M]. ("14th Five-Year" Planning Textbook of Ministry of Industry and Information Technology)

PROJECTS

Quadrotor UAV indoor autonomous navigation and target tracking   Apr 2022 - Present

- Responsible for hardware selection (including cameras, on-board computers, etc.) and algorithm research (including localization module and planning module), as well as algorithm initial simulation verification based on Gazebo
- Deployed algorithm (engineering practice)
  - Designed communication algorithm between localization module and flight control module (difficulty: Ardupilot's native communication mechanism makes flight controller's built-in IMU data unable to be used for VIO)
  - Calibrated parameters of sensors and optimized compatibility between softwares and hardwares
- Achieved VIO-based UAV indoor localization and waypoint navigation

Stereo visual inertial odometry based on sparse scene flow in dynamic scenes   Apr 2023 - Present

- Theoretical learning: building stereo VIO system based VINS Fusion from scratch
- Algorithm innovation: the front end uses stereo camera to construct sparse scene flow and loosely couples IMU pre-integration measurement to achieve dynamic feature detection, the back end combines dynamic features (feature motion prediction) and static features for BA optimization. It is expected to be deployed to edge computing platforms to realize real-time low-power VIO, and related paper is being written and will be submitted to RA-L

Cluster control of small fixed-wing UAV   Oct 2020 - Aug 2022

- Improved the energy state-based longitudinal control architecture of fixed-wing MAV by combining with Linear Active Disturbance Rejection Control (LADRC), and achieved stronger robustness and better coordination under wind disturbance conditions
- Built Real-time digital aircraft simulation computer and cluster UAV semi-physical simulation system through Simulink

and Links-RT simulation platform

Design and control of space-based unmanned platform   Jan 2021 - Dec 2021

- Carried out the overall design of the unmanned flight platform according to mission requirements (including overall parameters, layout form, mounting capacity and flight performance, etc.)
- Built a digital model of the unmanned flight platform based on Simulink, designed the control law for each stage of the entire mission process, and conducted simulation verification

Multicopter: from principle to practice ("14th Five-Year" Planning Textbook of Ministry of   Oct 2020 - Aug 2022
Industry and Information Technology)

- Wrote chapters related to the assembly and debugging of drones and designed related experiments (using Ardupilot)

PROFESSIONAL EXPERIENCE

Beijing Wattman Technology Co., Ltd   May 2021 - Sep 2021

Algorithm Intern in 3D reconstruction group   Beijing, China

- Verified the engineering deployment difficulty of 3D reconstruction technology based on openMVG and openMVS
- Built a mobile backpack mapping system, specifically including internal and external parameters calibration of Velodyne lidar and Insta panoramic camera, and point cloud coloring based on lio-sam

Beijing Deep Blue Frontier Technology Co., Ltd   Nov 2021 - Mar 2022

Teaching Assistant of State Estimation in Robotics   Beijing, China

- Corrected coursework and Q&A (requires mastering the theory of filter-based state estimation)

COMPETITION EXPERIENCE

RoboMaster Robotics Competition   Oct 2018 - Jan 2020

- Electronic control director of hero robot(2019 season), responsible for motion control, gimbal control, bullet shooting control and overall machine power control of robots
- Unmanned vehicle group leader(2020 season), responsible for R&D progress management and gimbal control algorithm optimization

Sailing Cup MBSE Modeling Contest   Jul 2020 - Nov 2020

Captain

- Taking the UAV swarm search and rescue scenario as the research object, the model-based system architecture process methodology is used to jointly model and simulate the entire search and rescue system using both SysML and Simulink (including operational perspective, logical perspective and physical perspective)

HONORS & AWARDS

Winning Award in Sailing Cup MBSE Modeling Contest (the only undergraduate team to reach the final)	2020
Winning Award in International General Aviation Innovation and Entrepreneurship Competition (Final)	2019
Third prize in RoboMaster Robotics Divisional Competition	2019
First-class Scholarship for Postgraduate of Beihang University(Top 20%)	2021 / 2022 / 2023
Outstanding graduate of Beihang University	2021
First-class Scholarship for Undergraduate of Beihang University (Top 20%)	2019 / 2020

SKILLS

- **Languages:** Mandarin(native), English (IELTS: 6.0)
- **Programming:** C(5 years), C++(3 years), MATLAB(5 years), python(4 years), ROS(2 years), PyTorch(2 years)
- **Code frameworks:** VINS series, ORB-SLAM series, Lio-sam, Ardupilot, PX4, etc
- **libraries:** OpenCV, Eigen, Sophus, Ceres, g2o, PCL, ACADO, etc
- **Developer Tools:** Git, Markdown, LaTeX, Docker, Vim, Tmux, etc