CHENLONG ZHANG

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Personal Profile

I love unmanned aerial vehicles and understand the overall technology stack of robot algorithms, have more practical experience in **SLAM** and **control** algorithms, have certain application to the basic knowledge of **environmental perception** algorithms, and have a certain understanding of the overall process of **decision planning** algorithms (proficiency ranking: **SLAM** > **control** > **environmental perception** > **decision planning**)

EDUCATION

Beihang University   2021.09 - 2024.06
Electronic information Master School of Automation Science and Electrical Engineering   Beijing
- Research Direction: UAV **Visual Localization** and **Motion Planning** in Dynamic Scenes
- GPA:3.79/4.00 (Professional Top 17%)

Beihang University   2017.09 - 2021.06
Unmanned Aerial Vehicle System Engineering Bachelor Flight Academy   Beijing
- Research direction: Small UAV **position and speed control** and route tracking **guidance** algorithm optimization
- GPA:3.54/4.00 (Professional Top 25%)

PROJECT EXPERIENCE

Robomaster mecha masters   2018.10 - 2020.01
- 2019 season as head of hero robot electric control
  - Using stm32 platform based on c language to realize unmanned vehicle chassis **motion control** and PTZ **steering control**, as well as bullet firing rate and bullet attack control
- 2020 season as head of driverless group
  - Responsible for managing multiple unmanned vehicle research and development progress
  - The existing gimbal control algorithm is improved (try to use system identification and adaptive control method)
  - Realize the control layer and visual perception layer interaction (TX2 and stm32 communication)

Binocular visual inertial odometry based on sparse scene flow in dynamic scenes   2023.04 - Present
core members
- Front-end uses binocular camera to build sparse scene stream and loosely couple **IMU pre-integration** measurement to realize dynamic feature detection
- Back-end combines dynamic features (feature motion prediction) and static features for **BA optimization**
- Expected deployment to edge computing platforms for real-time low-power **VIO**
- In writing related papers, to submit to RA-L

Autonomous navigation of low-cost micro-small multi-rotor UAV   2022.04 - Present
core members
- hardware selection (including camera, on-board computer) and algorithm research (including **localization** module and **planning** module)
  - Based on gazebo to create simulation scenarios for simulation verification
- algorithm deployment
  Design of communication algorithm between
  - **Localization** module and flight **control** module (based on Ardupilot)
    - Difficulty: Ardupilot native communication mechanism makes flight control built-in IMU data unavailable for VIO
  - Software and hardware compatibility optimization
- At present, VIO-based UAV indoor fixed-point hovering

Cluster control of small fixed-wing unmanned aerial vehicles   2020.10 - 2022.08
Core student members
- Longitudinal control of fixed-wing UAV based on total energy control and active disturbance rejection control
  - Has published a relevant conference paper, accept the relevant patent one
- Design of Semi-physical Simulation System for UAV Cluster Control
  - Has accepted a relevant patent.

PROFESSIONAL EXPERIENCE

Beijing Deep Blue Frontier Technology Co., Ltd   2022.11 - 2023.03
Course teaching assistant State Estimation in Robotics   Beijing
- Responsible for correcting coursework and answering questions
  - Need to **based on filter state estimation** theory system and **Lie group Lie algebra** have a deep understanding and have substantial derivation ability

Beijing Whatman Technology Co., Ltd   2021.05 - 2021.09
Algorithm intern 3D reconstruction group   Beijing
- Explore based on openMVG and openMVS **3D reconstruction** technology of the actual deployment difficulty

- **Internal and external parameters calibration** of Velodyne lidar and Insta panoramic camera
- lio-sam-based **point cloud coloring**

Course Experience

Visual SLAM Advanced: Handwriting VIO from scratch
Excellent cadets Deep Blue Academy
- Achieve VIO system construction that does not rely on ROS and any back-end optimization framework
- implemented square root BA based **marginalization** strategy
- Based on their own understanding of the annotated [VINS-Mono code](#)

VIO Thanos: ORB-SLAM3 source code is parsed line by line
Excellent cadets Computer Vision Life
- In-depth analysis of the ORB-SLAM series of source code, and the final learning total points to achieve the first place results
- Development of ORB-SLAM3 multi-map pure positioning mode code (to be open source)

School-related courses
- Computer Vision and Navigation Technology (96)
- Algorithm Design and Analysis (95)
- Pattern Recognition and Machine Learning (95)
- Multicopter Design and Control (93)
- Intelligent Perception and Autonomous Systems (93)

SKILLS LIST

- **Programming:** C(5 years), C++ (3 years), MATLAB(5 years), python(4 years), ROS(2 years), Pytorch(2 years)
- **Code framework:** VINS series, ORB-SLAM series, Lio-sam, Ardupilot, PX4, etc
- **Third-party libraries:** OpenCV, Eigen, Sophus, ceres, g2o, pcl, acado, etc
- **Other gadgets:** git, Markdown, Latex, vim, tmux, etc

HONORS & AWARDS

Robomaster mecha masters division third prize	2019
International General Aviation Innovation and Entrepreneurship Competition Winning Award (Final)	2019
Sailing Cup MBSE Modeling Competition Winning Award (Captain, the only undergraduate team to reach the final)	2020
First-class scholarship for excellence in school-level studies (top 20%)	2019~2020
Outstanding graduate of Beihang University	2021
Academic scholarship first prize (top 20%)	2021~2022

scientific research achievements

- **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**.
- Li Dawei, Zhang **Chenlong,** Yang Jiong, et al. A UAV cluster semi-physical simulation system [P]. Beijing: CN114063474A,2022-02-18.
- Li Dawei, Zhang **Chenlong,** Wang Ming, et al. Based on total energy control fixed-wing UAV longitudinal speed control system [P]. Beijing: CN113485406A,2021-10-08.
- Quan Quan, Li Dawei, Yang Jiong, et al. Multi-rotor aircraft from principle to practice [M](Ministry of Industry and Information Technology 14th Five-Year Planning Textbook).