

CHEN Jiaqing

E-mail: chenai_tgf@163.com / Tel: (+86) 19254916163

EDUCATION

- Bachelor of Engineering (B.Eng.) in Automation, Fuzhou University (FZU)** 09/2023-06/2027
● CGPA: 3.0/4.0 (补充百分制均分)
- Bachelor of Science in Robotics and Intelligent Devices, National University of Ireland, Maynooth (MU)** 09/2023-06/2027

PUBLICATION

Co-author, Low-Cost Versatile On-Orbit Servicing CubeSat with Refuellable Multimodal Water-Propellant Propulsion System, accepted by *International Astronautical Congress 2026 (IAC)* 04/2026

• Aim: Propose a novel 16U CubeSat on-orbit servicing platform, providing life extension, debris removal, and other on-orbit services for CubeSat constellations, with engineering application value for the development of the low Earth orbit space ecosystem.

Responsibilities: Vision Algorithms, Control Algorithms

- Designed a multi-task 6-DoF pose estimation algorithm based on an optimized SPNv2 network, using EfficientDetB3+BiFPN as the backbone to address challenges of full-field satellite views and keypoints exiting the frame, achieving end-to-end joint learning of pose, keypoints, and segmentation.
- Constructed two high-fidelity synthetic datasets for satellite rendezvous and docking, covering the approach phase (1–10m) and docking phase (0.1–1m), completing rendering, annotation, and scene configuration for 100,000+ samples.
- Designed a visibility-aware loss function and DIoU bounding box optimization strategy, achieving 3mm peak translational estimation accuracy and rotational error concentrated within 1°; algorithm maintains strong robustness under occlusion and extreme viewpoints.
- Completed edge deployment optimization on Jetson Orin NX platform with TensorRT quantization acceleration, achieving single-frame inference latency of 35ms, meeting on-board real-time requirements within 150ms.
- Completed satellite inertia matrix and flywheel parameter identification using MATLAB; designed an adaptive PID attitude controller in Simulink to improve attitude disturbance rejection during long-range rendezvous and docking.

Second author, Orbital Maneuver Study of High-Low Thrust Combined Multimodal Water Propulsion for On-Orbit Servicing, accepted by *International Conference on Guidance, Navigation and Control (ICGN)* 0/2026

• Aim: Addressing the contradiction between rapid large-scale orbital transfer and high-precision fuel-efficient orbital control in on-orbit servicing missions, this paper provides a technical solution for orbital maneuvering of low-cost CubeSats in complex on-orbit servicing scenarios.

Responsibilities: Control Algorithms

- Participated in PID mode-switching control algorithm implementation, completed thrust fluctuation suppression (within 5%) and orbit-attitude coupling control debugging.
- Built orbital maneuver simulation module based on Modified Equinoctial Elements (MEEs) orbital dynamics model, reproduced Lambert algorithm and Pontryagin's minimum principle trajectory optimization, validated feasibility of three propulsion strategies.
- Wrote Python data parsing scripts to extract core metrics (fuel consumption, delta-v, maneuver time, terminal position/velocity errors), completed comparative analysis of four orbital strategies.

Second Author, Preliminary Design of GNC System and Multi-mode Propulsion Cooperative Control for Micro-Nano Satellite Autonomous Rendezvous and Docking, the 6th Chinese Aerospace Safety Symposium (CASS) 0/2026

• Aim: This paper presents a preliminary GNC system simulation design for autonomous rendezvous and docking of micro-nano satellites under 100 kg. A long-range low-thrust dynamics model incorporating J2 perturbation is constructed. The simulation achieves high-precision rendezvous and docking, with the fuel-optimal scheme saving 62.88% fuel compared to the time-optimal scheme. Physical verification will be carried out subsequently.

Responsibilities: Control Algorithms, Vision Algorithms

- Implemented improved SPNv2 visual pose estimation algorithm for the 10m–0.02m docking phase, completed keypoint detection, homography matrix solving, and visibility-aware loss function in Python; implemented Cubature Kalman Filter (CKF) to fuse visual pose and IMU data, achieving millimeter-level relative position/attitude estimation.
- Built a 6-DoF cooperative control simulation model in MATLAB/Simulink, realized seamless mode-switching control logic for multi-mode water propulsion (switching time $\leq 1s$); wrote PID quaternion attitude control algorithm, output simulation results with attitude determination accuracy $\leq 0.005^\circ$.

First Author, High-Fidelity Orbital Reconstruction: A Physics-Grounded Simulation and Two-Phase Progressive Strategy for Space Objects, accepted by *International Conference on Guidance, Navigation and Control (ICGN)* 0/2026

• Addressing the need for high-precision 3D reconstruction of non-cooperative targets in on-orbit servicing, this paper constructs a simulation platform incorporating multi-sensor error models and proposes a "manifold-to-point" two-phase progressive reconstruction strategy, achieving nearly 100% topological coverage and centimeter-level accuracy, thereby supporting autonomous approach and robotic operations in congested orbits.

First author, Physics-aware LiDAR degradation modeling and 3D reconstruction pipeline for space target on-orbit servicing, *Chinese Conference on Pattern Recognition and Computer Vision (PRCV)* 0/2026

• Address the challenges of low Earth orbit constellations and space debris, this paper investigates physics-aware degradation modeling of LiDAR in on-orbit servicing and optimizes the LiDAR-only 3D reconstruction pipeline, achieve centimeter-level accuracy under extreme conditions, and provide a basis for sensor selection and algorithm design for on-orbit servicing.

INTERNSHIP

Project 1: Development of a CubeSat Proximity Pose Estimation and Docking Control System

- Produced 3 papers such as [Low-Cost Versatile On-Orbit.....](#), [Orbital Maneuver Study.....](#), and [Preliminary Design of GNC.....](#)

Project 2: Tiangong Program – On-Orbit Servicing Space Target 3D Reconstruction and High-Fidelity Simulation Platform

Responsibilities: Vision Algorithms

- Independently developed core simulation code, integrating fly-around sampling, point cloud filtering, voxel downsampling, and surface reconstruction modules.
- Completed high-precision physical error modeling for multi-source sensors (LiDAR, depth camera, IMU).
- Integrated simulation code with sensor error models to complete overall platform development and debugging.
- Built a standardized point cloud reconstruction quality evaluation system, completed fusion reconstruction of depth camera and LiDAR, achieving centimeter-level 3D reconstruction.
- Led the topic selection, writing, revision, and full-process implementation of ICGNC and PRCV conference papers.
- Hardware debugging of RoboSense E1R solid-state LiDAR, visualization software development, and technical documentation; led the investigation, demonstration, and system architecture of binocular/depth camera perception solutions.

RESEARCH & COMPETITION

Team Leader, Higher Education Cup National Mathematical Modeling Competition

09/2025

- Constructed and refined the models of two-beam interference and Fabry–Perot multi-beam interference.
- Designed the core "Moving Average Filtering + Peak Finding" algorithm, integrated an ANN (Artificial Neural Network), and established an infrared interferometric thickness measurement system for silicon carbide epitaxial layers, achieving high-precision measurement optimization.
- Authored the paper "Epitaxial Layer Thickness Model Based on the Fabry–Perot Formula and ANN".

Team Leader, TI Cup National Undergraduate Electronic Design Competition

08/2025

- Led the development of a machine vision algorithm based on color block detection and the design of a two-axis gimbal system with PID control, achieving fast target locking and precise laser emission within 0.5 seconds, while balancing system response speed and control accuracy.

Technical leader, Intelligent Mobile Robot Development and Scenario-Based Deployment Project

03/2025

- Focusing on the core requirements of intelligent mobile robot autonomous perception, motion control, intelligent operation and maintenance, completed the full-process algorithm design, software development, and system integration for two scenario-specific robots.
- Led the full-stack development of an intelligent inspection robot for campus environments, directing the development of an LSTM-based environmental data prediction algorithm, a YOLO-based pedestrian detection and automatic obstacle avoidance module, achieving precise environmental state prediction and safe inspection operation. Independently developed a multi-end collaborative architecture using PyQt, Streamlit, and mobile platforms, integrated the Deepseek large model API, and built a full-platform intelligent inspection management system.
- Spearheaded the complete vehicle development of an industrial autonomous material handling robot, leading the deployment of a PID motion control algorithm and a MobileNet-based vision recognition algorithm, realizing core functions of autonomous navigation and precise material handling.

Paper 1 (second author): A Review of Material Handling Robot Research Based on Machine Vision, *Robot Technology and Application (Peking University Core Journal, CSTPCD)*

- This paper systematically reviews the key technologies, application progress, and deployment value of machine vision in material handling robots, analyzes existing challenges, and discusses future development trends, highlighting its essential role as a core component of intelligent perception.

Team leader, SRTP (Student Research Training Program) Project: Machine Vision-Based Lip-Reading Algorithm Design and System Development

03/2024-present

- To address the challenges of scarce datasets and inefficient collection that hinder the deployment of Chinese lip-reading technology, led the design of a fully automated multilingual lip-reading dataset collection system. This effort resulted in the construction of the largest Chinese lip-reading dataset to date, AICLD (<http://aicld.ifzu.vip/>), comprising 1,300,000 samples from 5,000 speakers.
- To tackle the issue of inadequate algorithm adaptation for Chinese lip-reading, developed a lip-reading algorithm based on the Swin Transformer. By integrating the strengths of our dataset, a closed technical loop was formed, leading to the establishment of a comprehensive intelligent lip-reading technology system.

Paper 1 (second author): AICLD: AI-assisted Incremental Chinese Lip-reading Database, *IEEE Transactions on Image Processing (SCI Q1, Impact Factor: 13.7)*

- The dataset features multi-dimensional metadata annotations. The research also establishes an AI-assisted, fully automated data collection system, providing a core open-source resource for Chinese visual speech research and offering a technical reference for the construction of multilingual lip-reading datasets globally.
- **Paper 2 ():** The Evolution of Visual Speech Recognition: From Deep Spatio-Temporal Modeling to LLM-Guided

PATENT

A Hundred-Tip Array Multi-Channel Electrospray Micro-Thruster 0/2026
A Retarding Potential Analysis System and Measurement Method for Electric Propulsion Plume Characterization ??
An Electrostatic Control Method for Electrospray Thruster Plume Angle Based on Dual Auxiliary Electrodes and an Einzel Lens 补充获得证书时间
A Multi-Dimensional Current Automatic Measurement System for Electrospray Thruster Ground Testing
An AI-Assisted Automatic Construction Method for Large-Scale Lip-Reading Datasets (Patent & Copyright)

ACTIVITIES

"ChenAI TGF", independent CSDN tech blog operator, officially certified as "Rising Star Creator in AI" and "Blog Star TOP300" 0/2026-0/2026
• Has published over 100 technical blog posts in related fields, accumulating 280k+ views, 3,900+ collections, and 3,000+ code snippet copies.
• Blog homepage: chenai.blog.csdn.net.
Head of the Science and Innovation Dept., the Student Union 0?/2025-0?/2026
• Led academic competition and event promotion, training sessions, and technical exchanges, demonstrating strong communication and organizational skills.

HONORS & AWARDS

Higher Education Cup National Mathematical Modeling Competition – Provincial Second Prize 0/2026
TI Cup National Undergraduate Electronic Design Competition – Provincial Third Prize 0/2026
iCAN Innovation and Entrepreneurship Competition – Provincial Third Prize 0/2026
Electrician Cup National Mathematical Modeling Competition – Provincial Third Prize 0/2026

ADDITIONAL INFORMATION

IELTS: ? (L: , R: , W: , S:) 0?/2026
IT skills: Python, Matlab, Simulink, C, Pytorch/Tensorflow frameworks, machine vision, SQL, Git, Python software development, LaTeX, etc.