TANG YIFENG

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EDUCATION

UNIVERSITY OF CHINESE ACADEMY OF SCIENCES
Beijing & Shenzhen, China

Master of Science in Engineering, Control Science and Engineering
September 2020 – July 2023

Artificial Intelligence School, Shenzhen Institute of Advanced Technology, Chinese Academy of Sciences

Supervisor-Ou Yongsheng, Sheng Xu Research Interest-Optimal Control, Learning from Demonstration, Human-robot interaction

- Major Coursework: Pattern Recognition, Machine Learning, Modern Control Theory, Robotics, Matrix Theory, Engineering Calculation, Robot Intelligent Control
- Thesis--Research on Hierarchical Low-cost Automatic Driving Vehicle Control System.
- IELTS Overall 7.5 (R:8.5, L: 7.5, W:6.5, S:6.5)

CHONGQING UNIVERSITY
Chongqing, China

Bachelor of Automation
September 2015 – June 2020

Automation School

GPA 84.08 (rank 20/216) Supervisor-Su Xiaojie, Song Yongduan

- Main Coursework: Analog Circuit, Digital Circuit, Control Theory, Signal and System, Motor Control System, Robotics
- Thesis--AC Parameter Monitoring Node Based on LORA Communication Protocol.

PUBLICATIONS

Juyi Sheng*, **Yifeng Tang***, Fangning Tan, Ruiming Hou, Tiantian Xu, A Stable Learning-based Method for Robotic Assembly with Motion and Force Measurements [J]. Accepted by IEEE Transactions on Industrial Electronics (* equal contribution) JCR Q1, IF 7.606

Yifeng Tang, Yongsheng Ou* (2022). Constrained Model Predictive Control for Low-cost Autonomous Driving with Stability Guarantees. The 35th Chinese Control and Decision Conference (CCDC 2023).

Yifeng Tang, Yongsheng Ou* (2023). Control System for Low-cost Autonomous Vehicle Using ESO and Lyapunov-based Control. The 2023 IEEE International Conference on Advanced Robotics and Mechatronics (IEEE ICARM 2023)

Lingxin Kong, Guolai Jiang, **Yifeng Tang**, Yongsheng Ou*, Sheng Xu*. Person Following with Dynamic Obstacle Avoidance [C] // The 2023 IEEE International Conference on Real-time Computing and Robotics (IEEE RCAR 2023)

HONOR & AWARDS

Shenzhen Logistics Robot Competition **Outstanding Award**	September 2021
National College Student Electronic Design Competition **Second Prize**	August 2019
National College Students' innovation and entrepreneurship training program **National First Prize**	July 2019
DJI Robomater 2018 National University Robot Competition **National Third Prize**	August 2018
DJI Robomater 2017 National University Robot Competition **National Third Prize**	August 2017
CQU First-class Scholarship (rank 1/216), Second-class Scholarship (rank 9/216)	March 2016

RESEARCH PROJECTS & COMPETITION

CONTROL SYSTEM DESIGN FOR LOW-COST AUTONOMOUS DRIVING
Shenzhen, China

[Autonomous Driving & Control Engineering] Master Thesis
August 2022 – March 2023

Motivation: Designed and implemented the control system for a low-cost autonomous vehicle in which the stability is the main focus, and two improved control algorithms were proposed and tested.

- Designed and developed a control system based on C++ for an autonomous vehicle. The system consisted of multiple modules including **communication**, **estimation**, **trajectory tracking** and **motor control**.
- A **Constrained Model Predictive Control** algorithm was deployed on this vehicle and performs well, then the results are summarized and published on CCDC 2023 conference.
- Proposed a hierarchical autonomous driving system integrating **Lyapunov-based method** and **Active Disturbance Rejection Control**, the results are summarized and accepted by IEEE ARM conference.

LEARNING-BASED CONTROLLER FOR ROBOT ASSEMBLY
Shenzhen, China

[Robot Learning & Force/Torque] IEEE Transactions on Industrial Electronics
November 2022- Current

Motivation: Proposed a learning-based controller to tackle the assembly with tight contact, the practical use and stability were the emphasis of this research.

- Designed a learning-based controller to control the robotic manipulator to accomplish the assembly.
- Utilized **Lyapunov Stability Theory** to substantiate stability, while also incorporating **Lipschitz Constraints** during the network's learning process to ensure the controller's steadfast stability.

- Experimental results state the effectiveness of the controller, and the paper was submitted to TIE.

ICE HOCKEY LEARNING FOR ROBOTIC MANIPULATOR
[Learning from Demonstration & Reinforcement Learning]

Shenzhen, China
December 2021 - July 2022

Motivation: The objective was to enable robots to play ice hockey like human players. Combined visual information and learning-based algorithms to generate strategies for the robot to play ice hockey.

- Develop the C++ program for the robotic manipulator.
- Proposed a manipulator learning framework based on **Dynamic Movement Primitives (DMP)** and **Reinforcement Learning** to assimilate demonstration data. Employed the learning algorithm to acquire parameters within DMP, enabling the manipulator to replicate human arm-like movements.
- Considered strategy re-generation under varying friction conditions, enhancing the robot's human-like behavior.

DJI ROBOMASTER UNIVERSITY ROBOT COMPETITION
[System Design & Robot Control & Team Leader]

Shenzhen, China
October 2016 - August 2018

Motivation: Learned to use knowledge from curriculums and books to solve problems in real robots. Mastered techniques including mechanical design, circuit design, and software development.

- Spent two years on this competition, one year as the engineer and one year as the team leader.
- Designed and developed embedded hardware and software components for the robots. The hardware encompassed an MCU board, motor driver, and power monitor. The software included a multi-loop PID controller for 2-DOF, kinematics for chassis control, and a vision recognition program within a Linux environment.

——————————————— **WORKING EXPERIENCE** ———————————————

CHONGQING HAIYUE BUILDING INTELLIGENT ENGINEERING CO., LTD
Hardware Engineering (Intern)

Chongqing, China
September 2019 - June 2020

Motivation: The collaboration between the school and enterprises aimed to cultivate students' engineering capabilities and their skills in enterprise management.

- Finished the thesis in this enterprise, learned to design hardware in engineering and how to manage an enterprise.
- Successfully finish four IOT devices, including two **AC parameter collectors**, one **IOT Monitor** and one AC/DC monitoring and control node.
- These four devices are deployed in real buildings and performed well.

——————————————— **EXTRACURRICULAR** ———————————————

CHONGQING UNIVERSITY CALLIGRAPHY ASSOCIATION
Association President & Traditional Art Tutor

Chongqing, China
September 2016 - August 2017

Motivation: Engineering skills and scientific knowledge were just one aspect of life while art and philosophy were equally indispensable.

- Serving as the association president for a year, I organized numerous events and conducted several art-related lectures.
- The lecture on "The Spirit of Freedom in Chinese Culture: The Art of Cursive Script Calligraphy" achieved great success.

CHONGQING UNIVERSITY ROBOT TEAM
Team Leader

Chongqing, China
September 2017 - August 2018

Motivation：Managing a technical team demands not only exceptional technical prowess but also a profound understanding of team members. Successfully united over 30 students to accomplish a year-long competition

- Collaborated with team members to come up with the solutions about hardware software and mechanical structure, and incorporated team members' suggestions to enhance the solution.
- Communicated with the project manager and gave out proper weekly, monthly, and quarterly objectives.

——————————————— **PATENT** ———————————————

Xiao Luo, **Yifeng Tang**, Yue Liu, Yanqi Liu, Xin Yuan, Jian Long, Motorcycle Shock Absorber Test System, CN106596145A

——————————————— **TECHNICAL SKILLS** ———————————————

Engineering Skills: Embedded Software Design, Hardware design, Control System design
Software: C/C++, Python, Opencv, Pytorch, Altium Designer. Solidworks, Keil 5, Matlab, Linux, ROS
Control Algorithm : MPC, Backstepping, LQR, PID, ADRC, Sliding Mode Control, DMP
Learning Algorithm: DDPG, A3C, CNN, EM-based learning, SVM, ELM