Haizhou Zhao

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Education

Xi'an Jiaotong-Liverpool University Suzhou, China

B.Eng Mechatronics and Robotic Systems (First Class, GPA 3.87/4.0) *Sep 2022 - Aug 2023*

- Year 1 (2019-2020) rank 1. **University Academic Excellence Award**
- Year 2 (2020-2021) rank 2. **University Academic Excellence Award**

Research Projects

Bipedal Robot Hardware Design and Control | *ARX INFINITY Robotics, co-founder* 2023/06 - 2023/07

- DCM-WBC walking control with footstep and timing optimization.

Bipedal Robot Controller Design | *Tsinghua AIR research intern* 2022/05 - 2022/12

- HZD-based offline gait library walking control.
- Online foot placement optimization using NMPC (OCS2 based) with WBC for walking control.
- Asynchronous multi-threading modularized software system development.

Bionic Wheeled Bipedal Robot | *As XJTLU Robotics Laboratory researcher* 2021/08 - 2023/03

- Bionic design to improve torque efficiency inspired by human deep squat.
- CLF-WBC controller design based on wheeled linear inverted pendulum model.

Parallel Variable Stiffness Actuator | *As XJTLU Robotics Laboratory researcher* 2022/09 - 2023/01

- Compact hardware implementation of a leaf-spring based parallel variable stiffness actuator with a mathematical model for realistic humanoid leg applications to improve torque efficiency and increase joint output power.

Input-Constrained Variable Horizon Optimal Control | *As XJTLU SURF member* 2021/03 - 2021/07

- Continuous time nonlinear differential dynamic programming algorithm based on Pontryagin's maximum principle (PMP). The algorithm normalizes the horizon and augments the decision variables with time variation, and utilizes off-the-shelf QP solvers to handle input constraints.
- Accepted by IEEE ICAC2022 (International Conference of computing and automation).

Competition experience

C++/C Software Developer 2019/08 - 2020/08

XJTLU GMaster RoboMaster Team, Computer Vision Group

- Designed C++ software framework for CV task, including interfaces and communication.

Control System Group Leader 2020/08 - 2021/09

XJTLU GMaster RoboMaster Team, Electronic Control Group

- Improved and tuned highly dynamic control scheme for the robot motors based on classical control theory.
- On-board vision servo framework integrating IMU, camera and Kalman filter state estimation for automatic target tracking.

Technical Skills

Languages: English (Proficiency Level), Chinese (Native)
Programming and Simulation: C++, C, Python, Matlab, Simulink, Simscape Multibody, RaiSim, MUJOCO
Library, Tools and Framework: STM32, FreeRTOS, LaTeX, CMake, ROS, Ubuntu, Solidworks, CasADi, ACADOS, Pinocchio, OCS2, ...

Personal Interests

- Highly dynamic humanoid robot locomotion planning and tracking based on optimization and reinforcement learning.