

YULUN ZHUANG

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EDUCATION

Southern University of Science and Technology (SUSTech) *Sep. 2018 – Jun. 2022*

• Majoring in Robotics Engineering GPA: 3.77/4.00 (Top 6%) IELTS: 7.5 Shenzhen, China

RESEARCH EXPERIENCE

Deep RL for MPC Control of Quadruped Locomotion *Oct. 2021 – Present*

Senior Design Project

Prof. Wei Zhang, CLEAR Lab, SUSTech

- Transferring MIT Cheetah controller to NVIDIA Isaac simulator to control Aliengo quadruped robot.
- Building neural network policy and using PPO algorithm to train parameters of the controller.

Deep RL Control of Soft Peg-in-Hole Assembly *Jun. 2021 – Aug. 2021*

Summer Research Intern

Prof. Jing Xu, Institute of Mechatronic Engineering, THU

- Applied SAC algorithm to planned stiffness reference for an impedance controller based on force-torque observations and deployed our algorithms on an ABB robot arm.
- Applied two cameras to predict the deformation of the soft-peg for adjusting the bound of actions.

Jump Control of Wheeled-Bipedal Robot *Sep. 2020 – May. 2021*

Team Leader

Prof. Wei Zhang, Prof. Chenglong Fu, SUSTech

- Designed a wheeled-bipedal robot, integrated knee and hip motors by a four-bar linkage.
- Built the robot in Webots simulator and implemented balancing and jumping control algorithms.
- Derived the dynamics model based on the SLIP model, planed the torque curve based on the Bayesian optimization algorithm, and solved the optimal parameters of the jumping controller.

Autonomous Steering Control of Tractor *Jun. 2020 – Aug. 2020*

Summer Research Intern

Prof. Bill Goodwine, AgJunction Inc., ND

- Built a high-fidelity tractor in Webots simulator, including steering capability and body suspension.
- Derived the dynamics model of the tractor, and applied the MATLAB system identification toolbox to identify the system parameters by analyzing the IMU data when the real tractor crossed mound.

Hybrid-Connection Autonomous Floating Vessels *Sep. 2019 – May. 2020*

Undergraduate Research

Prof. Wei Zhang, CLEAR Lab, SUSTech

- Designed a surface vessel platform aiming to form a surface platform including thrusters and IMU.
- Designed a connection mechanism that can use servo motors to switch between rigid ball-socket connections based on the dead-point position of linkages and flexible cable connections.
- Applied closed-loop speed control using Kalman filter to estimate the body speed from the IMU data.

PUBLICATION

Y. Zhuang *et al.*, "Height Control and Optimal Torque Planning for Jumping with Wheeled-Bipedal Robots," 2021 6th IEEE International Conference on Advanced Robotics and Mechatronics

PATENTS

[W. Zhang, Y. Zhuang, *et al.*] [Biped robot] [China CN112977666A], filed [Mar 4, 2021] pending.

[Y. Zhuang *et al.*] [Connecting Structure and Multi-Hull Ship] [China CN212637810U],
filed [Jun 4, 2020] and issued [Mar 2, 2021]

TECHNICAL SKILLS

Languages & Frameworks: C++, Python, MATLAB, Java, HTML/CSS, OpenCV, PyTorch

Mechatronics Systems: Linux, ROS, Raspberry Pi, STM32, SOLIDWORKS

PROJECTS EXPERIENCE

Two-wheel Self-balancing Car | C++, STM32

- Built a two-wheeled robot based on *STM32F1 MCU*, *DC* motor, *IMU* and *Bluetooth* module, applied series *PID* for position and velocity control and used *Bluetooth* to perform remote control.

Mobile Robot SLAM and Navigation | C++, ROS

- Applied SolidWorks to build the *URDF* model of the four-wheel car, deployed the *Gmapping* algorithm for *SLAM*, deployed the *iFLYTEK* voice recognition algorithm and used the *ROS* navigation package to implement voice navigation.

Gesture Human Computer Interaction System | C++, OpenCV

- Applied the watershed algorithm in *OpenCV* to perform skin color segmentation, implemented gesture recognition by template matching, and implemented the gesture interaction with mouse and keyboard hotkey based on *Win32 API*.

Neural Machine Translation Challenge | Python, PyTorch

- Applied *Attention* mechanism to reproduce the *Transformer* deep neural network model based on the *PyTorch* framework. Trained models on *Multi30K* dataset, and implemented beam search for translation, getting a *BLEU* score of 37.39.

LEADERSHIP & ACTIVITIES

Head of Office, SUSTech Volunteer Association

Jul. 2019 - Sep. 2020

- Recruited more than 700 volunteers to participate in Shenzhen and international volunteer activities.
- Managed the logistical support of SUSTech volunteer activities.

Mechanics Group Member, Robotics Club

Sep. 2018 - Jun. 2019

- Prototyped and maintained a gimbal with a shooting gun.
- Won the third prize in the south division of 2019 RoboMaster Robotics Competition.

VOLUNTEER WORK

Coordinator of Volunteers, SUSTech 10th Anniversary Celebration

Dec. 2020

Volunteer, International Youth Innovation Conference

Nov. 2019

Coordinator of Volunteer, Nanshan Half Marathon

Oct. 2019 - Nov. 2019

Coordinator of Volunteer, 2019 FIBA Basketball World Cup

Aug. 2019 - Sep. 2019

HONORS & AWARDS

First Class of the Merit Student Scholarship (Top 5%)

Nov. 2020 & 2021

Top Ten Volunteers of SUSTech

Jan. 2021

Outstanding Student Leaders

May. 2020

Second Class of the Merit Student Scholarship (Top 10%)

Nov. 2019