YULUN ZHUANG

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Education

Southern University of Science and Technology   **Sep 2018 – June 2022**
Bachelor of Robotics Engineering   ***GPA***: *3.77/4.00 (Top 6%)*   ***IELTS***: *7.5*   *Shenzhen, China*
- Probability and Statistic (91%)
- Engineering Optimization (93%)
- Computer Vision (95%)
- Robot Modeling&Control (97%)
- Modern Control&Estimation (98%)
- Data Structures&Algorithm (92%)

Experience

Deep RL Control for Soft Peg-in-Hole Assembly   **Jun 2021 – Oct 2021**
Summer Research Intern   *Prof. Jing Xu, Institute of Mechatronic Engineering, THU*
- Used offline SAC to train a impedance-controller based model for assembly using 12-dim force data.
- Used vision to predict the deformation of the soft-peg and adjust the latent space and policy function.

Wheeled-Bipedal Robot   **Sep 2020 – May 2021**
Team Leader   *Prof. Wei Zhang, CLEAR Lab, 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, squatting 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.

Tractor Autonomous Steering Simulation   **Jun 2020 – Oct 2020**
Summer Research Intern   *Prof. Bill Goodwine, AgJunction Inc., ND*
- Built a high-fidelity tractor model in Webots simulator, including four-wheel steering capability and body suspension.
- Derived the simplified dynamics model of the tractor, and used 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**
Team Leader   *Prof. Wei Zhang, CLEAR Lab, SUSTech*
- Designed a vessel aiming to connect with each other robustly to form a surface platform, including thrusters and *IMU*.
- Designed the connection mechanism that can switch between rigid and rope connection by using servos and dead-point.
- Used *STM32* to control four thrusters and studied the velocity control algorithm by filtering IMU data.

Projects

Mobile Robot SLAM and Navigation | *C++, ROS, SOLIDWORKS*
- Used *SolidWorks* to build the *URDF* model of the four-wheel car, deployed the *Gmaping* algorithm for *SLAM*, deployed the *iFLYTEK* voice recognition algorithm and used the *ROS* navigation package to implement voice navigation.

Two-wheel Self-balancing Car | *C++, PID, 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.

Gesture Human Computer Interaction System | *Python, OpenCV*
- Used the watershed algorithm 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*
- Used 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*.

Publications

Height Control and Optimal Torque Planning for Jumping With Wheeled-Bipedal Robots   **Jul 2021**
Y. Zhuang*, Y. Xu*, B. Huang*, M. Chao, G. Shi, X. Yang, K. Zhang, C. Fu [PDF]   ICARM

Connecting Structure and Multi-Hull Ship   **Mar 2021**
Y. Zhuang, W.Zhang, B.Wang, T.Ren, H.Chen [PDF]   CN212637810U

Technical Skills

Languages & Frameworks: Python, C++, HTML/CSS, MATLAB, Java, OpenCV, PyTorch
Mechatronics Systems: Linux, ROS, STM32, Raspberry Pi, SOLIDWORKS, EDGECAM

Honors & Awards

Top Ten Volunteers of University (2020 – 2021)   The First Class of the Merit Student Scholarship (2019 – 2021)
Outstanding Student Leaders (2019 – 2020)   The Second Class of the Merit Student Scholarship (2018 – 2019)