Shipeng Liu

☎+86-1531-6001-597 ✉ 1351659@tongji.edu.cn ☐ ryoma-liu.netlify.app
Tongji University, 4800 Cao'an RD, Jiading District, Shanghai, 201804, P.R. China

EDUCATION

Tongji University (TJU) Sept. 2013 – Jul. 2020

- BEng in Communication Engineering & Minor in Mathematics
- Overall GPA: 89.4/100 Minor GPA: 88.6/100 Ranking: 4/65
- **With High Honors:** Outstanding Graduate of Tongji University (4%)

RESEARCH INTERESTS

Robotics, Autonomous Driving, Human-Machine/Robot Interaction, Learning for Control, Planning, Reinforcement Learning, Tactile Interaction

PUBLICATIONS

[C.2] Xuqiang Du, Yunfeng Wu, **Shipeng Liu**, Ali Moshiri, Kaspar Althoefer, Yi Sun, Peng Qi*. "An Adaptive Haptic Exploration and Surface Classification of Irregular Objects" submitted to IEEE International Conference on Robotics and Automation(ICRA), Xi'an, China, 2021. [**code**] [**pdf**] [**demo**]

[C.1] Xiaoying Yang, **Shipeng Liu**, Linwei Chen, Jing Zhou, Youling Yu*. "Analysis and Design of an Effective Energy Utilizing TEG System" accepted by International Conference on Artificial Intelligence and Computer Science(ICAICS), Hangzhou, China, 2019. [**code**] [**pdf**] [**demo**]

[J.2] Yangyang Dong, Shaojie Han, **Shipeng Liu**, Zijian Zhang, Peng Qi*. "Design and Evaluation of a Spherical Robot with Novel Hopping Mechanisms" submitted to Journal of Mechanisms and Robotics - Transactions of the ASME. [**pdf**]

[J.1] **Shipeng Liu**, Xiaoying Yang, Youling Yu*. "Analysis and Implementation of the Control Algorithms of the Smart Car" accepted by DEStech Transactions on Computer Science and Engineering, 2019, 103-109. [**code**] [**pdf**] [**demo**]

RESEARCH PROJECTS

A Web Conferencing Chat Robot for Solving Mutual Understanding Problems *August. 2020 – Present*
Research Intern at ***Lifelong Learning Lab***, *UMich*, Supervisor: ***Prof. Xu Wang***

- Designed storyboards for different user needs in the cooperation meeting(i.e. time allocation problem, incomplete hearing problem) and tested it by speed dating.
- Developed a Django-based website with video conference feature, online chat feature(based on Django channel), and voice auto-transcript feature
- Designed a chat robot to detect mentioned meeting problems and to improve cooperation efficiency

Surface touching and Interaction based on tactile information *Apr. 2020 – Present*
Research Intern at *Tongji University*, Supervisor: ***Prof. Peng Qi***

- Designed a novel robot fingertip attached with tactile sensors to explore detailed properties of surfaces
- Presented a robust surface following algorithm based on the tactile force for the fingertip to follow irregular objects and surfaces with discontinuous curvature such as cubes
- Designed a feed forward neural network to classify objects with different adjectives, i.e. soft-smooth soft-rough, hard-smooth, hard-rough
- Submitted a paper to 2021 IEEE International Conference on Robotics and Automation **[C.2]**

Development of a Sim-to-Real platform for unmanned logistics system *Dec. 2018 – Apr. 2020*

Research Intern at ***Tongji-MIT City Science Lab***, Supervisor: ***Prof. Xiaohua Sun***

- Developed the 3D simulation environment(warehouse, roadmap and multiple delivery cars) in unity
- Implemented autonomous driving modules of delivery robots including image processing module (lane detecting with OpenCV, traffic sign and pedestrian recognition with Yolo v3), decision-making module, multilane path planning module(with reinforcement learning) as well as controller module.
- Connected the simulation environment to real scenarios with "hilens-studio" to enable fast deployment
- Designed a user-interface to learn human preference about choosing routes based on energy, time, and priority of goods, etc.

Online Adaptive Dynamic Learning for High-Speed Car Control *July 2019 - Apr. 2020*

Summer Research Intern at ***Robotics and Multi-perception Lab***, *HKUST*, Supervisor: ***Prof. Ming Liu***

- Measured and Calibrated the dynamics parameters of lab's vehicles and integrated it with Carla Simulator
- Developed the trajectory design module(including B-spline, Bezier and Cubic spline trajectories), vehicle control module(lateral control and longitudinal control) as well as visualization module
- Implemented error coupled sliding mode control algorithm for lane following and trained an adaptive dynamic programming(ADP) network to further improve the tracking accuracy in high-speed situation
- Awarded as Excellent Bachelor Thesis(Top 10%)

Design and Production of a Beacon Tracking Intelligent Racing Car *Oct. 2017 - Aug. 2018*

Research Intern at ***Robotics and Artificial Intelligence Lab****, TJU, S*upervisor: ***Prof. Qijun Chen***

- Designed the complete set of hardware from schematics to PCB layout using Altium
- Implemented global planning algorithms to track target beacons and avoid obstacles
- Optimized trajectory and designed a fuzzy PID controller to follow the target trajectory
- Won the First Prize (Top 1%) in the Beacon Tracking Group of the 2018 NXP Cup National University Students Intelligent Car Race
- Published a paper in 2019 International Conference on Artificial Intelligence and Computer Science**[J.1]**

Design of an Intelligent Street Lighting Dimming System *Oct. 2017 - Aug. 2018*

Research Intern at *Information Engineering, TJU*, Supervisor: ***Prof. Youling Yu***

- Executed a survey about the shortcomings of the current street light dimming system
- Built an intelligent Street Lighting IoT System with multi interactive ways, i.e. pedestrian detection, light signal detection, voice interaction, which allows cloud control of the whole lighting system
- Won the Silver Medal in the 2018 "Internet Plus" Innovation and Entrepreneurship Competition, TJU
- Won the Third Prize in the 2018 Innovation and Entrepreneurship Forum, TJU
- Published a paper in 2019 International Conference on Artificial Intelligence and Computer Science**[C.1]**

COURSE PROJECTS

Robotics Course in Coursera: Aerial Robotics *Feb. 2020 - Apr. 2020*

- Solved the kinematics model of a quadrotor and implemented a nested PID controller for it
- Implemented a trajectory planner based on 7th order polynomial

Introduction to Robotics(Course): Kinematic modeling of soft robots *Sept. 2018 - Dec. 2019*

- Figured out robot-independent mapping from joint space to configuration space using D-H parameter
- Figured out robot-specific arc parameter mappings from configuration space to task space

Undergraduate Research Program: Simulation of V2V Communication *Oct. 2018 - Jan. 2019*

- Created a Vehicle to Vehicle(V2V) channel model based on the LTE-A Downlink Link Level Simulator
- Designed a SNR-CQI mapping algorithm of signal modulation for vehicle communication at high speed

EXPERIENCES

Mentor, Campus Workshop of Tencent Cloud Development, ***Tencent Company*** *Oct. 2019 - Nov. 2019*

- Instructed students to develop a front-end mini-app using Javascript and Nodejs

Teaching Assistant, Open Source Hardware and Programming course, ***TJU*** *Sept. 2018 - Feb. 2019*

- Instructed students to design circuits and to program with Arduino
- Designed and supervised a project — Construction of an autonomous path tracking mobile robot

Exchange Student, Creative Design Workshop, ***Feng Chia University*** *July 2015 - Aug. 2015*

- Designed a book lamp that can automatically adjust brightness with the environment

SELECTED CONTESTS

Top 1%	First Prize of 2018 National University Students Intelligent Car Race	*Aug. 2018*
Top 15%	Third Prize of Shanghai "TI" Cup Electronic Design Competition	*Aug. 2018*
Top 6%	Silver Medal of TJ University Internet Plus Innovation competition	*Apr. 2018*
Top 15%	Honorable Mention of MCM	*Feb. 2018*
Top 15%	Third Prize of National Mathematical Modeling Contest	*Sept. 2015*

HONORS & AWARDS

Top 4%	Outstanding Graduate Students, TJU	*June 2020*
Top 10%	Social Activity Scholarship	*Sept.2019*
Top 10%	The Second-Class Scholarship for Academic Excellence, TJU	*Sept.2019*
Top 5%	National Encouragement Scholarship	*Sept.2018*

SKILLS

Platform	ROS, Ubuntu, OpenCV
Simulation	Carsim, Carla, Omnet++, Altium Designer, Simulink, Multisim
Design	Solidworks, Altium Designer
Hardware	Arduino, Raspberry Pi, Jetson Nano
Programming	Python, Matlab, C/C++, Shell, JAVA, Javascript, Django, HTML
Language	Chinese(Native), English(C1), German (B2)