BOWEN SHEN

github.com/ShenBW bowenshenc@gmail.com 13586571920
No.1088 Xueyuan Avenue, Nanshan District, Shenzhen, Guangdong, P.R. China
Gender: male, Age: 24

EDUCATION

Southern University of Science and Technology (SUSTech) *2021.08 - Present*
Master of School of System Design and Intelligent Manufacturing, Intelligent Manufacturing and Robotics

- **GPA**: B+
- **Relevant Coursework**: Academic Writing and Presentation (A+), Advanced Numerical Methods (A), Advanced Robotics Control (A-), Advanced Artificial Intelligence (A-), ...

Southern University of Science and Technology (SUSTech) *2017.08 - 2021.06*
Bachelor of Department of Mechanical and Energy Engineering, Robotics Engineering

- **GPA**: 3.77 (5/43)
- **Relevant Coursework**: Machine Learning (100), Modern Control and Estimation (98), Analog Circuits (98), Awareness Practice of Manufacturing Engineering (96), Embedded System and Robotics (95), Signals and Systems (94), CAD and Engineering Drawing (94), Calculus II A (93), Fundamentals of Control Engineering (92), Robot Modeling and Control (91), Linear Algebra I-B (91), Engineering Mechanics I-Statics and Dynamics (91), Calculus I A (90), ...

SKILLS

Languages:	Chinese, English (TOEFL 87)
Programming:	C++, Python, Java, Matlab
Software & Tools:	ROS, Gazebo, RVIZ, Isaac Gym, LaTeX, Arduino

PUBLICATIONS

- S^2MAT: Simultaneous and Self-Reinforced Mapping and Tracking in Dynamic Urban Scenarios
  Tingxiang Fan*, Bowen Shen*, Yinqiang Zhang*, Chuye Zhang, Lei Yang, Hua Chen, Wei Zhang, Jia Pan
  Submitted to The International Journal of Robotics Research (IJRR), 2023.
- DynamicFilter: an Online Dynamic Objects Removal Framework for Highly Dynamic Environments
  Tingxiang Fan*, Bowen Shen*, Hua Chen, Wei Zhang, Jia Pan
  International Conference on Robotics and Automation (ICRA), 2022.

RESEARCH EXPERIENCE

Master at CLEAR Lab, SUSTech, China *2021.08 - Present*

- **Autonomous Navigation of Quadrupedal Robots in Unknown Urban Environments** *2023.10 - Present*
  - Training a control policy based on the open-source project 'extreme-parkour', with the expectation of enabling control of quadrupedal robots to track speed commands across diverse terrains.
  - Researching traversability analysis with the goal of proposing a traversability mapping method that comprehensively considers the kinematic capabilities of quadrupedal robots.
- **Simultaneous Mapping and Moving Object Tracking in Dynamic Urban Scenarios** *2022.02 - 2023.11*

- In collaboration with Ph.D. students from the University of Hong Kong, proposed a solution called S^2MAT (**S**imultaneous and **S**elf-reinforced **M**apping and **T**racking) that integrates a front-end dynamic object detection and tracking module with a back-end static mapping module. The proposed solution gradually improves the performance of the front-end and back-end through a self-reinforcing mechanism.
- Primarily focused on optimizing dynamic object detection at the front-end by harnessing static maps generated at the back-end. Based on Bayesian estimation, developed a background subtraction algorithm to identify potential dynamic points within the current scan using the static map. Additionally, employed a multi-object tracking approach to enhance the accuracy of the extraction results.
- Validated the proposed solution using diverse public datasets collected from vehicles and social robots. Conducted a detailed ablation study in dynamic simulation environments to further investigate the solution. Assisted collaborators in extensive long-range robotic navigation in real-world urban scenarios to further evaluate the effectiveness of the solution.

- **Online Dynamic Object Removal for Highly Dynamic Environments** *2021.08 - 2021.10*
  - In collaboration with a Ph.D. student from the University of Hong Kong, proposed an online dynamic object removal framework for highly dynamic urban environments. The framework consists of the scan-to-map front-end and the map-to-map back-end modules. Both the front-end and back-end deeply integrate the visibility-based approach and map-based approach.
  - Proposed a time-critical front-end employing sliding windows, leveraging the efficiency of visibility-based approaches for the instant removal of dynamic points within each Lidar scan. Introduced a map-based reverting algorithm to mitigate issues arising from the removal process based on visibility.
  - Collaboratively presented *visibility check* in the back-end, which utilizes a visibility-based approach to approximate the ray-tracing process and accelerate the occupancy computation.
  - Conducted validation of the proposed framework through testing in highly dynamic simulation scenarios and real-world datasets.

Undergraduate at CLEAR Lab, SUSTech, China *2019.05 - 2021.06*

- **Active Drone Tracking and Aerial Photography** *2021.02 - 2021.06*
  - Integrated PID-based GPS tracking with DJI's visual tracking algorithm to achieve stable tracking of high-speed moving persons by the drone.
  - Developed an interactive APP that allows users to engage the tracking controller to track and film target persons.

- **Flight Mode Conversion for Tailsitter Drones** *2020.07 - 2020.10*
  - Designed and assembled a tailsitter drone with an onboard computer. Tuned PID parameters of the flight control, ensuring the drone can maintain a stable hover under remote control.
  - Assisted the project leader in planning trajectories for Tailsitter Drones from vertical takeoff to horizontal flight within the Gazebo simulation environment using optimal control.

COURSE PROJECT EXPERIENCE

Master at Southern University of Science and Technology *2021.08 - Present*

- **Text-Independent Speaker Identification** *2022.12 - 2023.01*
  Advanced Artificial Intelligence
  - Constructed a simple convolutional neural network consisting of four convolutional layers and a fully connected layer, achieving comparable performance to ResNet-18 on a small audio dataset provided by the professor.
  - Implemented data padding and cutting techniques to standardize audio of varying lengths to a uniform size. Employed data augmentation to enhance the robustness of the trained network.

Undergraduate at Southern University of Science and Technology *2017.08 - 2021.06*

- **A Gecko-inspired Soft-and-rigid Climbing Robot** *2020.04 - 2020.06*
  Advanced Actuation for Robots
  - Collaboratively developed a flexible wall-climbing robot leveraging the elasticity of silicone. The robot consists of three components: a rigid head, a flexible silicone waist, and a rigid tail. And the robot climbs upwards by twisting the waist.
  - Designed specific gaits for the robot, enabling it to achieve continuous wall climbing.
- **Modeling and Simulation of a Bipedal Robot Climbing Stairs** *2019.04 - 2019.06*
  Walking Robot
  - Collaborated with course teammates to construct an 8-degree-of-freedom bipedal robot in the Webots simulation environment. Implemented stair-climbing controls when the robot's relative position to the stairs is known and the mass of the robot's legs negligible.
  - Planned the center of gravity trajectory for the robot and employed inverse kinematics to calculate the rotation angles of waist joints based on the determined center of gravity trajectory.

TEACHING EXPERIENCE

Southern University of Science and Technology

- **Teaching Assistant of Modern Control and Estimation** *2021.09 - 2022.01*
  - Homework correction, standard answers crafting, demonstration code development.

AWARD

2022: Excellent Teaching Assistant | SUSTech
2021: Outstanding Graduate, Department of Mechanical and Energy Engineering | SUSTech
2019: Second Prize | 12^{th} International Underwater Robot Competition
2018: Outstanding Individual in Social Practice Activities | SUSTech

EXTRACURRICULAR EXPERIENCE

Student Union of Shuli College, SUSTech *2017.10 - 2019.03*

- **Member of Activity Department** *2017.10 - 2018.03*
  - Love letter plank road, new year party.
- **Undersecretary of Activity Department** *2018.03 - 2019.03*
  - Girl's Day, welcome party.

Shuli College Football Team, SUSTech *2017.10 - 2019.03*

- **Linebacker of the Team** *2017.10 - 2019.03*
  - 4^{th} place in the SUSTech College Cup