

Bowen Yang

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EDUCATION

The Hong Kong University of Science and Technology

Hong Kong SAR, China

PhD in Electronic and Computer Engineering

Sep. 2019 – present

- Expected graduation: **August 2024**
- Focus: robot navigation, deep learning, legged robots

The Hong Kong Polytechnic University

Hong Kong SAR, China

BEng (Hons) in Electronic and Information Engineering

Sep. 2015 – Jun. 2019

- Graduated with First Class Honours, **GPA: 4.00/4.00**

SKILLS

Languages: C/C++, Python, MATLAB

Technologies: PyTorch, CUDA, Qt, CVX, Docker, ROS

PUBLICATIONS

- **B. Yang**, J. Cheng, B. Xue, J. Jiao, and M. Liu, “Efficient Global Navigational Planning in 3D Structures based on Point Cloud Tomography,” *IEEE/ASME Transactions on Mechatronics*, 2024 (**minor revision**).
- J. Jiao, R. Geng, Y. Li, R. Xin, **B. Yang**, J. Wu, D. Kanoulas, L. Wang, R. Fan, and M. Liu, “Real-Time Metric-Semantic Mapping for Autonomous Navigation in Outdoor Environments,” *IEEE Transactions on Automation Science and Engineering*, 2024 (**conditionally accept**).
- J. Cheng, Y. Chen, X. Mei, **B. Yang**, B. Li and M. Liu, “Rethinking Imitation-based Planner for Autonomous Driving,” *IEEE International Conference on Robotics and Automation (ICRA)*, 2024 (**newly accepted**).
- **B. Yang**, Q. Zhang, R. Geng, L. Wang, and M. Liu, “Real-time Neural Dense Elevation Mapping for Urban Terrain with Uncertainty Estimations,” *IEEE Robotics and Automation Letters*, vol. 8, no. 2, pp. 696–703, 2023.
- **B. Yang**, J. Jiao, L. Wang, and M. Liu, “An Online Interactive Approach for Crowd Navigation of Quadrupedal Robots,” *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, pp. 13556–13562, 2022.
- **B. Yang**, L. Wellhausen, T. Miki, M. Liu, and M. Hutter, “Real-time Optimal Navigation Planning Using Learned Motion Costs,” *IEEE International Conference on Robotics and Automation (ICRA)*, pp. 9283–9289, 2021.

PATENTS

CN116185000A: A Game-theoretic Crowd Navigation Algorithm for Quadrupedal Robots

- Inventors: **B. Yang**, M. Liu
- A human-friendly crowd navigation approach for quadrupedal robots using game theory to capture the crowd interactions for safe and natural behaviors.

CN116432875A: Real-time Optimal Path Planning for Quadruped Robots on Complex Terrain

- Inventors: **B. Yang**, M. Liu
- An approach using a neural network for traversability estimation and a GPU-accelerated path planning method for real-time navigation of quadrupedal robots on complex terrain conditions.

RESEARCH EXPERIENCE

Swiss Federal Institute of Technology Zurich

Zürich, Switzerland

Research exchange in Robotic Systems Lab

Oct. 2019 – Aug. 2020

- Supervisor: Prof. Marco Hutter
- Topic: A navigation framework for quadrupedal robots on complex terrain with CUDA-accelerated terrain reconstruction, learning-based traversability estimation, and path planning with locomotion capabilities awareness.

AWARDS & ACHIEVEMENTS

48th International Exhibition of Inventions Geneva

Geneva, Switzerland

Bronze Medal

Apr. 2023

- UGV-Quadrupedal robot autonomous delivery project, HKUST

Robocon Hong Kong 2019

Hong Kong SAR, China

3rd runner up, Best Engineering Award

Jun. 2019

- Core member of PolyU team Crimson

Dean's Honours List

Hong Kong SAR, China

Top 5% of registered students in each program year

Fall 2015 – Spring 2018

- Awarded by the Hong Kong Polytechnic University, faculty of engineering

PROJECTS

Efficient Trajectory Generation in Complex 3D Environments | [Code](#) | [Website](#)

- A highly efficient and extensible global navigation framework based on a tomographic understanding of the environment to navigate ground robots in multi-layer structures.
- It reduces the scene evaluation time by 3 orders of magnitude and improves the path planning speed by 3 times, demonstrating highly efficient global navigation in various complex 3D environments.

Neural Dense Elevation Mapping | [Website](#)

- A project that adopts a neural network for efficient and high-quality terrain reconstruction in urban environments, providing dense elevation mapping results with uncertainty estimations.
- It recovers noisy and occluded regions on urban terrain and reduces the terrain reconstruction error by over 40%, benefiting the locomotion and path-planning tasks of legged robots.

UGV-Quadrupedal Robot Autonomous Delivery

- A project that utilizes the advantages of both UGVs and quadrupedal robots to conduct autonomous delivery inside the campus. Developed an integrated system to share the perception information and computation resources between UGV and the robot.

Interactive Crowd Navigation for Quadrupedal Robots | [Website](#)

- A project that uses Game Theory to capture the interactions among the pedestrians, static environments, and the ego-agent for human-friendly crowd navigation.
- It fully utilizes the agile motion capabilities of quadrupedal robots, increasing the navigation success rate by over 10% and improving human compatibility by 20% with larger separation distances and lower directional costs.

Optimal Navigation Planner for Quadrupedal Robots | [Website](#)

- A project that adopts deep-learning approaches to predict the locomotion performance of a quadrupedal robot under various complex terrain conditions.
- It further performs GPU-accelerated traversability estimation on the global terrain map for real-time cost-optimal path planning, reducing the planning time by 3 orders of magnitude.

Robocon Hong Kong Contest 2019 | [Website](#)

- A project that designs the perception and control system of an autonomous quadrupedal robot to travel across complex terrain conditions and finish the contest.
- The robot is able to walk at 1.2m/s, climb a 15-degree slope, and jump more than 20cm high and 0.5m forward, ensuring strong obstacle-surmounting ability to finish the contest.
- Our team won 3rd runner-up and the Best Engineering Award.

ACTIVITIES

Lenovo (Shanghai) Design Center Internship

Shanghai, China

Lenovo (Shanghai) Design Center, Dept. of Software Development and Test.

Jun. 2017

- Participated in developing distributed systems and cloud computing platforms.

Chinese Mainland Affairs Office Student Ambassador

Hong Kong SAR, China

The Hong Kong Polytechnic University

Jan. 2016

- Shared study experience with high school students in mainland China and helped with the recruitment works.

Chinese Mainland Students' Association Publicity Secretary Assistant

Hong Kong SAR, China

The Hong Kong Polytechnic University

Dec. 2015 – Mar. 2016

- Dedicated to serving mainland students and other associate members to enrich their lives in the university, organized various cultural exchange activities.