Junzhe He

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Education

- **ETH-Zurich** — Switzerland
  Doctoral Student at Robotic Systems Lab — *Jan 2024 - present*
- **ETH-Zurich** — Switzerland
  Master of Science in Robotics Systems and Control — *Aug 2021 - Jan 2024*
- **University of Colorado at Boulder** — United States
  Bachelor of Science in Aerospace Engineering — *Aug 2015 - May 2019*

Research and Project Experience

- **Attention-based Neural Locomotion Policy on Diverse Challenging Terrains** — ETH-Zurich RSL, Switzerland
  Master Thesis — *Apr 2023 - Oct 2023*
  - Designed a novel attention-based end-to-end learning framework that can handle both dense and sparse terrains;
  - Utilized a Gate Recurrent Unit (GRU) to deal with degraded sensor inputs, which allows the policy to navigate through terrains with dense vegetation or snow coverage;
  - Designed a multi-stage training approach including pre-train, fine-tuning, and GRU training to improve the robustness of the training process;
  - Successful sim-to-real transfer of policies on challenging sparse terrains and dense terrains with degraded sensing for both a humanoid and a quadruped robot.
- **Sample Efficient Learning from Model-Based Controllers** — ETH-Zurich RSL, Switzerland
  Master Thesis — *Apr 2023 - Oct 2023*
  - Improved training efficiency by providing inverse kinematics solutions directly to a tracking network instead of learning a mapping from task space to joint space for quadruped locomotion.
- **Tracking MPC using Deep-RL** — ETH-Zurich RSL, Switzerland
  Semester Project — *Aug 2022 - Dec 2022*
  - Participated in designing a hybrid model- and learning-based controller and validated its ability to traverse challenging terrains;
  - Designed an integrated interface that includes two different model-based planners and demonstrated their interchangeability;
  - Improved sample efficiency and avoided knee collisions over complex terrains by introducing a rich set of joint space information from MPC.
- **Imitation Learning for Quadruped Robot Locomotion** — Tencent Technology, Co., Ltd, China
  Software Engineer — *Apr 2021 - Aug 2021*
  - Designed and trained a deep reinforcement learning (DRL) network using PPO that enables a quadruped robot, Max, to acquire agile locomotion skills by imitating reference expert motions in PyBullet;
  - Applied domain randomization and domain adaptation technique to improve the adaptability on terrains with different dynamic parameters;
  - Sim-to-Real Transfer: mitigated the sim-to-real gap by modeling the motors via end-to-end supervised learning.

Work Experience

- **ETH Zurich Robotic Systems Lab** — Zurich, Switzerland
  Research Engineer — *Jan 2024 - June 2024*
  - Legged Robot Locomotion

- **Tencent Technology** — Shenzhen, China
  Software Engineer Intern — *Apr 2021 - Aug 2021*
  - Deep-RL Quadruped Robot Locomotion

Publications

1. **Junzhe He**, ***, ***, ***, ***, and ***. ****** learning generalized legged locomotion. *Science Robotics 2025. Under Review*

2. Fabian Jenelten, **Junzhe He**, Farbod Farshidian, and Marco Hutter. Dtc: Deep tracking control. *Science Robotics*, 9(86):eadh5401, 2024

3. **Junzhe He**, et al. HERMES: Hazard Examination and Reconnaissance Messenger for Extended Surveillance. In *78th Annual Conference, Norfolk, VA*, page 11. Society of Allied Weight Engineers, May 2019

Skills

- **Programming:** C++, Python, Matlab
- **Operating System:** Linux, ROS
- **Machine Learning:** TensorFlow, PyTorch
- **Simulation:** Gazebo, PyBullet, Matlab Simulink
- **Experience on robotic platforms:** Tencent Max, Unitree Laikago, ANYmal

Selected Awards and Honors

- **ETH Recursive Estimation Programming Project Competition**:
  - Winner (spring 2022)
- **The 78th Society of Allied Weight Engineers International Conference 2019**:
  - 1st Place Student Paper Award
- **AIAA Region 5 Student Conference 2019**:
  - 2nd Place Student Paper Award, Team Category
- **CU Engineering Excellent Fund Engineering Projects Expo 2019**:
  - 1st Place Engineering Project
- **Scholarship**:
  - Engineering Differential Scholarship (2016-2017, 2017-2018)
  - ETH Scholarship (2022-2023)