

Haodi Hu

(213) 725-8244 myddhhd@gmail.com
Los Angeles, CA, USA

EDUCATION

UNIVERSITY OF SOUTHERN CALIFORNIA (USC)	Aug 2021
Viterbi school of engineering	Los Angeles, USA
Ph.D. student in electrical engineering	
UNIVERSITY OF SOUTHERN CALIFORNIA (USC)	Aug 2019 - May 2021
Viterbi school of engineering	Los Angeles, USA
M.S. degree in electrical engineering	
NORTHEAST FORESTRY UNIVERSITY (NEFU)	Aug 2015 - Jun 2019
School of Mechanical and Electrical Engineering	Harbin, China
B.S degree in electrical engineering	
Excellent Graduate Award	

ACADEMIC & PROJECT EXPERIENCE

Multi-robot connection towards collective obstacle field traversal Jun 2022 - Present
Robot Locomotion and Navigation Dynamics Lab Los Angeles

- **Proposed a multi-agent robot system to develop strategies for multiple robots cooperating to overcome locomotion challenges on different challenging terrains.**
- **Investigated how different robot leg-obstacle interaction patterns lead the robot to a moving state or stagnation state and applied it to an obstacle-dense terrain to help the open-loop robot generate desired movement without avoiding the interaction with obstacles.**

Obstacle-aided quadrupedal robot locomotion and navigation Sep 2021 - Present
Robot Locomotion and Navigation Dynamics Lab Los Angeles

- Built a simplified mathematical model based on discrete dynamics to describe quadruped robot interaction with obstacle
- Investigated passive steady mechanism under quadrupedal robot legs repeatedly interact with obstacles and proposed a sequential gaits method to guide a open-loop control robot to achieve desire locomotion trajectories on a obstacle dense terrain
- Engineered an efficient computational model predicting quadruped leg-obstacle behavior, validated through experiments, enabling sensor-free robot navigation across structural obstacles using sequential gaits.
- **Extended the proposed model to more randomized and natural obstacle terrains and developed a gait sequential optimizing criteria to help optimize the robot path on obstacle-dense terrains.**

Cannie gait on obstacle-dense terrains Oct 2020 - Present
Robot Locomotion and Navigation Dynamics Lab Los Angeles

- Helped biologist to utilize a simple mode map model to investigate cannie gaits shifting pattern on an obstacle-dense terrains.
- Generated simulation results with respect to cannie experiment parameters and compared the simulation results with the experiment results.

Computer System Organization and VLSI Design, USC Aug 2019 - Jan 2020
Los Angeles

- Designed basic logic cells, sequential cells (D-FlipFlop), Phase-locked loop and Phase Frequency Detector
- Used Cadence to do physical layout design (Compound gate), circuit simulation, parasite extraction and performance optimization
- Used Verilog HDL to design logic circuits (32bit ALU, FIFO, Multi-cycle CPU, Pipeline CPU)

Design of Automatic Measuring System of Railway Electrical Equipment Limit

Nov 2018 - Dec 2019

- Proposed an innovative 3D laser scanning imaging method to improve the detection efficiency
- Simulated and verified various imaging solutions proposed by team (Laser imaging, magnetic imaging, acoustic imaging)

Method for detecting micron cracks on a magnetic rotor surface based on a support vector machine

Oct 2017 - Mar 2018

- Proposed a new method to detect cracks on magnetic rotor surface realized a maximum crack identification accuracy of 97.9%.
- Our research won \$50,000 assistance from the National Research Foundation and results were published in IEEE Access.

PUBLICATIONS

- **Haodi Hu, Elliott Meeks, Feifei Qian, “Multi-robot connection towards collective obstacle field traversal”. In preparation, IEEE Robotics and Automation Letters(RA-L).**
- **Haodi Hu, Feifei Qian. “Obstacle-Aided Path Following of A Quadrupedal Robot Through Sequential Gait Composition”. In revision, IEEE Transactions on Robotics(T-RO).**
- Kaustav Chakraborty, Haodi Hu, Matthew Kvalheim, Feifei Qian. “Planning of Obstacle-aided Navigation for Multi-legged Robots using a Sampling-based Method over Directed Graphs”. IEEE Robotics and Automation Letters(RA-L), vol. 7, no. 4, pp. 8861-8868, Oct. 2022
- Haodi Hu, Guanting Dong, Peng Bo, Xing Jian, & Wenlong Song. “Method for detecting micron cracks on a magnetic rotor surface based on a support vector machine”. IEEE Access, 6, 53141-53152, Oct 2018.

CONFERENCES & PRESENTATIONS

- Benjamin Doshna, Michelle Joyce, Haodi Hu, Feifei Qian, Simon Wilshin, Andrew Spence. "RoboPhysics inspired experiments to understand how canines move over regular obstacle arrays". Bulletin of the American Physical Society (2023).
- Haodi Hu, Elliott Meeks, Feifei Qian. "Multi-robot connection towards collective obstacle field traversal". Bulletin of the American Physical Society (2023).
- Haodi Hu, Matthew Kvalheim, and Feifei Qian. "A mode map model to predict state transitions of multi-legged robots within obstacle fields". Bulletin of the American Physical Society (2022).
- Haodi Hu, Matthew Kvalheim, Michelle Joyce, Simon Wilshin, Andrew Spence, Feifei Qian. “A Mode Map Representation to Predict Steady States and Attraction Basins for Legged Locomotion on Obstacle Terrains”. International Conference on Intelligent Robots and Systems (IROS), Robotics Inspired Biology workshop, 2020.

TEACHING EXPERIENCE

University of Southern California

Sep 2022 - Present

Teaching Assistant

Los Angeles

- Teaching assistant for EE541(A computational introduction to deep learning) in 2023 fall semester
- Teaching assistant for EE457(Computer Systems Organization) in 2023 summer semester

- Teaching assistant for EE541(A computational introduction to deep learning) in 2023 spring semester
- Teaching assistant for EE599(Robotics mobility) in 2022 fall semester

SKILL

Programming Languages: C, C++, Java, Matlab, Python

Skilled fields: Legged robot locomotion and navigation, Multi-robot cooperation, Quadrator control, Mathematical modeling, Robot sensing, Embedded device