

HAOSEN (RUSSELL) XING

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Research Interests

Legged Robots, Dynamic Locomotion, Biomechanics,
Optimal Control and Real-time Optimization of Human Assistive Devices
Reinforcement Learning / Deep Learning for Locomotion

Education

- | | |
|---|----------|
| M.S. Mechanical Engineering, Carnegie Mellon University | May 2019 |
| • Advisor: Prof. Howie Choset | |
| B.S. Mechanical Engineering, University of California, Irvine | Jun 2017 |
| • Graduated with <i>Cum Laude</i> honor | |

Proficient Skills

Knowledge: Biomechanics, Locomotion, Control Theory,
Mathematical Modeling, Engineering Optimization, Robot Dynamic Analysis,
(Deep) Reinforcement Learning, Machine Learning, Finite Element Analysis
Design: SolidWorks, Rhino
Programming: Arduino, C++, MATLAB, Python (PyTorch),
Tools: LaTeX, Mathematica

Research Experience

- | | |
|---|-----------------------|
| Research Intern, Carnegie Mellon University, PA
(Advisors: Prof. Hartmut Geyer and Prof. Chris Atkeson) | Nov 2019 – Current |
| • Planning and control of artificial lower limbs for resilient locomotion using interaction of user intent and environment sensing | |
| Research Intern, Carnegie Mellon University, PA
(Advisors: Prof. Chris Atkeson and Dr. Ge Lv) | Jun 2019 – Current |
| • Task-invariant control and experimental testing of lower-limb exoskeletons | |
| Graduate Research Student, Carnegie Mellon University, PA
(Advisor: Prof. Howie Choset) | Oct 2017 – May 2019 |
| • Improving stability in diagonal sequence walking gaits using inertial tail appendage in Quadrupeds; | |
| • Improving static stability in diagonal sequence walking gaits using tail; | |
| • Designing legged system gaits and analyzing stability using Hildebrand diagram; | |
| • Geometric mechanics and quadruped back-bending | |
| Research Intern, Zhejiang University, China
(Advisor: Prof. Dongliang Zhang) | Apr 2017 – Jun 2017 |
| • Lower-body fitting robot CAD design and control | |
| Undergraduate Research Assistant, University of California, Irvine
(Advisor: Prof. John Larue) | Mar 2016 – March 2017 |
| • Analyzing the decay of kinetic energy downstream with turbulence using wind tunnel | |
| Undergraduate Research Assistant, University of California, Irvine
(Advisor: Prof. Yun Wang) | Mar 2016 – Jun 2016 |
| • Designing a micro generator for small-size electronic devices | |

Leadership, Honor and Activities

UCI SAE Savage Team – Aero/Body Team Leader
UCI Deans Honor List (2013 - 2016)
Pi Tau Sigma Honor Society (Former Vice President)

Publications

G. Lv*, **Haosen Xing***, J. Lin, R. Gregg, and C. Atkeson, [A Task-Invariant Learning Framework of Lower-Limb Exoskeletons for Assisting Human Locomotion](#), accepted by **American Control Conference, 2020**

(* indicates equal contribution)

B. Chong, Y. Aydin, C. Gong, G. Sartoretti, Y. Wu, J. Rieser, **Haosen Xing**, P. Schiebel, J. Rankin, K. Michel, A. Nicieza, J. Hutchinson, D. Goldman, H. Choset, [Coordination of Lateral Body Bending and Leg Movements for Sprawled Posture Quadrupedal Locomotion](#), submitted to **International Journal of Robotics Research**

B. Chong, Y. Aydin, G. Sartoretti, J. Rieser, C. Gong, **Haosen Xing**, H. Choset, D. Goldman, [A Hierarchical Geometric Framework to Design Locomotive Gaits for Highly Articulated Robots](#), **Robotics: Science and Systems, 2019**

B. Chong, Y. Aydin, C. Gong, G. Sartoretti, Y. Wu, J. Rieser, **Haosen Xing**, J. Rankin, K. Michel, A. Nicieza, J. Hutchinson, D. Goldman, H. Choset, [Coordination of back bending and leg movements for quadrupedal locomotion](#), **Robotics: Science and Systems, 2018**

Abstracts & Workshops

Haosen Xing, B. Chong, G. Sartoretti, J. Whitman, Y. Aydin, D. Goldman, H. Choset, [Inertial Tail-like Appendage Use in Quadrupeds Improves Stability in Diagonal Sequence Walking Gaits](#), **American Physical Society, March 2019**

B. Chong, Y. Aydin, G. Sartoretti, J. Rieser, **Haosen Xing**, C. Gong, H. Choset, D. Goldman, [Coordination of legs and body undulation during turning in quadruped locomotion](#), **American Physical Society, March 2019**

Haosen Xing, B. Chong, G. Sartoretti, D. Goldman, and H. Choset, [Tail Use in Quadruped Improves Static Stability in Diagonal Sequence Walking Gaits](#), **Robotics: Science and Systems, 2018**

B. Chong, Y. Aydin, J. Rieser, Y. Wu, **Haosen Xing**, H. Choset, D. Goldman, [The importance of body-limb coordination in a walking tetrapod](#), **American Physical Society, March 2018**

Academic Projects

Carnegie Mellon University

- Obstacle Avoidance Trajectory Optimization (Course: Engineering Optimization)
- Policy Gradient Tutorial (Course: Statistical Techniques in Robotics)
- Grid World Navigation Using Deep Reinforcement Learning (Course: Deep RL & Control)
- Develop a Simple Image Processing Application Named FinePixel Using C++ (Course: Engineering Computation)

Academic Services

Conference Reviewer

- Robotics: Science and Systems, 2019

TA/Grader Experience

- Grader for CMU graduate course: Electrochemical Energy Storage Systems

Courses Highlighted

Engineering Optimization (24-785)

Machine Learning (10-601)

Deep Reinforcement Learning and Control (10-703)

Robot Dynamics and Analysis (24-760)

Statistical Techniques in Robotics (16-831)

Sensing & Sensors (16-722)

Kinematic, Dynamic and Control (16-711)

Engineering Computation (24-780)

Numerical Method in Engineering (16-831)

References

- Dr. Chris Atkeson
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- Dr. Howie Choset
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- Dr. Ge Lv
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