HAOSEN (RUSSELL) XING

Robotics Institute, Carnegie Mellon University
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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 *Cum Laude* 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 — Nov 2019 – Current
(Advisors: Prof. Hartmut Geyer and Prof. Chris Atkeson)
- Planning and control of artificial lower limbs for resilient locomotion using interaction of user intent and environment sensing

Research Intern, Carnegie Mellon University, PA — Jun 2019 – Current
(Advisors: Prof. Chris Atkeson and Dr. Ge Lv)
- Task-invariant control and experimental testing of lower-limb exoskeletons

Graduate Research Student, Carnegie Mellon University, PA — Oct 2017 – May 2019
(Advisor: Prof. Howie Choset)
- 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 — Apr 2017 – Jun 2017
(Advisor: Prof. Dongliang Zhang)
- Lower-body fitting robot CAD design and control

Undergraduate Research Assistant, University of California, Irvine — Mar 2016 – March 2017
(Advisor: Prof. John Larue)
- Analyzing the decay of kinetic energy downstream with turbulence using wind tunnel

Undergraduate Research Assistant, University of California, Irvine — Mar 2016 – Jun 2016
(Advisor: Prof. Yun Wang)
- 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, submitted to **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
  Professor
  Robotics Institute
  Carnegie Mellon University
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- Dr. Howie Choset
  Kavcic-Moura Professor of Computer Science
  Robotics Institute
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  Tel: (412) 268-2495
  Email: choset (at) andrew dot cmu dot edu

- Dr. Ge Lv
  Assistant Professor
  Mechanical Engineering
  Clemson University
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- Dr. Aaron Johnson
  Assistant Professor
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- Dr. Dongliang Zhang
  Professor
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