TIANYU WANG

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EDUCATION

Georgia Institute of Technology (GT), Atlanta, GA Jan 2021 - Present

- PhD in Robotics
- Advisor: Daniel I. Goldman

Carnegie Mellon University (CMU), Pittsburgh, PA Aug 2018 - May 2020

- MS in Mechanical Engineering GPA: 4.0/4.0
- Thesis: Directional compliance in obstacle-aided navigation for snake robots
- Advisor: Howie Choset

Shanghai Jiao Tong University (SJTU), Shanghai, China Sep 2014 - Aug 2018

- The University of Michigan-Shanghai Jiao Tong University Joint Institute GPA: 3.61/4.0
- BS in Electrical and Computer Engineering

EMPLOYMENT

Complex Rheology and Biomechanics Lab, GT Jan 2021 - Present
Graduate Research Assistant *Advisor: Prof. Daniel I. Goldman*

Biorobotics Lab, CMU May 2020 - Dec 2020
Research Fellow *Advisor: Prof. Howie Choset*

Biorobotics Lab, CMU Sep 2018 - May 2020
Graduate Research Assistant *Advisor: Prof. Howie Choset*

Soft Robotics and Biodesign Lab, SJTU Oct 2016 - Aug 2018
Undergraduate Research Scholar *Advisor: Prof. Guoying Gu*

PUBLICATIONS

Refereed Journal Papers

* Equal contribution

[10] B. Chong, J. He, D. Soto, **T. Wang**, D. Irvine, G. Blekherman, D. I. Goldman. Multi-legged matter transport: a framework for locomotion on noisy landscapes. *Science*, 2023 (in press).

[9] B. Chong, J. He, S. Li, E. Erickson, K. Diaz, **T. Wang**, D. Soto, D. I. Goldman. Self-propulsion via slipping: Frictional swimming in multilegged locomotors. *The Proceedings of the National Academy of Sciences (PNAS)*, 2023.

[8] S. Li*, **T. Wang***, V. H. Kojouharov, J. McInerney, E. Aydin, Y. Ozkan-Aydin, D. I. Goldman, D. Z. Rocklin. Locomotion without force, and impulse via dissipation: Robotic swimming in curved space via geometric phase. *The Proceedings of the National Academy of Sciences (PNAS)*, 2022.

[7] B. Chong, **T. Wang**, E. Erickson, P. J. Bergmann, D. I. Goldman. Coordinating tiny limbs and long bodies: geometric mechanics of diverse undulatory lizard locomotion. *The Proceedings of the National Academy of Sciences (PNAS)*, 2022.

[6] B. Chong, Y. O. Aydin, J. M. Rieser, G. Sartoretti, **T. Wang**, J. Whitman, A. Kaba, E. Aydin, C. McFarland, H. Choset and D. I. Goldman. A general locomotion control framework for serially connected multi-legged robots. *Bioinspiration & Biomimetics*, 2022.

[5] B. Chong*, **T. Wang***, J. Rieser, B. Lin, A. Kaba, G. Blekherman, H. Choset and D. I. Goldman. Frequency modulation of body waves to improve performance of sidewinding robots. *The International Journal of Robotics Research*, 2021.

[4] **T. Wang***, B. Lin*, B. Chong, J. Whitman, M. Travers, D. I. Goldman, G. Blekherman, H. Choset. Reconstruction of Backbone Curves for Snake Robots. *IEEE Robotics and Automation Letters*, 2021.

[3] **T. Wang***, L. Ge*, and G. Gu. Programmable design of soft pneu-net actuators with oblique chambers can generate coupled bending and twisting motions. *Sensors and Actuators A: Physical*, 2018.

[2] L. Ge*, **T. Wang***, N. Zhang, and G. Gu. Fabrication of soft pneumatic network actuators with oblique chambers. *Journal of Visualized Experiments*, 2018.

[1] S. Wei, **T. Wang**, and G. Gu. Design of a soft pneumatic robotic gripper based on fiber-reinforced actuator. *Chinese Journal of Mechanical Engineering*, 2017.

Refereed Conference Papers

[6] **T. Wang***, B. Chong*, Y. Deng, R. Fu, H. Choset, D. I. Goldman. Generalized omega turn gait enables agile limbless robot turning in complex environments. *IEEE International Conference on Robotics and Automation (ICRA)*, 2022.

[5] B. Chong, **T. Wang**, B. Lin, S. Li, G. Blekherman, H. Choset, D. I. Goldman. Moving sidewinding forward: optimizing contact patterns for limbless robots via geometric mechanics. *Robotics: Science and Systems*, 2021. **Best Paper Award Finalist**

[4] G. Sartoretti G, **T. Wang**, G. Chuang, Q. Li, H. Choset. Autonomous decentralized shape-based navigation for snake robots in dense environments. *IEEE International Conference on Robotics and Automation (ICRA)*, 2021.

[3] **T. Wang***, B. Chong*, K. Diaz, J. Whitman, H. Lu, M. Travers, D. I. Goldman and H. Choset. The omega turn: a biologically-inspired turning strategy for elongated limbless robots. *IEEE International Conference on Intelligent Robots and Systems (IROS)*, 2020.

[2] B. Chong, **T. Wang**, J. Rieser, A. Kaba, H. Choset and D. I. Goldman. Frequency modulation of body waves to improve performance of limbless robots. *Robotics: Science and Systems*, 2020.

[1] **T. Wang**, J. Whitman, M. Travers, and H. Choset. Directional compliance in obstacle-aided navigation for snake robots. *American Control Conference*, 2020.

Thesis

[1] **T. Wang**. Directional compliance in obstacle-aided navigation for snake robots. Master's thesis, Carnegie Mellon University, Pittsburgh, Pennsylvania

Conference Abstracts/Posters

[24] **T. Wang**, C. Pierce, V. Kojouharov, K. Diaz, B. Chong, H. Lu, D. I. Goldman. Lattice transport via mechanical intelligence in undulatory locomotors. *American Physical Society March Meeting*, 2023.

[23] V. Kojouharov, **T. Wang**, C. Pierce, K. Diaz, B. Zhong, D. I. Goldman. Compliant cable-driven limbless robot for complex terrain navigation. *American Physical Society March Meeting*, 2023.

[22] J. He, B. Chong, S. Li, E. Erickson, K. Diaz, **T. Wang**, D. Soto, D. I. Goldman. Terrestrial swimming in multilegged robots. *American Physical Society March Meeting*, 2023.

[21] B. Chong, J. He, D. Soto, **T. Wang**, Daniel Irvine, Daniel I. Goldman. A Shannon-inspired framework for multi-legged matter transport. *American Physical Society March Meeting*, 2023.

[20] **T. Wang**, V. Kojouharov, C. Pierce, K. Diaz, B. Chong, V. Zborovsky, D. I. Goldman. Robophysical modeling reveals the role of passive body mechanics in *C. elegans* locomotion. *SICB Annual Meeting*, 2023.

[19] V. Kojouharov, **T. Wang**, C. Pierce, K. Diaz, B. Chong, V. Zborovsky, D. Soto, D. I. Goldman. Bilateral actuation mechanism for complex terrain navigation in limbless robots. *SICB Annual Meeting*, 2023.

[18] B. Chong, J. He, S. Li, E. Erickson, K. Diaz, **T. Wang**, D. Soto, D. I. Goldman. Self-propulsion via slipping: frictional swimming in multi-legged locomotors. *SICB Annual Meeting*, 2023.

[17] D. Soto, E. Erickson, K. Diaz, **T. Wang**, V. Kojouharov, D. I. Goldman. Novel terradynamic interactions in myriapod locomotion in obstacle-rich environments. *SICB Annual Meeting*, 2023.

[16] **T. Wang**, V. Kojouharov and D. I. Goldman. A novel limbless robot for complex terrain navigation via passive mechanical interactions. *GT IRIM Robotics Research Showcase*, 2022. **Best Poster Award**

[15] **T. Wang**, D. Z. Rocklin, D. L. Hu and D. I. Goldman. Experiment and analysis of limbless robot locomotion in heterogeneous environment from a macroscopic perspective. *GT IRIM Robotics Research Showcase*, 2022.

[14] **T. Wang**, B. Chong, Y. Deng, R. Fu, H. Choset, D. I. Goldman. Worm omega turn modeling and its limbless robot implementation via geometric mechanics. *American Physical Society March Meeting*, 2022.

[13] J. He, **T. Wang**, B. Chong, K. Diaz, E. Erickson, D. I. Goldman. Mismatch of body undulation and limb waves enables robust centipede locomotion. *American Physical Society March Meeting*, 2022.

[12] S. Li, **T. Wang**, V. Kojouharov, D. I. Goldman, D. Z. Rocklin, Y. Ozkan-Aydin, E. Aydin. Robotic swimming in curved space via geometric phase. *American Physical Society March Meeting*, 2022.

[11] E. Erickson, K. Diaz, **T. Wang**, B. Chong, J. He, D. I. Goldman. Gait transitions in centipede locomotion on complex terrains. *American Physical Society March Meeting*, 2022.

[10] **T. Wang**, M. C. Maisonneuve, K. Diaz, P. E. Schiebel, D. I. Goldman. Complex terrain navigation via passive mechanical interactions in a novel limbless robot. *SICB Annual Meeting*, 2022.

[9] **T. Wang**, B. Chong, J. He, K. Diaz, E. Erickson, D. I. Goldman. Robophysical modeling of the coordination between body undulation and leg movement in centipedes. *SICB Annual Meeting*, 2022.

[8] B. Chong, **T. Wang**, E. Erickson, P. J. Bergmann, D. I. Goldman. Robophysical modeling of the coordination between body undulation and leg movement in centipedes. *SICB Annual Meeting*, 2022.

[7] **T. Wang**, B. Lin, B. Chong, J. Whitman, M. Travers, D. I. Goldman, H. Choset, G. Blekherman. Reconstruction of Backbone Curves for 3-D Locomotion of Limbless Robots. *American Physical Society March Meeting*, 2021.

[6] **T. Wang**, B. Chong, K. Diaz, J. Whitman, H. Lu, M. Travers, D. I. Goldman and H. Choset. Nematode omega turns improve reorientation in a limbless robot. *American Physical Society March Meeting*, 2021.

[5] **T. Wang**, B. Chong, K. Diaz, J. Whitman, H. Lu, M. Travers, D. I. Goldman and H. Choset. A Biologically Inspired Omega-Shaped Turning Gait for Elongated Limbless Robots. *American Physical Society March Meeting*, 2021.

[4] **T. Wang**, B. Chong, K. Diaz, J. Whitman, H. Lu, M. Travers, D. I. Goldman and H. Choset. The omega turn: a biologically-inspired turning strategy for elongated limbless robots. *Workshop: Robotics-Inspired Biology in 2020 IEEE International Conference on Intelligent Robots and Systems (IROS)*, 2020.

[3] **T. Wang**, J. Whitman, M. Travers, and H. Choset. Directional compliance in snake robot obstacle-aided locomotion. *American Physical Society March Meeting*, 2020.

[2] K. Diaz, B. Chong, **T. Wang**, K. Bates, J. Ding, G. Sartoretti, H. Lu, H. Choset, D. I. Goldman. Steering and turning control of *C. elegans*. *American Physical Society March Meeting*, 2020.

[1] K. Diaz, **T. Wang**, B. Chong, J. Ding, H. Lu, G. Sartoretti, H. Choset, D. I. Goldman. Steering behaviors of *C. elegans* locomotion in heterogeneous environments. *SICB Annual Meeting*, 2020.

Patents

[2] **T. Wang**, V. Kojouharov, and D. I. Goldman, devices and systems for locomoting diverse terrain and methods of use. *US Patent (filed)*.

[1] G. Gu, L. Dong, **T. Wang**, and X. Zhu, Force feedback apparatus in bottom-up DLP 3D printers for soft materials. *China Patent, CN108081596A*, 2017.

WORKSHOP ORGANIZATION

· Workshop: *Agile Movements: Animal Behavior, Biomechanics, and Robot Devices*, IEEE International Conference on Robotics and Automation (ICRA), London UK, May 2023. Link

INVITED TALKS

- Mechanical Intelligence in Undulatory Locomotion, *Physics of Living Systems (PoLS) Seminar*, November 2022.
- Generalized omega turn gait enables agile limbless robot turning in complex environments, *Georgia Tech RoboGrads Student Seminar*, April 2022.
- Nematode omega turns improve reorientation in a limbless robot, *Physics of Living Systems (PoLS) Seminar*, February 2022.

AWARDS AND HONORS

- *GT IRIM Robotics Research Showcase* Best Poster Award 2022
- *Robotics: Science and Systems* (RSS) Best Paper Finalist 2021
- SJTU Academic Excellence Scholarship 2015, 2016, 2017, 2018
- Silver Medal in Advanced Vision Challenge, RoboCup China Open 2016
- Covidien Scholarship 2014

TEACHING EXPERIENCE

SJTU VM467 Introduction to Robotics Spring 2018
Teaching Assistant *Instructor: Prof. Yu Zheng*

SJTU VE216 Signal and System Spring 2017
Teaching Assistant *Instructor: Prof. Mohamed Atef*

SERVICE

Reviewer (Journals)

- The International Journal of Robotics Research (IJRR)
- IEEE Transactions on Robotics (T-RO)
- IEEE Robotics & Automation Letters (RA-L)
- Soft Robotics
- Nonlinear Dynamics

Reviewer (Conferences)

- IEEE International Conference on Intelligent Robots and Systems (IROS)
- IEEE Conference on Robotics and Automation (ICRA)
- American Control Conference (ACC)

MEDIA

These Search and Rescue Robots Could Save Your Life (by *Freethink*) 2019
Article link *YouTube link*

Tiny Limbs and Long Bodies: Coordinating Lizard Locomotion (by *Georgia Tech Research News*) 2022
Article link *YouTube link*

Robotic Motion in Curved Space Defies Standard Laws of Physics (by ***Georgia Tech Research News***) 2022
Article link *YouTube link*

PROFESSIONAL ASSOCIATIONS

Professional Societies

- Student member, Institute of Electrical and Electronics Engineers (IEEE)
- Student member, American Physical Society (APS)
- Student member, Society for Integrative and Comparative Biology (SICB)