TIANYU WANG

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EDUCATION

Carnegie Mellon University (CMU), Pittsburgh, PA 2018 - Present

· Master of Science in Mechanical Engineering GPA: 4.0/4.0
· Advisor: Prof. Howie Choset

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

· Bachelor of Science in Electrical and Computer Engineering GPA: 3.61/4.0

PUBLICATIONS

Journal/Conference Papers

[6] **T. Wang**, B. Chong, K. Diaz, J. Whitman, H. Lu, D. Goldman, M. Travers 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. (submitted)

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

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

[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. (*equal contribution)

[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.

Abstracts/Patents

[4] **T. Wang**, J. Whitman, M. Travers, and H. Choset. Directional compliance in snake robot obstacle-aided locomotion. *Bulletin of the American Physical Society*, 2020.

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

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

[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.

RESEARCH EXPERIENCE AND SELECTED PROJECTS

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

Directional Compliance in Snake Robot Obstacle-Aided Navigation

· Developed a reactive control strategy that enables the robot to exploit unmodelled terrain irregularities for necessary propulsion
· Developed an estimator to infer the presence of the obstacles using proprioceptive joint torque information

· Developed a controller to dynamically select the robot's locomotion mode for consistent locomotion in obstacle-rich environments

Snake Robot 3D Compliant Shape Control and Motion Planning

· Developed a method that cancels unexpected torsion caused by the non-commutativity property when coupling pitch and yaw curvatures to form a three-dimensional curve
· Developed tools that optimize the robot configuration to reproduce the desired curve in three-dimensional space, for snake robots to conform to and exploit three-dimensional obstacle features in environments

The Omega Turn: A Biologically-Inspired Turning Strategy for Elongated Limbless Robots

· Developed a novel turning strategy for snake robots inspired by the "omega-shape" turning motion of C. elegans
· Designed an innovative control template that defines a family of turning gaits for snake robots
· Investigated contributions of the key parameters in the control template to the robot turning motion

Frequency Modulation of Body Waves to Improve Performance of Limbless Robots

· Proposed the method to stabilize the snake robot sidewinding gaits by modulations of the spatial frequency of the vertical wave and the phase difference between the vertical wave and the horizontal wave
· Tuned the number of distinct body-environment contact patches to increase the static stability of the robot
· Tested performances of different modulation strategies on the snake robot and compared with simulation results

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

Programmable Soft Pneumatic Actuator

· Designed a novel structure of multi-chamber soft pneumatic actuator for coupled 3D bending-twisting motion
· Developed a programmable design method of modular soft pneumatic actuator that allows users to design single actuators for simple motion and assemble actuators up to achieve desired dexterous motion

Autonomous Robot Lab, SJTU Mar 2016 - Sep 2016
Undergraduate Research Assistant *Advisor: Prof. Jingchuan Wang*

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*

AWARDS AND HONORS

· China National Scholarship 2018
· SJTU Academic Excellence Scholarship 2015, 2016, 2017
· Silver Medal in Advanced Vision Challenge, RoboCup China Open 2016
· Covidien Fellowship 2014

MEDIA

These Search and Rescue Robots Could Save Your Life (by *freethink*) November 12, 2019

SKILLS

Programming	C++, C, Python, Matlab, Assembly language for micro-controllers
Simulator/Physics Engine	Simulink, MuJoCo, PyBullet
OS	Linux, ROS
Mechanical	Solidworks, AutoCAD, UG, Catia
Electronics	STM32, Arduino, FPGA, PLC

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