

TAO SUN

+86-183-0515-9970 | suntao.hn@sjtu.edu.cn | [linkedin.com/in/tao-sun-431a34197](https://www.linkedin.com/in/tao-sun-431a34197) | <https://sunzhon.github.io/>
Address: No. 800, Dongchuan Road, Minghang District, Shanghai, China

SUMMARY

Tao Sun currently is postdoctoral with the Wearable systems Laboratory at Shanghai Jiao Tong University, supervised by Prof. Peter B. Shull. His research aim is to investigate biomechanics of human in landing tasks using wearable sensors (IMUs) and machine learning. He received a PhD degree at the College of Mechanical and Electrical Engineering at the Nanjing University of Aeronautics and Astronautics in April 2021. His PhD research aim is to investigate adaptive neural control based on central pattern generators, reflex chains, sensory feedback, and learning mechanisms. The control can not only enable legged robots (e.g., quadruped robots) to autonomously generate adaptive self-organized locomotion and also contribute to the understanding of the biological neural mechanisms of animals. A secondary objective is to develop a generic adaptive neural controller, which can directly be applied in various legged robots with different morphology.



EDUCATION

Shanghai Jiao Tong University

Postdoc.

Shanghai, China

Jun. 2021 – Present

Nanjing University of Aeronautics and Astronautics

PhD of Machine design and theory

Nanjing, China

Apr. 2016 – Apr. 2021

Nanjing University of Aeronautics and Astronautics

Master of Machine design and theory

Nanjing, China

Sep. 2014 – Sep. 2016

Anhui Polytechnic University

Bachelor of Process Equipment and Control Engineering

Wuhu, China

Sep. 2010 – May 2014

EXPERIENCE

Senior Embedded Software Engineer

SageMotion

Oct. 2021 – Present

Shanghai, China

- Developed Firmware for Wearable IMU system
- Developed APP for estimating duty factor of gait during walking using wearable IMUs

Visiting researcher

SDU Biorobotics, University of Southern Denmark

Oct. 2019 – Sep. 2020

Odense, Denmark

- Developed a distributed force feedback-based reflex with online learning for adaptive quadruped robot control
- Performed a comparative study of adaptive interlimb coordination mechanisms for self-organized robot locomotion (comparing between continuous phase modulation and phase resetting of decoupled CPGs)

Robotic engineer (intern)

The 609 Research Institute of China Aviation Industry

Apr. 2016 – Dec. 2017

Nanjing, China

- Developed control algorithms for high slope walking of a hydraulic quadruped robot
- Developed a hardware system of a hydraulic quadruped robot

PRESENTATION

Oral

- International Youth Conference of Bionic Engineering (IYCBE 2018), "Adaptive neural control for self-organized locomotion and obstacle negotiation of quadruped robots", 7th-9th November 2018, Odense, Denmark.
- China Denmark Bio-inspired Engineering Seminar, "Adaptive neural control with adaptive physical and neural communications for quadruped locomotion", 15th October 2018, Nanjing, China.

Post

- The 2nd National Robot Innovation and Design Competition, "A small-sized quadruped robot for studying bio-inspired locomotion control", 23rd – 26th September 2020, Xi'an, China.
- The 27th IEEE International Symposium on Robot and Human Interactive Communication (RO-MAN 2018), "Adaptive neural control for self-organized locomotion and obstacle negotiation of quadruped robots", Aug. 2018, Nanjing, China.

AWARD

- The third prize in the 2nd in Robot Innovation and Design Competition of China Graduate Students, 23rd – 26th September 2020, Xi'an, China.
- The third prize of "Jerry Cup" in Energy Equipment Innovation Design Competition of China Graduate Students, 2020, China.
- Scholarship for supporting visiting research one year in Denmark from China Scholarship Council, 2019, China
- The third prize in the 7th "Tiangong Cup" of postgraduate innovative experiment competition, 30th November 2018, China.

PUBLICATIONS

1. **Sun, T.**, Li, DX, Fan, BF., Tian, T., Shull, P., (2022, August). Real-time ground reaction force and knee extension moment estimation during drop landings via modular LSTM modeling and wearable IMUs. IEEE Journal of Biomechanical and Health Informatics (revision).
2. **Sun, T.**, Shao, D., Dai, Z., & Manoonpong, P. (2018, August). Adaptive neural control for self-organized locomotion and obstacle negotiation of quadruped robots. In 2018 27th IEEE International Symposium on Robot and Human Interactive Communication (RO-MAN) (pp. 1081-1086). IEEE.
3. **Sun, T.**, Xiong, X., Dai, Z., & Manoonpong, P. (2020). Small-Sized Reconfigurable Quadruped Robot With Multiple Sensory Feedback for Studying Adaptive and Versatile Behaviors. Frontiers in Neurorobotics, 14, 14.
4. **Sun, T.**, Dai, Z., & Manoonpong, P. (2022.11). Robust and reusable self-organized locomotion of legged robots under adaptive physical and neural communications. Frontiers in Neural Circuits (revision).
5. **Sun, T.**, Dai, Z., & Manoonpong, P. (2020.8). Distributed-force-feedback-based reflex with online learning for adaptive quadruped motor control. Neural Networks, <https://doi.org/10.1016/j.neunet.2021.06.001>.
6. **Sun, T.**, Xiong, X., Dai, Z., Dai O., & Manoonpong, P. (2020). A comparative study of adaptive interlimb coordination mechanisms for self-organized robot locomotion. Frontiers in robotics and AI.
7. Calandra, M., Patane, L., **Sun, T.**, Arena, P, Poromate, M. (2020). Echo State Networks for estimating exteroceptive conditions from proprioceptive states in quadruped robots. Frontiers in Neurorobotics (under review)
8. **Sun T.**, Dai Z. & Manoonpong, P. (2018, Nov.) Self-organized quadruped locomotion and body attitude stabilization under adaptive neural control and reflexes. Proc. 2nd Int. Youth Conf. Bionic Eng. (pp. 41-42)

TEACHING

1. Teaching "Phase adaptation under physical and neural communication for stable self-organized locomotion" in Embodied AI and Robotics Course, University of Southern Denmark, Nov. 7th 2019.
2. Teaching "Decoupled CPGs-based control for self-organized locomotion of legged robot" in Adaptive Locomotion Control Course, Nanjing University of Aeronautics and Astronautics, Dec. 5th 2020.
3. Guest Lecture "How to design your legged robot" in Design and Manufacture Course, Shanghai Jiao Tong University, Nov. 28th 2021.

TECHNICAL SKILLS

Languages: Matlab, Python, C/C++, Lua, Latex

Platforms: Ubuntu, ADAMAS, ROS, CoppeliaSim, LpzRobots, Webots

Developer Tools: Git, Eclipse, Vim, UG NX, Inkscape, Kdenlive