Yongxi Cao

y.cao-18@student.tudelft.nl · y.cao.robo@gmail.com · yongxic97.github.io · (+31) 06 48 66 25 71 · (+86) 158 4005 9733
Citizenship: China

Current research interests

Explanatory trajectory prediction with generative deep learning; Data generation for robot learning.

Education

2022.9 – 2024.8	**Delft University of Technology (TU Delft)** – Delft, Netherlands M.Sc. in Robotics Relevant coursework: Robot dynamics, Machine perception, Planning and decision making, Deep learning, Model predictive control, Optimization. *GPA: 8.32/10* (*cum laude*).
2018.8 – 2022.7	**Southern University of Science and Technology (SUSTech)** – Shenzhen, China B.Eng. in Robotics Engineering Relevant coursework: Robot modeling and control, Machine learning, Probabilistic robotics, Convex optimization, Modern control, Data structures and algorithms. *GPA: 3.69/4* (Top 15%).

Publication

2024	Huang, A.*, **Cao, Y.***, Guo, J.*, Fang, Z., Su, Y., Liu, S., ... & Wang, Z. Foam-Embedded Soft Robotic Joint With Inverse Kinematic Modeling by Iterative Self-Improving Learning. *IEEE Robotics and Automation Letters (RA-L) vol. 9, no. 2, pp. 1756-1763.* (* Equal contributions)

Selected research experience

2023.10 – Present	**Explanatory Generative Trajectory Prediction via Weak Preference Supervision** Advisors: Dr. Arkady Zgonnikov and Julian Schumann (PhD candidate) (TU Delft). Role and contribution: This is an individually executed master's thesis project. *It is desirable to have socially interpretable behavior prediction models for safe autonomous driving. In this project, we migrate the preference loss originated from inverse reinforcement learning with human feedback, and propose a new loss function for conditional variational autoencoders. We are examining the versatility of this new loss in various applications.*

2021.7 – 2023.7	**Foam-embedded soft robot arm for robustness and its iterative sequential inverse kinematic modeling**

Advisors: Profs. Zheng Wang and Sicong Liu (SUSTech).

Role and contribution: Co-leader. Wrote major parts of the code for model learning and low-level control of the soft robot arm; Wrote the fund application; Built soft robot arm prototypes; Conducted the first round of experiments on hardware design as well as model training; Wrote some major parts and drew figures of the paper.

Outcome: An RA-L was published (See above in 'Publications').

Soft robot arms made with pneumatic bellows suffer from high oscillation and difficulty of establishing accurate kinematic models. We propose and validate a new pneumatic bellow-based arm design augmented with poroelastic foam. We also propose an iterative training schema for inverse kinematic modeling and control of the new robot arm.

2021.4 – 2023.6	**An electromagnetic tracking system with low-frequency electromagnetic fields**

Advisor: Prof. Chengzhi Hu (SUSTech).

Role and contribution: Participant. Wrote code for algorithm implementation in Matlab; Wrote code for sensing with STM32 (ARM C); Helped conducting experiments and hardware building; Drew major figures in the paper.

Outcome: We are preparing a manuscript to report this work. Draft available on demand.

For minimally invasive surgeries, low requirement on energy consumption and transmission speed are desired for building tracking systems. We develop an electromagnetic tracking system that employs extremely low frequency (2-10 Hz) electromagnetic fields for wireless 6-D tracking of a magnetic sensor used in commercial capsule endoscopes.

Industry experience

2023.7 – 2023.10	**Geekplus Robotics Inc. (Robotics algorithm intern)** – Beijing, China

Individually implemented a Kalman filter-based perception program for multi-robot trajectory forecasting as well as for stop-avoidance decision making logic for warehouse mobile robots. Initially tested the program with software stack provided by the company on real robots. Technical report available on demand.

Skill stack: ROS2, C++, Linux, Git, Docker.

2020.7 – 2020.8	**XenoDynamics Inc. (Algorithm intern)** – Shenzhen, China

Participated reimplementation of a deep reinforcement learning algorithm for simulated human gait generation.

Skill stack: C++, caffe.

Skills

Programming languages
Proficient in: Python, C/C++
Familiar with: Matlab, Java

Software

Linux, ROS (and ROS2), Git, Docker, LaTeX, SolidWorks

Languages

English (advanced; TOEFL 106, GRE 328+3.5), Chinese (native)

Other experiences

Served as a volunteer at RSS24 at TU Delft, Netherlands.
To give an oral presentation at IROS2024 on our RA-L paper.