Kaige Tan

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LinkedIn
Personal Website

Education

Ph.D | ***Division: Mechatronics*** — Dec. 2020 – June 2025
KTH Royal Institute of Technology — Stockholm, Sweden

M.Sc | ***Program: Mechatronics*** — Sept. 2017 – Sept. 2019
KTH Royal Institute of Technology — Stockholm, Sweden

B.Sc | ***Major: Mechatronics*** — Sept. 2014 – June 2017
Harbin Institute of Technology — Harbin, P. R. China

Technical Expertise

- AI/ML: reinforcement learning, diffusion models, PINN
- Robotics & Perception: soft robotics, autonomous systems, sensor fusion, motion planning
- Infrastructure & Deployment: Docker, CI/CD, edge computing, distributed training
- Programming & Tools: Python, PyTorch/JAX, MATLAB/Simulink, C/C++, ROS/ROS2, cloud (AWS/GCP)

Work Experience

Data Scientist — Oct. 2025 – Present
Weir Minerals Digital — Malmö, Sweden

- Develop and deploy world-model-based RL pipelines for industrial process optimization, enabling real-time inference and automation in grinding processes.
- Model physical system dynamics from sensor data, integrating predictive ML models with control systems, improving efficiency and automation.
- Collaborate with engineers for model containerization, CI/CD pipelines, and scalable edge deployment.

Model-in-the-Loop System Engineer — Aug. 2019 – Sept. 2020
BOSCH Group — Shanghai, China

- Developed and validated fuel cell control unit models using MATLAB/Python, focusing on MIL testing and robust controller design.
- Automated S-function compilation and testing, improving simulation throughput and controller validation efficiency.

VESC Program Student / Master Thesis — June 2018 – July 2019
Volvo Cars — Gothenburg, Sweden

- Designed MATLAB/Simulink and Java-based toolchain for MIL testing to extract critical scenarios for autonomous driving validation.
- Implemented automated testing pipelines using Git/Jenkins in CI/CD; optimized simulation and vehicle models.
- Contributed to two academic publications in autonomous driving safety (paper1, paper2).

Projects

World-Model RL for Industrial Automation — Oct. 2025 – Present

- Develop world-model RL framework (TD-MPC) with encoder-decoder latent dynamics, policy/value/reward networks for industrial automation.
- Implement high-accuracy predictive modeling in JAX/NumPyro; validated generalization on DM Control Suite and real industrial scenarios.
- Integrate models with edge devices for real-time inference, enabling scalable industrial deployment.

Soft Robotics Optimal Control Sept. 2021 – June 2025

- Developed pose estimation and control for soft actuator-sensor system using data-driven adaptive Kalman filters and edge computing for online control (paper1, paper2).
- Co-designed and 3D-printed soft quadruped robot; implemented RL-based gait optimization (SAC and MBRL) validated via real-time embedded control; addressed the sim2real issue through online training (paper1, paper2, paper3).

Edge Computing for Connected Vehicles Dec. 2020 – June 2025

- Designed and implemented distributed multi-vehicle coordination with edge-integrated controllers using Docker and ROS2 (paper).
- Optimized task allocation under communication delays, improved response time and efficiency (paper).
- Demonstrated system on KTH campus using 5G edge servers and multiple sensors (demo).

Selected Academic Publications

1. **K. Tan***, X. Niu*, D. G. Broo, and L. Feng, "Optimal gait control for a tendon-driven soft quadruped robot by model-based reinforcement learning," in *2025 IEEE International Conference on Robotics and Automation (ICRA2025)*, pp. 1–7, IEEE, 2025

2. **K. Tan**, X. Niu, Q. Ji, L. Feng, and M. Törngren, "Optimal gait design for a soft quadruped robot via multi-fidelity Bayesian optimization," *Journal of Applied Soft Computing*, p. 112568, 2025

3. **K. Tan**, Q. Ji, L. Feng, and M. Törngren, "Edge-enabled adaptive shape estimation of 3-D printed soft actuators with Gaussian processes and unscented Kalman filters," *IEEE Transactions on Industrial Electronics*, vol. 71, no. 3, pp. 3044–3054, 2023

4. **K. Tan**, L. Feng, G. Dán, and M. Törngren, "Decentralized convex optimization for joint task offloading and resource allocation of vehicular edge computing systems," *IEEE Transactions on Vehicular Technology*, vol. 71, no. 12, pp. 13226–13241, 2022

5. **K. Tan**, Q. Ji, L. Feng, and M. Törngren, "Shape estimation of a 3D printed soft sensor using multi-hypothesis extended kalman filter," *IEEE Robotics and Automation Letters*, vol. 7, no. 3, pp. 8383–8390, 2022

Honors and Awards

Chinese Government Award for Outstanding Self-financed Students Abroad July 2024
Wallenberg Foundations Travel Scholarship Awardee Mar. 2024
IEEE Robotics and Automation Society Travel Grant Awardee July 2023
Karl Engver's Foundation Travel Scholarship Awardee 2022, 2023
First Prize, China Undergraduate Mathematical Contest in Modeling (CUMCM) Sept. 2016