

Ranbao Deng

MSc Robotics, TU Delft · Prospective PhD candidate

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Available from March 2027 · eligible to work in the Netherlands (zoekjaar)

RESEARCH PROFILE

MSc Robotics student at TU Delft researching physics-informed, data-efficient machine learning for human-in-the-loop systems, currently applied to electrovibration haptics. My thesis learns user-specific models from a short calibration instead of exhaustive profiling. I am looking for PhD positions in physics-informed ML, few-shot user adaptation, or AI for games and interactive systems.

Interests: Physics-informed machine learning · Data-efficient & few-shot learning · Human variability & personalisation · Haptics & human-robot interaction · AI for games & interactive systems

EDUCATION

MSc Robotics, Delft University of Technology (TU Delft)

Expected Mar 2027

Delft, Netherlands · GPA 8.14 / 10

- Thesis: physics-informed, data-efficient ML for electrovibration haptics. Cognitive Robotics; supervisor Dr. Yasemin Vardar, daily supervisor Celal Umut Kenanoglu
- Courses: Machine Learning for Robotics, Deep Learning, Machine Perception, Planning & Decision Making, Model Predictive Control, Robot Software Practicals (9.5)

BEng Robotics Engineering, Southern University of Science and Technology (SUSTech)

2017 – 2021

Shenzhen, China · GPA 3.66 / 4.0 (final year 3.84)

- Excellent Graduate (top 5% of ~1,000 graduates)
- Courses: Robot Modeling & Control, Machine Learning, Data Structures & Algorithms

RESEARCH EXPERIENCE

MSc Thesis: Physics-Informed ML for Electro vibration Rendering

Sep 2026 – present

TU Delft, Cognitive Robotics · Delft, Netherlands

- Designing a calibration encoder and inverse voltage model trained with a composite loss (data + electrostatic capacitor model + Bowden–Tabor friction)
- Literature review of ML for haptics under variability and data scarcity: screened 868 articles down to ~50 core studies

Research Assignment: ML for Electro vibration under Small Data

Jan – Jun 2026

TU Delft, Cognitive Robotics · Delft, Netherlands

- Benchmarked 6 model families (linear, RF, SVR, MLP, GPR, TabPFN) on 15 feature groups: R^2 0.91 on random splits, 0.90 with real-time-feasible features only
- Showed with leave-one-participant-out and transfer experiments that unseen users drop to $R^2 \approx 0.5$, and found user clusters that motivate the thesis
- Detected and removed target leakage from a physics-derived feature (τ) that had produced a misleading $R^2 = 1.00$

"Centaur" Load-Carrying Walking Robot (BEng Thesis)

Oct 2020 – Jun 2021

SUSTech, Prof. Chenglong Fu · Shenzhen, China

- Built IMU-based gait perception: zero-velocity-update foot tracking, a combined LIPM + ZUPT foothold predictor, and real-time phase-angle gait estimation
- Designed LIPM-based foot trajectories, inverse kinematics and phase-synchronised position control; verified in Simulink
- Achieved stable 10-minute walking trials on the ≈ 15 kg prototype in synchronous and diagonal gaits

Elastic Backpack with Electrostatic Damping

Sep 2019 – Sep 2020

SUSTech · Shenzhen, China

- Designed and prototyped an electrostatic damping mechanism; ran motion-capture experiments in a multidisciplinary team
- Co-authored an IEEE ICARM 2021 paper and a Chinese patent (CN201911056953.9)

PUBLICATIONS & PATENTS

Y. Leng, X. Lin, **R. Deng**, et al. "Design and Implement an Elastically Suspended Back Frame for Reducing the Burden of Carrier." *IEEE International Conference on Advanced Robotics and Mechatronics (ICARM)*, 2021.
Chinese invention patent on the elastically suspended back frame (co-inventor), CN201911056953.9, filed 2019.

OTHER EXPERIENCE

Student Developer (part-time) Sep 2026 – present
X-Frontiers · Netherlands

- Helping to bring an AI-driven rescue drone from prototype to field deployment (~16 h/week)

Research Intern: Terramechanics Simulation for Tractors Jul – Sep 2019
University of Notre Dame · Indiana, USA

- Simulated tractor performance on different soft soils with terramechanics models in Webots
- Supported AgJunction's wheel-navigation products with simulation results and a literature review

SELECTED PROJECTS

AI Cup 2026: Bird Species Classification from Radar [Challenge](#) Feb – Mar 2026
Team Epoch × TNO · Netherlands · Solo

- Ranked 26th of 89 teams (215 participants) on the organisers' final hidden test set with an ensemble classifier, working solo
- Designed a radar-first system: calibrated species classifier → collision-risk score → rule-based, auditable curtailment modes

MPC for Ball Catching with a Quadrotor [GitHub](#) Feb – May 2022
TU Delft · Delft, Netherlands · Team project

- Designed a linear MPC on linearised quadrotor dynamics with a DARE-based terminal cost for stability and feasibility
- Validated across prediction horizons and constraint sets in 3D simulation (Python)

Quadrotor Motion Planning with k-PRM and A* [GitHub](#) Nov 2021 – Feb 2022
TU Delft · Delft, Netherlands · Team project

- Built a ROS/C++ planner from scratch: occupancy mapping, k-PRM with KD-tree, A*, corridor-based trajectory optimisation (OSQP)
- Benchmarked against RRT variants in forest-like and low-connectivity environments

AI Build Cities: Crusader Kings III Game-AI Mod [Workshop](#) 2026
Steam Workshop · Online · Solo

- Designed context-aware decision rules for game-AI agents (terrain, culture, dynasty); adopted by 14,400+ players

SKILLS, LANGUAGES & AWARDS

Programming	Python, C++, MATLAB, Java
Robotics & simulation	ROS, Webots, Unity, MATLAB Simulink
Machine learning	PyTorch, scikit-learn, TabPFN
Control & planning	MPC, PRM / A*, Trajectory optimisation
Hardware & design	SolidWorks (CSWA), AutoCAD, Arduino, Motion capture, 3D printing
Languages	Chinese (native), English (fluent), Dutch (basic, learning), Japanese (basic, learning)

Sino-Dutch Bilateral Exchange Scholarship, Nuffic (Fully funded MSc; awarded to 11 students nationally) 2021

Excellent Graduate, SUSTech (Top 5% of ~1,000 graduates) 2021

Third Prize, China Aeromodelling Design Challenge (Electric Glider), National competition 2018