TOM (HAOZHAN) TANG | Curriculum Vitae

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EDUCATION

CARNEGIE MELLON UNIVERSITY
8/2022 - 6/2026
Pittsburgh, PA, U.S.

B.S. in Computer Science with a Concentration in Computer System
Additional Major in Robotics
GPA: 3.95/4.0

CAPE HENRY COLLEGIATE
8/2018 - 6/2022
Virginia Beach, VA, U.S.

High School Diploma
GPA: 4.45/4.0, Cum Laude

EXPERIENCE

UNDERGRADUATE RESEARCHER
Jan 2024 - Present
Pittsburgh, PA

⬤ DROP Lab at CMU Robotic Institute
Developing robust **robotic perception and planning system** including following projects
1) Precise and fast **3D point cloud reconstruction from monocular camera**,
2) **Handheld object pose estimation based on gradient optimization**,
3) **3D point cloud surface segmentation** based on 2D segmentation for environment understanding,
4) Novel and high performance arm **control and planning**,
5) Robust and efficient quadraped **sim-to-real pipeline**.
See next page for some publications as a result of these projects.

RESEARCH INTERN
May 2024 - August 2024
Beijing, China

🪟 Microsoft Research - Asia
Received Microsoft Stars of Tomorrow Award.
Worked on/finished following projects at MSRA:
(2 Research Project) Transformer based LLM mechanism and alignments, and LLM Application.
(3 Industry Projects) Image (visual) embedding, system recall rate improvements, and embedding dim reduction for computing efficiency.
From these projects, I was trying to **answer** 1) Are LLMs robust and efficient enough for robotic perception and planning tasks? 2) What are the most suitable architecture for LLM to do robotic perception especially if space and visual information are critical?

TEACHING ASSISTANT
Jan 2024 - Present
Pittsburgh, PA

🐉 Carnegie Mellon University School of Computer Science
Working as teaching assistant for following courses at CMU:
(Spring 24 + Fall 24) 15210 Parallel and Sequential Data Structures and Algorithms
(Summer 23) 15122 Principles of Imperative Computation
(Spring 23) 15112 Fundamentals of Programming and Computer Science

SKILLS

PROGRAMMING LANGUAGE	**Experienced:** Python, C, go, SML **Familiar:** C++	sverilog	Latex	sh cmds
FRAMEWORKS & TOOLS	Git	Linux (Debian)	MacOS	Matlab	Windows	Learning ROS	Computer System Related Tools	Remote Computing Frameworks (AWS and AZ (Amulet))
LIBRARIES	Matplotlib	Major ML Related Libraries such as PyTorch, Numpy, etc.	PyQt
LANGUAGES	**Fluent:** English, Chinese
MOST IMPORTANT:	**Willingness and Ability to Learn, Collaborate and Adapt**

HONORS & AWARDS

- Microsoft Stars of Tomorrow Award
- Red-Robot Hardware Hackathon 2nd Place, 2022 Fall
- HackCMU Software Hackathon 4th Place, 2022 Fall
- British Physics Olympiad Senior Challenge Gold Award, 2021 Spring

- Superior Award (top 5%) in 2020-2021 Youth Impact Communication via a project of technology in aesthetic education), 2021 Spring
- The Best Innovation Award, Intelligent Handling Robot, the 8th Adolescent Robots Design and Production Competition at Beihang University, 2018 Fall

RESEARCH/PROJECT EXPERIENCE

RESEARCH FOR ROBUST COMPUTER VISION ALGORITHM AND DATA GENERATION
Computer Vision
Dec 2022 - Dec 2023

Explored and reconstructed several state-of-the-art CV algorithm on human pose estimation, integrate them for better computing efficiency along with potentially more robust performances, then utilized them to generate large and robust dataset.

AI TOOLBOX
AI
Aug 2022 - May 2023
CMU

An interface of several basic highly customizable AI/ML algorithms that takes data in various form, implemented solely in numpy. Best Project Award from CMU 15112, and then licensed to American Institute of AI as reported HERE.

RESEARCH ON SUBATOMIC PHYSICS
Physical Simulation and Data Analysis
May 2020 - September 2020
MIT (Remote)

Research on centrality of subatomic particles' collisions guided by Professor Gunther Roland from MIT; simulation and data analysis; main coder and the group leader.

PUBLICATIONS

1. Zhi, W., Tang, H., Zhang, T., & Johnson-Roberson, M. (2024). 3D Foundation Models Enable **Simultaneous Geometry and Pose** Estimation of Grasped Objects. IEEE Robotics and Automation Letters.
2. Zhi, W., Tang, H., Zhang, T., & Johnson-Roberson, M. (2024). Unifying **Scene Representation and Hand-Eye Calibration** with 3D Foundation Models. IEEE Robotics and Automation Letters.
3. Tang, L., Wang, H., Li, Z., Tang, H., Zhang, C., & Li, S. (2023). Quantum Dueling: an Efficient Solution for **Combinatorial Optimization**. Physica Scripta (Journal) + Quantum Information Processing 2024 (Conference).
4. Tang, H. (2021). **Application of Artificial Neural Network (ANN) and Feature Selection Algorithm (FSA)** on the ATLAS Experiment Data to Identify Higgs Boson. Journal of Physics: Conference Series (Vol. 1873, No. 1, p. 012072). IOP Publishing.

PATENT

BRAIN-COMPUTER INTERFACE SYSTEM BASED ON DYNAMICAL SSVEP
Patent no. CN202010877287.1,
August 2020

RELATED COURSEWORK

- 15316 Software Foundations of Security & Privacy
- 15210 Parallel and Sequential Data Structures and Algorithms
- 15440 Distributed Systems (Currently Taking)
- 15441 Networking and the Internet (Currently Taking)
- 16385 Computer Vision
- 15281 Artificial Intelligence: Representation and Problem Solving
- 15251 Great Theoretical Ideas in Computer Science
- 15150 Functional Programming
- 18240 Structure and Design of Digital Systems
- 16597 Undergraduate Reading and Research (Currently Taking)
- 33151/33152 Matter and Interaction I: Mechanics/II: Electricity & Magnetism