

Tingjun Huang

Southern University of Science and Technology

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Personal Profile

I am a senior undergraduate in Information Engineering at the Southern University of Science and Technology (SUSTech), with a strong focus on robotics. My research interests lie in how robots perceive, reason, and interact with their environment. I have conducted research at the National University of Singapore (NUS) under Prof. Lin Shao, implementing social navigation in robots using large language models, and currently work with Prof. Hong Zhang at SUSTech on Visual Place Recognition (VPR) in mobile robots through deep learning.

I am particularly interested in advancing embodied AI by leveraging multimodal large models for real-world planning, designing intelligent tools for task completion across various environments, and developing versatile, low-cost robotic platforms. With a strong foundation in robotics and programming, and hands-on experience in competitions like RoboMaster, I am eager to contribute to innovative research in robotics and AI to create systems that benefit humanity.

Education

Southern University of Science and Technology (SUSTech)

Shenzhen, China

Undergraduate, major in Information Engineering

Sep 2021 - Present

- GPA: 3.92/4.0 (rank: 1/25)
- **Courses(Grades):** Robotic Motion and Control(A), Mobile Robot Navigation and Control(A+), Robotic Perception and Intelligence(A-), Digital System Design(A+), Digital Image Processing(A+), Computer Network(A+), Microprocessors and Microsystems(A), Digital Signal Processing(A), Digital Circuit(A-), Analog Circuit(A+), Signals and Systems(A+), Linear Algebra(A-), Calculus(A/A+), General Physics(A+/A) etc.

Experience

National University of Singapore (NUS)

Singapore

Visiting Scholar

Jun 2024 - Sept 2024

- Refined and resolved issues in an object-navigation repository.
- Researched current implementation strategies, datasets, and simulation environments related to social navigation.
- Proposed a task-oriented social navigation pipeline capable of receiving natural language task descriptions and adopting appropriate social strategies based on the task content and social entities involved. For instance, when deployed on a medication delivery robot, this pipeline enables the robot to navigate through crowds, follow doctors in a socially compliant manner, and avoid potential social entities, such as open doors.
- **Keywords:** Social Navigation, Vision Language Model(VLM) Planning, Fast-slow System, RLHF

Projects

Lightweight yet effective visual place recognition (VPR) system

Shenzhen, China

Southern University of Science and Technology

Sept 2023 - Present

- Improving the performance of existing SOTA models by using better regularization techniques, loss functions, datasets, and training methods.
- Plan to distill large models with superior performance to small models and keep the models from experiencing significant performance degradation while ensuring real-time performance on low-computing power platforms
- **Keywords:** Visual Place Recognition (VPR), Deep Metric Learning, Knowledge Distillation

FPGA Digital Synthesizer - Fynthesizer

Shenzhen, China

Southern University of Science and Technology

Apr 2024 - Jun 2024

- Designed and implemented a real-time FPGA-based synthesizer with 3 oscillators, supporting adjustable parameters like ADSR and pitch control for waveform customization.
- Integrated MIDI controller support and developed a GUI control panel using PyQt5, deployed on a Nexys DDR4 FPGA board with optimized hardware resource usage.
- **Keywords:** Digital Synthesizer, GUI interface, MIDI Protocol Implementation, ADSR, Oscillator, Mixer

Augmented Reality Tapestry (ART)

Shenzhen, China

Southern University of Science and Technology

Apr 2024 - Jun 2024

- Developed an AR system using ArUco marker detection and Poisson blending techniques to create seamless image fusion in gallery environments.
- Benchmarked and optimized a custom ArUco detection method against OpenCV's implementation for improved robustness and performance in real-time AR applications.
- **Keywords:** ArUco Detection, Poisson Blending

Grasping and navigation task on a mobile robot

Shenzhen, China

Southern University of Science and Technology

Nov 2023 - Jan 2024

- Use Robot Operating System (ROS) to manipulate the lower unit (chassis + robot arm + gripper).
- Calculate the camera position using the aruco tag on the object, and invert the relative relationship between the gripper coordinate system and the object coordinate system.
- When the current chassis position is observed to be unsuitable for grasping, it can adaptively adjust the chassis position so that the robot arm can grasp smoothly.
- Robot navigation in known environments using the A* algorithm.
- **Keywords:** Global Planning, Simultaneous Localisation and Mapping (SLAM), Forward and Inverse Kinematics.

Skills

Programming Python, C/C++, Matlab, Java, VHDL.

Tools VSCode, Linux, ROS, Shell (Bash/Zsh), Keil, Vivado, Unity, EasyEDA, Solidworks, Labview, \LaTeX , Markdown, Git, Microsoft Office.

In-lab Skills Printed Circuit Board (PCB) Design, Surface-Mount Device (SMD) Soldering
STM32 Embedded System Development.

Awards

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|------|---|---------|
| 2023 | First Prize , RoboMaster University Championship (RMUC) - National | China |
| 2023 | Second Prize , Outstanding Student Scholarship | SUSTech |
| 2022 | Second Prize , National College Students' Mathematics Modeling Contest (Guangdong) | China |
| 2022 | Second Prize , Outstanding Student Scholarship | SUSTech |
| 2021 | Rank 1st , Summer School Sports Meet Men's 4x400m Relay | SUSTech |
| 2021 | Rank 6th , Summer School Sports Meet Men's 1500m | SUSTech |
| 2021 | Rank 7th , Summer School Sports Meet Men's 3000m | SUSTech |
| 2021 | Third Prize , Outstanding Freshman Scholarship | SUSTech |

Interests

Long-distance running I participated in 6 long-distance races in school sports events from middle school to college.

Badminton I play badminton every weekend. To improve my skills, I attended a course taught by world champion Yu Sun.

Tennis I am an amateur in tennis and look forward to practicing with everyone.

Piano I learned piano when I was six. And I performed at the Mid-Autumn Festival party in the college.

Languages

English TOEFL iBT: 107 (R:29, L:29, S: 22, W: 27)

Chinese Native proficiency

Cantonese Native proficiency