

Jiajun An | <https://jiajunan.github.io/>

Email: 7iajun4n@gmail.com; **Phone:** +852-60691431.

RESEARCH INTERESTS:

Mechanical design, Legged robots, Haptic devices, Robotic tail.

EDUCATION:

Ph.D. 2023, The Chinese University of Hong Kong (CUHK) Aug. 2018-Jul. 2023

Major: Mechanical and Automation Engineering. Supervisor: Kwok Wai Samuel Au. GPA: 3.787/4.0.

M.Sc. 2018, Purdue University, USA. Aug. 2016-May. 2018

Major: Mechanical Engineering. 3+2 Program (1 year exchange). GPA: 3.823/4.0.

B.S. 2017, Shanghai Jiao Tong University (SJTU) Sep. 2013-Jul. 2017

Major: Mechanical Engineering. GPA: 3.79/4.0 (5/37, Tsien Hsue-shen class, Honor Program).

PROJECT EXPERIENCES:

- **Towards Agile Maneuver for Terrestrial Robots with Spatial Morphable Inertial Appendage**

Project Description: My Ph.D. thesis project, the objective is to propose novel spatial morphable inertial tail designs with enhanced inertial adjustment capability in three-dimension (3D) space and investigate its capability in assisting agile maneuvers for terrestrial robots. (*Supervisor: Prof. Kwok Wai Samuel Au, CUHK, Sep. 2018-Jan. 2023.*)

- **A Novel 3-DoF Large Force Haptic Device for the Wrist Motion**

Project Description: Personal proposed project, the objective is to design a haptic device capable of providing large output forces, low inertia, high force transparency, high stiffness, and a large range of motion. The project targets potential applications in VR devices, teleoperation masters, and exoskeletons. (*CUHK, Apr. 2023-Until Now.*)

- **Teleoperated Legged-Manipulator with Replaceable Instruments**

Project Description: Lab project, we aim at developing a teleoperated legged-manipulator robot system with replaceable instruments for the application in hospitals and logistics warehouses. Now I am the mechanical design group leader. (*Supervisor: Prof. Kwok Wai Samuel Au, CUHK, Jan. 2023-Until Now.*)

- **Humanoid Leg Design Based on Parallel Mechanism**

Project Description: Personal proposed project, the objective is to enhance the performance of humanoid leg joints using parallel mechanisms. In the latest design, I propose the utilization of three motors in the hip joint of the leg to collectively drive the hip pitch movement. (*CUHK, Oct. 2019-Until Now.*)

- **Design of a 6-DoF Tailed Monopod Robot with a 3-DoF Active Leg**

Project Description: Lab project, the objective is to propose a 6-DoF tailed monopod robot by integrating a 3-DoF omni-directional leg with our 3-DoF morphable inertial tail. The goal is to construct a highly agile robot capable of executing more agile behaviors. (*Supervisor: Prof. Kwok Wai Samuel Au, CUHK, Jan. 2020-Jul. 2020.*)

- **Design of a Tailed Quadruped Robot Towards Various Somersault Motions**

Project Description: Personal proposed project, inspired by the agile aerial maneuvers of kangaroo rats, this project aims to explore the application of a 3-DoF morphable inertial tail to assist quadruped robots in

achieving various challenging somersault motions. (CUHK, Jun. 2021- Aug. 2021.)

- **Design of a Tailed Quadruped Robot for Walking on Pipes and Ropes**

Project Description: Personal proposed project, inspired by the agile movements of rodents traversing ropes and pipes, this project aims to explore the application of a 3-DoF morphable inertial tail to assist quadruped robots in achieving challenging walking movements on pipes and ropes. (CUHK, Jun. 2021- Aug. 2021.)

- **Design of a Humanoid Dexterous robot hand**

Project Description: Lab project, the objective is to develop an innovative cable-driven approach for humanoid robot finger design, while simultaneously increasing the degree of freedom (DoF) of the robot hand from 13 to 22. (*Supervisor: Prof. Fuchun Sun, IEEE Fellow, Tsinghua University, Jun. 2017-Aug. 2017.*)

PUBLICATION LIST

- [1] Y. Tang, **J. An (co-first author)**, X. Chu, S. Wang, C. Y. Wong, and K. W. Samuel Au, “Towards Safe Landing of Falling Quadruped Robots Using a 3-DoF Morphable Inertial Tail,” *ICRA*, 2022.
- [2] **J. An**, X. Ma, C. H. David Lo, W. S. Ng, X. Chu, K. W. Samuel Au, “Design and Experimental Validation of a Monopod Robot with 3-DoF Morphable Inertial Tail for Somersault,” *IEEE Transaction on Mechatronics*, 2021.
- [3] **J. An**, T. Y. Chung, C. H. D. Lo, C. Ma, X. Chu and K. W. Samuel Au, “Development of a Bipedal Hopping Robot With Morphable Inertial Tail for Agile Locomotion,” *BioRob*, 2020.
- [4] K. W. Samuel Au, **J. An**, X. Chu, T. Y. Chung, C. H. Lo, H. W. Yip, Carlos Ma. “Morphable inertial appendage, systems and associated methods,” *US Provisional Patent*, US 62/810,258.

COMPETITION EXPERIENCES

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| • Professor Charles K. Kao Student Creativity Awards | <i>2nd Place</i> | May. 2019 |
| • RoboMaster 2018 | | Jan. 2018-May. 2018 |
| • Purdue Mechatronics Robot Competition | <i>2nd Place</i> | Jan. 2017-May. 2017 |
| • The 9th Social Practice and Technological Competition for Energy Conservation and Emissions Reduction | <i>2nd Prize</i> | Feb. 2016-Aug. 2016 |
| • RoboMaster 2016 | | Jan. 2016-Jul.2016 |
| • The 2nd SUAV Contest in SJTU | | Nov. 2015-Apr. 2016 |
| • Mathematical Contest in Modeling America | <i>2nd Prize</i> | Feb. 2015 |
| • The 10th Freescale Cup National Smart Car Contest | <i>1st Prize</i> | Jan. 2015-Aug. 2015 |
| • RoboCup China Open 2014 | <i>2nd Place</i> | Jul. 2014-Dec. 2014 |
| • The 2nd NAO Robot Online Programming Contest | <i>Gold Award</i> | Feb.2014- Jul.2014 |

HONORS AND AWARDS

- Eleme Industry Scholarships 2014-15, Shanghai Jiao Tong University *Oct. 2015*
- National Scholarship 2013-14, Shanghai Jiao Tong University *Oct. 2014*

TECHNICAL SKILLS

Solidworks, Catia, Auto CAD, MATLAB, C++, Altium Designer.