

# Jie Zhou

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## EDUCATION

**Beijing University of Chemical Technology (BUCT, 211)**

2019.09-2023.06

Major: Mechanical Design, Manufacturing and Automation

● GPA: 3.72/4.33 (Ranking: 1/153, 0.65%)

**Harbin Institute of Technology, Shenzhen (HITSZ, 985, C9)**

2023.09-Present

Major: Mechanical Engineering (Robotics), MPhil

## HONOURS AND SCHOLARSHIPS

- First-class Scholarship, **HITSZ**, 2024
- Outstanding graduate of Beijing, **Beijing**, 2023
- Outstanding Competition Scholarship, **BUCT**, 2023
- **National Scholarship** × 2, 2022, 2021
- Li Wen Yang Yan Scholarship, **Social Fund**, 2020
- Excellent Student ×2, **BUCT**, 2020, 2021

## AWARDS ABOVE PROVINCIAL LEVEL

1. *The 12th Mathorcup Mathematical Challenge, 1<sup>st</sup> prize in China*, 2022
2. *Shenzhen Cup National Modeling Competition, China (rank16)*, 2021
3. *National Training Program of Innovation and Entrepreneurship*, 2021
4. *China Mechanical Innovation Design Competition, 2<sup>nd</sup> prize in Beijing*
5. *The 8th national internet+ Innovation and Entrepreneurship Competition, 2<sup>nd</sup> prize in Beijing*

## PUBLICATIONS

(Submitted) **Jie Zhou**, Yuan Fang, Yang Chen, Yao Li\*, Bing Li\*. "Modeling of the constant-current stimuli response of a bio-robot for long-term motion control." 2024 IEEE international conference on robotics and biomimetics (ROBIO). IEEE, 2024.

## RESEARCH & ENGINEERING

*In HITSZ; State Key Laboratory of Robotics and Systems(Shenzhen)*

### Modeling of the constant-current stimuli response of a bio-robot for long-term motion control

*Advisor: full prof. Yao Li & full prof. Bing Li;*

*Graduate Researcher; 2024.1 – Present*

- This study focused on the two major obstacles in the current development of cockroach robot: habituation and lack of basic model.
- **Article main work:** two new methods, one new model.
  - Method1: A new surgical method named optic lobe implantation was proposed. It lasted longer 5 times than traditional methods;
  - Method2: A more effective stimuli signal that bidirectional constant-current sign was implemented. My excellent hardware design skills secured the design of constant-current backpack.
  - New Model: stimulated-motion response is the basic movement process of cockroach bio-robots, but it hasn't been quantitatively described by anyone. I modelled it using a machine-learning approach in conjunction with theoretical extrapolation and validation.
- Hosted all the works, including idea, surgery, hardware, experiments, program and article.

### Research on autonomous navigation technology of pipeline bio-robot motion control

Key Technologies R & D Program of Shenzhen

*Advisor: full prof. Yao Li*

*Graduate Researcher; 2023.3-2024.6*

- Aimed to develop a bio-robot for pipeline maintenance that enabled navigation, localization and image retrieval.
- Electronic backpack hardware was designed, which consisted of UWB position module, camera module, wi-fi module, DAC module and voltage conversion module with stm32.
- UWB and IMU fusion positioning ensured positioning error not more than 10 cm.

- A yolov5-based image recognition algorithm was developed for pipeline identification and steering. Images were transmitted by ov5640 camera and displayed in the host software written by qt.
- Hosted all the things mentioned above.

### Multi-dimensional force sensor based on origami structure

*Supervisor: Gang Liang*

*Research Assistant; 2022.11 -2023.5*

- Aimed to create a new lightweight, high-precision sensor, inspired by Origami Configurations.
- 3-DOF Yoshimura Origami Unit Static model was derived to determine the relationship between unitary forces and postures.
- An equivalent circuit was designed and its resonant frequency was obtained by simulation verification. The equivalent inductance was calculated from the resonant frequency.
- Measurement board used stm32 as the main control and LDC1614 as the resonant frequency measurement chip. Then in turn calculated the angle of pinch and the force.
- Responsible for hardware design, fabrication, inductive sensor design(including formulae derivation)

*In BUCT*

### Roll dung beetle - a biomimetic robot with multiple motion modes

*Project leader; 2021.9-2022.5*

- Aimed to develop a bionic robot for exploration and rescue in complex terrain, inspired by dung beetle.
- The robot had two motion modes: crawling and rolling. Its crawling mechanism based on the Crane linkage. The rolling mechanism consisted of two semi-circular supports and the switching between rolling and walking was achieved through a screw nut.
- Done alone all technical content. What I'm most proud of is that the robot only costs 312.6RMB (HK\$338.3).
- **Achievement: China Student Mechanical Innovation Design Competition, 2<sup>nd</sup> prize in Beijing.**

### Ros-based quadruped robot

*Project core member 2020.6-2021.9*

- **Background:** 2020 was the year that quadrupedal robots sprang up in China, we dreamed of making our own quadrupedal robot as undergraduates.
- The mechanical design referenced and improved upon Stanford's Puppy. Compared to Puppy, our joint motors were embedded in the body, which enhanced the robot robustness.
- Rviz simulation and kinematic inverse solutions were used for trot gait planning. Jetson nano equipped with ROS was chosen as the control-center. Laser radar built environmental maps with cartographer.
- I done mechanical, assembly and bottom-level control, including kinematic inverse solutions.
- **Achievement: National Training Program of Innovation and Entrepreneurship, China, 2021; The 8th national "Internet+" Innovation and Entrepreneurship Competition, 2<sup>nd</sup> prize in Beijing.**

### National Award Mathematical Modeling Essay

*All served as research leader*

- **An investigation of base station planning problem based on clustering-genetical algorithm.**
  - Achievement: *The 12th Mathorcup Mathematical Modeling Challenge, 1<sup>st</sup> prize in China, 2022 .*
- **Reinforcement Learning with Control Variables Evaluation Algorithm in Canine Sheep game.**
  - Achievement: *Shenzhen Cup National Mathematical Modeling Competition, China (rank16), 2021.*

## Skills

- **Programming:** C++, Python, Qt, VB, WeChat small-program development
- **Modeling:** MATLAB, Solidworks, Altium Designer, AutoCAD.
- **OS:** Linux, Ros.
- Strong body that won one soccer champion and made it out of the group stage in basketball 2 times.
- **Self-awareness:** I consider myself an outstanding mechanical and hardware engineer, and a decent programmer. I do believe that I am also a good researcher. Thank you for seeing me here!