Jialong Ning

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EDUCATIONAL BACKGROUND

Columbia University in the City of New York   09/2023-12/2024
- Master of Science in Mechanical Engineering- Robotics and Control concentration
- Overall GPA: 3.875/4.0

Wuhan University of Technology (WUT)   09/2018-06/2022
- Bachelor of Engineering in Energy and Power Engineering
- Overall GPA: 3.661/5.0 (Ranking:15/134)

RESEARCH EXPERIENCES & COURSE PROJECTS

Project: Ornithopter   12/2023-04/2024
Supervisor: Hod Lipson   Columbia University in the City of New York
- Participated in a biomimetic robotics project, focusing on the design and optimization of mechanical systems for elastic-structure ornithopters and robotic fish**.**
- Completed six iterations of ornithopter design, improving the use of carbon fiber rods, gear systems, and material selection to reduce overall weight and increase lift.
- Conducted lift tests using sensors and video analysis, identifying issues with excessive weight and oscillation, and proposed structural optimizations to enhance stability.
- Led the actual flight tests, improved the testing environment and launch method, and identified fragile components, proposing reinforcement to improve durability.

Project: Robot studio   01/2024-05/2024
Supervisor: Hod Lipson
- We needed to design a robot independently that could walk without using wheels. Therefore, I decided to design a bipedal robot to simulate human walking..
- I started by sketching the basic shape of the robot. Then, I created a CAD model and used 3D printing to manufacture one leg of the robot.
- Using a Raspberry Pi, I tested basic code functionality and electronic wiring to ensure the system was working correctly.
- Next, I assembled the entire robot and programmed it to perform simple walking movements, conducting initial gait tests.
- I used MuJoCo for simulation and applied the hill-climbing algorithm to optimize the motor control parameters, aiming to improve the robot's walking speed and stability. However, since the motor control relied on sine functions, the optimization had some limitations.
- To overcome these limitations, I implemented reinforcement learning to find the optimal actions for maximizing the robot's walking speed. Due to the high computational demand and long training times of reinforcement learning, I was only able to find some relatively basic actions in the simulation

Project: CarbonFish   04/2024-06/2024
Supervisor: Hod Lipson
- Developed a soft robotic fish, CarbonFish, based on a bistable Hair Clip Mechanism (HCM) to achieve efficient, biomimetic motion through energy storage and release, enabling high-frequency undulation.
- Iteratively optimized the shell and skeleton of CarbonFish to accommodate electronic components, ensure waterproofing, and meet high-frequency vibration requirements.
- The shell was designed to provide sufficient space for servo motors and electronic components, while addressing waterproofing challenges for underwater operation.
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Project: dataset for multi-degree-of-freedom robotic arms   06/2024-10/2024
Supervisor: Hod Lipson
- We plan to build a dataset for multi-degree-of-freedom robotic arms, with the goal of training a model that takes videos of robotic arm movements as input and outputs the corresponding URDF file.
- I generated the link in Fusion 360, using DH parameters to determine the link's shape. A spine curve was used as the baseline, and the link was created with the loft function, then saved as an STL file.
- Since the loft function failed to generate the link for certain DH parameters, I switched to using dual quaternions. This method produced smoother curves and was capable of handling any DH parameter.
- I modified the DH parameter generation range to reduce the occurrence of oddly shaped links. Additionally, I optimized the link generation process to minimize excessive twisting caused by large theta values.
- I wrote a program that automatically selects appropriate links to assemble into a robotic arm and generates the corresponding MJCF files for visualization in MuJoCo.

INTERNSHIP EXPERIENCES

Sichuan Energy Internet Research Institute Tsinghua University, Chengdu, Sichuan, China

Electrochemical Energy Materials and Devices Research Center   07/2021-09/2021 & 01/2021-02/2021

Laboratory Technician

- Studied the preparation process of PEMFC catalytic layer ink
- Explored the stability of catalytic layer ink, mainly in the direction of the effect of different carbon-loaded platinum on the stability of ink
- Assisted in the daily research work in the laboratory

EXTRACURRICULAR ACTIVITIES

Keynote Speaker for Eco Enzyme Promotion   05/2019
Volunteer of Dongfeng Renault Wuhan Marathon   04/2019
Organization and Management of the "Safe Campus and Happy Community" Cultural Show 12/2018-01/2019

PUBLICATION

Zechen Xiong, Zihan Guo, Mark Liu, Jialong Ning, Hod Lipson "CarbonFish -- A Bistable Underactuated Compliant Fish Robot capable of High Frequency Undulation"

HONORS

Outstanding Undergraduate Graduates   06/2022
The 3rd Scholarship for Excellent Student Twice, WUT   11/2019 & 11/2021
Merit Student Twice, WUT   11/2019 & 11/2020
The 2nd Scholarship for Excellent Student, WUT   11/2020
The First Prize of CAD Drawing Competition, Donglizhiyuan-Science and Technology Culture Festival   12/2018
Outstanding Individual of Student Union in November for 2018-2019 Academic Year   12/2018

COMPUTER & MATHEMATICAL SKILLS

Proficient in python, C Language, Java, mujoco, AutoCAD, SolidWorks, Comsol, MATLAB, Multisim