

Boce Hu

CONTACT INFORMATION

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Website:

EDUCATION

Columbia University

New York, NY

Master of Science in Mechanical Engineering

Sep 2021 - May 2023 (expected)

Advanced Master Concentration in Robotics and Control, GPA: 3.9/4.0

- Coursework: *Intro to Robotics, Robotics Studio (A+), Evolution Algorithm, Data Science, Robot Learning, Deep Learning (A+), Natural Language Processing, Reinforcement Learning (In progress)*

Civil Aviation University of China (CAUC)

Tianjin, CN

Bachelor of Engineering in Flight Vehicle Power Engineering, GPA: 3.7/4.0

Sep 2016 - Jul 2020

- Coursework: *Aviation Engine Principle, Aviation Engine Control, Aviation Engine Structure, Aviation Engine Emission, Dynamics of Aircraft*

PUBLICATIONS

Boce Hu, Chenfei Zhu, Xupeng Ai, and Sunil K. Agrawal, "ACRNet: Attention Cube Regression Network for Multi-view Real-time 3D Human Pose Estimation", *IEEE Robotics and Automation Letters (RAL)*, Under Review, 2023.

Xupeng Ai, Victor Santamaria, Jiawei Chen, **Boce Hu**, Chenfei Zhu, and Sunil K. Agrawal, "A Deep-Learning Based Real-Time Prediction of Seated Postural Limits and its Application in Trunk Rehabilitation", *IEEE Transactions on Neural Systems and Rehabilitation Engineering (TNSRE)*, Under Review, 2023, *techRxiv preprint*: <https://doi.org/10.36227/techrxiv.20499006.v1>.

Wenting Lu, Yajun Chen, Xianjie Song, Keyu Wang, **Boce Hu**, and Xuntao Zhang, "Study on the Removal Process of Oxide Scale on the 17-4PH Aviation Fasteners", *PLATING&FINISHING*, 2019

PATENTS

Yajun Chen, Chenchen Liu, **Boce Hu**, Xiaoxiao Song, Pengda Xu, Jinchuan Yang, "Pre-corrosion and Alternating Corrosion Test Device for Mechanical Property Testing", Patent number: ZL 201820669567.1

Yajun Chen, Keyu Wang, Xuntao Zhang, **Boce Hu**, Fusheng Wang, Xiaoxiao Song, "An Electrolysis-Ultrasonic Synergistic Pickling Experimental Equipment with Adjustable Parameters", Patent number: ZL 201911184712.2

RESEARCH EXPERIENCE

Graduate Student Research Assistant

Oct 2021 - Present

Institute: Robotics and Rehabilitation (RoAR) Lab, *Columbia University*

Advisor: Professor Sunil K. Agrawal

- Collected a multi-view upper body movement dataset (UBM) for rehabilitation use, consisting of depth images collected from 16 healthy subjects based on the TruST system.
- Designed a novel end-to-end Attention Cube Regression Network (ACRNet) for multi-view real-time 3D human pose estimation based on depth images, and validated the superiority of ACRNet on the ITOP dataset and UBM dataset compared with other state-of-the-art methods.
- Proposed a dynamic fusion module based on cross-attention mechanism.
- Developed a new deep-learning-based real-time controller for TruST to generate a dynamic motion boundary, replacing the fixed boundary in the sitting task.

Undergraduate Student Researcher

Mar 2018 - Dec 2019

Institute: Laboratory of Aircraft Structure Strength Test and Corrosion Analysis, CAUC

Advisor: Professor Yajun Chen

- Readed literatures to study the effects of the oxide skin on fasteners and the thermal process methods of treating scales.
- Created a device to be jointly used with the Instron 8803 fatigue testing system so as to build a corrosion test platform.
- Built a multi-parameter adjustable electrolytic pickling device, which includes four modules: electrolytic reaction module, liquid level control module, temperature control module, and magnetic stirring module.

SELECTED COURSE PROJECT

Design, Fabrication, and Programming of Physical Robotic Systems

Dec 2021

Advised by professor Hod Lipson

- Designed the CAD model of an organic-looking two-legged robot including all components.
- Fabricated each part of the robot using 3D printing and assembled them for test.
- Programed the robot to walk and dance stably.
- [Journey Video](#)

Glass Cleaning Robot Design

Dec 2021

Advised by professor Sunil K. Agrawal

- Applied SolidWorks to design a 4 DOF redundant robotic arm with a rotating base.
- Simulated the cleaning robot in MATLAB using Robotics System Toolbox.
- Analyzed the workspace and the cleaning trajectory of the robot depending on the simulation.
- PDF

Dynamic Torque Control of Multi-link Robotic Arms According to End Effector Target positions

May 2022

Advised by professor Matei Ciocarlie

- Controlled the state (i.e., velocity, angle, and torque) of multi-link robotic arms to achieve specific positions.
- Gradually improved the speed of approaching the target position and the ability to maintain the current state after reaching the target position from simple deep learning to deep reinforcement learning (deep Q-Network, proximal policy optimization).
- Leveraged PyTorch, OpenAi Gym, and Stable-Baselines3 to create the working environment.
- Demo Page

Soft Robot Locomotion Training with Evolutionary Algorithm

Dec 2021

Advised by professor Hod Lipson

- Built a physics engine with Python and OpenGL to simulate the real-world environment.
- Treated each soft robot as a parent genotype and iteratively utilized the selection, mutation, and crossover mechanism to evolve the form and internal state of soft robots to improve the speed of hopping gait.
- [Journey Video](#)

PROFESSIONAL EXPERIENCE

English Teaching Assistant, Beijing New Oriental School

Jun 2018 - Aug 2018

- Obtained *Outstanding Teaching Assistant Award*.
- Communicated and discussed teaching materials with colleagues.
- Provided tutoring support, followed students' learning status, designed individualized learning plans for students.

SKILLS

- **Languages:** Python, C++, JAVA, MATLAB
- **Software:** TensorFlow, PyTorch, OpenCV, Robot Operating System (ROS), SolidWorks, Blender, 3D-Printing, LaTeX and Linux