

Boce Hu

CONTACT INFORMATION

Email: bh2770@columbia.edu
Website: www.bocehu.com

TEL: +1(646)808-5398
GitHub: github.com/BoceHu

EDUCATION

Columbia University

New York, USA

Master of Science in Mechanical Engineering

Sep 2021 - May 2023 (expected)

Advanced Master Concentration in Robotics and Control, GPA: 3.87/4.00

- 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: 3.62/4.00

Sep 2016 - Jul 2020

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

PUBLICATIONS

Chenfei Zhu, **Boce Hu**, Jiawei Chen, Xupeng Ai, Sunil K. Agrawal, "SARN: Shifted Attention Regression Network for 3D Hand Pose Estimation"

Under Review

Boce Hu, Chenfei Zhu, Xupeng Ai, Sunil K. Agrawal, "ACRNet: Attention Cube Regression Network for Multi-view 3D Human Pose Estimation in the Postural Star-sitting Test"

Under Review [PDF]

Xupeng Ai, Victor Santamaria, Jiawei Chen, **Boce Hu**, Chenfei Zhu, 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), 2022 [PDF]

Wenting Lu, Yajun Chen, Xianjie Song, Keyu Wang, **Boce Hu**, 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*

TEACHING

Teaching Assistant

Columbia University

Data Science for Mechanical Systems

Fall 2022

- Provided academic support for students according to course material.
- Graded and provided Q&A for weekly assignments.

WORKING EXPERIENCE

Dilato Innovative Technology Limited

Beijing, CN

Software Development Intern, mentored by Xiaoyu Peng

Dec 2020 - Jun 2021

- Developed and tested functional modules for the Adobe XD project using Java.
- Completed the black-box test to support the latest version to go live.

RESEARCH EXPERIENCE

Robotics and Rehabilitation (ROAR) Lab, Columbia University

New York, USA

Advisor: Professor Sunil K. Agrawal

Oct 2021 - Present

- Collected and labeled the depth-image-based upper body movement dataset (UBM) and hand movement dataset (PAKH) based on the medical guideline of the Star Excursion Balance Test and Parkinson's finger tapping test.
- Designed an Attention Cube Regression Network (ACRNet) and a Shifted Attention Regression Network (SARN) to accomplish the task of body pose estimation and hand pose estimation.
- Validated that these two networks achieve state-of-the-art performance on public datasets and have the potential to be used in real rehabilitation scenarios.
- Developed a new deep-learning-based controller for the trunk support trainer (TruST) to predict the dynamic virtual motion boundary of upper body movements in real-time.

Laboratory of Aircraft Structure Strength Test and Corrosion Analysis, CAUC

Tianjin, CN

Advisor: Professor Yajun Chen

Mar 2018 - Dec 2019

- Read literature to study the effects of oxides on aviation fasteners and heat treatment techniques for descaling.
- Created a test device to be jointly used with Instron 8803 fatigue testing system 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 stirring magnetic module.

SELECTED COURSE PROJECTS

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.
- Compared the speed of approaching the target position and the ability to maintain the current state after reaching the target position of simple deep learning and multiple deep reinforcement learning algorithms.
- Leveraged OpenAI Gym, PyTorch, and Stable-Baselines3 to build the real physical working environment and train the model to complete different control tasks.

Design, Fabrication, and Programming of a Humanoid Robot

Dec 2021

Advised by professor Hod Lipson

- Designed and fine-tuned the detail of each component of the humanoid two-legged robot's CAD model.
- Fabricated each part of the robot using 3D printing and assembled them with the Raspberry Pi, motors, the controller board, etc., as the entire robot.
- Programmed and tested each motor of the robot, allowing our 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. [\[Final Report\]](#)

Soft Robot Locomotion Training with Evolutionary Algorithm

Dec 2021

Advised by professor Hod Lipson

- Built an engine to simulate the real-world environment with Python and OpenGL, satisfying the laws of physics.
- Treated each soft robot as a parent genotype and iteratively utilized the selection, mutation, and crossover mechanism to evolve the internal state of soft robots to improve the speed of hopping gait.
- Calculated the speed of each robot and used this speed as a reward to optimize the soft robot population.

SKILLS

Programming Languages: Python, MATLAB, C++, JAVA, Git

Software: TensorFlow, PyTorch, OpenCV, Stable-baselines-3, Robot Operating System (ROS), SolidWorks, Blender, Ultimaker Cura (3D-Printing), LaTeX, Linux