

# Junhui Huang

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## EDUCATION

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**Beijing Institute of Technology**, Beijing 2022-Present

Ph.D. candidate in Mechanical Engineering

**Columbia University**, New York, NY February 2021

M.S. in Mechanical Engineering, Robotics and Control

**Shandong University of Technology**, Shandong, China June 2019

B.S. in Mechanical Engineering, Manufacturing and Automation

**University of California, Davis**, CA Exchange Study in 2018-2019

## SKILLS AND INTERESTS

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C++; Python; Embedded-C; Ros; Qt; Pytorch; Tensorflow; MySQL; Matlab; AutoCAD; Solidworks; G-Code;

## EXPERIENCE

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**Beijing Institute of Technology**, Beijing 2022-Present

- Developed *remote-control tunnel inspection robot* for Yalong River Hydropower Station, National Key R&D Program, as solution to replace regular manual inspection
- Individually responsible for development of control system in master computer, *Qt GUI, integrated control* of underwater unmanned vehicle, winch, power supply, and various sensors (inertial navigation and sonar)
- Applied *Master-Slave Control Algorithm(C++)* on underwater robotic arm system
- Designing an underwater robot assisted driving system based on sonar and obstacle avoidance, attitude sensor data to achieve safe underwater driving

**Robotics Algorithm Engineer, X Platform, JingDong**, Beijing 2021-2022

- Developed intelligent depalletizing and palletizing solutions from robotics picking algorithm to landing and commercialization for FeiHe Automated Logistics Robot Warehouse, one the biggest in China
- Individually realized *robotic kinetics algorithm* and developed motion-control module in master computer (C++) to transform CV info to executable target points for motion planning and picking tasks
- Productized solutions of robotics picking; developed backend including driver of robot arm control module in master computer and encapsulation of motion control and sensor control APIs, for unified control of various robot arms (ABB, UR, FANUC)
- Constructed a target detection pipeline: annotated dataset and trained the Mask R-CNN instance segmentation model
- Collaborated and accomplished concurrency programing in large commercialized project (*LOC>100w*)

**Research Assistant, Tsinghua University**, Beijing Summer 2019

- Individually developed and improved data structure of backend software as optimization of adaptability for various *Machining Path Algorithms*; Accomplished real-time collection and analysis of underlying data
- Transformed code generated by Solidworks into G-Code to machine mechanical parts
- Designed *high-accuracy manufacturing trajectory* algorithm for Five-axis Parallel Machining Robot

## PROJECT

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**Evolutionary Computation:** *Developed a physics engine based on OpenGL and C++ to simulate realistic physical scenarios such as gravity, friction, and acceleration; Designed evolutionary algorithm for robot to automatically evolve a suitable shape and control mode for rapid movement*

**Applied Deep Learning:** *Developed a DNN model based on ImageNet to output a heatmap predicting cancer regions for pathological diagnostics based on high-resolution slide images*

**Robotics Studio:** *Designed and developed a biped robot via Solidworks and 3D-printing; Applied genetic algorithm for training in virtual environment, and deployed to robot using Raspberry Pi*

## **Publishment**

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**BLSTNet: Bone-layer State Recognition for Robot-Assisted Laminectomy(Paper submission in progress):**

*Developed a bone recognition model for orthopedic surgical robots, constructing state-of-the-art long-term series classification model based on six-dimensional force sensor data to realize bone layer information classification throughout the surgery process.*

**FEIT-type feedforward robustness control for robotic manipulator under full-state constraints(finished experiment ,writing the manuscript):** *Proposed a novel online-trained feedforward controller for motion control, implemented the Transformer-based architecture integrated with fourier feature*