

# BOLUN DAI

Brooklyn, NY 11201 | (412)209-9607 | bd1555@nyu.edu

## EDUCATION

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### New York University

Expected May 2023

Ph.D. in Electrical Engineering

Selected Coursework: Swarm Robotics, Robot Perception, Applied Nonlinear Control, Convex Optimization

Honors: Ernst Weber Fellowship | Shiv Panwar Scholarship | SOE Fellows Scholarship

### Carnegie Mellon University

May 2019

Master of Science in Mechanical Engineering Research Option, GPA: 3.93 / 4.00

Selected Coursework: Deep Reinforcement Learning, Artificial Intelligent and Machine Learning

### Huazhong University of Science and Technology

May 2017

Bachelor of Engineering: Mechanical Engineering, GPA: 3.83 / 4.00

Honors: Academics Excellence Scholarship | Academics Progress Scholarship

## RESEARCH & PROJECT EXPERIENCE

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### State Constrained Stochastic Optimal Control Using LSTMs

May 2020 – Sep 2021

*New York University, Tandon School of Engineering, Brooklyn, NY*

- Proposed a new methodology for state constrained nonlinear stochastic optimal control using forward-backward stochastic differential equations and LSTMs.
- Created custom simulation environments to test the performance and scalability of nonlinear systems with both continuous and hybrid dynamics.

### Reinforcement Learning in Mining

Jun 2019 – Aug 2019

*SafeAI Inc, San Jose, CA*

- Created a reinforcement learning simulation environment for the load-haul-dump cycle.
- Designed the reward function, state space and action space to be both realistic while also speeds up training.
- Constructed a behavior tree that orchestrates between reinforcement learning based and traditional controllers.

### Adaptive Identification of Robotic Kinematic Structure

Jan 2018 – May 2019

*Carnegie Mellon University, Robotic Institute, Pittsburgh, PA, under supervision of Prof. Hartmut Geyer*

- Derived a 6 degrees-of-freedom (DOF) joint based kinematic model for a multi-link bipedal robot system
- Developed a 6 DOF joint based kinematic identification algorithm using linear regression and achieved 92.3% accuracy in simulation with white noise polluted data.
- Implemented the kinematic identification algorithm on a real bipedal robot ATRIAS using mocap data.

### Undergraduate Thesis: Human Knee Sensory System for Exoskeletons

Jan 2017 – May 2017

*Huazhong University of Science and Technology, Mechanical Engineering Department, Wuhan, China, under supervision of Prof. Jiajie Guo*

- Used a three-dimension curvature-based model to represent the whole femur-knee-tibia system, which overcomes the difficulty for modelling non-uniform shaped contact parts in bio-joints
- Implemented a modal-superposition method to reduce the number of sensors required to only three

## SKILLS

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### Programming Skills Languages

Python, C++, Matlab, Java, LaTeX, Tensorflow, PyTorch, ROS, HTML, CSS  
English (fluent) and Mandarin (native)