

# Jin Wu

Johns Hopkins University, Baltimore, Maryland, United States

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## EDUCATION

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### Laboratory for Computational Sensing & Robotics, Johns Hopkins University

Aug 2023-now

M.S. in Robotics, Overall GPA: 4.0/4.0

### UM-SJTU Joint Institute, Shanghai Jiao Tong University

Aug 2019-Aug 2023

B.S. in Mechanical Engineering, Overall GPA: 3.72/4.0, ranked 2/28

Core Coursework (GPA: 3.95): Intro to Solid Mechanics, Thermodynamics, Intro to Circuits, Intro to Dynamics and Vibrations, Design and Manufacturing I&II, Mechanical Behavior of Materials, Linear Algebra, Fluid Mechanics, Introduction to Data-driven Engineering Design, Electromagnetics, Heat Transfer, Modeling, Analysis and Control of Dynamic Systems.

### Exchange Program: University of Wisconsin, Madison

Jan 2022-May 2022

GPA: 3.70/4.0

Courses: Practicum in Finite Element, Elementary Heat Transfer, Computer Control of Machines and Processes.

## RESEARCH EXPERIENCES

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### Reinforcement Learning Environment for Robotic Suturing Task

Oct 2023-now

Advisor: Peter Kazanzides, Research Professor, Johns Hopkins University

- Developed an integrated environment combining OpenAI Gym with a simulated surgical suturing system to facilitate advanced procedural training.
- Implemented a hierarchical learning strategy, crafting high-level policies for task allocation and specialized low-level policies for executing multiple subtasks.
- Leveraged a combination of reinforcement learning techniques (TD3 with Hindsight Experience Replay) and imitation learning methodologies (Behavior Cloning and Generative Adversarial Imitation Learning) to enhance sub-task training efficacy.
- Designed and executed a robust pipeline for the collection and processing of expert demonstration datasets, optimizing the system for effective imitation learning applications.

### Adaptive Motion Planning for Robotic Arm Based on Digital Twin and Reinforcement Learning

Mar 2022-Aug 2023

Advisor: Youyi Bi, Assistant Professor, Shanghai Jiao Tong University

- Engineered a comprehensive control system and digital twin simulation for a JAKA robotic arm within the Unity3D environment, enhancing real-time interaction and visualization capabilities.
- Applied the Proximal Policy Optimization (PPO) algorithm and inverse kinematics to significantly improve the efficiency of pick-and-place operations and ensure collision avoidance in dynamic environments with obstacles.
- Developed a sophisticated digital twin framework in Unity3D, incorporating the OVE6D pose estimation algorithm through TCP/IP communication protocols to achieve accurate real-time robotic positioning and motion planning.
- Relevant paper was published in 2023 International Mechanical Engineering Congress and Exposition (IMECE).

### Ultrasonic Inspection of Metallic Machining Tools for Smart Manufacturing

Sept 2021-Dec 2021

Advisor: Yanfeng Shen, Associate Professor, Shanghai Jiao Tong University

- Identified the potential vibration mode of the milling cutter under ultrasonic signal.
- Designed an underwater measurement device that connected transducers with the cutter.
- Collected and analyzed data obtained from oscilloscope in MATLAB.

### Quadcopter with Holographic Projection

Feb 2021-Feb 2022

Advisor: Junqi Wu, Student Innovation Center, Shanghai Jiao Tong University

- Designed the framework and structure of quadcopter, manufacturing a connection joint with the projection device.
- Debugged the control algorithm in Betaflight and adjusted the PID parameter for stable flight status.

## COURSE PROJECT

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### Autonomous electric vehicle with transformable wheels

May 2022-Aug 2022

Advisor: Jaehyung Ju, Associate Professor, Shanghai Jiao Tong University

- Designed a transformable wheel structure with four-bar rocker-slider linkage compatible with suitable servo motor in Solidworks.
- Applied position and force analysis with MATLAB to simulate stair climbing processes, and checked safety factor, collision

avoidance, and required torque from motors.

- Rendered animation that simulated the process of climbing stairs and crossing a low-altitude tunnel with different wheel shapes.

### **Topology optimization and Generative design of quad-copter**

Sept 2021-Dec 2021

Advisor: Youyi Bi, Assistant Professor, Shanghai Jiao Tong University

- Investigate the mode of air drag during the flight of quadcopter and made quantitative analysis.
- Defined obstacle & preserve regions and set different loading conditions for generative design in Autodesk Fusion 360.
- Conducted an FEA analysis to select the optimal structure of quadcopter from multiple results generated by the program.

### **Automatic clothes folding machine**

May 2021-Aug 2021

Advisor: Youyi Bi, Assistant Professor, Shanghai Jiao Tong University

- Designed a four-bar linkage system with Solidworks and wrote an Arduino program that simulated folding movement by human hand.
- Conducted motion and torque analysis with MATLAB and FEA to obtain optimal length of each bar and select proper type of servo motor.
- Manufactured the machine with laser cutting and 3D printing.

### **Adjustable Ankle-foot Orthosis**

Sept 2019-Dec 2019

Advisor: Shane Johnson, Associate Professor, Shanghai Jiao Tong University

- Identified the components of traditional ankle-foot orthosis.
- Studied the principle of e-spring which performs various elastic coefficients at different angle positions.
- Designed and manufactured model with leverage that uses e-spring, and improved design based on user experience.

## **LEADERSHIP AND ACTIVITIES**

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### **Department of Computer Science | JHU | Course Assistant**

Feb 2024 – May 2024

- CA of Algorithms for Sensor-Based Robotics.
- Held weekly office hour and was responsible for homework grading.

### **Joint Institute Center for Learning and Teaching | UM-SJTU | Teaching Assistant**

Mar 2021- Aug 2022

- TA of *Solid Mechanics* (2021SP), *Thermodynamics* (2021SU), *Physics II* (2021FA), *Dynamics and Vibrations* (2022SU), *Honor Physics I* (2023SU).
- Held weekly recitation class and office hours, and assisted instructors with coursework.
- Finalized grading rubric and scored regular homework and exams.

### **JI Badminton Club | UM-SJTU | President**

Jul 2021-Jul 2022

- Managed and planned the schedule for badminton games and booked the court weekly.
- Arrange the institutional badminton competitions with University Sport Club.

### **Aero-Sport Club | SJTU | Leader of Mechanical Department**

Dec 2020-Dec 2021

- Responsible for mechanical designing and manufacturing in the department.
- Led club seminar meetings and workshop about 3D printing, laser cutting machine and CAD drawing.

## **AWARDS**

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### **China International Aircraft Design Challenge (CADC): Runner-up in Vertical Take-off and Landing**

Feb 2021-Nov 2021

- Worked with 5 students and placed 2nd of 340 teams, organized by Aero Sports Federation of China.

### **The University Physics Competition: Silver Medal**

Nov 2020

- Worked with 2 students and achieved Silver Medal (Top 1.7% ~ Top 15%) out of 346 teams.

### **National Undergraduate Engineering Training Integration Ability Competition: First Prize in Intelligent logistics UAV, Shanghai area.**

Mar 2021

## **SKILLS**

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Programming Languages: Python, MATLAB, R, C/C++, C#, Latex.

Software: ROS2, Solidworks, Arduino, Unity3D, Adobe Premiere Pro, Autodesk Fusion 360, Microsoft Office.