

Zhenyuan Yu

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EDUCATION

University of North Carolina at Chapel Hill & NC State University (UNC & NCSU)	Expected: August, 2024
M.S in Biomedical Engineering. GPA: 3.75/4	<i>Raleigh, NC, USA</i>
Xi'an Jiaotong University (XJTU)	June, 2022
M.S in Mechanical Engineering. GPA: 3.7/4	<i>Xi'an, Shaanxi, China</i>
Xi'an Jiaotong University (XJTU)	June, 2019
B.S in Mechanical Engineering. GPA: 3.6/4	<i>Xi'an, Shaanxi, China</i>

EXPERIENCE

- 1. Development of a Wearable Robotic Rehabilitation System for Neuro-Rehabilitation, UNC&NCSU** 2022.09-2023.03
 - Develop a visual feedback user interface using Python aimed at enhancing mediolateral balance. Use User Datagram Protocol (UDP) to accomplish the communication between the user interface and an abduction/adduction hip exoskeleton.
 - Apply individualized parameters of an impedance controller of the exoskeleton to simulate individualized training difficulties. Analyze the kinetic, kinematic, and EMG response of the visuomotor training.
- 2. Biomechanics Study of Walking Balance in Different Conditions, UNC&NCSU** 2023.08-present
 - Analyze the biomechanics response to mediolateral assistance provided by powered hip exoskeleton in different step width during walking. The data is recorded by Vicon and processed in Visual3D.
- 3. Collaborative Mapping of Multi Robots in Semi-Structured Orchard Environment, XJTU** 2019.10-2022.05
 - Complete the mechanical design, PCB design, and embedded system development of a mobile robot. Integrate camera and ultrasound distance sensor to build the measuring unit. Develop machine vision algorithm for trunk recognition using OpenCV.
 - Build single robot trunk localization system based on multiple sensors information (camera, ultrasound sensor, odometer). Simulate simultaneous localization and mapping algorithms based on Extended Kalman Filter method to obtain local map.
 - Apply Differential Evolution Algorithm for multi-map stitching. Validate the result of multi-robot collaborative mapping.
- 4. Control of a 6-DoF Stewart Platform, XJTU** 2020.10-2022.01
 - Accomplish synchronous control of multiple MCUs through CAN bus.
 - Perform inverse kinematics based on the platform pose obtained from the IMU to obtain the length command for each electric cylinder. Complete the platform horizontal control to isolate the disturbance caused by terrains when robot moves.
- 5. Gait Recognition and Torque Control of a Lower Limb Lightweight Exoskeleton, XJTU** 2021.02-2022.05
 - Design and build a lightweight hip exoskeleton. Integrate IMU and FSR sensor for control use.
 - Build a real-time user-interface using C++, showing a unified gait phase variable which can be used for identifying horizontal walking and obstacle crossing using fuzzy rules. Help design and test the characteristics of a novel soft force sensor.
- 6. Design of a Stiffness-adjustable Robot Joint and Analysis of Its Dynamic Characteristics, XJTU** 2018.09-2019.06
 - Design and build a stiffness-adjustable robot driving joint in Solidworks and Ansys. Drive and test of a DC servo motor.
 - Apply PID control in MCU to change the stiffness of the robot joint. Measure its dynamic response under different stiffness.

SKILLS

Programming: C/C++, Python, MATLAB

Hardware: STM32, Vicon, Xsens

Software: Solidworks, AutoCAD, Altium, Keil, Simulink, TwinCAT, Vicon Nexus, Visual3D

Keywords: Robotics, Mechanical Design, Mechatronics Design, Embedded System Development, Machine Learning, Motor Control, Biomechanics Analysis.

SELECTED PUBLICATIONS

- **Z. Yu, V. Nalam, A. Alili and H. H. Huang, "A Wearable Robotic Rehabilitation System for Neuro-Rehabilitation Aimed at Enhancing Mediolateral Balance," *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, 2023.**
- 5 published and accepted in total, 2 first-author papers. A full list of publications can be found here.

SELECTED HONORS AND AWARDS

- **First Prize.** National Graduate Student Robot Competition (Top 5% in 150 teams), China, 2021
- **Outstanding Graduates.** The College of Mechanical Engineering, Xi'an Jiaotong University, 2019
- **First Prize.** National College Student Mechanical Innovation Design Competition (Top 10% in 260 teams), China, 2018.