Hongrui Yi

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EDUCATION

Master of Science in Electrical and Computer Engineering   *August 2023 to present*

Johns Hopkins University, Baltimore, MD

Bachelor of Science in Mechanical Engineering   Sep. 2018- Jun. 2023

University of Cincinnati, Cincinnati, OH & Chongqing, China

- GPA: 3.80/4.0
- Minor in Robotics and Automation
- *Dean's List (Summer 2021, Fall 2020, Spring 2020)*

Bachelor of Engineering in Mechanical Engineering and Automation   Sep. 2018- Jun. 2023

Chongqing University, Chongqing, China

- GPA: 89/100
- *Recipient of National Scholarship (Oct. 2022)*

Summer Academic Program   August 2019

University of Cambridge, UK

- Leadership Innovation and Impact (A+), Business Management and Leadership (A+)

PUBLICATION

Hongrui Yi, Quanchang Li, Hao Wang, Jian Tang, Rui Liu, Wenbin Huang, Xiaoxi Ding, "Dual-kernel Driven Convolutional Sparse Learning for Bearing Transient Feature Enhancement", Measurement.

Haoyu Wang, **Hongrui Yi**, Jie Liu, Lixu Gu, "Integrated Treatment Planning in Percutaneous Microwave Ablation of Lung Tumors", 2022 44rd Annual International Conference of the IEEE Engineering in Medicine & Biology Society.

Yulan Li, **Hongrui Yi**, Hao Wang, and etc., "Parameterized Doppler Adaptive Correction for Wayside Acoustic Array Signal", The Efficiency and Performance Engineering Network 2022. (Best Paper Award)

Zhenyu Chen, Shenglan Liu, **Hongrui Yi**, and etc., "Prediction Reliability Assessment Based on Mahalanobis Distance and GRU in the Application of Bearing RUL Analysis", The Efficiency and Performance Engineering Network 2022.

RESEARCH EXPERIENCE

Soft-bodied Robot for Upper Limb Motion Assessment and Rehabilitation   Jul. 2022- Oct. 2022

Research Intern, University of Alberta (Mitacs Globalink)

- Implemented the algorithm by python for joint angles and REBA ergonomic risk score and achieved data transmission between sensor and computer
- Designed and developed a UX graphic interface capturing real-time data from wearable sensors
- Delivered a full-body 3D presentation and wrote a technical report
- Held weekly group meetings to discuss the research progress, including research findings and challenges

Percutaneous Lung Piercing Surgery Robot   Sept. 2021- Mar. 2022

Research Assistant, Institute of Medical Robotics, Shanghai Jiao Tong University (SJTU)

Supervisor: Lixu Gu, Professor of School of Biomedical Engineering, SJTU

- Conducted research on the range of microwave ablation and its algorithm through literature review
- Designed the needle and base parts of the structure, developed the end tool application, and verified proper assembly of the robot
- Established the medical image processing algorithm to read default parameters of lung images based on VTK/QT

Intelligent Infrared Thermal Imaging Detection Device   Jul. 2021- May 2022

Project Leader, State Key Laboratory of Power Transmission Equipment & System Security and New Technology

Supervisor: Fan Yang, Associate Dean of School of Graduate Studies, Chongqing University

- Utilized infrared image recognition and processing method based on feature learning, such as abnormal image and device boundary recognition algorithm to ensure 99.5% validation-level accuracy
- Implemented a fast AI infrared diagnosis method by optimizing resource allocation of embedded computing and module data management

- Optimized the intelligent power equipment malfunction diagnosis algorithm with deep learning, given the temporal and spatial gradient of temperature and the temperature probability density as parameters

Intelligent Bearing: National Key R&D Program   Sept. 2019- Apr. 2021

Member, State Key Laboratory of Mechanical Transmissions, Chongqing University

Supervisor: Wenbin Huang, Professor of College of Mechanical and Vehicle Engineering, Chongqing University

- Proposed dual-kernel driven convolution sparse learning algorithm with Python and MATLAB for more accuracy and less computational workload
- Participated in the data processing of mechanical equipment condition monitoring and malfunction diagnosis algorithm based on the embedded intelligent system
- Designed multi-source processing algorithm including image entropy analysis to monitor the state, operation, maintenance status, and early warning

COMPETITION PROJECT

Infantry Robot

Leader, Robomaster Robot Team

Advisor: Fangzheng Xue, Professor of College of Automation   May 2020- Aug. 2020

- Implemented the tracking function on a 2-DOF tracking head by using Yolov3 neural network and STM3232F427 embedded control
- Developed the overall planning of the mechanical group, electric control group and visual group, and held weekly team meetings as the team leader,
- Completed the overall design of the infantry robot and modified the friction wheel of the infantry robot chassis to make it move stably in a straight line

A Multifunctional Projectile Robot

Member, ROBOCON Robot Team

Advisor: Long Bai, Professor of College of Mechanical and Vehicle Engineering   May 2020- Aug. 2020

- Implemented the pneumatic loop design by SolidWorks for the ejection mechanism in manual robot and established its model
- Realized the model construction and optimization of the quadruped robot by adopting the form of the telescopic crossing of obstacles, finished its physical model analysis and mechanical simulation by ADAMS, and achieved the lightweight assembly process that could reduce the weight of the robot by 30% and improve its stability
- Participated in the robot path planning and the program architecture design by MATLAB

A Multifunctional Projectile Robot

Advisor: Long Bai, Professor of College of Mechanical and Vehicle Engineering   Sept. 2019- Dec. 2019

- Implemented the structural analysis and design of the automatic robot based on SolidWorks and realized the lightweight design and increase of the movable range of the throwing arm
- Designed and optimized the interaction mechanism between different robots and their matching mechanism with ball frame
- Participated in the ejection experiments and improved the system structure

WORK EXPERIENCE

Grader Position

College of Engineering and Applied Science, Department of Mechanical and Materials Engineering

University of Cincinnati   Sept. 2022- Dec. 2022

- Worked as a grader for MECH 2021: Kinematics and Kinetics of Machine, 10 hours a week
- Completed homework assignment correction for 50 students in the class
- Led 2 hours of Q&A sessions each week to solve homework and test problems for students

Teaching Assistant

College of Engineering and Applied Science, Department of Mechanical and Materials Engineering

University of Cincinnati   May 2022- Aug. 2022

- Graded over 600 homework assignments for 4 classes (MECH 2030: Solid Mechanics, MECH 3080: System Dynamics and Vibrations) and recorded in Excel for professors' reference
- Answered questions during the preview and after-class sessions to help student understand course materials

- Monitored class attendance, virtual meetings, and examination order to comply with school academic codes

PATENT

Yehua Chen, Zhuoya Fang, Yongzhi Liu, Siyi Chen, and **Hongrui Yi**. 2021. *A Solar Power Generator based on a Circular Involute to Concentrate Light*. China Patent Number: ZL202121107829.3. Issued on Nov. 2, 2021.

Hongrui Yi, Junyi Tian, JInglun Yu, et al. 2021. *A Convenient Charging System for Electric Skater*. China Patent Number: ZL201910785777.6. Issued on Jul. 30, 2021.

Xin Liu, Lai Zou, **Hongrui Yi**, et al. 2020. *A Device based on WebGL 3D Model Fabrication*. China Patent Number: ZL202010668766.2. Issued on Oct. 27, 2021.

Hongrui Yi. 2019. *A Storage Desk*. China Patent Number: ZL201920203589.3. Issued on Feb. 16, 2019.

HONORS & AWARDS

Gold Prize (Team leader), the 7th China International College Students "Internet+" Competition	Oct. 2021
First Prize, the 14th National Competition on Energy Conservation and Emission Reduction	Aug. 2021
Silver Prize, the 12th Challenge Cup National Undergraduate Entrepreneurship Competition	Dec. 2020
First Prize, the 12th User Experience Design Award	Oct. 2020
Third Prize, the 19th National College Students ROBOCON Competition	Oct. 2020
Second Prize, the 19th National College Students Robomaster Competition	Jul. 2020
Advanced Innovative Individual for 2022 Academic Year in Chongqing Municipality Universities	Apr. 2022
Grand Prize, the 17th Challenge Cup Extracurricular Project Competition for Advanced Technology	Aug. 2021
Gold Prize (ranked top 2), the 7th "Internet+" Chongqing Regional Qualification	Oct. 2020
Gold Prize (ranked top 1), the 12th Challenge Cup Chongqing Regional Competition	Oct. 2020
Nominee of Star of Innovation and Entrepreneurship	Dec. 2020

UNIVERSITY SERVICE

Executive Chairman   Jun. 2020- Jun. 2021

CQU-UC Student Association

- Supervised the general operation of the Practice Department, the Academic Department, and the Secretariat
- Organized events including the first PLUR music festival, the first ten-school joint debate, and the first overseas study exhibition to attract over 10,000 audiences

Vice-Captain   Apr. 2019-Jun. 2020

Chongqing University Rural Revitalization Volunteer Service Team

- Managed the logistics and financial work of the team during the teaching period, including the design of team uniforms, purchase of materials and management of funds, etc
- Participated in press release writing and reported by national media 3 times and municipal media more than 20 times

COMMUNITY SERVICE

Community Volunteer   Feb. 2020- May 2020

Heshan Community, Hanyang District, Wuhan City, Hubei Province, China

- Participated in volunteer service for the community through donated food distribution with a total of 80 hours of volunteer service
- Donated 400mL at the blood donation station to support the local hospital
- Reported by *China Daily* (https://enapp.chinadaily.com.cn/a/202003/19/AP5e72b554a3103a24b110b7cd.html)

SKILLS

Programming: C++ (advanced), Python (advanced), C (proficient)

Software: MATLAB (advanced), SolidWorks (advanced), AutoCAD (proficient), Unigraphics N.X. (proficient), MITK (familiar), CloudCompare (familiar), Blender (familiar)

Certificate: Piano (national-level 10), CPR First Aid (American Heart Association)