Mengrui Han

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EDUCATION

01/2023-now **Hong Kong Polytechnic University**
PhD of Philosophy, Electrical and Electronic Engineering

10/2022-11/2023 **Imperial College London**
MSC of Applied Computational Science and Engineering

09/2017-07/2021 **Beijing University of Technology**
Bachelor of Engineering in Measurement and Control Technique and Instrument**(First Class Honours Degree)**, Average Mark: **88.16% (Top 5%),** GPA: **3.66**

RESEARCH EXPERIENCE

05/2023-now **C++ HPC MPI project: Solving the Navier Stokes Equation**
- Develop a parallel solver for the Navier-Stokes equation with performance evaluation on IC's High-Performance Computing system

03/2023-04/2023 **C++ project: Image processing tool for 2D and 3D data**
- Offering features including filter application, color correction, data volume slicing, and projection generation

12/2022 **DL project: Using cVAE and cGAN to process Fashion MNIST dataset**
- Develop a Conditional Variational Autoencoder and a Conditional Generative Adversarial Network leveraging the YOLOv5 architecture

12/2019-06/2021 **Graduation Thesis: Lightweight Method of Laser Tracing System Mechanical Structure Based on 3D Topology Optimization**
- Awarded Excellent Graduation Project in Beijing and published a paper in the Journal of Harbin Engineering University
- Created optimised algorithms within MATLAB to improve the performance of this platform
- Reduce the weight of the platform by **55%**
- Used Autodesk Inventor to implement modelling, simulation and stress analysis, and finalised vibration experiment

04/2018-09/2018 **Researcher, Support Vector Machine-Based Gear Defect Detection Software System Design**
- Created algorithm with MATLAB and input the sound of gear rotation into support vector machine to identify whether gears were good
- Achieved 93% accuracy

05/2018-08/2018 **Member, A Smart Mobility Robot for Senior Citizens**
- Obtained the First Prize (twice, national level) respectively in China Robot Competition, Service-Based Robot Band and China Robot Competition
- Build an intelligent robot based on a robot operating system (ROS) combining a laser radar, Kinect motion sensors and simultaneous localisation and mapping (SLAM) techniques

10/2018-06/2019 **Researcher, Rubik's Cube-Based Restoring Robot**
- Employed Autodesk Inventor to model and design the structure, visualised main components of this structure by 3D printing technology
- Created algorithm based on machine vision to identify Rubik's cube's status with Python and Opencv Increased the accuracy of this algorithms to above 97% after denoising, image-splitting and recognition

10/2018-12/2018 **Team Leader, AVG Car Design based on PID control**
- Design and make a trailing car in 2018 China Robot Ability Competition, and won the First Prize
- Developed a computer programme to capture PID parameters of four wheels of the car

01/2019-05/2019 **Member, Four Tracked Lunar Service Robot**
- Generated 3D model of lunar service robot with Autodesk Inventor, awarded the First Prize in the 2019 National College Students' Mechanical Products Digital Design Competition

09/2019-11/2020 **Team Leader, Fall Prevention Walking Aid for Seniors**
- Designed and generated a fall prevention device with folding seat, speed limiting device and reverse device in 2020 National Undergraduate Mechanical Innovation Competition, and got the First Place (the national level)

INTERNSHIP EXPERIENCE

01/2022-05/2022 **Qingqingjieneng Technology Co., Ltd(Tsinghua Automotive Strategy Research Institute, TASRI))**
- Pure hydrogen mileage and data analysis (algorithm of jiaoyanyuan Institute)
- Data platform for search and model conversion (Technology serviced for 2022 Beijing Winter Olympics

- Complete the group and Futian enterprise standard

Dr. Jin zhenhuan(Tsinghua University) acted as my supervisor during the internship

EXTRACURRICULAR ACTIVITIES

09/2018-09/2019 **Director, Science and Technology Association of Beijing University of Technology**

- Planned and organised a wide range of contests, lectures, salons

02/2018-09/2019 **Volunteer, Volunteer Activities (100 Hours)**

- Work as an international volunteer in Sri Lanka and Nepal

SKILLS

- ✓ Language Skills: English-good, German-primary, French-basic, Korean-basic, Japanese-basic
- ✓ Computer Skills: MATLAB, Inventor, SolidWorks, CAD, ANSYS, Labview, KICAD, Arduino, STM32 (keil), C++, Python
- ✓ Hobbies: Mechanical Structure Design, Robot Design, Kendo, Reading, Play Chinese Chess

PUBLISH

10/2021 Lightweight method of laser tracing system mechanical structure based on topology optimization (https://scholar.google.com/scholar?hl=zh-CN&as_sdt=0%2C5&q=激光追踪系统机械结构拓扑优化轻量化方法&btnG=)

02/2022 Generative design for self-balancing unicycle robot in additive manufacturing(https://doi.org/10.1117/12.2639454)

PATENTS & SOFTWARE COPYRIGHT & CERTIFICATE

Patents:

08/2020 Utility Model Patent for an Optimisation Method of Mechanical Structure Weight Reduction for Laser Tracking Measurement System Based on 3D Topology Optimisation (No.2020108966114)

03/2020 Utility Model of a Device and Interactive Platform Algorithm for Rubik's Cube-Based Restoring Teaching and Training (No.202010246767.8)

12/2019 Utility Model Patent for Fall Prevention Walking Aid for Seniors (No. 201911384811.5)

12/2019 Utility Model Patent for A Reduction Device Featuring Slope Reversion (No. 201911384794.5)

04/2019 Utility Model Patent for Four Tracked Device for Lunar Rover to Assist Astronauts in Operations and Building Lunar Bases (No. 201910336772.5)

Software Copyrights:

04/2021 CMM Temperature Supplement Secondary Development System Based on Rational DIMS 7.1

05/2020 Measurement Uncertainty Analysis Software for Laser Heterodyne Interference System

11/2019 Stepper Motor Precision Control System Based on STM32 (V1.0)

11/2019 Rubik's Cube-Based Multifunctional Restoring Teaching Platform (V1.0)

11/2018 Support Vector Machine-Based Gear Detection Software System (V1.0)

Certificate:

10/2020 Certificate of Trainee Engineer of Instrument, Control and Measurement (awarded by China Instrument and Control Society)

AWARDS

07/2021 Outstanding Undergraduate Award in Beijing (Top 5%)

07/2021 Outstanding Undergraduate Graduation Project in Beijing (Top 1%)

07/2021 A-level Outstanding Bachelor Thesis of Engineering in Measurement and Control Technique and Instrument Major in China

08/2020 First Prize in the 14th University Computer Games Championship & National Computer Games Tournament

09/2019 Beijing University of Technology Innovation and Entrepreneurship Scholarship

09/2019 National Encouragement Scholarship