Yisu Fang

E-mail yisu.fang@outlook.com
Telephone (+44) 7818026290
Address Flat 1, Block 1, Maple Bank, Church Road, Edgbaston, Birmingham, West Midlands, United Kingdom, B153TE

Personal Statement

Robotics Researcher | IoT Specialist | MSc Robotics Student

I am a robotics engineer and IoT specialist with a strong academic foundation and hands-on experience in developing intelligent, connected systems. Currently pursuing an MSc in Robotics at the University of Birmingham (2024-2025), I combine expertise in robotics, artificial intelligence (AI), and IoT technologies to create innovative solutions addressing real-world challenges.

My work focuses on:
• Developing autonomous robotics and navigation systems
• Designing AI-powered decision-making frameworks for robotics applications
• Integrating IoT and edge computing into advanced automation and smart systems

Throughout my academic and professional journey, I have contributed to projects that blend cutting-edge technology with practical application, such as robotic inspection systems, IoT edge computing systems, and machine vision defect detection systems. These experiences have tried my skills in ROS, SLAM, embedded systems, and AI algorithms.

With a passion for pushing the boundaries of robotics and IoT integration, I am eager to bring my knowledge and creativity to forward-thinking organizations in the United Kingdom. I aim to leverage my skills in designing intelligent systems such as autonomous navigation, smart agriculture, and industrial automation while driving innovation and delivering impactful results.

Education Background

Sep. 2024-Aug. 2025
University of Birmingham
MSc. Robotics

Sep. 2020-Jul. 2024
University of Liverpool × Xi'an Jiaotong-Liverpool University
BEng. Internet of Things Engineering with Contemporary Entrepreneurialism
First Class Honours

Degree completed at Xi'an Jiaotong-Liverpool University **(XJTLU)**, awarded by University of Liverpool

Academic Awards

2023/24 **XJTLU - Best Performance in Final Year Project**
2022/23 **XJTLU - Professional Development Programme Stage 3 - 200 hours**
2022/23 **XJTLU - Professional Development Programme Stage 2 - 200 hours**
2020/21 **XJTLU - Professional Development Programme Stage 1 - 200 hours**

Research Experience

Oct.2024-Dec. 2024
Coursework Research Project
Local NLP Voice-Controlled Robot Navigation
Supervisors: **Dr. Melanie Jouaiti; Dr. Hyung Jin Chang**

Overview:
Developed a voice-controlled robotic navigation system utilizing:
- OpenAI Whisper for speech-to-text processing
- Llama 3.2 for natural language understanding
- ROS2 for robotic control

Translated spoken commands into precise robotic actions within a simulated environment

Employed WSL2, ROS2, and Gazebo for simulating intelligent robotic navigation with SLAM and Navigation2 stacks
Tested multilingual voice commands to validate system capabilities for interpreting and executing complex instructions

Identified resource-intensive processing and real-world adaptability as key limitations, forming the basis for future enhancements in intuitive human-robot interaction systems

Jun. 2024-Aug. 2024
Summer Undergraduate Research Fellowship
Distributed Robotic Controllers with AES-Encrypted Wireless Mesh Network
Supervisors: **Dr. Hadyan Hafizh; Dr. Muhammad Ateeq; Dr. Andrew Huey Ping Tan**

Overview:
Developed innovative control system using ESP32-based wireless mesh network (WMN), implemented:
- "painlessMesh" library for network management
- JSON data exchange pipelines
- Security layer with ECDH key exchange and AES-128 encryption
- Custom serial bridge for ROS integration

Designed scalable robotic system combining real-time distributed control with ROS capabilities

Optimized network topology, security, and responsiveness through rigorous performance evaluations

Provided insights for secure, decentralized mesh networks in swarm robotics and robot-infrastructure coordination

Paper published in
• 2nd International Conference on Intelligent Manufacturing and Robotics (ICiMR) • Aug 23, 2024

Aug. 2023-Jun. 2024 Final-Year Project

An Autonomous Houseplant Irrigation Robot based on ROS2, YOLOv8 and Distributed WMN

Supervisors: **Dr. Hadyan Hafizh; Dr. Muhammad Ateeq**

Overview: Designed and implemented prototype robot integrating locomotion, water delivery, sensing, and power management hardware

Developed control system using ROS2, incorporating:
- YOLOv8 object detection with transfer learning (trained on 2,113 custom plant images)
- Google Cartographer SLAM for localization and mapping
- ROS2 Nav2 and m-explore-ros2 for autonomous navigation and targeted irrigation

Implemented ad-hoc wireless mesh network and RFID-based plant management system

Successfully demonstrated autonomous functionalities, identifying future enhancements

Paper published in
- **8th IEEE International Conference on Smart Internet of Things (SmartIoT 2024), IEEE • Nov 16, 2024**

Jan. 2023-Feb. 2023 Research Assistant at Nanjing University of Science & Technology

An Enhanced YOLOv5s-Based Algorithm for Defect Detection in Steel Box Beam Sections

Supervisor: **Dr. Jian Wu**

Collaborators: **Yuhao Xie; Lei Yin**

Overview: Developed improved algorithm based on YOLOv5s architecture:
- Implemented Weighted Bidirectional Feature Pyramid Network (BiFPN)
- Integrated fusion of CBAM and NAM attention modules
- Replaced CIoU loss with EIoU for better convergence

Tested on NEU-DET dataset:
- 9.9% accuracy improvement over baseline YOLOv5s
- 2.3% boost in average precision

Paper published in
- **2023 International Conference on the Cognitive Computing and Complex Data (ICCD), IEEE • Oct 21, 2023**

Publications

Y. Fang, H. Hafizh, M. Ateeq, and A. Tan, **"Modular Robotic Controllers with Ad-hoc ESP32 Wireless Mesh Network and Embedded AES Security,"** *2nd International Conference on Intelligent Manufacturing and Robotics (ICiMR)*, Suzhou, China, 2024, in press.

Y. Fang, H. Hafizh, and M. Ateeq, **"An Autonomous Irrigation Robot Based on ROS2, YOLOv8, and Distributed ESP32 WMN Architecture,"** *2024 IEEE International Conference on Smart Internet of Things (SmartIoT)*, Shenzhen, China, 2024, pp. 384-391, doi: 10.1109/SmartIoT62235.2024.00065.

Y. Xie, J. Wu, **Y. Fang,** and L. Yin, **"An Enhanced YOLOv5s-Based Algorithm for Defect Detection in Steel Box Beam Sections,"** *2023 International Conference on Cognitive Computing and Complex Data (ICCD)*, Huaian, China, 2023, pp. 23-27, doi: 10.1109/ICCD59681.2023.10420706.

Relevant Coursework

Robotics Engineering

Advanced Project
Robot Vision
Applied Robotics
Intelligent Robotics
Robot Motion Planning & Control
Computer Vision and Imaging

Internet of Things Engineering

Final-Year Project
Big Data Analytics
Wireless Sensor Networks
Machine Learning
Principle and Application of RFID
Radio Communication Protocols
Group Project: IoT in Action
IoT Information Security Technology
Sensor Technology
Data Structure and Algorithms
Introduction to Databases
Control Technology of IoT
Computer Architecture and Operating Systems
Embedded C/C++ Programming

Entrepreneurship

Capstone Project
Cutting-Edge Practice in Innovation and Entrepreneurship
Cross-Border Management
Corporate Entrepreneurship
Business Model Generation
Leadership and Communication
Futurology and Business Opportunities
Entrepreneurship Concepts and Practice
Introduction to Business in China
Introduction to Innovation and Entrepreneurship

Foundational Courses

English Language and Study Skills for Engineering (III)
Advanced English Communication and Academic Skills (I - II)
Engineering Mathematics (I - II)
Multivariable Calculus (Science and Engineering)
Calculus (Science and Engineering)
Linear Algebra
Physics
Spanish Stage 1 - 2 (Intermediate level)

*Transcript of Studies available upon request.

Personal Projects

Wireless ESP32 PID Self-Balancing Dicycle Robot with WebUI for Remote Control and Video Transmission
Wireless ESP32 LCD Weather Forecast Display based on OpenWeatherMap API, LVGL GUI and FreeRTOS with OTA Upgradability
Wireless ESP32 Horticultural Sensor based on Blynk Cloud: Thermometer, Hygrometer, and Photometer

Work Experience

Jul. 2023-Aug. 2023

Nanjing, Jiangsu, China
Jiangsu Zhichenghuining Transportation Technology Co., Ltd

Position: **Software Engineer Intern**

Overview:

Developed Python-based AI vision algorithm using YOLO v8 for lane, pothole and crack detection

Trained on multiple open-source datasets (e.g., RoadDamageDetector2022)

Deployed on ROS server for vehicle-mounted road testing

Optimized preprocessing filters for real-life conditions (blurring, shadows)

Integrated with proprietary company software:
- Developed SQL database upload function
- Created local HTML/CSS webpage interface

Jun. 2023-Jul. 2023

Hefei, Anhui, China
Anhui Shunwei Intelligent Device Manufacturing Co., Ltd

Position: **Embedded Systems Engineer Intern**

Overview:

Designed and implemented ESP32-based CAN bus data-logger for vehicle repair diagnostics

Features:
- FreeRTOS threading
- SD card storage for log record-keeping, logs saved in timestamped .csv format
- Log files can be uploaded wirelessly through WLAN to local server computer for data analysis
- TFT LCD touchscreen powered by LVGL User Interface for real-time data display and address selection

Jul. 2022-Aug. 2022

Nanjing, Jiangsu, China
Nanjing Instinct Technology Co., Ltd

Position: **Hardware Designer Intern**

Overview:

Designed miniature servo motor extension board for STM32F1 microcontroller using Altium Designer

Integrated PCA9685 servo controller for simultaneous control of 16 servos

Interfaced with a custom serial PLC port

Board designed for proprietary robotic arm project in logistics package handling and sorting

Jun. 2021-Aug. 2021

Nanjing, Jiangsu, China
Jiangsu Zhichenghuining Transportation Technology Co., Ltd

Position: **Embedded Systems Engineer Intern**

Overview:

Designed and developed a wirelessly networked, solar-powered traffic indicator light with LoRa mesh networking

Key features:
- Real-time traffic congestion status display using color-coded signals
- Central nodes are connected to intranet to fetch traffic status, and broadcast through LoRa tranceiver module
- Peripheral nodes are interconnected through a repeater mesh network to extend signal coverage

Responsibilities:
- Designed hardware circuit and PCB layout based on ESP32 microcontroller and SPI module interface
- Developed an embedded C program with team for device control and LoRa network communication
- Built and tested a functional prototype
- Collaborated with team to integrate device into local traffic network infrastructure

Skills

Languages	English (proficient, IELTS: 7.5) Mandarin Chinese (native) Cantonese Chinese, French, Spanish (intermediate)
Graphics Design	Adobe Photoshop, Illustrator
Video Editing and Special Effects	Adobe After Effects, Premiere
Game Design, 3D Modeling and Rendition	Autodesk 3DsMax, Maxon Cinema 4D, Blender, Unreal Engine 5
Industrial Design	MATLAB Simulink, Altium Designer, SolidWorks
Web & UI Design	Adobe Dreamweaver, Qt Design Studio, SquareLine Studio
Programming Languages	C, C++, Python, Java, Linux Bash, HTML, CSS, JavaScript, SQL
Embedded Systems Engineering	32-bit Microcontroller SoC, Arduino IDE, RTOS, Embedded GUI (LVGL, U8G2)
Robotics Engineering	Robot Operating System (ROS), Gazebo, Ubuntu, Windows Subsystem for Linux