

Jinsong Zhang

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Education

University of Liverpool <i>Liverpool, UK</i>	<i>Sep 2022 - Jun 2024</i>
B.Eng. in Electrical and Electronic Engineering	
Xi'an Jiaotong-Liverpool University <i>Suzhou, China</i>	<i>Sep 2020 - Jun 2022</i>
B.Eng. in Electronic Science and Technology	
Major GPA: 3.69/4.00	

Skills

Programming: Linux, ROS, C/C++, Verilog, Python, MATLAB, Assembly, HTML, CSS

Software: Git, VS Code, MATLAB, PyCharm, Anaconda, Jupyter Notebook, Arduino, Quartus II, Multisim

Research Experience

FPGA Accelerated CNN for Digit Recognition <i>University of Liverpool, UK</i>	<i>Nov 2022 – Present</i>
Researcher, <i>Undergraduate Research Fellowship</i>	
Designed and implemented a Convolutional Neural Network (CNN) using Verilog on Altera's FPGA board for real-time handwritten digit recognition using the MNIST dataset.	
<ul style="list-style-type: none">Developed a customized CNN architecture optimized for real-time processing on FPGA hardware.Created a seamless integration between the FPGA board and a display module, enabling real-time visualization of handwritten digit recognition results on the FPGA display.Utilized FPGA efficiently to achieve high-performance and low-latency inference for real-time applications.	
YOLOv5s-Powered Vision System for Distributing Robot Swarms <i>Westlake University, China</i>	<i>Jun 2023 – Sep 2023</i>
Researcher, <i>Visiting Student</i>	
Developed and implemented an innovative vision system, integrating the YOLOv5s model with ROS (Robot Operating System), for real-time object detection within a distributed robot swarm.	
<ul style="list-style-type: none">Curated a comprehensive object detection dataset by leveraging ROS in conjunction with cameras.Conducted YOLOv5s model training with a custom dataset and deployed Triton Inference Servers with YOLO v5s model on each robot in the swarm.Implemented object detection functionality for the robot swarm through the collaborative integration of ROS and Triton Inference Servers, enhancing the overall intelligence and coordination capabilities.	
Real-time Slope Perception Module for UAV <i>Westlake University, China</i>	<i>May 2023 – Jul 2023</i>
Researcher, <i>Visiting Student</i>	
Designed and implemented a cutting-edge perception module for unmanned aerial vehicles (UAVs) utilizing a combination of four laser distance sensors and an Inertial Measurement Unit (IMU).	
<ul style="list-style-type: none">Developed a sophisticated slope perception algorithm tailored for real-time monitoring of inclined surfaces.Developed a visually intuitive real-time interface to communicate with the microcontroller, facilitating the monitoring and analysis of slope data.Integrated the slope perception algorithm seamlessly with the sensor module using Keil, enabling UAVs to perceive and navigate inclined terrains in real-time.	
Comparative Analysis of FedAvg in Non-IID dataset <i>Xi'an Jiaotong-Liverpool University, China</i>	<i>Jun 2022 - Sep 2022</i>
Undergraduate Researcher, <i>Summer Undergraduate Research Fellowship</i>	
Conducted experiments and evaluations on the Federated Averaging (FedAvg) algorithm using the MNIST dataset to compare the performance of various methods in handling non-identically distributed data.	
<ul style="list-style-type: none">Implemented and executed experiments applying FedAvg algorithm to assess its efficacy in federated learning scenarios, specifically focusing on non-IID data distributions.Analyzed and compared the performance of FedAvg with different approaches, shedding light on its suitability for scenarios involving non-identically distributed data in the context of MNIST digit recognition.	

Projects

UART Serial Communication Implemented in Verilog HDL on FPGA <i>Digital System Design</i>	<i>Oct 2023 – Nov 2023</i>
Developed and implemented a versatile UART communication module in Verilog, seamlessly integrating transmitter and receiver functionalities on an Altera FPGA board for establishing reliable bidirectional communication with a computer.	
<ul style="list-style-type: none">Crafted dedicated transmit and receive modules for UART serial communication, incorporating essential components such as shift registers, baud rate generators, and controllers to facilitate efficient data transmission and reception.Utilized ModelSim to meticulously simulate and analyze each module, ensuring optimal stability, robustness, and portability of the transmission and reception processes.	
Image Processing for Object Recognition <i>Year 2 Project</i>	<i>Sep 2022 - May 2023</i>
Developed and implemented an autonomous visual tracking system on a small car using Jetson Nano as the main processing unit, integrating computer vision, deep learning and automatic control technologies.	
<ul style="list-style-type: none">Developed a small car equipped with a camera for perception capabilities and generated a runway dataset through camera-based trials.Conducted training sessions for the ResNet model using the custom dataset, enabling the small car to make informed decisions for autonomous navigation and path following based on visual inputs.Implemented a PID controller as the motor control module to ensure precise and responsive adjustments, facilitating stable and accurate movements in accordance with the visual feedback.	