

# Yimian Liu

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## EDUCATION BACKGROUND

### University of Liverpool (UoL), UK

09/2019 – 07/2021

BEng in Electrical & Electronic Engineering | Grade Average: 83.3/100

### Xi'an Jiaotong-Liverpool University (XJTLU), P.R.China

09/2017 – 06/2019

BEng in Electrical & Electronic Engineering | Grade Average: 74.4, 80.6 | 2018 University Academic Excellence Award (Top 5%)

**Coursework (Math & Software):** Linear Algebra | Multivariable Calculus | Partial Differential Equations | Complex Analysis | Probability and Statistics | C/C++ Programming | Image Processing | Neural Networks

**Coursework (Hardware):** Analog/Digital Circuits | Electromagnetism | Integrated Circuits | Power Electronic System | Communication System | Measurement Theory | Microprocessors and Assembly | CMOS IC | Embedded Systems | Digital System Design | Electronic Instrumentation and Communication | Antennas

## SKILLS

**Programming Languages:** JavaScript/TypeScript | C/C++ | PHP | Python | CSS (SASS) | MATLAB | VBS | Go | SQL

**OS/Software:** Centos7 | Ubuntu | OpenWrt | Kubernetes | Helm | Docker/Docker-Compose | Drone CI | Kafka | Git | Vim | Nginx | iptables | Redis | MongoDB | Altium | PSpice | ADS | Visual Studio Code | Sublime Text 3 | VMware | Pr | Ps | Ae | Adobe Audition

**Hobbies:** Piano (Top Amateur Grade) | Animated Show | Video Game | Mountain Climbing | Drone | Buddhist Meditation

## WORK EXPERIENCES

### ODM R&D Engineer Intern

#### Eolane (China) Co., Ltd., Suzhou, China

06/2018 - 08/2018

- Participated in the Industry and Enterprise Tailored Education (IETE) program jointly supported by éolane China and XJTLU's Syntegrative Education initiative:
  - ✧ Systematically studied the industrial practice of IoT development and manufacturing, covering the design of circuits, microcontrollers, PCB, machine learning models, and 3D mechanical parts using fit-for-purpose software packages.
  - ✧ Led a team of four to complete a project for promoting the use of electronic student ID based on WeChat social media platform, covering conceptual design, market survey, software prototyping, software testing, product deployment, and technical presentation; implemented the frontend and backend of the WeChat App using PHP, JavaScript, and MySQL, focusing on user-friendliness, information security, etc.

## RESEARCH EXPERIENCES

### Development of *Ushio*, a Distributed Information Support System [[GitHub](#)]

07/2019 – Present

- Design and implement an integrated distributed information support system in Linux based on Iterative Development model:
  - ✧ Leveraged 1) Git, rsync, OBS, and Microsoft OneDrive for file management, 2) Kubernetes and Docker containers for elastic process management and load balancing, 3) Redis, MongoDB, MySQL, and MySQL Router for data management, 4) Kafka event streaming and MQTT protocol for transporting messages, and 5) iptables user-space utility program for firewall management, focusing on distributed computing and compatibility with Linux and Win10 Pro based on AMD X86 and ARM architectures.
  - ✧ Enabled image hosting service (Ushio-imgbed) based on Node.js, JavaScript, CSS, HTML, Docker, Nginx, and Huawei Cloud Object Storage [[GitHub](#)].
  - ✧ Built a program (Ushio-session) based on WebSocket and Ajax techniques to mimic the functionality of HTTP cookie so as to enable cross-origin communication between web browser and server, with users' stateful information, browsing history, and previously entered data stored on the server [[GitHub](#)].
  - ✧ Enabled API service (Ushio-api) for Ushio system maintenance [[GitHub](#)] so as to facilitate web development, covering image, MEMOIBIRD printer, music, email, message, etc.
  - ✧ DevOps of Ushio based on Drone CI, Github and Kubernetes so as to improve system stability in a multi-user setting.

### Shared Expense Management System [[GitHub](#)]

09/2019 - Present

- Built a software application for managing the shared expense within the apartment community, covering 1) a frontend adapted from a bitcoin web template, 2) self-developed Ushio-js plugin for security and logbook functions, 3) a backend written in PHP and MySQL, with 5 interfaces to support various operations, 4) an Email system using the self-developed Ushio Mail API, 5) a user authentication and management module based on self-developed Ushio-auth, 6) a payment system for balance and transaction management, and 7) a GUI built in CSS and HTML with Pjax and data visualization capability.
- Practiced the workflow for developing a commercial software product, spanning user requirement solicitation, architecture design, programmatic implementation, testing, and deployment.
- Fully leveraged existing components and know-how to enable fast development (two days from concept inception to final deployment)

### Development of *sola*, an IoT Smart Home System [[GitHub](#)]

08/2018 – Present

- Design, implement and test a full-stack IoT system for intelligent control of lightning, climate, entertainment systems, and appliances at home, focusing on hierarchical, interface-oriented, test-driven, document-based development for improved availability and reliability:
  - ✧ Designed questionnaire and performed user requirement analysis; followed the iterative development model, and optimized the system design for a balance between cost-effectiveness and redundancy.

- ✧ Leveraged 1) WifiDuino and Arduino Uno for device control, 2) LoRa protocol and a WiFi network bridge for reliable data transmission, 3) frp reverse proxy for accessing the server from outside, 4) PHP and Python for web GUI development, 5) MySQL and Redis for data storage, and 6) Node.js and C++ for control logic programming.
- ✧ Built, trained, and validated a LSTM neural network model in Keras, TensorFlow, Python and MATLAB to enable intelligent lightning control; collected historical sensor data from MySQL for model training and testing.
- ✧ Self-developed OAuth server to incorporate the Tmall Genie, a smart speaker developed by Alibaba Group, to enhance the control of the IoT system.

### **Circuit Design Course Projects, UoL**

02/2020 – 04/2020

- Designed and simulated using OrCAD PSpice 1) a logic circuit functioning as a NAND gate using two NMOS and two PMOS transistors, 2) operational amplifiers of three types, i.e., common collector, common base and common emitter, 3) a single-cycle CPU, a multi-cycle CPU and a 5-stage pipelined CPU based on ARM assembly language and MIPS instruction set, and 4) a 4-bit adder using FPGA with VHDL.
- Designed in Altium Designer, simulated in ADS and tested a downconverter:
  - ✧ Systematically practiced the general workflow for building an RF device.

### **Development of an IoT-based Intelligent Farming System [[GitHub](#)]**

**Summer Undergraduate Research Fellowship (SURF), XJTU | Advisor: Prof. Muhammad Alam**

06/2019 – 09/2019

- Designed, prototyped, and tested an autonomous farming system:
  - ✧ Employed Arduino Nano, Raspberry Pi, and various sensors (e.g., humidity, temperature, camera-based imaging) and tools (e.g., seed injector, weed suppressor, watering nozzle, motor) for automated sowing, weed control and watering.
  - ✧ Collectively leveraged 1) LoRa, MQTT, WebSocket, TCP/IP protocols for data communication, 2) MySQL and Redis for data logging, and 3) Node.js, C/C++ and Python for cloud server programming; applied quality of service (QoS) mechanism for reducing packet loss, latency and jitter in the data communication.
- Gained familiarity with the full-stack IoT system design, covering objective scoping, hardware/software design, hardware procurement, assembly, testing, and optimization.

### **Development of *wIoT* System [[GitHub](#)]**

**Project Leader, XJTU | Advisor: Prof. Pengfei Song**

05/2019

- Led a team of three to build an open-source platform based on Node.js and JavaScript for web developers to implement IoT system using Raspberry Pi and microcontrollers with Zigbee, LoRa, WiFi, Bluetooth or serial port connection.
- Focused on user-friendliness, maintainability, extensibility, and reduced reliance on firmware programming; performed document-oriented, test-driven development in Arduino IDE and Visual Studio Code; introduced registry mechanism to facilitate the management of control logics; enabled two-way communication between microcontrollers and server using socket.
- Built an array of plugins to support various electronic components and Internet communication.
- Compiled report, user manual, and API document to promote the public use of the product.

### **C++ Programming Course Projects, XJTU**

04/2019 – 05/2019

- Designed, implemented and tested 1) a smart parking software in C++ to help manage vehicles in a multi-level stacked parking lot, focusing on leveraging a self-developed C++ library with SHA-256, MD5, Base64, AES encryption, a document-oriented database, and a relational database, 2) the classic “Monopoly” board game, 3) the classic “scissor-rock-paper” game allowing online user data management and playback of BGM, and 4) a hotel management application, allowing multithreading data storage, advanced report creation, AES data encryption and digital signature, FTP backup, etc.
- Employed various OOP concepts (e.g., polymorphism, template classes, operator overloading, STL) to facilitate development; followed common software engineering practices and design patterns to enhance robustness, modularity, usability, and maintainability of the developed programs; performed rigorous and extensive testing; facilitated team collaboration and version control using Git.

### **Development of a Smart Car Based on Arduino Nano, XJTU | Advisor: Prof. Pengfei Song**

03/2019

- Led a team of three to build an autonomous racing car for navigating through a track with electromagnetic markers:
  - ✧ Designed circuits and PCBs, including 1) electromagnetic marker detection using operational amplifiers, inductor-capacitor pairs, and modules for signal amplification and A/Q conversion; and 2) an integrated control module with Arduino Nano, power supply, four-axis gyroscope and drive circuits for steering servo and electric motor.
  - ✧ Designed a suite of control algorithms in the IAR embedded workbench software to enable real-time steering, speed control, path-finding and road condition recognition based on sensor data.
- Enabled real-time visualization of car parameters on a remote computer based on WiFi communication (ESP8266 ESP-01) and programming in C++, JavaScript, and HTML.

## **EXTRACURRICULAR EXPERIENCES**

### **Team Leader | The 2018 University Physics Competition (Online)**

11/2018

- Formulated a mathematical model to characterize the motion of an ultralight spacecraft driven by a light sail onboard and a ground-based array of lasers:
  - ✧ Established the relationship between laser beam characteristics and the dynamics of the spacecraft.
  - ✧ Optimized the design of the hyperbolic sail shape and the ring-shape amplitude envelope in the transverse plane of the laser beam, followed by sensitivity analysis to determine the required accuracy and precision of laser beams and light sail fabrication for the spacecraft to flyby a distant celestial body (Proxima Centauri b).