JOSEPH MA

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EDUCATION

Purdue University, College of Engineering – West Lafayette, IN | **Expected: May 2025**

Master of Science in Electrical and Computer Engineering

- Courses: Artificial Intelligence, Reinforcement Learning, Deep Learning, Computer Networks, Advanced IoT
- Graduate Teaching Assistant - *Microprocessor Systems and Interfacing*

Purdue University, College of Engineering – West Lafayette, IN | **Graduated: May 2023**

Bachelor of Science in Computer Engineering | **Cumulative GPA: 3.83/4.00**

- Undergraduate Teaching Assistant - *C Programming, Data Structures, Electrical Engineering Fundamentals*
- Undergraduate Researcher – *Sequential Task Based Reinforcement Learning*

WORK EXPERIENCE

The Walt Disney Company – Hong Kong

Attractions Engineering Intern – IoT and Embedded Systems | **May 2024 – August 2024**

- Engineered and led the development of a monitoring and data acquisition system for a Disneyland boat ride using an ESP32, capturing over 16 critical measurements, including location, speed, engine RPM, water temperature, oil pressure, and fuel levels. Utilized I2C and SPI for sensor interfacing and applied signal conditioning techniques to enhance data accuracy.
- Prototyped the circuit system on a breadboard, iterated and tested through multiple versions, and finalized the design on a PCB for mass production. Successfully deployed the system on 22% of the ride, enabling 24/7 monitoring and real-time data transmission via LoRa to a central gateway whenever a boat is active.
- Configured LoRa protocols on the ESP32, programmed and optimized gateway settings for efficient data reception using UDP. Developed Python scripts utilizing TCP protocols and API keys for reliable data transfer from the gateway to a NAS (InfluxDB), enabling continuous data logging and remote monitoring - even from offsite - providing real-time data and precise boat location—insights previously inaccessible unless observed directly.
- Prepared data for potential use in Machine Learning, including Recurrent Neural Networks (RNNs) to predict and prevent engine failures. The system is estimated to reduce engine downtime by 50% and is projected to increase ride capacity by 23,000 guests annually. Framework set for mass deployment across the entire ride.

Preface – Hong Kong | **June 2021 – August 2021**

Full Stack Development Intern

- Redesigned and enhanced web portal interfaces, achieving responsiveness and cross-browser compatibility by utilizing advanced features of HTML5, CSS3, and JavaScript. Self-taught these technologies to stay ahead of current web standards.
- Optimized backend processes by testing CRUD operations and integrating RESTful API services using Postman.
- Implemented robust data validation and security measures within a Ruby on Rails environment by leveraging Active Record validations to ensure the integrity of backend form submissions.

TECHNICAL SKILLS

Languages: Advanced: Python, C, C++; Intermediate: Assembly, Java, HTML, CSS, JavaScript, MATLAB; Basic: SystemVerilog

Tools: Unix/Linux, TCP/IP, HTTP/HTTPS, CI/CD, Git, GDB, STM32 ARM, SQL, NoSQL, SolidWorks, I2C, SPI, UART, PyTorch, TensorFlow

PROJECT HIGHLIGHTS - *See https://joseph-ma.com for a full range of projects with interactive demos.*

Cat & Mouse – Reinforcement Learning | **April 2024**

- Developed a pursuit-evasion model using A* for a deterministic cat agent and wrote a Q-learning algorithm from scratch for an adaptive mouse agent. Created a user interface allowing any user to train their own RL agent in real-time and implemented a double DFS algorithm to deepen the mouse agent's understanding of dead ends.

Neural Network Architecture Guide – Supervised Learning | **March 2024**

- Authored a comprehensive guide on neural network architecture, developing a neural network from scratch and deriving detailed explanations for each step, including forward propagation, backpropagation, and gradient descent, to visualize the underlying mathematical principles.