

Ong Wei Xuan, Justin

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Self-motivated maker with a passion for problem solving and challenging existing norms. Fast to pick up new skills to supplement lessons learnt from past freelance, personal and academic projects. Capable of working both independently, and with technical and non-technical stakeholders to manage requirements and deliverables. Looking to work with embedded firmware for R&D applications in fast-paced environments.

KEY SKILLS & KNOWLEDGE AREAS

- Firmware development for resource-constrained environments using bare-metal super loops and FreeRTOS
- Use of debuggers, oscilloscopes and logic analysers for development
- PCB Schematic Design, Routing, Assembly, Rework for microcontroller-based applications
- Development in, and administration of Linux environments
- CAD for 3D printing, and operation of 3D printers
- Full stack web development

EDUCATION

Nanyang Technological University, Singapore

Aug 2019 – Dec 2022

Bachelor of Engineering (Computer Engineering) with an Elective Focus in Cyber Security

- Honours (Highest Distinction), GPA: 4.92/5.00
- Dean's List for Academic Year 2019/2020, 2020/2021 and 2021/2022

Ngee Ann Polytechnic, Singapore

Apr 2014 – May 2017

Diploma with Merit in Electronic & Computer Engineering (Option in Computer & Mobile Technology)

- Gold Medallist for May 2017 Cohort

WORK EXPERIENCE

Freelance Work

Dec 2022 – Present

- Rapid prototyping and fabrication of electronics and associated firmware for interactive art installations
- Trained and deployed YOLOv4 on a RK3588-based Single-Board Computer, utilising the Neural Processing Unit for hardware acceleration to achieve 30fps inference for face detection and tracking
- Designed and wrote firmware for a network of modules for control of actuators and LEDs over Modbus

Dyson, Singapore – Electronic Hardware Integration, Floor Care

May 2022 – Dec 2022

Intern

- Demonstrated the integration of a power management IC (PMIC) and a System-on-Chip, and controlling power sequencing and requirements for entering and exiting low-power mode from a microcontroller
- Developed a Python driver for control of the aforementioned PMIC through an intermediary microcontroller
- Designed and routed a 4-layer PCB with impedance control to break out interfaces like JTAG and USB to connectors, and UART to a FT4232 in order to work with a high density debug connector

Nanyang Technological University, Singapore - Making & Tinkering Lab

Jan 2021 – May 2022

Lab Assistant

- Guided students through planning the overall architecture of projects, covering topics from controlling actuators through high level languages and user interfaces, to communication protocols and electrical compatibility
- Maintenance and repair of laboratory equipment such as 3D printers
- Taught practical skills like soldering and operation of 3D printers

PROJECTS

Nanyang Technological University, Singapore – Final Year Project

Aug 2021 – Mar 2022

Data Capture Module for Texas Instrument's mmWave Radar Sensors

- Developed module to capture LVDS data from a radar and retransmit it over a network for further processing
- Built on a development board for the Zynq UltraScale+ MPSoC, using the Processing Logic for LVDS decoding with a custom Verilog module, and the Processing System for control over HTTP through a Python interface
- <https://hdl.handle.net/10356/157253>

National Arts Council, Singapore – Arts X Tech Lab

May 2021 – Feb 2022

MARCS – Modular Action and Reaction Control System

- Collaborated with artists to develop proof-of-concept of a modular control system to simplify the building of large scale kinetic sculptures, with the objective of reducing the technical barriers to entry
- Developed hardware nodes capable of controlling various actuators and sensors
- Designed software for controlling a network of aforementioned nodes through multiple means such as a Python library, Scratch extension or higher level software like TouchDesigner

Singapore Art Week 2022

Dec 2021 – Jan 2022

(W)AVE 2.0

- Developed light-reactive haptic modules as part of an experiential installation allowing visitors to “touch” light
- Designed, assembled, and wrote firmware for modules based on Padauk's PFS172 microcontroller to vary intensity of vibration motor based on the output of a light-dependent resistor
- Implemented receive-only UART in software for configuring sensitivity of the haptic modules
- <https://jus.tin.sg/wave-2-0>

Nanyang Technological University, Singapore – Multidisciplinary Project

Jan 2021 – Mar 2021

Autonomous Robot for Maze Navigation

- Developed firmware running on a ATmega328P to control a robot to autonomously map and navigate a maze
- Applied optimisation techniques like using fixed-point math for PID calculations, and writing encoder-related ISRs in Assembly to take advantage of processor specific instructions
- Developed high-level software in Node.js running on a Raspberry Pi as communication router between the robot, multiple computers running navigation and computer vision tasks, and an Android device for live visualisation
- <https://www.youtube.com/watch?v=QXWnia-FdgY>, <https://github.com/divyeshmundhra/MDP---Group-13>

Nanyang Technological University, Singapore – Making and Tinkering

Jun 2020 – Nov 2020

Wireless Data-loggers

- Developed firmware for ESP32's to extract data from data-loggers wirelessly from a control unit carried by a UAV
- Implemented Selective Repeat ARQ for reliable transfer of collected data at rates of up to 400kbps over 30m between multiple ESP32's using ESP-NOW
- Utilised GPS receiver for time synchronisation across independent units to ensure alignment of sampled data
- <https://blogs.ntu.edu.sg/ps9888-2020-g16>

Singapore Robotic Games 2019, 2020

Aug 2018 – Jan 2019, Aug 2019 – Jan 2020

Sumo Robot Competition

- Designed and fabricated two sumo robots, the first powered by electric skateboard wheels, then evolving to brushless motors used in quadcopters
- Incorporated a vacuum cleaner into the robot to increase the traction of the robot
- <https://jus.tin.sg/singapore-robotic-games-2019>, <https://jus.tin.sg/singapore-robotic-games-2020>

SKILLS

Languages: Proficient in English and Chinese

Digital Skills: Fusion 360, Altium Designer, KiCad, C, C++, Python, JavaScript, Git, Linux, Docker