Duan Yihe

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Hardware Projects

Electrical Sub Team, BumbleBee Autonomous Systems | *Altium, STM32CubeMX*   **May 2024 - Present**

- Architecting a **PCB** for **24V and 12V rail power switching and monitoring** to multiple PCBs and computing stack including GPU and SBC on BumbleBee AUV (Autonomous Underwater Vehicle).
- Researched **LDO**, **Load Switch IC** and other linear and switching **analog Power Management ICs** that support **Power Good** and **Enable signals**, ensuring **low-noise power delivery** with **thermal dissipation considerations**.
- Designed and simulated **LC and PI type EMI filter circuits** for Fibre-optic gyroscopes and sonar **input power noise suppression**, using **RedExpert filter simulation** for circuit verification.
- Optimized **PCB layout** for power integrity, considering thermal management and **noise-sensitive signal routing**.
- Developing **microcontroller-based power management** using **STM32**, integrating **I2C and CAN communication** to control **power sequencing, monitoring and enable signals** for overall vehicle power control.

Kopi Teh Revolution | *FPGA, Verilog, Vivado, Github*   **Oct 2024 – Nov 2024**

- Designed and implemented a **real-time rhythmic game** on the Basys3 **FPGA** using **Verilog HDL**, integrating game logic, local and global score check, user interaction and audio.
- Engineered a responsive **user interface** by processing **button and switch input**, dynamically controlling game states, and visualizing health and scoring via **PWM-driven LEDs**.
- Developed **UART communication** for **cross-board score synchronization**, enabling real-time score display on **7-segment LEDs**.

Electrical Sub Team, Hornet 9.0 | *C++, Platform IO, Visual Studio Code*   **Sept 2023 - Apr 2024**

- Contributed to **Light Panel development** for AUV computer vision detection task, which achieved top 15 in the Singapore Autonomous Underwater Vehicle Competition 2024.
- Created a **CAN** header file to ensure communication between the STM32 microcontrollers and NVIDIA Jetson Xavier.

Project Connecto, NUS MedTech Society | *C#, .NET, Arduino, Github*   **Feb 2024 - Sept 2024**

- Built a **sensor GUI** for a mechanical mouse custom-made to assist patients with **muscle dystrophy** at NUH, utilizing **C#** on the **.NET** framework.
- Prototyped the GUI using **Visual Studio** to display potentiometer values received from an **Arduino UNO**, ensuring accurate functionality and intuitive user interaction.

Software Projects

Da Vinci Surgical Simulator | *C#, Unity*   **Oct 2024 – Present**

- Modelling a **VR simulator** with Meta Quest 2 in **Unity** to replicate the **Da Vinci Surgical Robot** as an educational tool for students in NUS Medicine School.
- Utilising the **Obi softbody package** and **C#** to simulate **realistic physics** for fat tissues and blood vessels in the surgical environment.

Subject 404 | *C#, Unity, Git/Github, Command Line*   **May 2024 – Aug 2024**

- Awarded the **Artemis (Highest Achievement)** level under NUS Orbital program.
- Engineered an immersive **3D VR horror game** for Meta Quest 2 using **Unity**, implementing **AI-driven enemy behavior**, **NPC animation**, and interactive mechanics via the **XR Interaction Toolkit**.
- Leveraged **OOP** principles in development and **GitHub** for CI/CD and version control.

AskMe | *Java, XML, Android Studio*   **Dec 2024 – Jan 2025**

- Prototyped an intuitive **Android app** in **Java** and **XML** to assist seniors in Singapore with digital literacy, incorporating **touch-triggered animations** for easy interaction.

Education & Skills

National University of Singapore   **August 2023 – Present**

- *Year 2, Bachelor of Electrical Engineering, minor in Quantitative Finance (GPA: 4.55/5.00 expected 1st class honour)*
- **Hardware:** *Integrated IC Design with Synopsys, Analog PCB design with Altium, Embedded Systems with C and ARMv7E-M assembly, FPGA Verilog HDL with Vivado, STM32CubeIDE*
- **Software:** *C#, C, C++, Game Development with Unity Editor, Machine Learning in Python, Signal Processing in Python, command line, version control with Git/Github and PlatformIO, Mobile App Programming in Java, XML and Android Studio, LaTex, MATLAB, Jupyter Notebook*