KENNETH WONG CUN WI

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PROFILE SUMMARY

I am a passionate robotics and embedded systems engineer with 10+ years of hands-on experience in robotics. I am currently Electrical Lead of NUS Bumblebee, with a proven track record integrating hardware, firmware and software for international competitions.

EDUCATION

National University of Singapore **Aug 2024 - Present**
Bachelor of Engineering - Computer Engineering (Honours)

- Specialisation in Robotics, Specialisation in Advanced Electronics, Minor in AI
- Electrical Lead, NUS Bumblebee Autonomous Systems (BBAS)
- IEEE-Eta Kappa Nu (HKN) Honor Society
- Current GPA: 4.88/5.00
- University Town College Programme - Residential College 4 (RC4)
- **Internship Availability Period: 11 May 2026 - 06 Dec 2026**

Hwa Chong Institution **Jan 2016 - Nov 2021**
Singapore-Cambridge GCE 'A' Levels

- Grades: AAAA/AA (90RP)
- Hwa Chong Infocomm & Robotics Society (HCIRS)

TECHNICAL SKILLS

- **Programming Languages**: C | C++ | Verilog | Python | Java
- **Electrical Design**: PCB Design (Altium Designer), full electrical stack for an Autonomous Underwater Vehicle, kill switch designs, circuit analysis and debugging
- **Embedded & Firmware**: Bare-metal programming and communication protocols (UART, I²C, SPI, CAN bus), FreeRTOS and RTOS scheduling, MAVLink, MAVROS
- **Microcontrollers / SBCs**: ESP32, Teensy, NXP FRDM, Arduino, Jetson, Raspberry Pi
- **Robotics & Perception:** Sensor fusion (Kalman filter, quaternion/polar methods), IMU processing, AprilTags, PID control, Computer Vision, SLAM, LiDAR integration, ROS
- **Mechanical & CAD:** VEX Robotics, actuation design, Autodesk Fusion 360, Solidworks
- **FPGA & Digital Design**: Basys3, image-processing pipelines, union–find connected components for blob detection, interactive GUIs
- **Unix/Linux & Git**

RECENT PROJECTS

Object Tracking System on FPGA (Basys3) **Oct 2025 – Nov 2025**
Verilog | FPGA | Image Processing | Real-time Robotics

- Built an interactive object-tracking system in real-time with zero frame latency with full verilog-based GUI, VGA output and PD-controlled servo tracking
- Implemented custom union–find disjoint set algorithm in hardware for identification of connected-components to achieve blob detection, achieving 75% increase in algorithm efficiency and 99% reduction in buffer size required.
- Implemented image-processing pipeline (preprocessing → thresholding → morphology) fully in Verilog, that can be customised via GUI through drag and drop.

- Chosen for NUS Engineering Showcase and permanent display.

IoT Tilt and IR Security Device with ESP32, FRDM and RTOS Oct 2025 – Nov 2025
Bare-Metal C++ | SLAM | LiDAR | TLS Communication

- Implemented FreeRTOS-based firmware with proper use of ISRs, semaphores, queues, message passing, tasks with time slicing and pre-emption
- Integrated dual-MCU architecture (FRDM-MCXC444 and ESP32-S2-DevkitM-1U) with hobby peripherals such as MPU-6050 IMU.
- Designed ESP32-hosted lightweight HTTP server and UI with Wifi AP and JSON

Mini Autonomous Underwater Vehicle (Mini-AUV), RoboSub 2025 May 2025 – Aug 2025
Co-Lead Developer | Embedded Systems, PCB, Robotics, Vision, Controls

- Developed end-to-end system for AUV with ~50% reduction in hull space and 66% reduction in weight
- Designed electrical system with parallel MOSFET power switch, signal-based ESC kill switch (SN74HC4066), and compact PCBs for power and signal distribution.
- Implemented telemetry on ESP32-S3 with OLED displaying pressure, voltage (INA219), killswitch state.
- Integrated DVL A50, Bar30, and exploreHD vision for navigation and perception.
- Set up Pixhawk 6X with Ardusub and MAVROS link to Jetson for control + localization.
- Successfully completed RoboSub tasks: Gate (Control + Coin Flip + Barrel Roll), Slalom Channel, contributing to NUS BBAS' 1st Place in Robosub 2025.

CO-CURRICULARS

Electrical Lead & Robotics Engineer, Team Bumblebee (NUS) May 2025 – Present

- Leads the Electrical team to develop the electrical systems of every vehicle for both local and international competitions.
- Collaborates with Mechanical and Software subteams (~50 members) to drive overall vehicle developments.
- Oversees developments and maintenance of these electrical systems with high standards (in hardware design, firmware development, systems testing & integration) to ensure the reliability and robustness.

Member of IEEE-Eta Kappa Nu (HKN) Honor Society Aug 2025 – Present

- Conduct PCB design workshops using Altium Designer for members and students.

Member of Hwa Chong Infocomm and Robotics Society (HCIRS) Jan 2016 - May 2021

- Executive Committee (General Secretary): 2020-2021, 2018-2019
- Team Co-Lead, VEX Robotics Section
- Won multiple awards in VEX Robotics Championships (2017-2021), National Robotics Competition (2016-2018), First Lego League (2016-2017)

AWARDS & ACHIEVEMENTS

- 1st Place – RoboSub 2025, Irvine, California (Team Bumblebee)
- NUS Merit Scholarship
- SPF NSF of the Year 2024, Singapore Police Force
- Tournament Champion – Singapore VEX Robotics National Championships (2020)
- Represented Singapore – VEX Robotics World Championships (2020)
- Hwa Chong Outstanding Student Award