MOHAMMAD HAMZAH WARSI

Electrical and Electronics Engineer

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PROFILE

Master's in Electrical and Electronics Engineer with direct engineering experience at BMW, Sony, Fraunhofer, Varta, and PEC NV — delivering firmware, battery testing infrastructure, and automation solutions in high-stakes industrial environments. At PEC NV, developed bare-metal and Linux-based firmware for integrated cell testers, directly supporting a €100M handover and enabling safer high-power battery cells for BMW. At Sony, optimized Fanuc and Mitsubishi robots on a live TV production line, improving throughput through real-time troubleshooting and dashboard-driven error tracking. Published researcher in energy harvesting (Springer Nature). Combines embedded systems depth, industrial automation discipline, and data-driven validation to build reliable, energy-efficient electronics.

KEY HIGHLIGHTS

- Embedded firmware - TI MCU (Bare metal/Linux)
- High value industrial delivery - Contributed to €100M handover to BMW; commissioned ICT towers at BMW Wackersdorf
- Automation & Robotics - Fanuc/Mitsubishi robots; control panel integration
- Power Electronics & Safety - Cell pallet prototyping, probe optimization, safety margin analysis for low-contact-resistance cells
- Data dashboards & ML - Excel error dashboard; time series forecasting for energy planning
- Peer-reviewed research - Springer Nature publication on smart highway energy harvesting

EXPERIENCE

PROJECT, ENGINEERING & CONTRACTING NV (PEC NV) - BELGIUM

Electronics Engineer - Firmware & Testing | 2/2025 - 12/2025

- Developed bare-metal & Linux-based firmware for Integrated Cell Testers (TI MCUs, C) for BMW and Fraunhofer, introducing new functions for the docking controllers and reducing test cycle variability via optimized low-level control logic.
- Integrated pressure transducers (±1% accuracy), vacuum systems, safety systems and HMI monitoring for real-time cell control.
- Developed 3-way valve and fan control logic for thermal regulation.
- Diagnosed and corrected overheating safety issue (incorrect wiring) on Varta testers, delivered probe comparison study for Fraunhofer.

BMW Project - Wackersdorf, Germany

- Developed and prototyped a new cell pallet for 20 cells at 84,000 Ah charging rate (4.2V max) for BMW "Neue Klasse" vehicles.
- Refined cell testing parameters to improve safety margins and consistency without compromising throughput.
- Resolved critical tower issues: wiring faults, overheat risk, sensor placement, and condensation root cause; delivered full service documentation.
- Completed tower RD01 validation, contributing to successful €100M customer handover.

SONY EMCS - MALAYSIA

Automation Engineer Intern | 6/2022 - 9/2022

- Deployed Fanuc and Mitsubishi robots on a live production line, achieving 30% reduction in downtime within 3 months
- Led control panel and power system troubleshooting, ensuring uninterrupted production operations.
- Designed Excel-based error dashboard enabling faster root-cause analysis.

THINK OUTSIDE - NORWAY

Machine Learning Engineer | 2/2022 - 5/2022

- Developed time-series forecasting models for electricity prices and water availability, enabling 5-year energy planning for hydropower and wind integration.

- Owned end-to-end data pipeline: cleaning, preprocessing, feature selection, and model tuning, directly improving forecast accuracy.
- Established reproducible ML workflows with data versioning and experiment tracking.

EDUCATION

University of Nottingham

Masters (MEng) in Electrical and Electronics Engineering | 2019 - 2024

Foundation in Engineering | 2017 - 2018

Tanarata International School

IGCSE | 2016 -2017

CORE SKILLS AND TOOLS

Embedded systems & Firmware | Circuit PCB & Design | Cell testing & Validations | Power Electronics | Industrial automation | Robotics | Troubleshooting | Wiring systems | Project management | Cross functional teams | Communication | Adaptability |

PROJECTS

Energy harnessing system using roads

Designed and simulated a multi-source renewable energy system for Malaysian highways to power street utilities by harvesting wasted vehicle energy. Key findings show that piezoelectric transducers with a full-wave bridge rectifier can convert pulsed mechanical inputs (~65V) to a regulated 12V output, while a closed-loop DC-DC boost converter stabilized the wind turbine's fluctuating output (10–20V) to a constant 24V with <2mV ripple. Wind turbine simulations (Ansys Fluent) projected up to 350W of electrical power at highway speeds using a NACA 4412 horizontal-axis design (1.3m diameter). The battery management circuit successfully prevented overcharging via comparator-based switching (120µA charging current). All sub-systems (piezoelectric, thermoelectric, wind) were integrated into a single PCB and validated using LTspice, Simulink, and partial physical testing (1–2V from generator prototype).

Switch mode power supply (SMPS)

Designed, simulated, and breadboard-tested a 12V/2A buck converter using a PWM controller (TL494) and a MOSFET switching at 100 kHz. Calculated and selected appropriate inductor (100 µH) and output capacitor (470 µF) to ensure continuous conduction mode (CCM) operation. The open-loop prototype achieved ~85% efficiency at full load with 150 mV output ripple. Troubleshooting involved measuring gate drive waveforms, optimizing component placement to reduce parasitic inductance, and adding a freewheeling diode to prevent voltage spikes. Validated using an oscilloscope, electronic load, and multimeter in the university power electronics lab.

Hercules 4WD line following robot

Designed and built an autonomous 4-wheel drive line-following robot using an Arduino Mega, an array of 5-8 infrared (IR) sensors, and a motor driver (L298N or similar) to control four DC geared motors. Implemented a PID control algorithm to process sensor feedback and maintain precise trajectory along a black line on a white surface. Calibrated sensor thresholds to handle varying lighting conditions and curve sharpness. The robot successfully navigated a test track with straight paths, 90° turns, and S-curves at a consistent speed without losing the line. Validated through multiple trial runs in the university lab.

Doppler Radar speed gun

Designed and built a continuous wave (CW) Doppler radar speed gun using an HB100 microwave motion sensor module (10.525 GHz) and an Arduino Uno. The sensor's intermediate frequency (IF) output produced a low-voltage signal proportional to moving object velocity. Designed a signal conditioning circuit using a non-inverting op-amp (LM358) with band-pass filtering (approx. 10 Hz to 100 Hz) to amplify and clean the weak Doppler shift signal. Measured the frequency of the conditioned signal using Arduino's analog-to-digital converter and zero-crossing detection algorithm. Converted frequency to velocity using the Doppler equation ($v = (f_d \times c) / (2 \times f_t \times \cos \theta)$). Calibrated the system using a known moving target (e.g., a toy car or pendulum). Achieved velocity measurements within ±5% error compared to a commercial radar gun in lab testing.

PUBLICATIONS

Advances in energy harnessing techniques for smart highways: A review

MH Warsi, TN Kumar

Springer Nature: Electrical Engineering | DOI: 10.1007/S00202-024 02379-8 | Published: 14 Apr 2024

Abstract: This review consolidates research on highway energy harvesting technologies - piezoelectric, thermoelectric, pyroelectric, electromagnetic, and solar - offering a balanced assessment of their principles, challenges and trade-offs to guide researchers, engineers, and policy makers towards sustainable infrastructure development.

Real-Time Disease Classification in Coffee Plants with Coral Developer Board Mini

MH Warsi, H Nugroho, HA AlMurib, TF Siang, S Eswaran

2024 IEEE International Conference on Agrosytems Engineering, Technology & Applications (AGRETA) | DOI: 10.1109/AGRETA61912.2024.10948998 | Published: 9/07/2024

Abstract: This paper presents an automated system for coffee leaf disease classification using the Coral Developer Board Mini with Google's Edge TPU, where MobileNetV2 achieved 98.9% training accuracy and the Coral board significantly outperformed a GPU workstation (10 ms vs. 40 ms inference time), demonstrating its efficiency for real-time, on-device agricultural machine learning.