Ivan Jovanovski

ivan.jovanovski271@gmail.com · ivanjovanovski.com · +389 78 324 018

EDUCATION

2020 – 2025

Ss. Cyril and Methodius University (FEIT) – *Skopje, MK*

B.Sc. in Electrical Engineering & Computer Science | GPA: 8.51/10

- Focus: Computer Architecture, Embedded Systems, and Distributed Network Engineering.
- Relevant Coursework: Advanced Computer Architectures, High-Performance Computing, Distributed Systems, Internet of Things Systems, Computer Communication Technologies, Network Security, Embedded Computer Systems, Microprocessor Systems, Machine Vision.
- Thesis: Automated Power-Flow Analysis Pipeline – Developed a service that converts IEC CIM/XML grid models into OpenDSS scripts and executes load-flow simulations; deployed in Kontron's production grid-monitoring platform for real-time distribution network analysis.
- Scholarship: Awarded full tuition scholarship for the first two semesters based on high school competition achievements.

EXPERIENCE

Kontron – Electrical Engineer ***Link***

SKOPJE, MK | MAY 2023 – PRESENT

- Architected and deployed an IoT grid-monitoring platform that ingests telemetry from heterogeneous field devices at active generation stations, normalizes it into IEEE CIM (IEC 61970) models, and drives OpenDSS-based analysis for distribution-network planning and reliability.
- Designed a Java backend for a CAD-like graphical editor of national-scale grid topologies, implementing data-adapter layers that convert vendor-specific time-series meter datasets (typically yearly exports) into a unified schema so CIM snapshots can be continuously updated and re-solved with fresh measurements.
- Collaborated with Cermat, a local ice-cream manufacturing plant, to deploy a factory-scale instance of the grid-monitoring stack: upgraded metering infrastructure, installed and commissioned new meters on two high-load cooling compressor stations, and integrated vendor-specific (e.g., Schneider) data into the platform to monitor energy consumption and power factor in real time as groundwork for optimization and cost control.
- Worked with Kontron Solar (Germany) to obtain two STECA Solbird industrial inverters as field test cases; arranged deployment of one unit on university premises by upgrading an existing PV installation, networked the device, and integrated its telemetry into the platform as a representative test case for solar-generation data source.
- Worked on STM32MP1 board bring-up, resolving secure-boot conflicts between OP-TEE, ETZPC, and QSPI flash that prevented boards from booting reliably. Reconciled divergent U-Boot 2023/2024 trees to restore a stable, reproducible boot and flash-access flow.
- Built an automated testing framework using Labgrid and an i.MX8MM host to validate signal integrity and bus stability (CAN, RS485) under load.

COMPETITIONS

- PASQAL Quantum Computing Challenge 2025 – 2nd Place *Link*
- European Physics Olympiad (EuPhO) 2018-20 – National Representative
- International Physics Olympiad (IPhO) 2018-19 – National Representative
- National Physics Competitions 2015-20 – Consistent Gold/Silver Medalist

PROJECTS

Built 3-Axis CNC Machine Build *Link*

- Built a full-metal 3-axis CNC router from bare mechanical and electrical components, integrating 4 × NEMA 23 stepper motors with DM-series stepper drivers for all axes.
- Designed and wired the complete power and control stack: 36 V rail for steppers and separate 24 V/12 V/5 V busbars via DC–DC converters so high-current motor stages and low-voltage logic/telemetry are cleanly isolated.
- Implemented Arduino-based auxiliary control (Nano + relay board) to switch spindle power, drive temperature-controlled cooling fans and work-area lighting, and display spindle RPM/telemetry on a dedicated screen.
- Mitigated EMI and step-loss issues by reorganizing cable routing, introducing star-grounding, and adding ferrite chokes, achieving repeatable ≈0.1 mm positioning accuracy over multi-hour routing jobs.

Secure Distributed IoT Sensor Network *Link*

- Designed an end-to-end telemetry system with SX127x-based LoRa nodes and an ESP32 gateway bridging uplink traffic to an MQTT/Kafka backend for storage, alerting, and analysis, with simple provisioning so new nodes can be added by deploying a device and registering it in the backend.
- Profiled and optimized node power budgets, reducing deep-sleep current to microamp levels through peripheral clock gating, aggressive duty cycling, and tuned wake-up intervals for multi-month field operation.
- Implemented a lightweight TDMA-like time-slot scheme on top of LoRa's ALOHA MAC to reduce collisions and improve reliability in the 433 MHz ISM band under multi-node deployment.
- Secured the full path with AES-128 payload encryption on the nodes and SSL/TLS on the gateway–backend link, hardening the system against eavesdropping and message injection.

Autonomous Outdoor Navigation Platform *Link*

- Built a small outdoor test robot for lawn-scale navigation using ultrasonic distance sensors for basic obstacle detection.
- Tuned sensor placement and simple filtering to get reliable readings on grass and uneven ground, reducing false triggers from ground echoes.
- Added a perimeter-wire guidance system: a buried 7 kHz loop and a receiver coil with a basic amplification stage to detect the field near the boundary.
- Implemented and tested navigation logic that keeps the robot inside the loop and slows or stops when the perimeter signal weakens, verifying stable behavior in repeated runs around the boundary.

Voice-Actuated Autonomous Mobile Robot *Link*

- Developed bare-metal C firmware for an STM32F303-based differential-drive robot, using DMA-backed UART ring buffers to exchange commands and telemetry with a Python host script without blocking the main control loop.
- Configured advanced timers (TIM1) for center-aligned PWM to drive H-bridge motor stages, improving low-speed control and reducing switching noise on the motors.
- Connected the robot to a PC running OpenAI Whisper; a simple Python TCP bridge converted spoken commands (e.g., "forward", "left", "stop") into motion commands that the firmware executed and verified in repeated indoor navigation tests.

Wildlife Hackathon Winner (2023) *Link*

- Designed a remote-trigger humane trap for lynx conservation; successfully deployed in Mavrovo National Park.

PET Bottle Recycler – Filament Extruder *Link*

- Built a DIY filament extruder using a RAMPS 1.4 board, dual 3D printer hotend nozzles, and a NEMA 17 stepper motor to convert shredded PET bottles into usable 3D printer filament.
- Designed a bottle-cutting contraption to slice PET bottles into uniform strips suitable for feeding into the extruder.
- Implemented temperature control and extrusion speed tuning to achieve consistent filament diameter for reliable 3D printing.

Automotive CAN-Bus Analysis & Physical Layer Debugging *Link*

- Interfaced with a live Fiat BCM using an STM32MP1 and SocketCAN, characterizing the ISO 11898-2 physical layer on a real vehicle.
- Measured dominant/recessive voltage levels with an oscilloscope to verify correct CAN signalling and spot basic wiring/termination issues.
- Reverse-engineered proprietary UDS (Unified Diagnostic Services) frames by correlating arbitration IDs with physical vehicle stimuli (lights, locks, etc.).
- Used captured traces and error counters to track intermittent bus errors back to wiring and termination problems on the CAN harness.
- Collaborated on a multi-make diagnostics platform by applying the same capture/analysis workflow to a Renault Clio CAN network, extending the approach beyond Fiat vehicles.

AMD Am2900 Bit-Slice Processor Recreation *Link*

- Recreated AMD's 1975 Am2901 4-bit ALU slice in VHDL, simulating the bit-slice architecture using AMD's Vivado toolchain.
- Verified basic arithmetic and logic operations on the synthesized design, exploring how modular bit-slice processors worked before single-chip CPUs became viable.

TEACHING & MENTORING

Private Tutoring
SKOPJE, MK | 2017 – PRESENT

Math & Physics Tutor

- 7+ years of 1:1 and small-group instruction in mathematics and physics for high school and university students.
- Focus on exam preparation and closing conceptual gaps in topics such as calculus, linear algebra, mechanics, and electromagnetism through custom problem sets and step-by-step solutions.

NASA Space Apps Challenge
SKOPJE, MK | 2024

Mentor, High-School Team

- Guided a high school team through the full NASA Space Apps Challenge cycle: defining a problem, selecting open data sources, and building a working prototype.
- Provided technical support in programming, data analysis, and presentation structure, helping students turn their solution into a clear and coherent final pitch.

Yahya Kemal College
SKOPJE, MK | 2017 – 2020

Physics Olympiad Tutor

- Delivered regular lectures and problem-solving sessions in advanced high school physics (mechanics, electromagnetism, thermodynamics) for Olympiad-track students.
- Coordinated curriculum and practice exams with the physics department to align training with national and international Physics Olympiad requirements.

School of The Future
SKOPJE, MK | 2019

Assistant Head, Physics Department

- Helped design the physics training program for national and international Olympiads, prioritizing topics and difficulty levels across the school year.
- Developed tailored materials and ran intensive mentoring sessions that supported students in achieving top placements in national competitions.

PUBLICATIONS

- I. Jovanovski et al., "Enhancing Music Genre Classification: A Divide and Conquer Strategy," ETAI Conference, Sept 2024. DOI: 10.5281/zenodo.14054137

SKILLS

- **Embedded Hardware:** STM32 (MP1, F4, F303), ESP32, i.MX8M, Raspberry Pi, LoRa (SX1278), Logic Analyzers
- **System Software:** C/C++, Python, Java, U-Boot, Yocto Project, Device Tree, OP-TEE, Embedded Linux
- **Protocols:** CAN, RS485/Modbus, MQTT, LoRaWAN, TCP/IP, SSL/TLS, SPI, I2C, UART, IEEE CIM
- **Tools:** Docker, Git/GitLab CI, OpenDSS, Altium Designer, Labgrid, Oscilloscopes, Fusion 360, KiCad