ZOUHAIR EL KOUSH

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SUMMARY

Third-year Computer and Communications Engineering student working in embedded systems and hardware. Lead the electronics of AUB's BAJA SAE car, a three-ESP32 architecture covering data acquisition, driver dashboard, and telemetry, and am designing a multi-tool 3D printer that builds circuits inside printed parts.

EDUCATION

American University of Beirut (AUB) **Sept 2024 – Present**
B.E. in Computer & Communications Engineering, MSFEA *Beirut, Lebanon*

- Relevant coursework: Electronic Circuits, Signals & Systems, Computer Architecture, Computer Networks, Numerical Methods.

Grand Lycée Franco-Libanais (GLFL) **2024**
French Baccalauréat, Specialties: Mathematics and Physics-Chemistry *Beirut, Lebanon*

- Winner, 2023 **Trophée NSI** national competition (Prix spécial du jury).

EXPERIENCE

Electrical & Electronics Systems Lead, AUB BAJA SAE Team **2024 – Present**
Maroun Semaan Faculty of Engineering and Architecture (MSFEA), AUB *Beirut, Lebanon*

- Lead the electrical and electronics subsystem of a student-built off-road vehicle (BAJA SAE 2024/2025 rules).
- Designed a three-ESP32, three-board architecture covering data acquisition, driver dashboard, and LoRa pit telemetry, with a LiFePO4 and alternator power system rated for 4+ hour endurance runs.
- Authored the subsystem's technical design report covering architecture, sensor selection across 40+ channels, wiring, and coordination with the powertrain, brakes, and chassis teams.

AUB Makerspace (The Red Room) **2024 – Present**
Maroun Semaan Faculty of Engineering and Architecture (MSFEA), AUB *Beirut, Lebanon*

Head of Design & Manufacturing, JEDIs (Junior Engineer Design Interns)

- Guide student projects from concept to working prototype across mechanical and electrical disciplines, mentoring on CAD, electronics, and digital fabrication.
- Run workshops and events that build hands-on technical skills across the engineering student body.

Systems & Infrastructure

- Built and maintain the web portal the engineering student body uses to submit 3D-print orders, along with the staff-side management dashboard and the Azure Functions back end behind it.
- Manage remote operation of a mixed Bambu Lab, Creality, and Elegoo printer fleet from a Raspberry Pi 5, with authenticated remote access over a dedicated 4G LTE link.

Teaching Assistant, EECE 231 (Introduction to Programming, Python) **Fall 2025**
Maroun Semaan Faculty of Engineering and Architecture (MSFEA), AUB *Beirut, Lebanon*

- Led a weekly Python lab for a full semester covering data structures, file I/O, and problem-solving fundamentals; supported students in office hours, debugged code, and graded assignments.

PROJECTS

LOOM: 3D Printing with Embedded Electronics **July 2026 – Present**
Personal project (CoreXY, Klipper, OpenPnP, pneumatic dispensing, machine vision)

- Designing a desktop machine that prints a plastic part and builds working circuitry inside it in a single job, using four automatically swapped tools: FDM hot end, pneumatic paste dispenser, vacuum pick-and-place head, and a probe with camera for metrology.
- Specified the control electronics: two MCUs under one Klipper instance driving eight steppers, heaters, pneumatics, and probing, with axes allocated so no homing move crosses the USB boundary between boards.
- Deriving the error budget the design has to meet: sub-50 µm tool-tip Z repeatability across automatic tool changes, where 5 K of thermal drift in a 500 mm aluminium frame alone accounts for 59 µm, so every tool is re-probed against a bed datum after each change.
- Extending OctoPNP into toolchanger-aware CAM that interleaves printing, dispensing, and placement in one G-code job, with camera-based recovery of each tool's XY offset. Designed around locally sourced parts to keep the build affordable for one person.

TECHNICAL SKILLS

Embedded & Hardware: ESP32, Arduino, Raspberry Pi, GPS (NEO-6M), sensor integration, 3D printing (FDM/SLA).
Programming: Python (advanced, TA-level), C/C++, JavaScript, HTML/CSS.
Tools & Simulation: PSpice/OrCAD, Vivado, MATLAB, OnShape (CAD), Tinkercad, Git/GitHub, Wireshark, Packet Tracer.
Software & Cloud: Azure Functions, Google Cloud, Docker.
Systems: Linux (Ubuntu, Kali), Windows, macOS. **Languages:** Arabic (native), English (fluent), French (fluent).