

Antonie Bostan

Computer Science BSc · Embedded Systems, Simulation & Backend Engineering

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Languages: Romanian (native), Russian (fluent), English (fluent)

PROFILE

Computer Science student at Maastricht University, building things with computers since I was a teenager in Chişinău. I work best at the layer where software meets physical reality — STM32 firmware, a finite-element field solve, a robot arm deciding where to close its fingers. My bachelor thesis is the clearest example: a study of **electro-quasistatic body-coupled communication** built on self-taught COMSOL, LTspice and Python, held to 385 automated tests and a provenance register that made me withdraw ten of my own claims. Alongside it I am getting into **quantum computing**, through a university course and introductory quantum physics lectures I attend in my own time. Open to any role I find genuinely interesting, and looking above all for a full-time engineering or research position in **embedded systems, simulation or backend development**.

EDUCATION

BSc Computer Science — Maastricht University

Sept 2023 — 2027

Department of Advanced Computing Sciences, Faculty of Science and Engineering

- **Thesis:** *Reverse Body-Coupled Authentication for Smart Rings: A Simulation Study of Channel, Energy and Security Limits* — supervisor Dr. Mirela Popa; second examiner Dr. Charis Kouzinopoulos.

Relevant coursework: Embedded Programming · High Performance & Parallel Programming · Software Engineering and Architectures · Ubiquitous Computing & Internet of Things · Quantum Computing · Machine Learning · Robotics · Computer Security · Computer Networks · Databases · Data Structures and Algorithms · Numerical Methods

Before university — Chişinău, Moldova

2017 — 2023

- Competed in **FIRST LEGO League** for several years — an autonomous robot built and programmed against timed missions, judged alongside a research project and team core values — then stayed on to help run the events after ageing out of competing.
- Self-taught Adobe Photoshop and Premiere Pro; first programming in Turbo Pascal. A regular at computer-science competitions and active in the Chişinău CS community throughout.

SELECTED PROJECTS

Reverse Body-Coupled Authentication for Smart Rings — Bachelor Thesis

SOLO 2026

COMSOL Multiphysics 6.0 (FEM) · LTspice · Python · pytest + Hypothesis

- Modelled a smart ring powered **by the door handle it touches** — inverting the usual body-coupled link — and asked whether that architecture is feasible and what it must defend against.
- Taught myself COMSOL (including attending COMSOL Day) and built a **2D axisymmetric FEM model** extracting the full Maxwell capacitance matrix of the body–handle–ring–earth system.
- Built a **validation ladder**: closed-form electrostatics predicts the FEM, each FEM reproduces the previous tier to better than 1%, and the circuit simulation closes its own energy balance.
- Corrected the prior channel model — solving the network rather than combining reciprocals moved end-to-end coupling by **19×**, bracketing effective capacitance from 6.43 fF at a 1 mm gap to 124.8 fF in galvanic contact.
- Proved batteryless operation is excluded **by two orders of magnitude** via an exposure-limited energy bound (29.5 µA ring current), independent of the coupling bracket.
- Identified and quantified an **energy-domain denial-of-service threat** with an attacker-optimal standoff distance — no prior report of it exists in the HBC literature reviewed.
- Enforced machine-readable provenance on every constant: **385 automated tests**, a register of thirty-three open unknowns, and ten of my own claims withdrawn when their support failed.

Canvas — Telegram ordering system for a custom-print business

SOLO 2025

Python 3.13 · aiogram 3 · asyncio · SQLite · ~3,600 LOC

- Built an end-to-end customer ordering bot around a **21-state finite state machine** covering size, orientation, framing, NFC chip, gift packaging, delivery, photo upload and payment choice.
- Designed a normalised four-table SQLite schema with enforced foreign keys, CHECK constraints and cascading deletes; prices computed server-side from the option table rather than trusted from input.
- Shipped an **admin console of eleven commands**: order lookup, status and price editing, photo review, a revenue and user statistics dashboard, and targeted or broadcast notifications with a preview-and-confirm step.
- Rewrote the 780-line prototype into a router/service/keyboard architecture; HTML-escaped every piece of user input. Development ended when the client withdrew mid-project.

Grasp Generation for a KUKA iiwa Robot Arm — Project 3-1

TEAM OF 6 2026

ROS Noetic · Docker · PyBullet · Python · NVIDIA GraspGen · VGN

- Benchmarked NVIDIA's diffusion-based **GraspGen** against the Volumetric Grasping Network across **300 generated grasps**, scored with an approximated Ferrari–Canny ϵ -metric and physically validated in PyBullet.
- Built the grasp-generation pipeline and the ROS node integrating it into a larger autonomous manipulation system, and containerised the Ubuntu 20.04 / ROS Noetic toolchain for the KUKA arm.
- Found GraspGen grasps more resistant to external disturbance, VGN more consistent — and diagnosed why a rule-based baseline silently misclassified the target object as a support surface.

AI-Driven Compression of LHC Sensor Data — High Performance Computing

TEAM OF 7 2025

Python · Optuna · Reinforcement Learning · HPC parallelisation

- Built a pipeline converting Large Hadron Collider detector data to binary, profiling its entropy, and tuning chunk sizes and entropy thresholds by **derivative-free optimisation** for both compression ratio and throughput.
- Compared an Absolute Zero Reinforcement agent against a hybrid categoriser + reward-predictor system; the hybrid delivered higher average reward while avoiding deep-inference overhead, and I documented why the AZR agent prematurely converged.

Custom Android Keyboard — Computer Security project

PAIR 2025

Kotlin · Android IME

- Two-person project building a working custom Android keyboard to demonstrate, concretely, how much a third-party input method can capture — and why keyboard permissions deserve scrutiny.

Transitor — socio-economic accessibility routing engine, Project 1-2

TEAM OF 7 2024

Java · SQL

- Built a bus-and-walking route planner over Maastricht's postal codes from scratch, then derived a per-postal-code accessibility metric to expose transport inequality for urban planners.

3D Packing & Knapsack Optimisation — Project 1-1

TEAM OF 6 2024

- Designed and benchmarked space-filling algorithms for 3D bin packing with cuboid and pentomino items, trading spatial efficiency and configuration value against computation time.

EXPERIENCE

Freelance Bot Developer — independent

2025 — present

- Built Telegram automation for small businesses on commission, including **PePlus**: an admin-gated broadcast bot with an approval workflow, subscriber validation, and automatic Russian-to-Romanian translation of outgoing messages (Python, aiogram 3).
- Gathered requirements directly from non-technical clients and delivered Romanian-language interfaces.

Medical Bicycle Courier — Vleugels, Maastricht

2023 — present

- Time-critical pharmaceutical deliveries across Maastricht, held continuously alongside a full-time degree.

Freelance Graphic & Video Editor — Chişinău

2018 — 2022

- My first paid work: commissioned photo retouching, graphic design and video editing in **Adobe Photoshop** and **Adobe Premiere Pro**, taken on while still at school.

TECHNICAL SKILLS

Programming	Python, Java, Kotlin, C/C++, MATLAB, SQL, TypeScript
Simulation	COMSOL Multiphysics 6.0 (FEM), LTspice, PyBullet, numerical methods, SolidWorks / Inventor / FreeCAD
Embedded & robotics	STM32CubeIDE (STM32U5), X-CUBE-AI on-device inference, Arduino, ROS Noetic, Docker
Backend & data	asyncio, aiogram, SQLite / aiosqlite, APScheduler, pytest + Hypothesis, Optuna, Git, Next.js
Creative	Adobe Photoshop, Adobe Premiere Pro
Interests	Quantum computing · restoring and modifying vintage mechanical watches and typewriters