Alexandru Dabu

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Summary

Recent graduate in **Automation and Computer Science** with hands-on experience ranging from hardware, software, low-level programming, and robotics to advanced control design, AI/ML-driven automation, and cross-platform mobile development. Passionate about exploring new technologies and applying technical skills to solve real-world challenges.

Education

2025–Present: Master's Degree in Information Systems and Digital Transformation in Materials Processing, **University Politehnica of Bucharest**, Faculty of Materials Science and Engineering

2021–2025: Bachelor's Degree in Automatic Control and Computer Engineering, **University Politehnica of Bucharest**, Faculty of Automatic Control and Computer Engineering

2017–2021: High School Diploma, **Colegiul Național „Radu Greceanu"**, Slatina — Mathematics & Informatics Specialization

Projects

❄ *Basketball Social Media & AI Shot Analysis App (B.Sc. Thesis)* — 2025

The project provided real-time computer vision for basketball shot evaluation, complemented by features that foster player interaction and feedback sharing.

- **Designed and implemented a cross-platform application** combining social networking with AI-powered basketball shot analysis.
- **Enabled engagement features** including accounts, personal profiles, posts, comments, private messaging, and notifications.
- **Delivered automated performance feedback** by building a YOLOv8-based shot detection pipeline with pose estimation and trajectory heuristics.
- **Optimized inference pipeline** to run **real-time video analysis at 30 FPS on GPU**, with fallback to CPU for broader compatibility.
- **Improved training usability** through interactive maps of basketball courts and an integrated chatbot for tactical advice.
- ✗ Tech Stack: `Python(YOLOv8, OpenCV, Flask), Flutter, Firebase, REST, Google Maps API, OpenAI API`

🖧 *Path Planning in Radioactive Environment using Probabilistic Roadmaps* — 2025

The project focused on building a customizable, safe and efficient robot navigation in dangerous environments.

- **Built a path planning framework** using Probabilistic Roadmaps (PRM) for efficient navigation in complex, static obstacle environments.
- **Designed interactive tools**, including a simulator and visualization interfaces, enabling experimentation and analysis of pathfinding behavior.
- **Improved safety and robustness** by implementing obstacle inflation, safety margins, and adjustable connection thresholds, validated across diverse maps.
- ✗ Tech Stack: `Python, NumPy, Tkinter, Matplotlib, PIL`

🚩 *Multi-Agent Formation Control* — 2025

The project aimed to create a system aimed at enabling coordinated movement of robot teams while preserving a stable formations.

- **Applied advanced control methods** by combining graph Laplacians, control barrier functions, and spiking neural networks.
- **Increased robustness** by avoiding collisions through distributed control strategies and dynamically changing formations (line, square, diamond, trapezoid).
- **Explored scalability and performance trade-offs** with trajectory visualizations, scalability and stability plots for effective evaluation.
- ✗ Tech Stack: `Python, NumPy, SciPy, Matplotlib, PyTorch`

☁ *Rain Prediction in Australia* — 2023

The project investigated how machine learning can leverage historical weather data to improve short-term rainfall predictions and model interpretability.

- **Achieved 80% prediction accuracy** by developing an end-to-end ML pipeline to forecast next-day rainfall using a dataset of 140k+ records.
- **Improved model accuracy by 12%** compared to logistic regression baseline using Random Forests.
- **Reduced false negatives by 18%** through hyperparameter tuning, improving recall for rainy days.
- **Conducted exploratory data analysis** to identify high-impact meteorological features correlated with rainfall, strengthening model transparency and explainability.
- ✗ Tech Stack: `Python, Pandas, scikit-learn, Matplotlib, Jupyter`

🔒 ARP Spoofing & Man-in-the-Middle   *2024*

The project demonstrated network vulnerabilities by implementing ARP spoofing in a controlled lab environment and exploring defenses.

- **Developed packet manipulation routines** for interception, modification, and forwarding of packets.
- **Simulated ARP spoofing attacks** to show how attackers can intercept and manipulate network traffic.
- **Exposed security risks** such as credential theft, silent monitoring, and session hijacking.
- **Documented countermeasures** including encrypted protocols, static ARP entries, and inspection tools.
- **Strengthened networking expertise** through analysis of ARP/TCP traffic with Wireshark.

🛠 Tech Stack: `Python, Scapy, Wireshark, Kali Linux`

🔲 Image Processing Pipeline in Verilog   *2023*

The project implemented a hardware image processing pipeline on FPGA using finite state machines and memory management techniques.

- **Implemented a hardware pipeline** performing flip, grayscale, and sharpen operations on FPGA.
- **Ensured synchronization** with FSMs, registers, and counters coordinating pixel processing cycles.
- **Balanced performance and resource use** with sequential and parallel logic optimized for throughput.

🛠 Tech Stack: `Verilog, FSM, FPGA tools, Xilinx`

🔒 E-commerce Management System   *2023*

The project provided a prototype of an online store, from catalog management to checkout and returns, built with structured software engineering methods.

- **Delivered core features of an e-commerce platform**, including product catalog, cart management, and order lifecycle.
- **Driven team collaboration** with UML diagrams for architecture, user flows, and business processes.
- **Strengthened testing coverage** with unit tests for order, cart, and return functionality.

🛠 Tech Stack: `Java, Spring Boot (intro), JUnit, UML`

💼 Work Experience

Carpasoft — Mobile Developer Intern   *Jul 2024 – Oct 2024*

The internship focused on building a cross-platform mobile application for pet-related management services.

- **Extended user and pet profiles** with editable attributes and health records.
- **Developed booking and scheduling features** for veterinary visits, grooming, and pet walking services.
- **Improved community features** such as posts, stories, and real-time chat to connect users and providers.
- **Integrated maps and geolocation** for discovering pet-related facilities and tracking lost pets.
- **Improved software quality** by implementing automated test suites within CI/CD pipelines.

🛠 Tech Stack: `Flutter, Google Cloud Services, Maps/Geolocation, GitLab, Linux, Android, iOS`