Cătălin-Alexandru Rîpanu

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Education

POLYTECHNIC University of Bucharest **September 2020 – July 2024**
Faculty of Automatic Control and Computers *Bucharest, Romania*

- Bachelor's Degree in Computer Science & Engineering, **GPA: 9.805/10.00**.
- Relevant **coursework**: Artificial Intelligence, Quantum Computing, Machine Learning, Data Structures and Algorithms, Numerical Methods, Formal Languages and Automata Theory, Programming Paradigms, Computer Networking, Computer Architectures, Parallel and Distributed Programming, Operating Systems, Assembly Programming

Relevant Work Experience

POLYTECHNIC University of Bucharest **February 2022 – July 2024**
University Undergraduate Teaching Assistant *Bucharest, Romania*

- Taught students **Programming subjects** to deepen their understanding of low-level concepts and internals.
- Assisted in grading projects, midterms, and final exams, and served as an invigilator alongside professors during sessions.

Projects

QRKT-GAN: Neural ODE Generative Network with Quantum Transformers | *Quantum, AI, ML* **July 2024**

- Implemented using **Pytorch**, **Jax** and **Flax** a *Quantum Generative model* tested on CIFAR-10 dataset.
- Developed a Variational Quantum Circuit in **TensorCircuit**, harnessing Quantum Entanglement through Bell states.
- Designed a Quantum Transformer architecture that leverage Runge-Kutta Numerical Methods to optimize the solution of Ordinary Differential Equations within Transformer layers.
- Evaluated it alongside a comparable **Pytorch** model presented at **NeurIPS 2021**, namely Trans-GAN, showing promising results.

Halite Bot | *Algorithms, OOP, C++, Techniques Design* **May 2022**

- Implemented in C++ a *Halite bot* using techniques such as Divide and Conquer, Greedy and Dynamic Programming.
- Processed the cells with the highest scores first to achieve the design goal of conserving the bot's strength.
- Developed a greedy approach used by the border cells so that all the unoccupied cells will be attacked.
- Created a **strength loss correction** method which uniformly redirects power to all own cells for minimizing the waste.

Car Race Game with AI | *C++, OpenGL, OOP, GLSL* **December 2022**

- Developed a *Car race* based game using C++, OpenGL and Graphics Design techniques.
- Implemented collision detection with opponents (which are dynamic objects) using the **Sphere vs Sphere** test.
- Created a complex shape of the road rendering a large density of triangles so that no visual artifacts are generated.

Seven-Segment LED Display on FPGA | *Verilog, Vitis HLS, C++, Vivado* **January 2023**

- Created an *app* which takes 8 signals as input from a **Nexys A7-100T board** and shows the numeric result on it.
- Implemented the **Double Dabble** algorithm for simplifying the conversion between **Binary** and **BCD** formats.

RPG Adventure Game | *Java, OOP, JSON, Swing, Design Patterns* **December 2021**

- Designed a *Complex RPG* based game using Java and JSON files for **storing accounts** which are used for **logging in**.
- Implemented a functionality which allows the user to choose between 2 game formats (**GUI** and **CLI**).

Extracurricular Activities

3DPUB Summer School **June 2022**
2^{nd} *Year Student* *Bucharest, Romania*

- Participated in 5 **Gameloft** and **UPB** *workshops* related to GPGPU, Computer Vision and Game Development.
- Understood basic implementation practices of **Multiplayer** functionality and **Artificial Intelligence** in modern games.

Awards

National Student Mathematics Competition "Traian Lalescu" **November 2021**
2^{nd} *Year Contestant* *Transilvania University of Brasov, Romania*

- Participated in the **National phase** and obtained the honorable mention of the **Complex Analysis** section.

Skills

Technical Skills

- Intermediate Knowledge: Data Structures, Algorithms, C/C++, Python, Java, Networking, Numpy, Pandas
- Basic Knowledge: Pytorch, TensorFlow, Flax, TensorFlow Quantum, DevOps, CUDA, REST API, Flask, SQL

Languages

- Romanian: Native Speaker
- English: Professional Level
- French: Good Command