

# Burghelea Zaharia

*Curriculum Vitae*

## PERSONAL DETAILS

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<i>Birth date</i>	14 October 1998
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<i>GitHub</i>	<a href="https://github.com/Zackyzz">https://github.com/Zackyzz</a>
<i>Website</i>	<a href="https://zackyzz.github.io">https://zackyzz.github.io</a>

## EDUCATION

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### MSc. Advanced Computing Systems

2021-2023

*Lucian Blaga University of Sibiu*

- Gained experience and developed various projects in areas related to Natural Language Processing, Deep Learning, Data Compression and Quantum Computing.

### BSc. Computer Science

2017-2021

*Lucian Blaga University of Sibiu*

- Gained experience and developed various projects in areas related to Machine Learning, Computer Architecture, Web Development, Databases and Computer Vision.

## WORK EXPERIENCE

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### Software Engineer

March 2023 - Present

*Avelon Cetex*

- Part of a project which revolves around IoT devices designed to manage and connect building systems such as weather monitoring, HVAC, lighting and energy management.
- Working on the low-level part of the project, which includes configuration and communication among the IoT devices, the building systems and the Cloud.
- Responsible for integrating parts of various communication protocols, such as BACnet, Modbus and LoRaWAN. The development is primarily done in C++, but Python is also used for scripting and automation.
- The project also involves working with different operating systems (like Gentoo, Ubuntu and Rocky) and isolated environments (Docker and Schroot).

### Software Engineer

November 2022 - May 2023

*Lucian Blaga University of Sibiu*

- Part of a project entitled "Monitoring eco-friendly quality of the PET bottle manufacturing using advanced AI".
- Developed a Machine Learning software aimed at clustering the working modes of the PET machine, and also at identifying potential anomalies within the PET manufacturing process.
- Utilized various Machine Learning and Deep Learning models, such as Hidden Markov Models and Deep Learning-based Autoencoders.
- This formed the basis of my Dissertation, available [here](#), and further contributed to the publication of a paper entitled "Anomaly Detection in Smart Industrial Machinery Through Hidden Markov Models and Autoencoders" found [here](#).

## Software Engineer

March 2021 - March 2023

*Ausy Technologies Romania*

- Part of an automotive project focused on the Engine Control Unit (ECU) functionalities.
- My main responsibilities included developing unit tests, enabling automation, and performing various maintenance tasks. The development was primarily done in C++, but Python was also used for scripting and automation.
- Additionally, I also participated in a Machine Learning training program, which involved self-research and completing online courses.

## Internship

July 2019 - October 2019

*Marquardt Schaltsysteme Sibiu*

- Part of an Embedded Systems internship program.
- Gained experience in working with embedded devices such as Arduino and ATmega and learned about various communication and encoding protocols.

## PROJECTS & ARTICLES

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### Comparative study between different Machine Learning algorithms

- Implemented various Machine Learning algorithms from scratch (in Lisp) with the focus to intuitively understand, compare and visualize them.
- A detailed description can be found **here** (in Romanian) and the code can be seen **here** on GitHub.

### Predicting StackOverflow Tags

- Developed a project to predict the popular programming language tags from Stack Overflow, with the focus to examine the impact of text elements such as the title and key terms on the prediction accuracy.
- This included combining NLP techniques with ML algorithms in order to predict the tags in various circumstances.
- A detailed description can be found in **this article** and the code is available **here**.

### Handwritten Digit Recognition using JPEG & Deep Learning

- An implementation of the book **Neural Networks and Deep Learning** embedded with the JPEG algorithm for dimensionality reduction.
- This consists of preprocessing the classic MNIST image dataset using the JPEG algorithm and employing a deep neural network in order to classify the digits.
- For a better understanding and visualization, the neural network was also implemented from scratch. The code can be found **here**.

### Generating Quantum Computing Programs

- Developed a project that generates Quantum Computing programs to solve Grover's search algorithm.
- The process was performed using Genetic Programming, facilitated by the usage of meta-programming techniques. The code can be found **here**.

### An introduction to Feynman's Trick (Math related)

- I wrote an in-depth introduction to Feynman's trick, available **here**. This focuses on explaining intuitively a lesser known integration technique that is rarely taught in universities, but at the same time it is extremely useful in tackling integrals.

### Other various projects

- Some other projects relevant to Data Compression, Machine Learning, Image or Signal Processing and other stuff can be found on **my GitHub page**.

## SKILLS

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### Languages

My mother tongue is Romanian, but I speak English fluently and studied a bit of French in high-school.

### Programming

I enjoy learning new programming languages, including lesser-known languages such as Racket, Haskell or Julia. Other than that I mostly used or worked with Python, C, C++, C# and Matlab.

### Mathematics

In high-school, I reached the national olympiad and later contributed to some math journals and forums such as the Romanian Mathematical Magazine, Crux Mathematicorum, AoPS or Mathematics Stack Exchange (my profile on the latter one can be found [here](#)).

### Others

I am proficient with LaTeX, Git and different operating systems.

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### Hobbies

I enjoy playing chess, working out and solving math problems in my free time.

### Interests

I am mostly interested in Artificial Intelligence, especially Machine Learning, but also in other fields like Quantum Computing, Computer Vision or Data Compression.