Project Portfolio

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Below is a non-exhaustive list of projects and mini-projects I completed over the past ten years, which are relevant to this job application.

Academic work

During my studies, I focused on robotics-related topics. The most relevant included a project to design a small BLE-controlled robot and a course focused on robotics in biomedical applications.

Codobot (Educational Robotics Board Game)

I contributed to the design and development of **Codobot**, a robot-based educational board game. I developed a prototype and helped transition to a production-ready version. During my master, I was tasked with redesigning the PCB following the reviews made by Quimesis. Below are various public-facing resources showcasing this project:

- Facebook Page: https://www.facebook.com/codobot.be
- Portfolio at Arteam Interactive: https://www.arteam-interactive.com/fr/portfolio-item/codobot-jeu-de-societe
- Instagram Page: https://www.instagram.com/codobot
- Quimesis Article: https://quimesis.be/apprenez-a-coder-des-le-plus-jeune-age-avec-codobot

University Coursework

As part of the *Robotics and Biomedical Applications* course, I was tasked with simulating and resolving singularities in robotic arms during one of the practical work sessions:

- Singularity Resolution Simulation (video): https://youtu.be/y19PrHbScWs

We also studied control systems, and the various sensors and actuators used in robotics. Moreover, the lecture included a visit to JTekt Torsen, and another visit to the CHU of Mons, where we interacted with a Da Vinci robot.

Work within the electroLAB

During my study, I spent a significant amount of my free time within the electronic club. So much, that I went through three relocations and have been actively involved in the design of two of our labs. I also completed a handful of projects.

- Facebook Photo Archive: https://www.facebook.com/electroLAB.FPMs/photos

electrolabot

For some of our activities, we lacked a robotic platform suitable for use with secondary school students. Therefore, we collectively designed an ESP32 based 2WD robot, on which we can mount IR line detectors, ultrasonic distance sensor, RGB LEDs, buzzers, and so on.

- electroLABOT (Firmware): https://github.com/Vincent-Stragier/electroLABOT
- electroLABBOT GUI (Python): https://github.com/electroLAB-Belgium/electroLABBOT_GUI

Connected Birdhouse (Naturewatch Camera)

I contributed to improve the functionality and codebase of a Raspberry Pi-based connected birdhouse camera system:

- GitHub Repository (Community Development Edition)

This project greatly enhanced my understanding of embedded Linux development and custom Raspberry Pi OS images.

Instrumentation

To assess the power consumption of a Raspberry Pi Pico-based CANSAT system, I developed a control script to automate power measurements using an HMC8012 multimeter:

- Multimeter Control Gist

This mini-project was aimed at helping a group of secondary school students participating in the CANSAT contest.

Eurobot Support

While I never joined the faculty teams, I contributed to various support tasks, including developing a test bench and software emulation of an obsolete decoder counter IC:

- Test Bench for Emulated Counter Chip (Video): https://youtu.be/cDIHlI2J2tM

Research work at the University of Mons

After getting my degree I began a PhD focused on developing an interactive assistant for visually impaired individuals. Although I discontinued my thesis, I still gained some valuable experience in the computer vision field, as well as in the natural language processing field. Soon after, I worked as a part time teaching assistant and as a research assistant on a health-related topic.

YOLOv4 Bee Detection

To evaluate YOLOv4 for bee detection, I fine-tuned the model on a manually annotated dataset and performed an initial evaluation:

- Video: Bee Detection with YOLOv4

The goal of the project was to evaluate the feasibility of an app that could help new beekeepers to find the queen bee in their hive.

Computer Vision with Hailo 8L TPU

As part of a student project that I proposed with Professor Olivier Verlinden, we investigated the use of the Hailo 8L TPU for real-time collision avoidance for the visually impaired. I also prepared a quick start guide for the students that worked on this project:

- TPU Setup Guide Gist

Emotion and Face Recognition

I contributed to the **DeepFace** Python library by fixing bugs and adding features. This library was also applied in my own research on emotion and face recognition:

- DeepFace GitHub Repository

Research on LLMs

I also conducted research on the deployment and optimisation of large language models (LLMs) under restricted resources:

- Gist: Notes on LLMs with Limited Resources

Summary of Skills

- Programming: Python, C/C++

- Tools: Git, LaTeX, LXC, Docker, OpenCV, YOLO, DeepFace

- Hardware: Raspberry Pi, ESP32, Hailo 8L TPU

- Areas: Embedded systems, robotics, computer vision, AI