Aly Elbindary

Robotics Engineer

May 1, 2000

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Personal Blog

Linkedin Profile

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Swiss Residency (Permis B)

Education

Master in Robotics along with a Minor in Data Science at École Polytechnique Fédérale de Lausanne (EPFL) :
Major specializing in mobile robotics. Studies in AI, Machine Learning, Control Systems and robotics. | 2022 - current

Bachelor of Engineering at École Polytechnique Fédérale de Lausanne (EPFL) :
Major in Microengineering. Studies in programming, digital systems design, microcontrollers, electronics, microfabrication, mechanism designs. | 2018 – 2022

French Baccalaureate S (Scientific)
at Lycée Français du Caire | 2018

Skills

- Programming : Proficient in C, C++, python, pytorch, MatLab and Assembly
- Software : AutoCAD (CATIA), Logisim & Quartus Prime (digital system design)

Languages

	A2	B1	B2	C1	C2
English					●
French					●
Arabic					●
Spanish			●	●	●

Working Experience

2022 - current **Teacher's Assistant** EPFL
Tutor for various complex mathematical subjects at EPFL (Calculus I and Linear Algebra) under professors M. Sacha Freidli, M. Nicolas Boumal and M. Peter Wittwer.

July 2021 **Machining Internship** ETML
Hands-on experience at ETML (Ecole Technique des Métiers de Lausanne) in different high-precision manufacturing processes, such as milling, turning, drilling, tapping, threading and rolling. Design of various tools from scratch, including a Sterling motor, a clamp and a hand vise.

Projects

Automatic Segmentation of Light-Sheet Zebrafish Scans

- Semester Project in MICROBS lab at EPFL : Use machine learning segmentation techniques in order to automatically segment light-sheet scans.
- Key Concepts : Computer Vision, Usage and fine-tuning of preexisting state-of-the-art models (SAM), coding with **python and pytorch**, focal loss, cross-entropy loss, intersection over union (IoU), multi-class segmentation.

Create an AI ChatBot Specialized to course content at EPFL

- Use Modern Natural Language Processing techniques in order to develop a specialized tutor-ChatBot through python, pytorch and state-of-the-art models such as `T5, LLaMA`.
- Key Concepts : NLP, RLHF, DPO training, dataset collection & labeling, preference dataset, improvement methods (RAG & Quantization).

Tweet Sentiment Classification

- Create a **machine learning model** that can perform binary classification (positive/negative sentiment) on a given dataset of tweets.
- Achieved the **Highest Accuracy Score (92.1%)** in the Class
- Key concepts : Tokenizing/encoding a text dataset (TF-IDF, GloVe), use of pre-existing state-of-the-art transformers (BERTWEET), ethics of machine-learning.

2D Animal Pose Detection for the Autopilot of an Autonomous Vehicle

- Implementation of one of Tesla's autopilot features : 2D Animal Pose Detection.
- Contribution : Improving a preexisting model (OpenPifPaf) through Semantic Data Augmentation (SDA).
- Key concepts : ML, AI, perception, prediction, planning, neural networks (NN), convolutional NNs, recurrent NNs, regularisation techniques, supervised learning.

Programming a quadrotor drone to complete an obstacle course

- Coding using Python, in both simulation and hardware.
- Key concepts : path planning, obstacle avoidance, drone navigation and target detection, **sensor usage**.

Programming a Thymio robot to go through an obstacle course

- Coding done using Python
- Key concepts : computer vision, map recognition, path determination, neural networks, local-obstacle-avoidance and Kalman filter for pose estimation.

Embedded Systems and Robotics

- Programming an epuck robot to perform a specific application.
- Coding done using C, **programming sensors** such as TOF, microphones, cameras and IMU.
- Optimization and programming done with the use and management of threads.