Aly Elbindary

Robotics Engineer

- May 1, 2000
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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

September 2024 - February 2025	**Internship at CHUV (.NeuroRestore Lab)**	CHUV

Modeling cardiovascular instability in people with spinal cord injury. Analysis of various clinical data, such as blood pressure and heart rate, to extract important features. Usage of different machine learning models to predict whether a specific data reading contains signs of orthostatic hypotension or not.

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.

Projects

Automatic Segmentation of Light-Sheet Zebrafish Scans

- Semester Project in MICROBS lab at EPFL : Use machine learning segmentation techniques to automatically segment light-sheet scans.
- Key Concepts : Computer Vision, Use 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), multiclass 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 preexisting 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.