Nathan Touboul

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Skills

Programming Python (*NumPy, Pandas, TensorFlow*) | C/C++ (STL) | JavaScript | HTML/CSS | Docker
Tools Linux | Bash | Git | LaTeX | MATLAB/Simulink | OOP | Multithreading | Machine Learning, Computer Vision | CI/CD
Language French (Native) | English (Fluent)

Experience

Software Engineer (Temporary Employee) **March 2022 - Today**
Qualcomm *San Diego, CA*

- Developed around 200 APIs with Python and C++ for a framework used to support numerous libraries across 3 generations of automotive chipsets.
- Enabled graphical features using **OpenCL, OpenGL, and EGL**, managing kernels, context, and command queues; performed validation on Qualcomm's internal camera APIs for the latest chipset firmware builds.
- Developed an audio capture and playback tool using **ALSA** for Linux-based virtual machines.

Machine Learning Engineer Intern **Jun 2021 - Aug 2021**
Kapaix Ltd *London, England (Remote)*

- Designed neural network models for anomaly detection purposes, analyzing discrepancies in frequencies and amplitudes of data points in time series to assess the quality of a database for a Big Data Management company.
- Preprocessed the dataset by building histograms with variable time frames, using **PCA** and **k-means clustering** as the first analysis tool.
- Constructed two ML architectures: a classification model and an autoencoder model, using dense and convolutional layers with **Python: *Keras - TensorFlow - Pandas***.

Projects

Research Project: Navigation Integrity of Lidar-based localization **Sep 2021 - Dec 2021**
Navigation Lab - Illinois Institute of Technology *Chicago, Illinois*

Lidar-based localization of autonomous vehicles in an area with low **GNSS** availability, with a Velodyne's Puck sensor to compensate for **IMU** drift to ensure landmark identification against the misassociation problem. I established an error model to quantify precise 3σ probabilities of tree misdetection, considering multiple noise sources. I also researched the implementation of the Error Correction Codes domain **(Hamming and BCH codes)** for navigation safety.

Master's Thesis: Isogeometric Representation of Turbojet Blades **Sep 2020 - Dec 2020**
Structure Mechanics Laboratory - INSA *Lyon, France*

Building an algorithmic solution to merge CAD and FEA methods through Non-Uniform Rational Basis Spline **(NURBS)** manipulations. I designed an adaptive fillet to join the blade and its root volumes by implementing a fillet patch mesh on **Python: *NumPy - geomdl***.

Other personal projects:

- Path Finding app using C++ and Qt: real-time visualization of algorithms (Dijkstra, A*, Maze Generation) through multithreading.
- VGG16 and ResNet50 blood cells classification, using TensorFlow and data augmentation with image data generators.
- Graph SLAM implementation from scratch, using Lidar measurements from the Victoria Park Dataset.
- Kinematics and dynamics modeling of a Scara Robot with PID and linearized command control.
- Drive cycle designed for autonomous vehicles: testing Wh and SOC consumption by simulating the pursuit of a standard car.
- Consciousness and Neuroscience research project: Statistical and Bayesian Brain.

Education

Master of Engineering – *Illinois Institute of Technology* **Jan 2021 - Dec 2021**
*Robotic Motion Planning **(SLAM, Kalman filter)** - Machine Learning **(PCA, Clustering, CNN, RNN)** - Electric Vehicles **(EPA drive cycles)***

Master of Science in Mechatronics – *National Institute of Applied Sciences - France* **2018 - 2022**
*Control Theory **(PID, optimal LQR control)** - Robotics - State-Space Analysis **(Simulink)** - Fluid and Thermodynamics*

Bachelor of Engineering in Electronics and Computer Science – *CPE Lyon - France* **2015 - 2018**
*Programming - Analog and Digital Systems **(Microcontrollers implementation)** - Electronic Architectures **(VHDL Design on FPGA)** - Mathematics & Physics*

Activities

Job on Campus, Admissions Office at Illinois Tech (Salesforce and GeckoEngage Chatbot) **Apr 2021 - Dec 2021**
Student Government Association at INSA Lyon **2019 - 2020**
Physics and Mathematics tutor **2017 - 2020**