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Nathan Touboul

Software Engineer

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Work Experience

Software Engineer – Automotive Team **March 2022 - Today**
Qualcomm *San Diego, CA*
- I have written over 150 APIs for a framework tool used on multiple automotive chipsets, built by a large team of developers, using git, QNX, ADB, and virtual machines.
- I implemented **Vulkan APIs** graphics features supporting **OpenCL**, **OpenGL** and **EGL** by implementing kernels, contexts and command queues. I am currently focusing on enabling support of the audio APIs **ALSA** for Linux by designing a capture-playback loop using C++ and Python.

Machine Learning Engineer Intern **Jun 2021 - Aug 2021**
Kapaix Ltd *London, England (Remote)*
- Assessing the quality of a time-series database for a Big Data Management company. I designed neural network architectures for anomaly detection purposes, analyzing discrepancies of frequency and amplitude.
- I preprocessed the dataset by building histograms with variable time frames: I used **PCA** and **k-means clustering** as the first analysis tool. I constructed two ML architectures to compensate for the limited training dataset: a classification model and an autoencoder model, using dense and convolutional layers with **Python:** ***Keras*** **-** ***TensorFlow*** **-** ***Pandas***.

Technical 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 sources of noise. I also researched the implementation of the Error Correction Codes domain **(Hamming and BCH codes)** to 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 (Djikstra, A*, Maze Generation) through multithreading.
- VGG16 and ResNet50 blood cells classification, using tensorflow and image data generators.
- Neural Network from scratch (without built-in functions) compared to Fisher's Linear Discriminant with Tensorflow.
- Graph SLAM from scratch, using Lidar measurements of the Victoria Park Dataset.
- Kinematics and dynamics modeling of a Scara Robot - PID and linearized command control.
- Drive cycle designed for autonomous vehicle - testing Wh and SOC consumption by simulation of the pursuit of a standard vehicle.
- 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 - CAD* ***(CATIA, SolidWorks)***

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*

Main skills

Programming	Python - C/C++ - JavaScript - Linux - Bash - Git - HTML/CSS - ADB - LaTeX - MATLAB/Simulink
Languags	French (Native) - English (Fluent)

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**