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)** 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 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 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 - 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
Language	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**