

# Nathan Touboul

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🐙 GitHub

in LinkedIn

🌐 Portfolio

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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

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  $3\sigma$  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