

Nathan Touboul

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SKILLS

Programming	Embedded and Desktop C++ Python Typescript MATLAB/Simulink Qt/QML HTML/CSS Linux Git Visual Studio
Concepts	CI/CD OOP Multithreading/Multiprocessing Unit Testing Computer Vision Machine Learning
Language	French (Native) English (Fluent)

EXPERIENCE

Software Engineer - Velo3D (San Jose, CA)

Dec 2022 - October 2023

- **Developed C++ and Python software, to control electronic, pneumatic, and optical systems for metal 3D printers**, involving numerous multi-threaded processes across multiple embedded systems.
- **Implemented a crucial functionality**, accessible through the main UI (QML), enabling customers and manufacturing engineers to effortlessly monitor and override process-critical settings on different servers. This ensures a reliable qualification process for new printers, contributing to the overall system's robustness.
- **Decreased printer build failure rate** by enhancing O₂ correction, using multiple sensors and applying effective filtering techniques.
- **Upgraded the BKM framework of the laser controller firmware** through additional available configurations.
- **Incorporated the latest sensors and controls of an SIB into the simulator** designed for the newest printer generations.
- **Collaborated with the R&D team** to enhance the consistency of powder bed recoating using asynchronous pneumatic controls.
- **Collaborated as a team member in an agile development process using Jira, Git, pull request reviews and CI/CD with Jenkins.** Demonstrated a strong commitment to being a team player throughout the development cycle.

Software Engineer - Qualcomm (San Diego, CA)

March 2022 - Dec 2022

- **Developed hundreds of APIs using Python and C++** to support libraries, improving software functionality and system performance.
- **Utilized OpenCL, OpenGL, and EGL to enable graphical features** on embedded systems.
- **Conducted validation on Qualcomm's internal camera APIs** for the latest chipset firmware builds.
- **Created an audio capture and playback tool** for Linux-based virtual machines using the ALSA library.

Machine Learning Engineer - Kapaix Ltd (London)

Jun 2021 - Aug 2021

- **Designed neural network models to detect anomalies** by analyzing discrepancies in time series data, assessing database quality for a Big Data Management company.
- **Preprocessed the dataset** by creating histograms with variable time frames and applying PCA and k-means clustering as initial analysis techniques.
- **Constructed two machine learning models** (classification and autoencoder based) using Python with TensorFlow, and Pandas. The models incorporated dense and convolutional layers.

PROJECTS

Research Project: Navigation Integrity of Lidar-based localization - Navigation Laboration 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 - Structure Mechanics Laboratory

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**.

Personal projects

- **Path Finding app** using C++ and Qt: real-time visualization of algorithms (Dijkstra, A*, Maze Generation) through multithreading.
- Kinematics and dynamics modeling of a Scara Robot with PID and linearized command control.
- Consciousness and Neuroscience research project: Statistical and Bayesian Brain.

EDUCATION

Master of Engineering – Illinois Institute of Technology

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

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

Programming - Analog and Digital Systems (Microcontrollers implementation) - Electronic Architectures (VHDL Design on FPGA) - Mathematics & Physics