

Nathan Touboul

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SKILLS

Programming Modern 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

December 2022 - October 2023

Velo3D

San Jose, CA

- **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.
- **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.
- **Enhanced O₂ correction** using multiple sensors and applying effective filtering techniques, decreasing printer build failure rate.
- **Upgraded the BKM framework of the laser controller firmware** through additional available configurations.
- **Reworked the consistency of powder bed recoating** using asynchronous pneumatic controls.

Software Engineer

March 2022 - December 2022

Qualcomm

San Diego, CA

- **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

June 2021 - August 2021

Kapaix Ltd

London

- **Designed neural network models to detect anomalies** by analyzing discrepancies in time series data, assessing database quality.
- **Preprocessed the dataset** by creating histograms with variable time frames and applying PCA and K-means clustering as initial analysis.
- **Constructed two ML models** (classification and autoencoder based) using Python with TensorFlow, and Pandas.

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.
- **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.
- **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