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 - 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.
- **Enhanced O_2 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.
- **Introduced the latest sensors and controls** of an SIB into the simulator designed for the newest printer generations.
- **Reworked 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.
- **Preprocessed the dataset** by creating histograms with variable time frames and applying PCA and K-means clustering as initial analysis.
- **Constructed ML 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.
- **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