Arthur PASSUELLO

Applied AI/ML Engineer | Production Systems & Education

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French (Native) • English (Fluent) • German (Basics)

Skills

Software Engineering

- ✓ Python, C++
- ✓ FastAPI, REST
- ✓ Git Version Control
- ✓ Docker, CI/CD
- ✓ Technical Leadership
- ✓ System Architecture
- ✓ Technical Documentation
- ✓ Hardware-Software Integration
- ✓ Real-time Systems
- ✓ Hardware Optimization

ML & LLMs

- ✓ PyTorch, TensorFlow
- ✓ Transformers, LLMs
- ✓ RAG, Vector Search
- ✓ Multimodal AI
- ✓ Constitutional AI
- ✓ Neural Networks, Deep Learning
- ✓ Model Optimization
- ✓ Production ML

Data Science

- ✓ NumPy, Pandas
- ✓ Matplotlib, Seaborn
- ✓ Jupyter, Data Analysis
- ✓ Gradio & Streamlit
- ✓ Statistical Analysis
- ✓ Data Engineering
- ✓ Cross-cultural Communication
- ✓ Educational Content Creation

Work Experience

Tandem Diabetes Care Switzerland

Lausanne, Switzerland

Embedded Software Engineer & Technical Lead (Ref. Patrick Segura) *December 2022 - June 2025*

- **Clinical Trial Leadership:** Led firmware development for Sigi™ insulin pump delivering FDA-compliant system for First In Human clinical trial, ensuring ISO-13485/IEC-62304 compliance with comprehensive regulatory documentation
- **Technical Documentation System:** Designed and prototyped RAG-based technical documentation search system for complex medical device specifications, implementing intelligent document retrieval to improve engineering team efficiency
- **Data Pipeline Development:** Implemented Hall effect signal modeling and data analysis pipelines using Python for simulation experiments and sensor validation in medical device applications
- **Production Systems:** Architected safety-critical software with 99.9% uptime, implementing comprehensive testing (96% coverage) and real-time monitoring
- **Cross-functional Leadership:** Organized and facilitated Scrum ceremonies (standups, sprint planning, retrospectives, demos) while coordinating with hardware, QA, regulatory affairs, and clinical teams across multiple time zones
- **Technical Infrastructure:** Developed comprehensive HIL (Hardware-in-the-Loop) test infrastructure achieving 96% code coverage, enabling automated firmware validation and accelerating development cycles by 40%
- **Embedded Architecture:** Designed and implemented embedded software architecture for medical device combining Bluetooth communication stack with real-time insulin delivery protocols and safety-critical algorithms

Signal Processing | Statistical Analysis | Production Systems | Team Leadership | Technical Training | Software Architecture | Testing Infrastructure | CI/CD | QMS | GitHub Actions | Grafana | Real-time Monitoring | Medical Device Development

IMD Business School

Lausanne, Switzerland

Lead AI/ML Instructor & Curriculum Designer (Ref. Marc Chauvet) *July 2018 - August 2021*

- **ML Curriculum:** Designed 40-hour hands-on curriculum covering supervised learning, neural networks, and PyTorch, achieving 4.8/5.0 rating from 100+ international executives
- **Technical Translation:** Developed innovative methods to explain backpropagation, attention mechanisms, and gradient descent to non-technical business leaders
- **Applied Projects:** Led implementation of business-focused ML projects including demand forecasting and sentiment analysis, with students presenting to C-suite
- **Advanced Pedagogical Skills:** Demonstrated advanced pedagogical skills in technical education, successfully translating complex ML algorithms into actionable business insights for diverse international professional backgrounds

PyTorch | Teaching | Neural Networks | Python | Curriculum Design | Technical Communication | Training Development | Cross-cultural Communication | Educational Content Creation

ADEPT Neuro SA

Lausanne, Switzerland

Research Project Student Intern (Ref. Dr. Jason Ruan) *September 2021 - March 2022*

- **Neural Signal Processing:** Performed time series analysis on 300+ parallel neural signals at 50-60Hz for epilepsy onset detection, implementing feature extraction algorithms for medical diagnostic applications
- **Signal Processing Pipelines:** Developed signal processing pipelines using Python visualization libraries for ASIC-based neural electrode data acquisition and analysis
- **Medical AI Algorithms:** Developed machine learning-based seizure detection algorithms achieving 87% accuracy with <100ms real-time processing latency
- **High-Frequency Processing:** Processed neural signals at 30kHz sampling rate contributing to 2 patent applications for novel electrode technology

Neural Signal Processing | Python | Machine Learning | Signal Processing Pipelines | Medical AI | Feature Extraction | Time Series Analysis | Seizure Detection | High-Frequency Processing | Data Visualization | Medical Diagnostics

Projects

Enterprise RAG System (Personal Portfolio Project)

June 2025 - Present

Github | **Demo**

- **Personal Portfolio Project:** Architected production RAG processing 10,000+ documents with hierarchical parsing and multi-stage query processing
- **Hybrid Retrieval:** Implemented hybrid retrieval: FAISS vector search + BM25 + neural reranking, achieving 94% relevance and <100ms latency
- **Auto-scaling Infrastructure:** Built auto-scaling infrastructure handling 1,000+ QPS with A/B testing framework improving satisfaction 35%
- **Enterprise Deployment:** Deployed enterprise solution with Weaviate integration and comprehensive LLM integration pipeline

RAG | FAISS | Vector Search | Neural Reranking | Production ML | NLP | LangChain | A/B Testing | Weaviate | Deployment | Query Processing | LLM Integration

MultiModal AI Research Implementation (Personal Project)

Feb 2025 - May 2025

Github

- **Transformer Implementation:** Implemented transformer architectures from scratch (Attention is All You Need) with multi-stage training pipeline
- **Multimodal Fusion:** Built CLIP and ViT implementations for vision-language tasks with cross-modal attention and progressive training stages
- **Safety Framework:** Developed Constitutional AI safety framework with red teaming suite testing 500+ adversarial cases
- **Performance Optimization:** Optimized for Apple Silicon achieving 6x inference speedup through custom MPS kernels and multi-stage optimization

Transformers | CLIP | ViT | Multimodal AI | PyTorch | Constitutional AI | Research Implementation | Multi-stage Training | Progressive Training | Model Optimization

Data-Driven Analysis of DeepWeb Marketplace Dynamics

2019

Demo | **Github**

- **Statistical Modeling:** Implemented statistical modeling pipeline to reconstruct missing marketplace data, addressing data sparsity challenges in large-scale behavioral datasets
- **Big Data Processing:** Built scalable data processing system using PySpark and distributed databases handling 1TB+ of historical marketplace data on standard hardware
- **Data Extraction Pipeline:** Developed comprehensive data extraction and cleaning pipeline processing mixed HTML content using BeautifulSoup and custom parsing algorithms
- **Interactive Visualization:** Created interactive JavaScript visualization dashboard demonstrating complex market dynamics and regulatory policy impact analysis
- **Statistical Analysis:** Conducted rigorous statistical analysis of police intervention effects on marketplace behavior, revealing no significant long-term market disruption

Statistical Modeling | Data Engineering | PySpark | Distributed Computing | Big Data Analytics | ETL Pipelines | Data Quality | Exploratory Data Analysis | Time Series Analysis | A/B Testing | Data Visualization | D3.js | Behavioral Analytics | Causal Inference

Education

EPFL — *Lausanne, Switzerland*

Master's in Computer Science and Engineering

2019 - 2022

Data Science specialization with Machine Learning research and production deployment experience

HEIG-VD — *Yverdon-les-Bains, Switzerland*

Bachelor's in Computer Science, Major in Embedded Systems

2016 - 2018

High-performance computing foundation with hardware acceleration and parallel processing experience