Nishal Stanislaus Silva, *PhD*

Research Engineer | Real-Time ML, DSP & Time-Series | Music Technology

Canadian Permanent Resident · Eligible to work in Canada without sponsorship

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Professional Summary

Cross-domain Machine Learning Engineer and PhD researcher with 10+ years across industry and academia. I build end-to-end ML systems; from data acquisition and feature engineering to training, deployment, monitoring, and iteration. My work spans music technology (audio + gesture/sensor ML), computer vision for industrial inspection and retail analytics, and time-series pattern detection. I work closely with product, data, and engineering teams to turn ambiguous problems into measurable outcomes. Published researcher with a track record translating research into production grade, measurable outcomes (<30ms real-time inference, >90% F1, and up to 300% efficiency improvement in deployed industrial solutions).

Core Competencies

Machine Learning, Deep Learning, Computer Vision, Analytical Thinking, Decision Making, Signal Processing / DSP, Algorithm Design, Time Series Analysis, Pattern Detection, Sequential Data Modeling, Benchmarking & Ablations, Feature Engineering, Model Architecture Design, Model Evaluation, Real-Time / Low-Latency Inference, Multimodal Data Analysis, Anomaly Detection, Experimental Design, Product Development, Technical Writing, Peer-Reviewed Publications

Education

Ph.D - Information Engineering and Computer Science - *University of Trento, Italy* — *Jan 2025*

M.Sc - Telecommunication and Electronic Engineering - *Sheffield Hallam University, UK* — *Aug 2018*

B.Eng (Hons) - Electronic Engineering - *Sheffield Hallam University, UK* — *Mar 2014*

Technical Stack

Languages: Python, C++, C, JavaScript, MATLAB, C#
ML & AI: TensorFlow, Keras, scikit-learn, Time Series Modeling, Anomaly Detection, NLP, Pattern Recognition
Signal & Audio Processing: DSP, Librosa, SciPy, JUCE, Elk Audio OS, Real-Time Signal Analysis, IoT Analytics
Data & Cloud: AWS (EC2, S3, ECS, MWAA, RDS), Snowflake, NumPy, Pandas, ETL Pipelines
MLOps & Dev: Docker, Apache Airflow, Jenkins, Git, Linux/UNIX, OpenCV

Research and Work Experience

Postdoctoral Researcher | *University of Trento, Trento, Italy* — *Jan 2025 – Dec 2025*

- Led end-to-end ML pipeline development for streaming audio, sensor, and gesture data (EU-funded MUSMET project), spanning data acquisition, signal processing, feature engineering, model training/evaluation, and low latency deployment with monitoring.
- Built and optimized real-time inference services achieving < 30ms latency in operation while maintaining > 90% accuracy (F1 score), enabling innovative smart musical instrument and immersive performance prototypes.
- Designed benchmark suites (baselines + ablations) to quantify architecture/feature tradeoffs and drive system level decisions under latency/compute constraints.
- Led technical execution with academic and industry partners, translating research prototypes into maintainable components with reproducible pipelines and deployment documentation.

Visiting Researcher | *McGill University, Montreal, Canada* *May 2024 – Aug 2024*

- Prototyped and evaluated a real-time gesture detection ML system on multimodal sensor + time-series data; assessed deployment feasibility and compute trade-offs for near real-time inference.
- Investigated synthetic data generation (generative and sampling based approaches) to improve robustness under limited labeled data regimes.

Visiting Researcher | *University of Visual and Performing Arts, Colombo 02, Sri Lanka* *Jan 2024 – Mar 2024*

- Ran human-centered evaluations of ML-driven interactive systems, combining performance metrics and user feedback to produce actionable recommendations on usability, interpretability, and adoption.

Technical Consultant | *Forestpin (Pvt) Ltd, Colombo 05, Sri Lanka* *Aug 2020 – Feb 2021*

- Designed and deployed ML and statistical modeling pipelines for financial forensics, compliance monitoring, and risk detection on large structured datasets.
- Built Python-based backend scoring services to flag anomalies and support triage in production systems.

Research Engineer | *MAS Holdings (Pvt) Ltd, Colombo, Sri Lanka* *Jan 2015 – Jul 2020*

- Owned end-to-end development and deployment of ML/CV automation systems for manufacturing, integrating camera + sensor streams into production workflows; improved operational efficiency by up to 300%.
- Built real-time data ingestion systems and ETL pipelines for large scale IoT and operational time-series data across geographically distributed sites; implemented quality checks and monitoring to maintain reliability.
- Developed ML-driven optimization and decision engines to support real-time monitoring and long-term capacity and efficiency planning using streaming machine and sensor data.
- Developed low latency inspection models with human-in-the-loop decision making, increasing throughput while managing operational risk.
- Authored technical documentation and delivered internal training to accelerate adoption of ML-driven systems across engineering and operations teams.

Selected Publications (full list of publications available at: *nishal.xyz/publications*.)

- Silva, N. and Turchet, L. *Real-Time Audio Pattern Detection for Smart Musical Instruments*. Journal of the Audio Engineering Society, Feb 2026.
- Silva, N., Wanderley, M. and Turchet, L. *Melody and Motion: Integrating Guitar Gesture Detection with Musical Patterns for Extended Control....* IEEE International Symposium on the Internet of Sounds, Oct 2025.
- Silva, N., Boem, A., and Turchet, L. *Interactive IoMusT-Based Concerts: Real-Time Pattern Recognition and Audience Experience*. International Conference on Immersive and 3D Audio, Sep 2025.

Independent Research , Awards, Volunteer Work, & Extracurriculars

- **MIDI Innovation Awards:** Finalist (Sep 2023): Real-time symbolic pattern detection system for smart instruments.
- **GMOA Recognition (Sri Lanka):** Computer vision system for COVID-19 patient vitals monitoring, deployed across hospital wards during the pandemic; enabled remote monitoring and reduced healthcare worker exposure.
- Built real-time audio feature extraction and musical pattern recognition for smart/embedded instruments, targeting low-latency inference under constrained compute.
- Prototyped multimodal gesture detection for interactive ML systems integrating audio, motion, and control signals.
- Actively researching on foundation and generative models for music generation and synthetic musical variation.
- Performing guitarist; music-tech projects inform applied ML for human-AI interaction and real-time systems.