BAS MAAT

AI Research Engineer & Full-Stack Developer

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SUMMARY

AI Engineer with experience across the full model lifecycle: from designing novel neural network architectures and training on multi-GPU HPC clusters (DGX B200, Snellius) to deploying production RAG systems and real-time audio plugins. I have published research on discrete probability distributions for neural networks, secured an NWO research grant, and shipped generative AI products used by hundreds of concurrent users. Core domains: Generative AI, AI-driven Audio/Music, and Agentic LLM systems.

SKILLS

Languages:	Python, C++, JavaScript, Node.js, SQL, R, JUCE
AI & Stack:	PyTorch, LangChain, RAG, Agentic Workflows, Vector DBs, Huggingface, WandB, ONNX
Infra/Ops:	NVIDIA DGX, Kubernetes, Run:AI, Slurm, Docker, GCP, Azure, Databricks, CI/CD

PUBLICATIONS

2026

Predicting Integers from Continuous Parameters
Under review at TMLR

arXiv: 2602.10751 Introduced **Dalap** (Discrete Analogue of Laplace) and **Bitwise** distributions, enabling backpropagation through strictly integer-constrained domains. Demonstrated that Dalap matches state-of-the-art results (PixelCNN++) in negative log-likelihood while maintaining differentiability; proved Bitwise distributions outperform in high-entropy scenarios.

```
Statistical Modeling  /  Distribution Theory  /  PyTorch
```

EXPERIENCE

2024 – present
The Netherlands

AI Engineer
TU Eindhoven

I operate at the intersection of HPC infrastructure and Applied AI development:

- **HPC Infrastructure:** Spearheaded the deployment of the Netherlands' first NVIDIA DGX B200 system. I manage the Kubernetes/Run:AI environment and containerized workloads, supporting XX+ researchers and ensuring critical research uptime.
- **Applied LLM Engineering:** Developing an internal "AI for Researchers" platform serving 200+ users. I build Agentic AI workflows and RAG systems for secure, hallucination-resistant interaction with private university data across 100+ document collections with each containing hunders of documents.

```
Agentic AI  /  RAG  /  NVIDIA DGX  /  Kubernetes  /  Run:AI  /  LangChain
```

2021 – Present
Remote / Hybrid

Freelance AI Engineer & Researcher
Various Clients (Thunderboom, SETUP)

I provide end-to-end AI consulting, moving from concept to custom model training and full-stack implementation.

- **Thunderboom Records:** Engineered "MusicGen VST," wrapping a Meta foundation model into a C++ plugin for real-time production. Presented at Dutch Design Week 2024.
- **SETUP:** Architected "Smartlappen.ai," a GPT-2 based co-writing tool for Dutch folk songs. Scaled the GCP infrastructure to handle 200+ concurrent users during live festival events.

```
Full-Stack AI  /  Model Fine-tuning  /  Consultancy  /  Cloud Architecture
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2023 – 2024
The Netherlands

Research Assistant (Deep Learning)
VU Amsterdam - Network Institute

Co-developed the **MIDIGPT** project. I focused on the mathematical modeling of sequential data, specifically designing Transformer architectures to capture the micro-timing and expressive nuances of musical structures. This role required translating music theory concepts into learnable tensor representations which would be understandable by transformer models. We were granted an NWO small grant to carry out the research (equivalent to 30k euro) which allowed me to carry out distributed workloads across many H100 GPUs on the Dutch supercomputer Snellius.

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PyTorch  /  Transformers  /  Sequential Modeling  /  WandB  /  SLURM  /  Snellius  /
Distributed training
```

2022 – 2025
The Netherlands

Database Manager
MediaOcean

Maintained database operations and provided technical support for advertising invoicing systems. `SQL`

2017 – 2024
The Netherlands

Technical Lecturer & Assistant
VU Amsterdam, HKU, CvA

Led workgroups and co-designed courses across three institutions. At **VU Amsterdam**: taught Deep Learning, ML, NLP, and ML & Security; co-designed NLP and ML & Security curricula. At **HKU**: guided advanced C++/VST projects in Creative System Design and delivered guest lectures on AI for creative practitioners. At the **Conservatorium van Amsterdam**: delivered guest lectures on how emerging technology is reshaping music education.

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Academic Teaching  /  NLP  /  ML Security  /  C++  /  Leadership
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2019 – 2020 Barcelona, Spain	**Research Assistant (Audio Analysis)**	**Music and Technology Group**

Tackled polyphonic audio transcription (MIR). Designed MLP models to deconstruct complex audio signals, pioneering the use of Python-based audio analysis to transcribe simultaneous notes from single-source audio.

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Scikit-Learn  /  DSP  /  Audio Analysis  /  Tensorflow
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PROJECTS

Generative AI / Dev
2024 - 2025

MusicGen VST — github.com

Pioneered the integration of state-of-the-art AI into practical music production workflows. I translated Meta's complex MusicGen model from a research paper into a seamless, accessible VST plugin, removing technical barriers for producers to use Generative AI directly in their DAWs. Crucially, I engineered the system to be license-free, solving a major industry pain point by guaranteeing producers full ownership of their creations. Commissioned by Thunderboom Records and presented at the **Dutch Design Week 2024**.

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C++  /  JUCE  /  ONNX  /  Model Quantization  /  Real-time Audio
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Generative AI / Research
2023

Disco GAN — setup.nl

Developed 'Disco GAN,' an experimental model addressing the challenge of generating high-fidelity results from small, highly specific datasets. The project explored abstract AI applications by attempting to 'distill' the intangible atmosphere of a specific Dutch discotheque into visual art. I optimized the training pipeline using VAEs and GANs on HPC infrastructure (Slurm/Docker). This work was selected for presentation at the **Betweter Festival 2023**.

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GAN  /  VAE  /  HPC training  /  Docker  /  SLURM  /  PyTorch
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Dev / Automation
2024

DLVU Course Platform — dlvu.github.io

Architected a fully automated content pipeline for the VU Amsterdam Deep Learning course, transforming raw lecture materials into interactive, annotated web handouts. The system orchestrates GCP services to extract data from Google Slides and YouTube, utilizing OpenAI's Whisper for high-fidelity transcription and LLMs for semantic refinement. I engineered custom parsers—including specialized AppleScript modules for Keynote—to render complex slide decks (PowerPoint/Google/Keynote) into web-ready SVGs and animations, automatically deploying the final static site via GitHub Pages.

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Automation  /  GCP  /  OpenAI Whisper  /  AppleScript  /  CI/CD  /  Python
```

Generative AI / Dev
2021-2024

SETUP Smartlappen — smartlappen.ai

Built a full-stack generative AI platform for human-AI co-creation of Dutch "Smartlappen" (sentimental folk songs), pre-dating the public release of ChatGPT. I owned the entire stack—from frontend/backend development to GPT-2 fine-tuning—and scaled the infrastructure from a local on-prem server to a Google Cloud cluster handling 200+ concurrent users during live festival workshops.

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LLM Serving  /  GCP  /  Docker  /  NodeJS  /  GPT-2 Fine-tuning
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EDUCATION

09/2022 - 07/2024	**Master of Science - Artificial Intelligence**	**VU Amsterdam**

Specialized in Deep Learning, with a focus on generative and sequential models. A notable highlight included developing a predictive model for snoring behavior by analyzing temporal patterns in generic smartwatch tracking data.

09/2021 - 07/2022	**Pre-Master of Science - Artificial Intelligence**	**VU Amsterdam**

Completed an intensive fast-track program covering core AI foundations, including Statistics, Machine Learning, Data Structures & Algorithms, and Evolutionary Computing.

09/2017 - 07/2021	**Bachelor of Arts - Music and Technology**	**University of the Arts Utrecht (HKU)**

An interdisciplinary program combining audio engineering and software development. Focused on DSP and creative coding using C++, C, JavaScript, and Python, alongside professional music production.

LANGUAGES

Dutch - Native, **English** - C1, **Portuguese** - B1, **German** - B1