






Bernard Spiegl

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I am an enthusiastic, curious and adept researcher working on deep learning research with robust interdisciplinary background in neuroscience, vision, audio and language. To this end, my goal is to drive innovation through integration of domain-specific expertise with interdisciplinary insights.

EDUCATION

Master of Science - Signal Processing and Data Science *with honours* | Aalto University | Helsinki, Finland **2021 — 2023**
minors in Human Neuroscience and Technology; Acoustics and Audio Technology

- Thesis: Palette View Synthesis - Novel View Synthesis using Diffusion Probabilistic Modelling
- Advisors: Stéphane Deny and Alexander Ilin

Bachelor of Science - Computer Science | University of Zagreb | Zagreb, Croatia **2018 — 2021**

- Thesis: Contrastive Learning for Image-to-Image Translation
- Advisor: Siniša Šegvić

PROFESSIONAL EXPERIENCE

Researcher | Aalto University | Helsinki, Finland **OCT 2023 — PRESENT**

- Developed and released state-of-the-art generative, diffusion-based method for novel view synthesis, ViewFusion implemented using Python and PyTorch. - [\[github\]](#)
- Scaled up our method to operate on 1.5TB Objaverse dataset by leveraging a customized, fine-tuned diffusion model parallelized on LUMI supercomputer.

Research Assistant | Aalto University | Helsinki, Finland **APR — JUN 2022**

- Developed TensorFlow based generative deep neural network architecture combining VQ-VAE and an autoregressive transformer to simulate musical call and response interaction and provide interpretability.
- Research project on application of deep learning for music and creative processes coordinated by Koray Tahiroğlu in collaboration with Google Brain (Magenta Team). - [\[project page\]](#)

Data Scientist Intern | RealNetworks Inc. | Zagreb, Croatia **JUL — AUG 2021**

- Implemented, prototyped and fine-tuned large-scale deep learning architectures (vision transformers, EfficientNets and other CNNs) for speech classification in order to enable real-time robocall detection for the US telecommunications carriers.

Software Engineering Intern | Koncar – Electrical Industry Inc. | Zagreb, Croatia **JUL 2019; JUL — AUG 2020**

- Developed a Python and PyQt based GUI client for real-time network communication via Modbus protocol including network communication module and interactive user interface accompanied by unit tests. - [\[github\]](#)
- Developed a real-time communication and data management web application for SCADA based wind turbine systems.

PUBLICATIONS

ViewFusion: Learning Composable Diffusion Models for Novel View Synthesis | ICML 2024 submission - [\[PDF\]](#) [\[github\]](#) **FEB 2024**
Bernard Spiegl, Andrea Perin, Stéphane Deny, Alexander Ilin

Contrastive Unpaired Translation using Focal Loss for Patch Classification | technical report - [\[PDF\]](#) **SEP 2021**
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PROJECTS

Decoding the Human Brain - [\[github\]](#)

- Series of algorithms for fMRI data analysis and brain decoding based on generalized linear models, region of interest analysis, classification analysis and representational similarity analysis.

Audio Signal Processing Algorithms - [\[github\]](#)

- Series of python implementations of audio signal processing algorithms such as two-band equaliser, onset detection, FM synthesis, etc. Part of Audio Signal Processing course at Aalto University by Prof. Vesa Välimäki.

Spoken Language Understanding - SpeechBrain contribution

- Performed extensive grid-search and fine-tuning on models for spoken language understanding, contributing to SpeechBrain model database for spoken language understanding. Advised by Aku Rouhe.

Crime and Socio-Economic Factor Analysis in Chicago - [\[github\]](#)

- Extensive statistical analysis of crime rates in Chicago using R including statistical testing, significance analysis and model fitting.

TEACHING EXPERIENCE

Teaching Assistant (CS-E4890 - Deep Learning course, Prof. Alexander Ilin) | Aalto University | Helsinki, Finland **2023; 2024**

- Coordinated weekly TA sessions for over 400 enrolled students.
- Introduced experimental flipped classroom paper reading sessions for enthusiastic students.

Undergraduate Teaching Assistant | University of Zagreb | Zagreb, Croatia

FEB 2019 — JUL 2019

- Assisted students during laboratory exercises in Fundamentals of Electrical Engineering.

ACHIEVEMENTS

HIIT Funding Received 15,000€ MSc thesis funding from Helsinki Institute for Information Technology. **2023**

Dean's Incentive Scholarship Received Aalto University scholarship for good academic progress. **2022; 2023**

STEM Scholarship Received a scholarship for being among the top 5% students on matriculation exam in fields of Mathematics and Physics. **2018**

LEADERSHIP

Head of Maintenance & Project Lead | Teekkaripurjehtijat ry | Helsinki, Finland **2023 — 2024**

- Managed and executed a sustainable electric sailboat refurbishment project valued at over 20,000€ in a student sailing club.
- Lead a core team of five people managing over 50 participants for the duration of the project.
- Secured 4,500€ in external project funding.

Ambassador | United Nations Office on Drugs and Crime | Vienna, Austria

MAR 2018

- Represented Croatia at an international youth forum, organised by the UNODC in the margins of 61st session of the Commission on Narcotic Drugs, delivering a statement to the policy making body and giving an interview. - [\[link\]](#)

SKILLS AND INTERESTS

Languages Fully proficient in Python (NumPy, PyTorch, TensorFlow, Pandas, Jupyter, matplotlib, scikit-learn, asyncio); intermediate in C/C++, SQL, R, MATLAB, Java, bash; working knowledge of web stack (JS, HTML, CSS)

Technologies Git, Slurm (multi-node, multi-GPU experiments) , Cluster Computing (Distributed Training, Dataset Sharding, etc.), Containers (Singularity, Docker)

Professional Interests Machine Learning, Deep Learning, Computer Vision, Neuroscience

Personal Interests Sailing, Music Production and Sound Design, Guitar and Piano Playing

Natural Languages Croatian (native), English (fluent), German (limited), Italian (limited), Finnish (basic)