Axel **Faes**

Machine Learning Engineer · PostDoctoral Researcher · Scientific Coordinator

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Work & Research Experience

Postdoctoral Researcher: Scientific Coordinator and Artificial Intelligence — *UHasselt*
- Scientific Coordinator of the Flanders AI Research program, Use Case Real World Evidence.
- Technical Machine Learning lead of the Biomedical Data Sciences Group, UHasselt

January 2024 - Current

Postdoctoral Researcher: Brain-Computer Interfacing and Machine Learning — *KU Leuven*
- Project: "Sign Language Alphabet decoding from intracranial brain activity"
- Group: Prof. Marc van Hulle, Computational Neuroscience, Laboratory for Neuro-and Psychophysiology, KU Leuven

May 2023 - January 2024

Web Performance Research Internship — *UHasselt*
- I worked on the iMinds PRO-FLOW project @ Expertise centre for Digital Media (EDM)
- focus on the difference between the http versions (http1.1, https, http2).

Jul. 2016 - Sep. 2016

Summer Research Internship Physical Computing — *UHasselt*
- Interfacing between human entity, a drone and virtual objects @ Expertise centre for Digital Media (EDM).
- (C++, Optitrack motion capture, custom built drone)

Aug. 2015 - Sep. 2015

Educational background

Doctoral Programme in Biomedical Science (PhD) in Computational Neuroscience — *KU Leuven*
- Cognitive and Molecular Neuroscience
- PhD Thesis: Finger Movement Decoding: From Source-Localisation to Tensor Regression Modelling

Sep. 2018 - May 2023

Advanced Master of Science in Engineering (M.Sc.) in Artificial Intelligence — *KU Leuven*
- Engineering and Computer Science
- Thesis: An Information Theoretical Approach to EEG Source-Reconstructed Connectivity (on Github)

Sep. 2017 - Jul. 2019

Honoursprogramme of the Faculty of Engineering Science (Research Track) — *KU Leuven*
- Research Assistant: design of type-&-effect system for Eff based on row polymorphism
- Research Assistent: efficient compilation of algebraic effect handlers (in Eff)

Sep. 2016 - Oct. 2018

Master of Science in Engineering (M.Sc.) in Computer Science (Burgelijk Ingenieur - ir.) — *KU Leuven*
- Artificial Intelligence & Theoretical Computer Science
- Thesis: Algebraic Subtyping for Algebraic Effects and Handlers (on Github)

Sep. 2016 - Sep. 2018

Business Summer School: United in Manchester (0739) — *The University of Manchester*
- International Business

Jul. 2015 - Aug. 2015

Bachelor of Science (B.Sc.) in Computer Science — *UHasselt*
- Physics and General courses
- Thesis: Machine learning techniques for flow-based network intrusion detection systems (on Github)

Sep. 2013 - Jul. 2016

Projects

Cardinal: scripting language — *Lead Developer*
- Written in C (and since 2023, in C++14). High performance (on par with Luajit 2.1 -joff).

Jan. 2015 - Current

Reinforcement Learning Agent in Google Deepmind's StarCraft II Framework — *Developer*
- Implement reinforcement learning algorithms in PySC2 utilising the KU Leuven supercomputer.

Feb. 2018 - Jul. 2018

IoT-platform with pluggable sensors — *Developer*
- Showcase large-scale use of Internet of Things sensors

Feb. 2017 - Jul. 2017

ICAL parser for KU Leuven schedules — *Lead Developer*
- An nodejs application to create an iCalender file for courses at KU Leuven. (>1000 active users)

Aug. 2016 - Current

Search and Recommendation System — *Team Member*
- A search and recommendation system for VoD (Video on Demand) for Androme.
- In production in the Nebula project.

Feb. 2016 - Jul. 2016

Technologies and Tools for User Interfaces: Household Survival — *Researcher*
- A tower-defense game written in Unity utilising Optitrack motion capture.
- Combine the virtual world and reality using augmented reality

Sep. 2015 - Dec. 2015

Visual Programming IDE — *Developer*
- A Visual programming IDE (Java)

Feb. 2015 - Jul. 2015

Honors & Awards

Mar. 2018	**Finalist**, Cyber Security Challenge	*Brussels, Belgium*
Sep. 2017	**3rd place**, ICFP 2017 Student Research Competition	*Oxford, UK*
Jul. 2016	**Bachelor Award**, in Computer Science	*UHasselt, Belgium*
May. 2016	**3rd place**, ACM CHI 2016 Student Design Competition (Interaction Design and User Experience.)	*San Jose, CA, USA*
Feb. 2016	**2nd place**, BeGDC (Belgian Game Development Championship)	*Brussel, Belgium*
Jan. 2016	**IELTS**, Academic Module (8.0/9.0)	*Brussel, Belgium*

Extracurricular Activities

DjangoGirls	**Coach**, Inspire women to fall in love with programming (Python, Django workshops)	*Mar. 2018 - Current*
CoderDojo	**Coach**, Teach children programming (Scratch, Python, Minecraft and Lego mindstorm).	*Sep. 2014 - Current*

Publications

International Journal Papers

[1] **Axel Faes, Marc M. Van Hulle**, "Finger movement and coactivation predicted from intracranial brain activity using extended Block-Term Tensor Regression", Journal of Neural Engineering.

[2] **Axel Faes, Flavio Camarrone, Marc M. Van Hulle**, "Single finger trajectory prediction from intracranial brain activity using Block-Term Tensor Regression with fast and automatic component extraction", IEEE Transactions on Neural Networks and Learning Systems.

[3] **Axel Faes, Aurelie de Borman, Marc M. Van Hulle**, "Source space reduction for eLORETA", Journal of Neural Engineering.

[4] **Axel Faes, Iris Vantieghem, Marc M. Van Hulle**, "Neural Networks for Directed Connectivity Estimation in Source-Reconstructed EEG Data", Applied Sciences.

Conference Papers

[5] **Robin Marx, Maarten Wijnants, Peter Quax, Axel Faes, Wim Lamotte**, "Web Performance Characteristics of HTTP/2 and comparison to HTTP/1.1", International Conference on Web Information Systems and Technologies, pg 87-114.

[6] **Robin Marx, Peter Quax, Axel Faes and Wim Lamotte**, "Concatenation, embedding and sharding: Do HTTP/1 performance best practices make sense in HTTP/2?", WEBIST 2017 - Proceedings of the 13th International Conference on Web Information Systems and Technologies.

Extended Abstracts

[7] **Axel Faes, Mansoureh Fahimi Hnazaee, and Marc M. Van Hulle**, "Causal Graphical Modelling of Functional Connectivity from Reconstructed EEG Sources", 8th International BCI Meeting (2021).

[8] **Axel Faes and Tom Schrijvers**, "Towards a Core Language with Row-Based Effects for Optimised Compilation", International Conference on Functional Programming 2017 Student Research Competition.

[9] **Kashyap Todi, Brent Berghmans, Axel Faes and Matthijs Kaminski**, "Purpose-Centric Appropriation of Everyday Objects as Game Controllers", CHI EA '16: Extended Abstracts of the SIGCHI Conference on Human Factors in Computing Systems. Late Breaking Work.

[10] **Kashyap Todi, Donald Degraen, Brent Berghmans, Axel Faes, Matthijs Kaminski and Kris Luyten**, "Household Survival: Immersive Room-Sized Gaming Using Everyday Objects as Weapons", CHI EA '16: Extended Abstracts of the SIGCHI Conference on Human Factors in Computing Systems. Student Game Competition.

Thesis

[11] **Axel Faes**, "Finger Movement Decoding: From Source-Localisation to Tensor Regression Modelling", PhD Thesis 2023.

[12] **Axel Faes**, "An Information Theoretical Approach to EEG Source-Reconstructed Connectivity", Advanced Master's Thesis 2018.

[13] **Axel Faes**, "Algebraic Subtyping for Algebraic Effects and Handlers", Master's Thesis 2018.

[14] **Axel Faes**, "Machine learning techniques for flow-based network intrusion detection systems", Bachelor's thesis 2016.

Posters

[15] **Axel Faes and Tom Schrijvers**, "Towards a Core Language with Row-Based Effects for Optimised Compilation", International Conference on Functional Programming 2017 Student Research Competition.

Other publication

[16] **Matija Pretnar, Amr Hany Shehata Saleh, Axel Faes and Tom Schrijvers**, "Efficient compilation of algebraic effects and handlers", 2017 - CW Reports, CW708, 32 pp. Leuven, Belgium: Department of Computer Science, KU Leuven..

Talks, presentations and other media

Apr. 25, 2023	"voordracht met als titel "Decoding finger movements from invasive recordings in human motor cortex", Mindseed event Leuven", georganiseerd door NeuroTech Leuven.
May. 11, 2022	"BCI demo op Advanced Engineering, Antwerp Expo,", georganiseerd door AI Vlaanderen, Vlaanderen Industrie 4.0.
Nov. 28, 2021	"BCI demo op de "Dag van de Wetenschap", georganiseerd door Technopolis", georganiseerd door Technopolis (geannuleerd wegens de covid-19 situatie).
Nov. 07, 2019	"voordracht met als titel "'MINDSPELLER' Medical Research Project on Brain Computer Interfaces" \& concert (in samenwerking met Tigran Maytesian en zijn Mind Speller Chamber Orchestra)", Kathedraal van Sint-Michiel en Sint-Goedele, Brussel.
Sep. 19, 2017	"Honours student Axel Faes wins bronze medal in ACM SIGPLAN", KU Leuven, Department of Computer Science.
Sep. 19, 2017	"Student Axel Faes wins bronze medal in the ACM SIGPLAN Student Research Competition in ICFP conference", KU Leuven, Department of Computer Science, DTAI.