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

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.