ALEXANDER NEERGAARD ZAHID

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SUMMARY

Biomedical engineer and data scientist with 10 years of research experience within biomedical signal processing and analysis, and 8 years of experience in designing and implementing machine learning/deep learning models with biomedical applications. Extensive experience in computational sleep science, i.e. designing and implementing algorithms for automated modeling, annotation, and analysis of electrophysiological sleep signals, as well as general full-stack data analysis and visualization in Python/MATLAB. Seeking new opportunities within industrial research and development.

EMPLOYMENT HISTORY

Technical University of Denmark Sep 2021–present
Postdoctoral researcher, Department of Applied Mathematics and Computer Science Kgs. Lyngby, DK

- LF Postdoc 2021: *Learning the Content and Style of Brain Responses.*
- Primary goal was to design a model capable of separating latent factors relating to brain states and individual variability in brain signals, which was presented at NeurIPS 2023.
- Co-authored and published 3 peer-reviewed journal papers and 8 abstracts.
- Co-supervised 3 BScEng, 4 MScEng, and 2 PhD students.

Stanford University May 2020–Sep 2021
Postdoctoral researcher, Stanford School of Medicine Copenhagen, DK (remote position)

- Joint program with Takeda Pharmaceuticals.
- Co-lead on project related to improving the diagnosis of narcolepsy type 1 using single-night PSG and genetic factors, which was presented in preliminary form at World Sleep 2023.

Technical University of Denmark 2016–2020
PhD student, Department of Health Technology Kgs. Lyngby, DK

- Joint PhD program with Stanford School of Medicine and Rigshospitalet Glostrup.
- Developed deep learning models for various aspects of clinical sleep research, including sleep stage scoring, sleep event detection and sleep disorder diagnosis.
- Co-authored and published 11 peer-reviewed papers and 6 abstracts.
- Presented my work at several high-profile conferences in sleep science and biomedical engineering.

Trackman 2016
Development Engineer Vedbæk, DK

- Designed a novel algorithm for time-of-impact estimation of golf putting strokes using radar data.
- Designed and built a custom setup for recording simultaneous radar tracker and video for putting strokes.

Cathvision 2016
Development Engineer (internship) Copenhagen, DK

- Developed custom communication protocols for interfacing with ECG ablation devices.

Technical University of Denmark 2012–2015
Teaching assistant, Department of Electrical Engineering Kgs. Lyngby, DK

- Facilitated lab exercises and graded assignments in courses on analog and digital signal processing, biomedical imaging, engineering mathematics, physics, electric circuits, programming,

Oticon 2015–2015
Student assistant Smørum, DK

Novo Nordisk 2013–2014
Student assistant Måløv, DK

Købmanden i Søllerød 2009–2014
Assistant Manager Søllerød

EDUCATION

Technical University of Denmark 2016–2020
PhD, Biomedical Engineering Kgs. Lyngby, DK
Thesis title: *Deep Learning Methods for Clinical Sleep Analysis*
Advisors: Assoc. Prof. Helge B. D. Sørensen, Prof. Poul Jennum, Prof. Emmanuel Mignot

Stanford University 2017–2019
Visiting Student Researcher hosted by Prof. Emmanuel Mignot during PhD studies. Palo Alto, CA, USA

Technical University of Denmark 2013–2016
MScEng, Biomedical Engineering Kgs. Lyngby, DK
Thesis title: *Electrooculography-based Detection and Characterization of Sleep Stages in Patients with Narcolepsy*
Advisors: Assoc. Prof. Helge B. D. Sørensen, Prof. Poul Jennum

Stanford University 2014
Visiting Student Researcher hosted by Prof. Emmanuel Mignot during MScEng studies. Palo Alto, CA, USA

Technical University of Denmark 2010–2013
BScEng, Biomedical Engineering Kgs. Lyngby, DK

TECHNICAL SKILLS

Programming languages	Python, MATLAB, R, C++.
Machine learning libraries	PyTorch, Keras, TensorFlow, scikit-learn, wandb
Python libraries	Numpy, Scipy, Pandas, MNE, various
Developer tools	UNIX shell/bash, git, HPC systems, LaTeX
Operating systems	Linux (Ubuntu, CentOS), Mac OS X, Microsoft Windows
Languages	danish (native), english (fluent), french (basic), german (basic).

SUPERVISION

PhD

- **Javier García Ciudad** 2023–present
  Co-supervised with Prof. Morten Mørup and Prof. Birgitte Kornum.
- **Laura Rose** 2021–present
  Co-supervised with Prof. Morten Mørup and Prof. Birgitte Kornum.

MSc

- **Anders Vestergaard Nørskov** 2024–present
  Thesis title: *Diffusion models for EEG denoising*
  Co-supervised with Prof. Morten Mørup.
- **Marius Jonika** Spring 2023
  Thesis title: *Sleep Spindle Detection and Characterization using Deep Learning*
  Co-supervised with Prof. Morten Mørup.
- **Anna Chukwunonso Eze** Spring 2023
  Thesis title: *Characterizing subject and task responses in electroencephalography data using deep autoencoders*
  Co-supervised with Prof. Morten Mørup.
- **Javier Garcia Cíudad** Fall 2022
  Thesis title: *Modeling Electroencephalography Data using Deep Learning and Explainable AI*
  Co-supervised with Prof. Morten Mørup and Prof. Birgitte Kornum.
- **Kristina Pilgaard Jacobsen** 2018
  Thesis title: *Automatic Detection of Respiratory Events During Sleep*
  Co-supervised with Prof. Emmanuel Mignot, Prof. Poul Jennum, and Assoc. Prof. Helge B. D. Sørensen

BSc

- **Peter Fabritius Hulgaard & Mark Yishi Chen** Spring 2023
  Thesis title: *Detection of sleep events in polysomnographic data using transformers*
  Co-supervised with Prof. Morten Mørup.
- **Anders Vestergaard Nørskov** 2022–2023
  Thesis title: *Characterizing Biological Signatures and Individual Variability in EEG Data using Deep Learning*
  Co-supervised with Prof. Morten Mørup.

GRANTS AND AWARDS

Lundbeck Foundation: LF Postdoc Grant (DKK 2.4 mio)	2021
Best poster award: 37th National Meeting on Biomedical Engineering, DMTS'19 (DKK 1,000)	2019
Travel grant: Otto Mønsteds Fond (DKK 7,500)	2019
Travel grant: Otto Mønsteds Fond (DKK 7,500)	2018
Various travel grants for PhD research stay at Stanford University (total DKK 362,500)	2017
Travel grant: Otto Mønsteds Fond (DKK 9,076)	2016
Various travel grants for MScEng research stay at Stanford University (total DKK 141,500)	2014

SCIENTIFIC SERVICE

Volunteer work	EMBC'19
Review experience	Fondation Leenaards (grant), IEEE Journal of Biomedical Health Informatics (J-BHI), IEEE Access, Scientific Reports, SLEEP, IEEE Transactions on Neural Networks and Learning Systems (TNNLS), IEEE Transactions on Biomedial Engineering (TBME), Royal Society Open Science.

INVITED TALKS

26th Congress of the European Sleep Research Society — Sep 2022
Megaron – Athens Concert Hall — Athens, Greece

Danish Sleep Research Day — Nov 2021
Panum Institute — Copenhagen, DK

Danish Society for Neuroscience: Brain States and Beyond Symposium — Oct 2021
DGI-Byen — Copenhagen, DK

Annual Meeting of the Neuroscience Centre Faculty Group — Mar 2021
Neuroscience Centre, Rigshospitalet — Copenhagen, DK

LIST OF SELECTED PUBLICATIONS

*shared first authorship
626 citations, h-index 11, i-index 13, as of October 30, 2024 per Google Scholar.
Also published under Alexander Neergaard Olesen.

Pre-prints

· J. G. Ciudad, M. Mørup, B. R. Kornum, **A. N. Zahid**. Evaluating the Influence of Temporal Context on Automatic Mouse Sleep Staging through the Application of Human Models *Accepted for publication and presentation at IEEE EMBC'2024*.

2023

· A. V. Nørskov, **A. N. Zahid**, M. Mørup. CSLP-AE: A Contrastive Split-Latent Permutation Autoencoder Framework for Zero-Shot Electroencephalography Signal Conversion. Advances in Neural Information Processing Systems 36 (NeurIPS'2023), 13179-13199, 2023.

· **A. N. Zahid**, P. J. Jennum, E. Mignot, H. B. D. Sorensen. MSED: A multi-modal sleep event detection model for clinical sleep analysis. IEEE Transactions on Biomedical Engineering, vol. 70, no. 9, pp. 2508-2518, 2023. DOI:10.1109/TBME.2023.3252368.

2021

· **A. N. Olesen**, P. J. Jennum, E. Mignot, H. B. D. Sorensen. Automatic sleep stage classification with deep residual networks in a mixed-cohort setting. Sleep, Volume 44, Issue 1, January 2021, zsaa161. DOI:10.1093/sleep/zsaa161.

2020

· A. Ambati, Y.-E. Ju, L. Lin, **A. N. Olesen**, H. Koch, J. J. Hedou, E. B. Leary, V. P. Sempere, E. Mignot, S. Taheri. Proteomic biomarkers of sleep apnea. *Sleep*, Volume 43, Issue 11, November 2020, zsaa086. DOI:10.1093/sleep/zsaa086

· **A. N. Olesen**, P. Jennum, E. Mignot, H. B. D. Sorensen. Deep transfer learning for improving single-EEG arousal detection. 42nd Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC), Montreal, QC, Canada, 2020, pp. 99-103, DOI:10.1109/EMBC44109.2020.9176723

· A. Brink-Kjær, **A. N. Olesen**, P. E. Peppard, K. L. Stone, P. Jennum, E. Mignot, H. B. D. Sorensen. Automatic Detection of Cortical Arousals in Sleep and their Contribution to Daytime Sleepiness. Clinical Neurophysiology, 2020;131:1187-1203. DOI:10.1016/j.clinph.2020.02.027

· L. Carvelli, **A. N. Olesen**, A. Brink-Kjaer, E. B. Leary, P. E. Peppard, E. Mignot, H. B. D. Sorensen, P. Jennum. Design of a deep learning model for automatic scoring of periodic and non-periodic leg movements during sleep validated against multiple human experts. Sleep Medicine, 2020;69:109-119. DOI:10.1016/j.sleep.2019.12.032

2019

- **A. N. Olesen**, S. Chambon, V. Thorey, P. Jennum, E. Mignot, H. B. D. Sorensen. Towards a flexible deep learning method for automatic detection of clinically relevant multi-modal events in the polysomnogram. 2019 IEEE 41th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC), pp. 556-561, Berlin, Germany, 2019. DOI:10.1109/EMBC.2019.8856570

2018

- J. B. Stephansen*, **A. N. Olesen***, M. Olsen, et al. Neural network analysis of sleep stages enables efficient diagnosis of narcolepsy. Nature Communications, 9:5229, 2018. DOI:10.1038/s41467-018-07229-3
- **A. N. Olesen**, P. Jennum, P. E. Peppard, H. B. D. Sorensen, E. Mignot. Deep Residual Networks for Automatic Sleep Stage Classification of Raw Polysomnographic Waveforms. 2018 IEEE 40th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC), pp. 1-4, Honolulu, HI, USA, 2018. DOI:10.1109/EMBC.2018.8513080
- A. B. Klok*, J. Edin*, M. Cesari, **A. N. Olesen**, P. Jennum, H. B. D. Sorensen. A New Fully Automated Random-Forest Algorithm for Sleep Staging. 2018 IEEE 40th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC), pp. 4920–4923, Honolulu, HI, 2018. DOI:10.1109/EMBC.2018.8513413
- M. Cesari, J. A. E. Christensen, L. Kempfner, **A. N. Olesen**, G. Mayer, K. Kesper, W. H. Oertel, F. Sixel-Döring, C. Trenkwalder, H. B. D. Sorensen, and P. Jennum. Comparison of computerized methods for REM sleep without atonia detection. Sleep, Volume 41, Issue 10, zsy133, 2018. DOI:10.1093/sleep/zsy133
- **A. N. Olesen***, M. Cesari*, J. A. E. Christensen, H. B. D. Sorensen, E. Mignot, and P. Jennum. A comparative study of methods for automatic detection of rapid eye movement abnormal muscular activity in narcolepsy. Sleep Medicine, vol. 44, pp. 97–105, 2018. DOI:10.1016/j.sleep.2017.11.1141

2016

- **A. N. Olesen**, J. A. E. Christensen, H. B. D. Sorensen, and P. J. Jennum. A Noise-Assisted Data Analysis Method for Automatic EOG-Based Sleep Stage Classification Using Ensemble Learning. 2016 IEEE 38th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC), pp. 3769–3772, Orlando, FL, USA, 2016. DOI:10.1109/EMBC.2016.7591548