

Mikolaj Aleksander Kegler

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EDUCATION

- 10.2018 - 03.2022
(expected) **PhD in Neurotechnology**
Department of Bioengineering & Centre for Neurotechnology,
Imperial College London, UK
Thesis: *Modelling natural speech processing across human auditory pathways*, supervised by Prof. Tobias Reichenbach, Prof. Mauricio Barahona
- 10.2017 - 09.2018 **MRes in Neurotechnology (Distinction)**
Department of Bioengineering & Centre for Neurotechnology,
Imperial College London, UK
Thesis: *Computational model for the modulation of speech-in-noise comprehension through transcranial electrical stimulation*, supervised by Prof. Tobias Reichenbach, Prof. Mauricio Barahona, Prof. Robert Leech
- 10.2016 - 09.2017 **MSc in Biomedical Engineering (Distinction)**
Department of Bioengineering,
Imperial College London, UK
Thesis: *Complex statistical model for detecting the brainstem response to natural speech*, supervised by Prof. Tobias Reichenbach
- 10.2012 - 02.2016 **BEng in Biomedical Engineering (Distinction)**
Department of Mechatronics,
Warsaw University of Technology, Poland
Thesis: *Control system using lower limbs EMG signal to initialize movement procedures of exoskeleton*, supervised by Prof. Danuta Jasińska-Choromańska, Dr Krzysztof Fiolek

RESEARCH EXPERIENCE

- 10.2021 - present **Consultant - Clinical Data Analysis (remote)**
INBRAIN Neuroelectronics, Barcelona, Spain
Duties: Design and development of automated signal processing & analysis pipelines for neural data recorded using invasive probes.
- 11.2019 - present **Scientific Advisor - CTO office (remote)**
Logitech, Lausanne, Switzerland
Duties: Not-for-profit consultancy and contributions in collaborative applied research projects in the fields of audio/speech processing and human-computer interaction. Co-supervision of research interns.

- 06.2021 - 10.2021 **Applied Scientist Intern - Lab126** (remote)
Amazon, Sunnyvale, CA, USA
Duties: Development of deep learning algorithms (PyTorch) for low-latency, multi-channel speech enhancement. Preparation of publications (*ICASSP*).
- 06.2019 - 10.2019 **PhD Intern - CTO office**
Logitech, Lausanne, Switzerland
Duties: Development of deep learning algorithms (Tensorflow) for speech signal processing with a focus on speech enhancement, learning representation and transfer learning. Preparation of publications (*InterSpeech*, *EUSIPCO*).
- 04.2016 - 10.2016 **Research Assistant & Clinical Engineer**
Bioimaging Research Center, World Hearing Centre,
Institute of Physiology and Pathology of Hearing, Kajetany, Poland
Duties: Acquisition and analysis of neuroimaging data (EEG, fMRI, fNIRS) of hearing aid users & cochlear implant patients, as well as, normal-hearing adults & children. Active involvement in grant-funded research projects.

SKILLS & AREAS OF EXPERTISE

Machine learning and data analysis: Broad training in engineering & applied mathematics with focus on (bio)signal processing, data science and computational modelling. Demonstrable experience in developing custom machine- & deep learning algorithms (scikit-learn, PyTorch, Tensorflow/Keras).

Speech signal processing: Demonstrable experience in speech signal processing with particular focus on deep-learning-based speech enhancement, learning speech representation and paralinguistics.

Neurotechnology (methods): Computational neuroscience & modelling, electroencephalography (EEG), brain-computer interfacing (BCI), transcranial brain stimulation (TBS), electromyography (EMG).

Programming and computational methods: Demonstrable strong programming skills in Python and MATLAB, including many specialized packages/toolboxes/APIs. Basic programming skills in C/C++ and R. Demonstrable experience in processing large volumes of data and high-performance computing.

PUBLICATIONS (*-equal contribution)

Kulkarni, A., **Kegler, M.** & Reichenbach, T. (2021). Effect of visual input on syllable parsing in a computational model of a neural microcircuit for speech processing. *Journal of Neural Engineering*, 18, 056055. DOI: [10.1088/1741-2552/ac28d3](https://doi.org/10.1088/1741-2552/ac28d3)

Beckmann, P.*, **Kegler, M.***, & Cernak, M. (2021, in print). Word-level Embeddings for Cross-Task Transfer Learning in Speech Processing. *EUSIPCO 2021*. DOI: [arXiv:1910.09909](https://arxiv.org/abs/1910.09909)

Kegler, M. & Reichenbach, T. (2021). Modelling the effects of transcranial alternating current stimulation on the neural encoding of speech in noise. *NeuroImage*, 224, 117427. DOI: [10.1016/j.neuroimage.2020.117427](https://doi.org/10.1016/j.neuroimage.2020.117427)

Kegler, M.*, Beckmann, P.* & Cernak, M. (2020) Deep Speech Inpainting of Time-Frequency Masks. *Proc. Interspeech 2020*, 3276-3280, DOI: [10.21437/Interspeech.2020-1532](https://doi.org/10.21437/Interspeech.2020-1532)

Vanheusden, F., **Kegler, M.**, Ireland, K., Constantina, G., Reichenbach, T., Simpson, D.M. & Bell, S.L. (2020). Hearing aids do not alter cortical entrainment to speech at audible levels in mild-to-moderately hearing-impaired subjects. *Frontiers in Human Neuroscience*, 14, 109. DOI: [10.3389/fnhum.2020.00109](https://doi.org/10.3389/fnhum.2020.00109)

Keshavarzi, M., **Kegler, M.**, Kadir, S. & Reichenbach, T. (2020) Transcranial alternating current stimulation in the theta band but not in the delta band modulates the comprehension of naturalistic speech in noise. *NeuroImage*, 210, 116557. DOI: [10.1016/j.neuroimage.2020.116557](https://doi.org/10.1016/j.neuroimage.2020.116557)

Etard, O.*, **Kegler, M.***, Braiman, C., Forte, A.E. & Reichenbach, T. (2019). Decoding of selective attention to continuous speech from the human auditory brainstem response. *NeuroImage*, 200, 1-11. DOI: [10.1016/j.neuroimage.2019.06.029](https://doi.org/10.1016/j.neuroimage.2019.06.029)

Kegler, M., Jasińska-Choromańska, D. & Fiok, K. (2016). Possibilities of using electromyographic (EMG) biosignals in control systems. *Inżynier i Fyzyk Medyczny (eng. Medical Engineer and Physicist)*, 5(6), 329-334.

PREPRINTS & UPCOMING PUBLICATIONS

Kegler, M., Weissbart, H. & Reichenbach, T. (2021). The neural response at the fundamental frequency of speech is modulated by linguistic information. Under review at *NeuroImage*.

Kegler, M., Liu, Y., Milani, A., Pruthi, T. & Kristjansson, T. (2021). All-neural sidelobe canceller for target speech separation. Under review at *ICASSP 2022*.

Scheidwasser-Clow, N., **Kegler, M.**, Beckmann, P. & Cernak, M. (2021). SERAB: A multi-lingual benchmark for speech emotion recognition. Under review at *ICASSP 2022*. DOI: [arXiv:2110.03414](https://arxiv.org/abs/2110.03414)

ADDITIONAL EMPLOYMENT (selected)

09.2018 - 02.2021	Data Science Mentor Decoded , London, UK <u>Duties:</u> One-to-one personalized mentoring of professionals taking part in the <i>Data Academy</i> course covering a broad range of topics from the fields of data science, applied mathematics & statistics, and machine learning.
08.2014 - 09.2015	Assistant Field Service Engineer Candela , Warsaw, Poland <u>Duties:</u> Assistance in maintenance, service, quality assurance and risk management procedures for radio- & neurosurgery and dosimetry systems.

STIPENDS, AWARDS & ACHIEVEMENTS (selected)

2017 - 2022	<i>EPSRC Centre for Doctoral Training in Neurotechnology for Life and Health studentship</i> - £85,000
04.2021	Second prize for the best project at <i>g-tec international virtual BR41N.IO BCI hackathon</i> - \$600 (donated to Brain Research UK)
10.2020	Travel grant at <i>InterSpeech 2020</i> , Shanghai, China - \$190
01.2020	Travel award at <i>43rd Annual Midwinter Meeting of the Association for Research in Otolaryngology</i> , San Jose, CA, USA - \$500
11.2018	Travel award at <i>Attention to Sound - Royal Society Scientific Meeting</i> , Chicheley, UK - £300
09.2018	Best poster award at <i>BSA Basic Auditory Science Meeting 2018</i> , Newcastle, UK - £75
03.2017	First prize for the best algorithm at <i>Brain-Machine Interfaces student competition</i> , Imperial College London, UK - £100
02.2015 - 10.2016	<i>President's scholarship for exceptional academic results</i> , Warsaw University of Technology, Poland - £1,800
04.2014 - 10.2016	<i>Student research grants</i> , Warsaw University of Technology, Poland - £3,000

COMMUNITY SERVICE, TEACHING & PUBLIC ENGAGEMENT (selected)

Peer review	NeuroImage, Journal of Neural Engineering (<i>Trusted Reviewer</i>), Biomedical Physics & Engineering Express, Journal of Hearing Science
10.2017 - present	Graduate teaching assistant Department of Bioengineering & Department of Computing, Imperial College London, UK <u>Courses:</u> <ul style="list-style-type: none">• Machine Learning and Neural Computations (2017 - 2019)• Reinforcement Learning (2019 - 2021)• Statistics and Data Analysis (2018 - present)• Computational Neuroscience (2018 - present)• Brain-Machine Interfaces (2018 - present)• Hearing and Speech Processing (2018 - present)• Introduction to MATLAB (2020 - present)• Statistical and Computational Methods for Research (2021 - present)
07.2020	Organizing committee member <i>Neurotechnology Annual Research Symposium</i> , Imperial College London, UK
04.2018	Organizer of the Centre for Neurotechnology demo stand <i>Imperial Festival</i> , Imperial College London, UK
01.2013 – 10.2016	Member of the board Students Society for Biomedical Engineering, Warsaw University of Technology, Poland <u>Duties:</u> Leader of the fast-growing not-for-profit scientific student organization involved in public engagement and promotion of STEM through live demonstrations and talks. Co-author and co-investigator in student research grants.

PROFESSIONAL AFFILIATIONS

2020 - present	International Speech Communication Association (ISCA), student member
2017 - present	Association for Research in Otolaryngology (ARO), student member

LANGUAGES

English: Professional proficiency (Cambridge Certificate in Advanced English)

German: Elementary knowledge (Goethe-Zertifikat A1)

Polish: Native speaker

REFEREES

MSc, MRes & PhD supervisor: Prof. Tobias Reichenbach, Head of Sensory Neuroengineering group, Department for Artificial Intelligence in Biomedical Engineering (AIBE), Friedrich-Alexander-University (FAU) Erlangen-Nuremberg, Germany. Email: tobias.j.reichenbach@fau.de

INBRAIN Neuroelectronics: Dr Marina Saiz Alia, Biomedical Data Scientist, INBRAIN Neuroelectronics, Barcelona, Spain. Email: msaiz@inbrain-neuroelectronics.com

Amazon - Lab126: Dr Ali Milani, Senior Research Scientist, Lab126, Amazon, Sunnyvale (CA), USA. Email: alimila@amazon.com

Logitech - CTO office: Dr Milos Cernak, Principal Engineer, CTO Office, Logitech, Lausanne, Switzerland. Email: mcernak@logitech.com