Richard CSAKY

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Interdisciplinary **Research Scientist** with a PhD in **Machine Learning & Neuroscience** (Oxford). Proven track record of both deep research (neural decoding, **language modelling**) and **real-world applications** (gesture control, object detection). Passionate about **neurotechnology** and **safe & beneficial AGI**.

Research & Work Experience

AI Research Scientist
Foresight Institute 2025 – present
- Obtained 6-month funding from the Foresight Institute as an independent researcher.
- Building **large-scale foundational brain models** for forecasting and decoding electrophysiology data.

Machine Learning Engineer
Sonera, Berkeley, CA 2023 – 2025
- Implemented **ML/DL infrastructure** and was responsible for all aspects of the ML/DL pipeline.
- Built **real-time gesture recognition** into a sub-300 ms latency application for computer control & gaming.

PhD researcher in Machine Learning & Neuroscience
University of Oxford 2020 – 2023
- Published 2 first-author papers on **DL-based decoding** and **interpretability** methods for neural time-series.
- Developed "ChannelGPT2," a **custom GPT-2** adaptation for continuous **time-series**, outperforming baselines.

Machine Learning Research Scientist
Budapest University of Technology 2018 – 2019
- Developed one of the first **Transformer chatbots** (2017, 400+ GitHub stars), winning a national competition.
- Built early **GPT2 chatbot** achieving sub-1s response for 100s of users.
- Led dialog modeling research; published **data-filtering** approaches at ACL improving chatbot response quality.
- Created and released a new dialog dataset derived from public-domain books (14.8M utterances, 7 languages).

Software Engineer
Bosch, Hungary 2017 – 2018
- Developed OpenGL-based UI (C++/Python) for **real-time** manipulation of parking space **camera-overlay**.
- Collected 10k+ images & adapted **YOLO** for parking space detection; attracted funding and team expansion.
- Collaborated across hardware/software groups, integrating **object detection** with **embedded systems**.

Key Skills

ML/DL: PyTorch, TensorFlow, Transformers, CNN, LSTM, LLMs, computer vision, time-series modeling
Neural Interfaces: Neural signal processing (EEG, MEG, OPM), gesture recognition, closed-loop BCI
Software Engineering: Python, C++, real-time inference/optimization, large-scale data processing
Research & Leadership: Peer-reviewed publications, conference talks, interdisciplinary collaboration, project initiation & funding, mentoring & reviewing experience

Education

PhD in Machine Learning & Neuroscience
University of Oxford 2020 – 2023
- Secured $100,000 studentship and presented research at 4 international conferences.

M.S. in Computer Science Engineering
Budapest University of Technology 2018 – 2020
- Awarded National Excellence Scholarship. Presented research at 6 conferences.

B.S. in Mechatronics Engineering
Budapest University of Technology 2014 – 2018
- Built C++ molecular circuit simulations, placed 2nd in a national research conference.
- Gained solid foundation in robotics, signal processing, and advanced math fundamentals.

Selected Publications

Generalizable Gesture Recognition Using Magnetomyography
R. Yun, **R. Csaky**, D. Dash, I. Gerrard, G. Gonzalez, E. Kittle, D. Taylor, R. Soroushmojdehi R, D. Labanowski D, N. Deka
bioRxiv preprint, 2024
Developed a novel deep learning gesture recognition system based on magnetomyography (MMG), achieving >95% within-session and 80% cross-participant accuracy.
Available at: biorxiv.org/content/10.1101/2024.09.30.615946v2

Foundational GPT Model for Magnetoencephalography
R. Csaky, M.W.J. Van Es, O.P. Jones, M. Woolrich
arXiv preprint, 2024
Adapted GPT-2 for continuous neural time-series (MEG) using channel-wise embeddings and novel tokenization techniques. Achieved robust performance in spectral and temporal neural dynamics prediction, laying groundwork for foundational brain data models.
Available at: arxiv.org/abs/2404.09256

The Gutenberg Dialogue Dataset
R. Csaky, G. Recski
EACL, 2020
Created and released a new large-scale dialogue dataset derived from public-domain books, containing 14.8 million utterances across 7 languages. Trained and compared Transformer and GPT2 models. This dataset has been widely used in follow-up research and emphasizes data curation for multilingual conversational AI.
Available at: aclanthology.org/2021.eacl-main.11

Improving Neural Conversational Models with Entropy-Based Data Filtering
R. Csaky, P. Purgai, G. Recski
ACL, 2019
Introduced an entropy-based data filtering method for training conversational AI models (Transformers), addressing data-quality issues. Improved the informativeness of responses across datasets and models.
Available at: aclanthology.org/P19-1567

Deep Learning Based Chatbot models
R. Csaky, G. Recski
arXiv preprint, 2017
Thorough review of the state of dialogue modelling research in 2017. Trained and evaluated Transformer models on public dialogue corpora months after the original paper came out.
Available at: arxiv.org/abs/1908.08835