

Abhay Koushik

📍 Leipzig, Germany • Open for relocation: Paris/Île-de-France

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PROFILE

Interdisciplinary research engineer and neuroscientist with a computer-science foundation and hands-on experience translating noisy physiological and neural time series into validated quantitative evidence and working human-sensing systems. Developed reproducible analysis pipelines and real-time prototypes across EEG, ECG/HRV, respiration, IMU, and multimodal neuroimaging.

TECHNICAL SKILLS

Programming & systems: Python (8+ years), MATLAB (3+ years), R, Keras/TensorFlow/PyTorch, Linux/Unix, Windows

Biosignal & multimodal analysis: EEG, ECG/HRV, Respiration, IMU, MNE-Python, NeuroKit2, FSL, EEG-fMRI, PET connectivity, Bayesian models

Open source & software: BBSIG contributor: BIDS ECG/PPG/HRV pipelines; Git/GitHub, TensorFlow Lite, Android, C#, Unity

Leadership & communication: Project leadership, Judging-panel pitches, Invited presentations, Cross-disciplinary collaboration

SELECTED EXPERIENCE

Doctoral Researcher | Heart-Brain Group

Max Planck School of Cognition / MPI CBS, Leipzig - Germany

Sep 2023—Present

[OSF Project](#) | [Code](#)

- **Project Lead:** end-to-end implementation and analysis of DeerghaPraaNa—a randomised, counterbalanced two-visit neurophysiological study investigating heart and brain interactions in deep breathing with an individually paced active control across 79 completers.
- **Data Acquisition:** Acquired simultaneous EEG, ECG, and respiration; building reproducible Python workflows for preprocessing, cardiorespiratory metrics, signal-quality control, predefined exclusions, and participant/condition validation.
- **Statistical Modelling:** Modelling (150 GB+ Data) physiological and behavioural outcomes in R with Bayesian mixed-effects models, Bayes factors, equivalence assessment, multiplicity control, and sensitivity analyses; maintaining tested analysis infrastructure and preparing the first manuscript.

Doctoral Intern | Biomarker Development | Heart-Brain | Cognitive Neuroendocrinology Group

Forschungszentrum Jülich & MPI CBS, Leipzig - Germany

Sep 2022—July 2023

Papers: [Biol. Psych.](#) | [bioRxiv](#) | [Featured](#)

- **Neuropharmacology:** implemented PET receptor-informed EEG-fMRI connectivity for Ketamine-Midazolam-Placebo trials. April—July 2023
- **Heart-Brain study:** preprocessed ECG for a big cohort of 50+ Atrial fibrillation patients Jan—Mar 2023
- **Premenstrual-Disorder:** delivered PVE & volumetric morphometry analyses for the *Biological Psychiatry* study. Sept 2022—Dec 2023

Graduate Student Intern | Control-Interoception-Attention | Mind-Body-Emotion | Social Cognition Group

Paris Brain Institute (ICM) & ENS Paris - France & MPI CBS - Germany

Feb 2021—Aug 2022

Projects: [FaceSim](#) | [XR Project](#) | Papers: [Royal Soc.](#) | [Featured](#)

- **HRV-Gut-Brain:** developed HRV Toolbox pipelines for placebo-controlled synbiotic gut-brain trials. Jun—Aug 2022
- **Face-Perception:** co-designed a Unity/UXF study comparing 2D and dynamic 3D face-similarity judgements. Nov 2021—May 2022
- **Social-Cognition:** created and validated a 3D emotion database; developed immersive socio-emotional decision models. Feb—Aug 2021

Visiting Student Researcher | Fluid Interfaces Group

MIT Media Lab, Massachusetts Institute of Technology, Cambridge - USA

Aug 2018—Jan 2019

[Code](#) | Papers: [NeurIPS ML4H](#) | [IEEE BSN](#) | [Featured](#)

- **End-to-End Implementation:** Built an integrated Android research prototype for real-time five-stage sleep inference from single-channel wearable EEG, unifying EEG/IMU streaming, raw-signal visualisation, power-spectral processing, and on-device TensorFlow Lite inference.
- **Model Adaptation:** Adapted a Sleep-EDF convolutional model and integrated BioEssence, a physiology-aware olfactory interface; first-authored publications at IEEE BSN and ML4H at NeurIPS.

Research Engineering Intern | Wearable XR platform R&D

HoloSuit / Kaaya Tech, Mysuru - India

2017—2018

[XR Project](#) | [Featured](#)

- **Module Development:** Built integrated modules for full-body motion capture/replay, personalised skeletal calibration, gesture control, posture recognition, and trainer-learner movement comparison from wearable-sensor and quaternion data.
- **Experimentation:** Developed motion-classification deep learning experiments and Dynamic Time Warping comparison in C# and Unity as an early engineering intern at the startup.

EDUCATION

PhD, Cognition and Neurophysiology | Max Planck School of Cognition

2022—Present

MSc, Interdisciplinary Approaches to Life Sciences | Université de Paris—16.78/20 (A+) • *Mention Très Bien*

2020—2022

BE (Hons), Computer Science | BITS Pilani • Principles of Neuroengineering & Senior Thesis at MIT Media Lab—16 credits (A)

2015—2019

SELECTED RECOGNITION

NSF Student Travel Award | \$1,000 | Selected oral presentation at IEEE Body Sensor Networks, Chicago.

2019

Global Community Bio Fellow | One of 36 leadership fellows from 24 countries; public-leadership training.

2020

MIT-Takeda Superminds contributor | Collective-intelligence project addressing adult depression in Japan.

2019

Charpak Master Full Scholarship | Full tuition waiver + €700/month | Awarded twice and renewed.

2020—2022

MIRES Scholarship of Excellence | €1,000/month | International mobility scholarship, Université de Paris.

2022

iGEM Gold Medal & Best Manufacturing Project | Paris Bettencourt team, for distributed biological manufacturing.

2021

Best OpenAI Hack | 1M-token award | Stanford TreeHacks, for a generative-AI biodiversity communication prototype.

2021

Best Hardware Hack | Full Arduino Kit | HackHarvard, for a magnetometer-based silent-speech prototype.

2018

Kaaya Tech / HoloSuit Scholarship | \$12,000 | Supported full-time MIT Media Lab senior-thesis research.

2018