Ankur Gupta, PhD

R&D Scientist | **Neurotechnology** | **Brain-Computer Interfaces** | **Neuroprosthetics**

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Profile Summary

A neuroscientist with 10+ years of international experience specializing in **neuroprosthetics**, state-of-the-art **neuromodulation (invasive and non-invasive)**, and **BCI prototyping** and development for both **humans and non-human primates (NHP)**. Proven expertise in **hardware-software integration for electrophysiological recordings** (LFP, EEG, EMG, single- /multi- unit activity) and **open and closed-loop neurostimulation**. Strong **innovative problem solving**, **project design**, and **translational research development** in a collaborative team setting.

Core Competencies / Technical Skills

- **Neurotechnology & BCI:** Open and closed-loop neurostimulation, electrophysiology, real-time data processing.
- **Non-invasive Neurostimulation:** TMS, tACS, tSCS, tDCS, Temporal Interference, visuo-auditory stimulation.
- **Signal Processing & Data Analysis:** Big data, LFP, single- /multi- unit, EEG, CCEP, SSEP, VEP, EMG, TMS, tACS, tDCS, finger force analysis, time-frequency decomposition, event-related potentials.
- **Neuroimaging & Neuronavigation:** MRI/diffusion MRI processing, CT, neuronavigation (Brainsight, Cortexplore).
- **Computational Modeling:** Drift-diffusion models, actor-critic RL, cognitive-motor decision modeling, deep learning.
- **Hardware & Software Development:** MATLAB, Python, LabVIEW, VR integration, custom manipulanda.
- **Experimental Hardware:** Blackrock CerePlex Direct, Blackrock CereStim, Intan, Alpha Omega, Kinarm customization, MagVenture MagPro TMS, Soterix Medical tACS, Soterix Medical tDCS, Digitimer, NI DAQs, CANTAB, HTC VR, Compumedics Neuvo, Wearable Sensing wireless DSI-VR300.
- **Software Competence**: 3D Slicer, FreeCAD, ITKSnap, FSL, Blender, Illustrator, Photoshop.
- **Cross-disciplinary Collaboration:** Experience with engineering, clinical, and behavioral teams.
- **Project Leadership & Training:** Mentored 14+ graduate/PhD students, organized international workshops, collaborated and extensive collaboration with multi-disciplinary teams (clinicians, engineers, cognitive scientists), coordinated cross-site research.

Professional Experience

CNRS & University of Bordeaux (Bordeaux, France)

Research Engineer & Postdoctoral Researcher (Conferences 7, Publications 3)

Funded by Région Nouvelle-Aquitaine, University of Bordeaux; and **ERC** (MEMOPROSTHETICS)

Feb 2023 - Present (Engineer), Oct 2020 - Jan 2023 (Postdoc)

- Optimized and performed the NHP surgical procedures for **high-precision MRI based neuronavigation** guided **DBS electrode implantation** in deep memory regions, and **ECoG placement** at decision-making prefrontal cortex.
- Developed **open- and closed- loop neurostimulation system**, using NI DAQs and LABVIEW, to **invasively stimulate** hippocampal formation and prefrontal cortex for **memory manipulation** in **NHPs**.
- Developed **EMG, TMS, tACS, and tDCS data processing** pipelines, in MATLAB, for study involving **human controls**, **spinal cord injury**, and **stroke patients**.
- Developed and deployed **non-invasive SSEP stimulation** paradigm in LABVIEW for **Parkinson's disease** *and* **Tourette patients** for the Centre Hospitalier Universitaire (CHU) de Bordeaux.
- Created **NHP model of Alzheimer's disease** by depositing amyloid beta and tau proteins in deep brain areas and, separately, **GFP labeled entire cortex** using neuronavigation collaboration with a startup, Motac neuroscience.
- Designed and integrated **hardware-software systems for non-invasive VR-based audio-visual non-invasive stimulation** (in *humans*) synchronized with wireless EEG using Blender, PsychoPy and Python.
- Developed human version of Monkey CANTAB **experimental task for cognitive assessment in cerebral small vessel disease (cSVD)**, a study under SHIVA consortium.

Western Sydney University (NSW, Australia)

Research Associate (Part-time) (Publications 1)
Jul 2019 - Sep 2020

- Applied **drift-diffusion model and actor-critic algorithm** based decision models to study learning deficits in Parkinson's disease, aging, and social anxiety.

The Hebrew University of Jerusalem (Jerusalem, Israel)

ELSC Postdoctoral Fellow (Conferences 3, Publications 1)
Funded by **NIH** (R01 NS110901-01), **NIH** (R01 MH105397-04) and **Israel Science Foundation** (ISF-1801/18)
Jan 2016 - Jun 2019

- Performed approx. 150 months **single- and multi- unit recording** and analysis sessions, to study **motor cortical neuroplasticity after skill acquisition in NHPs** involving either proximal or distal joint movements, using Kinarm exoskeleton and custom hardware respectively.
- Conceptualized novel experimental paradigm design, performed hardware-software integration, and developed a custom data analysis pipeline to assess the relationship between facial expressions, and reward processing using Intan electrophysiology suite and MATLAB.

Indian Institute of Technology Madras (Chennai, India) & Sree Chitra Tirunal Institute for Medical Sciences and Technology (Thiruvananthapuram , India) & Christian Medical College Vellore (Vellore, India)

PhD, Biomedical Devices & Technology (Conferences 5, Book chapter 1, Publications 4)
Funded by **Department of Biotechnology** (Government of India)
Sep 2008 - Jul 2015

- Developed a **computational model of precision grip production in Parkinson's disease**, revealing *dopamine-modulated decision-making deficits*.
- Built **custom experimental manipulandum** to measure precision grip force under varying frictional conditions.

Selected Publications *(Full list of publications)*

- Gupta A. et al. High-accuracy electrode implantation in deep brain structures using multi-camera neuronavigation in non-human primates. (Accepted). *Journal of Neural Engineering*.
- Valcourt Caron A. et al. In vivo submillimeter diffusion MRI dataset of 9 macaque brains curated for tractography. (2025). *Scientific Data*.
- Gupta A. et al. Neuroprosthetics: from sensorimotor to cognitive disorders. (2023). *Communications Biology*.
- Gupta A. et al. Neural substrates of the drift-diffusion model in brain disorders. (2022). *Frontiers in Computational Neuroscience*.

Education

- **PhD, Biomedical Devices & Technology** - Indian Institute of Technology Madras & Sree Chitra Tirunal Institute for Medical Sciences and Technology & Christian Medical College Vellore, India.
- **Masters of Technology, Medical Biotechnology** - Indian Institute of Technology Madras, India.
- **Bachelors of Technology, Biotechnology** - Dr. A.P.J. Abdul Kalam Technical University, India.

Awards

- ELSC post-doctoral fellow, Hebrew University of Jerusalem, Israel. (1 Jan 2016 - 30 Jun 2019)
- 1st Prize in Pan IIT research expo at Shaastra 2014, IIT Madras, India. (6 Jan 2014)
- SAARC-IAESTE academic intern at Keio University, Japan. (23 Feb - 18 Mar 2009)

Languages

English (Fluent), Hindi (Native), French (Beginner)