Pankaj K. Gupta

Cell: +1 (604) 715 7045 — Email: pankajgupta@alumni.ubc.ca — https://pankajkgupta.github.io/

Education

PhD in Neuroscience
University of British Columbia, Vancouver, Canada. *2018 - 2024(expected)*
Dissertation: Shaping cortical and behavioral motor dynamics using real-time closed-loop feedback system
Advisor: Prof. Timothy H. Murphy

M.Sc. Interactive Entertainment Tech. (CS)
Trinity College Dublin, Ireland *2011 - 2012*

B.E. Computer Engineering
University of Pune, Pune, India *2004 - 2008*

Research and Work Experience

PhD Researcher
University of British Columbia, Vancouver, Canada *2018 – (Expected: Feb. 2025)*
- Designed and implemented a closed-loop feedback systems to study cortical dynamics in motor learning tasks in mice.
- Developed computational models (RNNs, HMMs) to analyze neural data and identify learning-related activity patterns.
- Collaborated on interdisciplinary projects, including joint studies with the Fairhall Lab on computational modeling.

Research Associate
Brown University, Providence, RI, USA *Oct. 2015 - Jun. 2018*
- Using computational analysis of behavior to discover developmental change in memory-guided attention mechanisms in a smart-playroom

Research Engineer
ATR International, Kyoto, Japan *Dec. 2012 - Jul. 2015*
- Decoding physical actions using Near-infrared spectroscopy signals from the brain in an assisted smart-house for disabled people

Intern (M.Sc. Thesis)
ATR International, Kyoto, Japan *May 2012 - July 2012*
- Thesis: Estimating a person's object of interest in a smart-house using depth sensors

Sr. Software Developer
Propalms Network Pvt. Ltd., Pune, India *Dec. 2008 - Aug. 2011*
- Worked on a novel virtual private network (VPN) and desktop infrastructure (VDI)

Associate Software Developer
GlobalLogic, Noida, India *Aug. 2008 - Dec. 2008*

Teaching and Mentorship

Programming Tutor (Python, MATLAB)
Dynamic Brain Circuits cluster, University of British Columbia, Vancouver, Canada *Mar. 2020 – Dec. 2023*
Mentored graduate students on programming techniques and data analysis in their project.

Teaching Assistant
Assisted in teaching systems neuroscience and computational modeling topics.
- UBC Neuroscience NRSC-500(2022F) course *Sep. 2022 - Dec. 2022*
- Summer Workshop on the Dynamic Brain (2022), Friday Harbor, USA *Aug. 2022 - Sep. 2022*
- Lead Teaching Assistant - UBC Neuroscience NRSC-501(2021W) course *Dec. 2020 - May 2021*
- NeuroMatchAcademy (2020, and 2021) Summer School, held online *Aug. 2021, July 2020*
- Frontiers in Neurophotonics Summer School, Quebec City, Canada *June 2019*

Summer Courses

Summer Workshop on the Dynamic Brain **(Allen Institute; U. Wash., USA)** *Aug 2021*
CNEURO 2020: Theoretical and Computational Neuroscience **(Tsinghua University, China)** *Aug 2020*
Methods in Neuroscience at Dartmouth **(Dartmouth College, USA)** *Jul - Aug 2018*
Translational Neuroscience and Neural Engineering **(Brown Uni. & EPFL)** *June 2018*
Computational Approaches to Memory and Plasticity **(NCBS, Bangaluru, India)** *Jul - Aug 2017*

Technical Skills

- **Programming Languages:** Python, MATLAB, C#, C++, C
- **Data Analysis & Modeling:** Tensor decomposition, RNNs, HMMs, PCA, t-SNE, UMAP, clustering, statistical analysis, signal processing, supervised and unsupervised machine learning, Computer Vision, Augmented Reality
- **Neuroimaging Techniques:** Widefield, and Two-photon imaging, optogenetics, electroencephalogram (EEG), near infrared spectroscopy (NIRS)
- **Software & Tools:** Conda, VS Code, GitHub, OpenCV, OpenGL, SciPy, NumPy, Inkscape

Publications

(In review) **Gupta, P.**, Murphy, T. (2024)"*Real-Time Closed-Loop Feedback System For Mouse Mesoscale Cortical Signal And Movement Control: CLoPy*" *bioRxiv*

T Fong, H Hu, **P Gupta**, B Jury, TH Murphy (2023)"*PyMouseTracks: flexible computer vision and RFID-based system for multiple mouse tracking and behavioral assessment*" *eneuro 10 (5)*

Bolaños, L. A., Xiao, D., Ford, N. L., LeDue, J. M., **Gupta, P. K.**, Doebeli, C., Hu, H., Rhodin, H., Murphy, T. H. (2021). "*A three-dimensional virtual mouse generates synthetic training data for behavioral analysis*" *Nature Methods, 18(4), 378–381*

Gupta, P., Murphy, T. (2021)"*Real-time neural feedback of mesoscale cortical GCAMP6 signals for training mice*" *Computational and Systems Neuroscience (Cosyne) 2021, 2-118*

Hart et. al. (2021)"*Neuromatch Academy: a 3-week, online summer school in computational neuroscience*" *Journal of Open Source Education*

Amso, D., Govindarajan, L.N., **Gupta, P.**, Baumgartner, H., Lynn, A., Gunther, K., Placido, D., Sharma, T., Veerabadran, V., Thakkar, K., Kim, S. Serre, T. (2021)"*Using Computational Analysis of Behavior To Discover Developmental Change In Memory-Guided Attention Mechanisms In Childhood*"

Freier, L., **Gupta, P.**, Badre, D., Amso, D. (2020)"*The value of choice in 3- to 7-year-olds' use of working memory gating strategies in a naturalistic task*" *Developmental Science (DS-05-19-0224-P)*

Forys, B. J., Xiao, D., **Gupta, P.**, Murphy, T. H. (2020). "*Real-time selective markerless tracking of forepaws of head fixed mice using deep neural networks*" *Eneuro, ENEURO.0096-20.2020*

Gupta, P.K., and Murphy, T.H. (2019). "*Cortex-wide Computations in Complex Decision Making in Mice*" *Neuron 104, 631–633*

Drew Linsley, Sven Eberhardt, Tarun Sharma, **Pankaj Gupta**, Thomas Serre "*What are the visual features underlying human versus machine vision?*" *Proceedings of the IEEE CVPR 2017*, 2706-2714

Abdur-Rahim, J., Morales, Y., **Gupta, P.**, Umata, I., Watanabe, A., Even, J., ... Ishii, S. (2016). "*Multi-sensor based state prediction for personal mobility vehicles*" *PLoS ONE, 11(10)*

Ogawa, T., Hirayama, J. I., **Gupta, P.**, Moriya, H., Yamaguchi, S., Ishikawa, A., ... Ishii, S. (2015). "*Brain-machine interfaces for assistive smart homes: A feasibility study with wearable near-infrared spectroscopy*" *Proc. of the IEEE EMBS*, 1107-1110

Ogawa T, **Gupta KP**, Yano K, Abdur-Rahim JA, Morioka H, Hirayama J, Yamaguchi S, Ishikawa A, Inoue Y, Kawanabe M, Ishii S. "*Decoding daily behaviors from NIRS signatures by using a portable NIRS device in the daily-life environment*" *Society for Neuroscience 2014*, Washington DC, USA, November 2014

Ogawa T, **Gupta KP**, Yano K, Abdur-Rahim JA, Morioka H, Hirayama J, Yamaguchi S, Ishikawa A, Inoue Y, Kawanabe M, Ishii S. "*Decoding daily-life behavioral signatures in the real environment: portable NIRS signal using behavior labels*" *37th Japan Neuroscience Society*, Yokohama, Japan, September 2014

Selected Presentations

"**Real-time feedback of cortical activity and specific body movements in mice**" *NeuroAI-Seattle 2024 (Talk)*

"**Platform for real-time closed-loop feedback of behavior and cortical GCaMP activity in mice**" *Nanosymposium, Society for Neuroscience 2023 (Talk)*

"**Modeling multi-region cortical interactions using task-specific data-constrained recurrent neural networks**" *Lake Conference 2023 (Poster)*

"**Real-time neural feedback of mesoscale cortical GCAMP6 signals for training mice**" *Computational and Systems Neuroscience (Cosyne) 2021 (Poster)*

"**What classic neuroscience result would you revisit with a BMI?**" *Annual Symposium 2019, SWC, UCL (Talk)*

Awards and Honors

- CPSR 180 Pitch Competition, second place
- LLMs for Brain Health 2023 hackathon winner
- AccelNet IN-BIC fellowship 2021, 2022
- CCN 2022 conference award (Simons Foundation)
- Frontiers in Neurophotonics 2021 presentation winner
- Student choice award for project at SWDB 2021
- Brain-Tech 2021 hackathon winner
- DMCBH Neural Repair Endowment 2021
- Edward Squires Memorial Fellowship 2020
- **MIT GrandHack2016** healthcare at home award
- **SAMSUNG BADA** codeathon 2011 winner

Community Engagement

- Co-chair, **Canadian Partnership for Stroke Recovery (CPSR) National Trainee Association**
- Member, **Diversity Mentorship Program**, UBC
- Editor and Communications Manager at **Neuropsyched.ca**, a UBC-student run science magazine
- Science communicator at the **Science World** , Vancouver
- Added support for non-Admin users of **OpenVPN** client on Windows platform

References

Prof. Tim Murphy
Dept. of Psychiatry
University of British Columbia
✆+1 604-822-0705
✉thmurphy@mail.ubc.ca

Prof. Adrienne Fairhall
Department of Physiology and Biophysics
University of Washington
✆+1 206-616-4148
✉fairhall@uw.edu

Prof. Thomas Serre
Brown Institute for Brain Sciences
Brown University
✆+1 (401) 863-1148
✉Thomas_Serre@brown.edu

Prof. John Dingliana
Trinity College Dublin
✆+353 1896 3680
✉john.dingliana@scss.tcd.ie