CURRICULUM VITAE

Vaibhav Thakur, MS, MA, E-mail Id: vaibhavthakur@ucla.edu

EDUCATIONAL QUALIFICATION:

- PhD (continuing student): University of California – Los Angeles (Fall 2019-present)
- MS Thesis, Indian Institute of Science, Bangalore (2016-2017)
  Title: Study of Kinematic Planning and Decision Making in Hand Movement
- BS-MS, Indian Institute of Science Education and Research, Pune (2012-2017)
- Jawahar Navodaya Vidyalaya, Pune (2005-2012)

ACADEMIC EMPLOYMENT HISTORY:

▪ PreDoctoral Fellow	| University of California – Los Angeles	*Oct 2020 – Present*
▪ Teaching Assistant	| University of California - Los Angeles	*March 2020 – June 2020*
▪ Staff Research Associate II	| University of California – Los Angeles	*Nov 2017 – Aug 2019*
▪ Research Assistant	| Indian Institute of Science, Bangalore	*May 2016 – Oct 2017*

PUBLICATIONS:

- **Thakur, V.**, Basso, M., Ditterich, J., Knowlton, B., Implicit learning of Bayesian priors in perceptual decision-making task. (*Scientific Reports – August 2021*)
- **Thakur, V.**, Murthy, A., Neural representations underlying the planning and execution of kinematic and dynamic movement parameters using electroencephalography. (*Thesis; Manuscript in progress*)

CONFERENCES:

I) PRESENTATIONS:

- Thakur, V., Ditterich, J., Basso, M., Knowlton, B., Different influences of explicit and implicit Bayesian priors on perceptual decision-making. Presented at Society for Neuroscience, Chicago, Oct 2019
- Knowlton, B., Thakur, V., Perugini, A., Shaikh, A., Basso, M., Use of priors in perceptual decision-making in clinical subtypes of Parkinson's disease. Presented Cognitive Neuroscience Society Meeting, San Francesco, March 2019.
- Knowlton, B., Thakur, V., Perugini, A., Basso, M., Implicit learning of Bayesian priors in perceptual decision-making task. Presented at Society for Neuroscience, San Diego, Nov 2018.
- Thakur, V., Murthy, A., Neural correlates of kinematic planning and execution. Presented at Society for Neuroscience, San Diego, 2018.

II) OTHER POSTERS:

- Schorn, J., Thakur, V., Knowlton, B., Interleaved practice enhances implicit learning of motor sequences. Presented at Psychonomic Society Meeting, New Orleans, Nov 2018.
- Mckee, C., Perugini, A., Thakur, V., Knowlton, B., Iacoboni, M., Basso, M., Shattuck, D., Isolation and characterization of medial temporal lobe-basal ganglia circuit using diffusion magnetic resonance imaging. Presented at Society for Neuroscience, San Diego 2018.

PROFESSIONAL SKILLS:

- Research skills: Wet lab, Behavior lab, and Computational modeling
- Model system: Humans (healthy and clinical), and Mice
- Neuroimaging: EEG, Confocal Microscopy, fMRI trained
- Programming: C++, Fortran95, MATLAB, R, Python, Arduino
- Presentation Skill: Psychtoolbox 3, MS-Office

WORKSHOPS/SUMMER SCHOOL:

- Neuromatch Academy Summer Workshop – Deep Learning *Aug 2021*
- Neuromatch Academy Summer Workshop – Computational Neuroscience *July 2020*
- Methods of Information Theory in Computational Neuroscience, OCNS, Seattle *Jun 2018*
- Computational Approaches to Memory and Plasticity (Summer School), NCBS, India. *July 2017*
- 1st Workshop on Brain, Computation, and Learning, Indian Institute of Science, India. *January 2017*
- 4th Cognition Workshop, organized by Indian Institute of Science, India. *June 2016*

SCHOLARSHIPS AND ACHIEVEMENTS:

- CSIR National Eligibility Test 2016 - secured Junior Research Fellowship (All India Rank 141)
  - Offers fellowship for doctoral studies in India *December 2016*
- Department of Science and Technology - INSPIRE fellowship
  - Offers fellowship for undergraduate studies in India *August 2012 - May 2017*
- Accepted for Navodaya Vidyalaya Samiti Program (Initiative by Govt. of India)
  - Offers all paid Secondary and Higher Secondary education *June 2005 – April 2012*

PROFESSIONAL MEMBERSHIPS:

- Society for Neuroscience
- Organization for Computational Neuroscience

RESEARCH EXPERIENCE:

- **Understanding of neural microcircuit of decision-making using optogenetics and electrophysiology:**
  Advisor: Prof. Michele Basso, Professor, University of California, Los Angeles. *Oct 2018-Present*
  - Training mice to perform perceptual decision-making task.
  - Automated training procedure with own python based software.
  - Once mice are trained, we will use optogenetic technique to excite/inhibit neurons in SC and observe if it has an effect on decision-making process.

- **Use of priors in perceptual decision-making task in clinical subtypes of Parkinson's disease:**
  Advisor: Prof. Barbara Knowlton and Prof. Michele Basso, Professor, University of California, Los Angeles.
  Apr 2017 – Present
  - Previous literature shows that Parkinson's patients are impaired at learning perceptual biases.
  - In this experiment, we collected the data from two sub-type of Parkinson's patients with different brain regions impaired. Based on their performance we can deduce the possible brain regions involved in this learning impairment.

- **Strategies for implicit learning of motor sequences and transfer of learning:**
  Advisor: Prof. Barbara Knowlton, Professor, University of California, Los Angeles.
  Jan 2017 – May 2019
  - In this study, we are trying to compare the benefits of interleaved versus blocked practice in motor learning task.
  - My part was to help in designing the experiment paradigm based on previously known sequential reaction time task. I also coded the task and helping in analyzing the data.

- **Implicit learning of Bayesian priors using perceptual decision-making task:**
  Advisor: Prof. Barbara Knowlton and Prof. Michele Basso, Professor, University of California, Los Angeles.
  Nov 2017 – March 2021
  - Through this study we tried to understand if the perceptual biases can be learned implicitly and what is the mechanism behind it.
  - For this we designed the experiment paradigm based in previously known glass-pattern stimulus.
  - We collected the data from healthy subjects and used drift diffusion model to understand the mechanism of this learning.

- **Characterization and understanding function of MTL-basal ganglia circuit using diffusion MRIs:**
  Advisor: Prof. Barbara Knowlton, Prof. Michele Basso, Prof. David Shattuck, and Prof. Marco Iacoboni, Professor, University of California, Los Angeles. *Nov 2017 – Nov 2018*
  - In this project, we are trying to characterize the MTL-basal ganglia pathway and understand its possible function in decision-making.
  - My part in this project is to collect and analyze the behavior and MRI data from healthy human subjects and Parkinson's patients.

- **Study of kinematic planning and initiation of hand movement using electroencephalography:**
  Advisor: Prof. Aditya Murthy, Professor, CNS, Indian Institute Science (IISc). *May 2016 - Oct 2017*
  - Studied the neural representations underlying the planning and execution of movement parameters such as kinematics and dynamics in humans.
  - Successfully initiated EEG study in the lab for the first time and the corresponding analysis pipeline is self-developed with the help of previous literature.
  - The results support the idea that kinematic information is dominant in premotor cortex during planning and feedforward movement and moves to parietal cortex during online control.

- **Modeling and simulation of purinergic signaling in astrocytes:**
  Advisor: Dr. Suhita Nadkarni, Assistant Professor, Biology Dept., IISER Pune *Jan 2016 – Apr 2016*
  - The purine nucleosides modulate cell (neuron and astrocyte) activity by an increase in calcium level via P2Y receptors.
  - Similar signaling mechanisms are implicated in memory, learning, and feeding behaviors.
  - I tried to model and understand how this type of receptors modulate the synaptic transmission in neurons by changes in calcium concentration.

- **The role of Formin2 in the retrograde flow of filopodia and lamellipodia:**
  Advisor: Dr. Aurnab Ghose, Assistant Professor, Biology Dept., IISER Pune *Aug 2015 – Nov 2015*
  - Retrograde flow is the net rearward flow of actin network in the cell. This process is essential for cell development and movement.
  - I tried to find out how Formin knockout modulates the retrograde flow in lamellipodia and filopodia using confocal microscopy.

- **Quantification and state space modeling of learning of kinematics and dynamics in motor learning Task**:
  Advisor: Prof. Aditya Murthy, Professor, Indian Institute Science. *May 2015 – Jul 2015 and Dec 2015*
  - We recorded the hand movements and EMG of human subjects during task.
  - Tried to identify which movement parameter is learnt in perturbed environments.
  - In both kinematic and dynamic perturbation, the maximum deviation from the planned movement seems to be the learned parameter.

- **The role of DEP domain on Formin's cellular localization in neurons:**
  Advisor: Dr. Aurnab Ghose, Associate Professor, Biology Dept., IISER Pune *Jan 2015 - Apr 2015*
  - DEP domain is known for gene regulation, cytoskeleton regulation, and calcium regulation.
  - Formin is known for the polymerization of actin monomers and also contains the DEP domain.
  - I tried to find the role of DEP in the localization of the fmn2 protein.
