SABYASACHI SHIVKUMAR |
UNIVERSITY OF ROCHESTER

Meliora Hall, University of Rochester +1 (585)-498-0999 sshivkum@ur.rochester.edu

EDUCATION

Program	Institution	%/CGPA	Year of completion
PhD in Brain and Cognitive Sciences (Advisor: Ralf Haefner)	University of Rochester	3.95(4)*	2022
Dual Degree (B.Tech (Hons.) & M.Tech) in Electrical Engineering, Minor in Computational Biology	Indian Institute of Technology Madras, Chennai	8.81(10)	2017
XII	National Public School Rajaji Nagar, Bangalore	94.80%	2012

* After 2 Semesters

PUBLICATIONS

- Sabyasachi Shivkumar, Vignesh Muralidharan, and V. Srinivasa Chakravarthy. "A Biologically Plausible Architecture of the Striatum to Solve Context-Dependent Reinforcement Learning Tasks" *Frontiers in neural circuits* 11 (2017): 45. Link
- Sabyasachi Shivkumar, V. Srinivasa Chakravarthy, and Nicolas P. Rougier. Modeling the Role of the Striatum in Non-Stationary Bandit Tasks" **Under Review** Preprint

CONFERENCE PROCEEDINGS

- Sabyasachi Shivkumar*, Richard D. Lange*, Ankani Chattoraj*, Ralf M. Haefner, A probabilistic population code based on neural samples (NIPS 2018, Oral Presentation) (* indicates equal contribution)
- Sabyasachi Shivkumar, Madeline Cappelloni, Ross Maddox, Ralf M. Haefner, Approximate inference explains paradoxical data in two-event causal inference task (CCN 2018)
- Ankani Chattoraj, Shu Chen Wu, Richard D. Lange, Sabyasachi Shivkumar, Ralf M. Haefner, 'A probabilistic population code based on neural sampling (Cosyne 2018)
- Sabyasachi Shivkumar, Vignesh Muralidharan, V. Srinivasa Chakravarthy, 'A computational architecture to model the microanatomy of the striatum and its functional properties', in BMC Neuroscience 2016, 17(Suppl 1):P189 (OCNS 2016)

RESEARCH EXPERIENCE

- A BIOLOGICALLY PLAUSIBLE ARCHITECTURE OF THE STRIATUM TO SOLVE CONTEXT- DEPENDANT REINFORCEMENT LEARNING TASKS(SUPERVISED BY PROF. VS CHAKRAVARTHY) (DEC 2015-NOV 2016)
  - Developed a layered SOM computational model of striosomes and matrisomes and its functional properties
  - Incorporated the striatum in a network model of Basal Ganglia for an overall biologically plausible model
- COMPUTATIONAL AND THEORETICAL MODEL OF STRIATUM IN STOCHASTIC MULTI CONTEXT ENVIRONMENTS(SUPERVISED BY PROF. NICOLAS P. ROUGIER) (JUN 2016 -JUL 2016)
  - Two month summer internship at INRIA, Bordeaux, France
  - Developed a theoretical model of the striatum for solving non-stationary bandit tasks
- BRAIN COMPUTER INTERFACE USING COVERT ATTENTION VIA SSVEP SIGNALS (SUPERVISED BY PROF. SRIDHARAN DEVARAJAN) (MAY 2015 - SEP 2015)
  - Two month summer internship at Indian Institute of Science, Bangalore
  - Collected EEG data from subjects performing a covert spatial attention task and used an offline decoder to predict direction of subject attention

Teaching Experience

- **Teaching Assistant** : Applied Programming Lab (IIT Madras)
- **Teaching Assistant** : Advanced Electrical Engineering Lab (IIT Madras)
- **Voluntary Teaching** : English for Communication (Underprivileged Children from grades 6 to 8)

Professional Experience

- Healthcare Technology Innovation Centre(HTIC) (May-Jul 2014)

  Developed a dynamical noise model to reduce the motion artifact from PPG signals for a wearable health monitor which included a novel pseudo-filter algorithm. Incorporated a tap detection and basic gesture control algorithm for the wristwatch and tested it on real time data using Labview.

- Dhvani Research-IITM Research Park (Dec 2013)

  Developed an algorithm to extract the contour points from a fluoroscent illuminated crack in an image and used ray-tracing to get the corresponding 3D points. Incorporated a curve fitting model and algorithms to determine the length and width of the crack.

Skills

- Coding in C, C++,Python
- Numerical Computation using Matlab and NumPy
- Experimental Paradigm Design using Psychtoolbox
- Deep Learning using Torch and Caffe
- Image Processing using OpenCV and Matlab.
- Web Development using HTML,CSS,Javascript etc.

Miscellaneous Projects

- Robotic Arm catching a ball(Reinforcement Learning Course Project) (Jan-April 2015)

  Trained a robotic arm to catch the ball using a continuous state and action variant of the SARSA algorithm. Implemented a novel parallelised RL framework to speed up training.

- Air Hockey Playing Robot (as part of Young Innovator's Program Centre for Innovation(CFI), IIT Madras) (May-August 2013)

Designed an air hockey playing robot. The prototype robot consisted of a two arm-four bar mechanism.

- Image Based Augmented Reality using Opencv (Feb-April 2013)

Developed an application that detects known pattern in live video feed and replaces it with another pattern.

Positions of Responsibility

- Student-in-charge of Electrical Engineering Association May 2014-August 2015

  Electrical Engineering Association is a student body that organizes various activities like Hackathon, Webinars and Lecture series for Electrical Engineering students with faculty support

- Editor Chennai36, The Alumni Blog of IIT Madras (Jan 2014-May 2015)
- Exhibitions coordinator (Evolve) Shaastra 2014 (2014)