

EDUCATION

Program	Institution	%/CGPA	Year of completion
PhD in Brain and Cognitive Sciences (Advisor: Ralf Haefner)	University of Rochester	4.0(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 1 Semester

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, 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)
- Ankani Chattoraj, Shu Chen Wu, Richard D. Lange, Sabyasachi Shivkumar, Ralf M. Haefner, 'A probabilistic population code based on neural sampling (Cosyne 2018)

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 fluorescent 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)