AKSHAY SUJATHA RAVINDRAN

@ akshay.s.ravindran@gmail.com ☰ @AkshaySujatha ⚲ Houston, TX, USA
⌨ akshaysravindran ⚯ www.akshayravindran.com ♟ Scholar Link

AREA OF EXPERTISE

Explainable Deep Learning   Neural Oscillations   Computational Neuroscience   Machine Learning

Brain-Machine Interfaces   Mindfulness   Neuroaesthetics

EDUCATION

Ph.D. Electrical & Computer Engineering - Advisor: Dr. Jose Luis Contreras-Vidal   Fall 2016-Present
University of Houston, Houston, TX
Thesis: Developing Robust Explainable Deep Learning Models Using EEG for Brain Machine Interface Systems

- -

Bachelor of Technology, Electrical and Electronics Engineering   2015
University of Kerala, Kerala, India

RESEARCH EXPERIENCE

Laboratory for Non-Invasive Brain-Machine Interface Systems ⬏   Fall 2016–Present
Electrical & Computer Engineering, University of Houston
Supervisor: Jose L. Contreras-Vidal, Ph.D.

1. Conducted EEG analysis (ERP, ERD/S, parameterized spectral analysis, functional connectivity etc)

2. Trained multiple deep learning and machine learning models on EEG with an emphasis on explainability of model decisions and feature relevancy

3. Conceptualized and developed a BCI-GAN model based immersive art in python; real-time sonification and digital art generation based on the brain activity

4. A book chapter and six research articles in journals/conferences. Two manuscripts under preparation

5. Created three and amended four protocols for human subject testing as approved by the IRB

6. Recorded EEG from 50+ human subjects and supervised the recording from 100+ additional subjects

7. Wrote three grants and contributed to multiple other grant writing processes

8. Mentored 21 high school / undergraduate students

- -

Computational Medicine Lab ⬏   Spring 2019
Electrical & Computer Engineering, University of Houston
Supervisor: Rose T. Faghih, Ph.D.

1. Estimated instantaneous point process characterization of heart beat dynamics for emotion recognition

2. One first author conference publication

Healthcare Technology Innovation Centre ⬏   July 2015–July 2016
Dept. of Electrical & Computer Engineering, Indian Institute of Technology, Madras
Supervisors: Preejith SP, MS; Mohanasankar Sivaprakasam, Ph.D.

1. Developed an acquisition system and multiple algorithms to calculate different vital signal measures such as heart rate, blood oxygen saturation, and cuffless blood pressure using a wearable device

2. Co-authored one conference publication and mentored 6 undergraduate students

- -

SKILLS

1. **Programming**: (Advanced) Matlab, Python; (Basic) R, C, C++

2. **Toolboxes/ Libraries**: (Advanced) EEGLab, FieldTrip, SEREEGA, Keras, Tensorflow, Python generic libraries; (Intermediate) FOOOF, Pytorch, MNE; (Basic) visbrain, SIMEEG, Brainstorm

3. **Other**:(Advanced) Inkscape, LaTeX; (Intermediate) Illustrator, Anaconda, Github, Website development (Github, WIX, Wordpress); (Basic) Labview, Arduino, Touch Designer, Adobe Premier

TEACHING EXPERIENCE

Teaching Assistant (Selected)   2021
Neuromatch Academy (Deep learning track)

Guest Lecturer/ Teaching Assistant at University of Houston, TX   Spring 2021
Neurohumanities (ECE 6397)

Summer EEG Bootcamp Lead at University of Houston, TX   Summer 2020
NSF BRAIN Center Summer workshop series

PUBLICATIONS

📖 Book Chapters

1. Nakagome S, Craik A, **Ravindran AS**, He Y, Cruz-Garza JG, and Contreras-Vidal JL. Springer Handbook of Neuroengineering. In: ed. by Thakor NV. Springer Nature. Chap. Deep learning methods for EEG neural classification. *In Press*.

📄 Peer -Reviewed Publications

1. Paek AY, Brantley JA, **Ravindran AS**, et al. A roadmap towards standards for neurally controlled end effectors. IEEE open journal of engineering in medicine and biology 2021;2. *10.1109/OJEMB.2021.3059161*.

2. Cruz-Garza JG, **Ravindran AS**, Kopteva AE, Rivera Garza C, and Contreras-Vidal JL. Characterization of the stages of creative writing with mobile EEG using generalized partial directed coherence. Frontiers in human neuroscience 2020;14:533. *DOI: 10.3389/fnhum.2020.577651*.

3. **Ravindran AS**, Cestari M, Malaya C, et al. Interpretable deep learning models for single trial prediction of balance loss. 2020 IEEE International Conference on Systems, Man, and Cybernetics (SMC) 2020:268–73. *DOI: 10.1109/SMC42975.2020.9283206*.

4. Nakagome S, Luu TP, He Y, **Ravindran AS**, and Contreras-Vidal JL. An empirical comparison of neural networks and machine learning algorithms for EEG gait decoding. Scientific Reports 2020;10:1–17. *DOI: 10.1038/s41598-020-60932-4*.

5. **Ravindran AS**, Nakagome S, Wickramasuriya DS, Contreras-Vidal JL, and Faghih RT. Emotion recognition by point process characterization of heartbeat dynamics. IEEE Healthcare Innovations and Point of Care Technologies 2019:13–6. *DOI: 10.1109/HI-POCT45284.2019.8962886*.

6. **Ravindran AS**, Mobiny A, Cruz-Garza JG, Paek A, Kopteva A, and Vidal JLC. Assaying neural activity of children during video game play in public spaces: a deep learning approach. Journal of neural engineering 2019;16:036028. *DOI: 10.1088/1741-2552/ab1876*.

7. Preejith S, **Ravindran AS**, Hajare R, Joseph J, and Sivaprakasam M. A wrist worn SpO_2 monitor with custom finger probe for motion artifact removal. 2016 38th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC) 2016:5777–80. *DOI: 10.1109/EMBC.2016.7592040*.

⬆ Under Preparation / Review

1. **Ravindran AS**, Malaya C, Cestari M, et al. Decoding neural activity preceding balance loss during standing in a lower-limb exoskeleton. In: 2021. *In preparation*.

2. **Ravindran AS**, Upadhyay P, Susheela AT, Contreras-Vidal JL, and Subramaniam B. Changes in periodic EEG following six weeks of Isha Kriya meditation practice: A pilot study. In: 2021. *In preparation*.

🖴 Publically Contributed Data

1. Cruz-Garza JG, Hendry MF, **Ravindran AS**, et al. Mobile brain-body imaging and audio-visual data of theatrical actors during rehearsal and performances. Scientific data. 2021. *In preparation*.

2. **Ravindran AS**, Cruz-Garza JG, Kopteva A, et al. Multi-modal mobile brain-body imaging (MoBI) dataset for assaying neural and head movement responses associated with creative video game play in children. IEEE Dataport. 2017. DOI: 10.21227/H23W880. URL: http://dx.doi.org/10.21227/H23W88.

FELLOWSHIPS & AWARDS

Graduate Tuition Fellowship	2016-Present
BCI Society Student Award	2021
Cullen Graduate Student Success Fellowship (UH)	2020
Brain-Computer Interface Designers Hackathon Winner (IGS-BOA conference)	2019
Center for Advanced Computing Fellow (UH)	2017
99.9 percentile National Merit Certificate for Science (AISSCE, India)	2009

GRANT WRITING EXPERIENCE

1. **Bitbrain Equipment Grant, 2020**
   Equal contribution to the conceptualization and led the drafting of the grant. Investigators are Akshay Sujatha Ravindran, Dr. Jose Contreras-Vidal, Geraldina Interiano Wise (**Not Awarded**)
2. **University of Houston/Baylor College of Medicine Collaborative Pilot Grant, 2019**
   Facilitated the collaboration. Equal contribution to the conceptualization and writing of the grant. Investigators are Akshay Sujatha Ravindran, Dr. David Ress and Dr. Jose Contreras-Vidal, (**Not Awarded**)
3. **Seed Funding for Advanced Computing (SeFAC) by the University of Houston's Center for Advanced Computing and Data Systems, 2017**
   Has equal contribution to the writing of the draft. Investigators are Dr. Jose Contreras-Vidal, Dr. Jesus Cruz-Garza and Akshay Sujatha Ravindran ($32,000; **Awarded**)
4. Provided feedback and minor contribution to multiple grant submissions to programs like NSF-EAGER, NSF-DARE, and NAKFI Challenge

MENTORSHIP

University of Houston (2017-Present)

1. **Undergraduate trainee (N = 13)**
   Chase Philip (UH), Yuchien Lin (UH), Adriana Lopez Cajigas (UH), Christian Alacorn (UH), Mominah Shaik (UH), Brett Velasquez (Research Assistant), José Angel Pérez Alonso (International Trainee, UDEM), Devika Dileep (ASU), Vidisha Ganesh (Rice University), Anjana Ganesh (UT Austin), Ava Nelson (UH), Anthony K. Brandt (NCSU), Luca Cohen (Colorado School of Mines)

2. **High school trainee (N = 8)**
   Karthikeya Gullpalli (Carnegie Vanguard High School), Dhivya Venkatraghavan (Seven Lakes High School), Adhithi Venkatraghavan (Seven Lakes High School), Lakshya Gupta (Tompkins High School), Anika Patel (Dulles High School), Jeana Joo (Klein Cain High School), Rhea Phatak (DeBakey High School for Health Professions), Isabel Khattar Hatem (Carnegie Vanguard High School)

Healthcare Technology Innovation Center, IIT-Madras, India (Summer 2016)

Deeksha Karanjgaokar, Priyanka Vinod, Ashwin R, Santhana Bharathi N, S Rahul, V Poornima (N = 6)

LEADERSHIP

Treasurer: BRAIN Student Group (UH)	2021-Present
President: BRAIN Student Group (UH)	2020-21
Vice Chair: IEEE EMB Chapter Houston Section	2020-21
Vice President: Graduate and Professional Student Association (UH)	2018-20
Student Representative: IEEE Section Travancore HUB (R10, Kerala Section)	2014-15
Chairman: IEEE Student Branch (R10, Kerala Section)	2014-15

PROFESSIONAL SERVICE

1. **Ad hoc reviewer**
   IEEE Transactions on Human-Machine System, Neural Networks, Frontiers in Neuroscience, Brain-Computer Interfaces, Physiological Measurement, Brain Sciences, Journal of Physiology, IEEE EMBC, International Graphonomics conference 2019

2. **Graduate Student Employment Committee (2021-22), UH**
   One among the two student representatives present on the committee aimed at making recommendations regarding policies surrounding graduate student on-campus employment in graduate teaching and research assistantship positions

3. **President (2020-2021) BRAIN Student Group, UH**
   Organized 11 technical workshops specializing in EEG during summer of 2020. Personally handled two of the workshops. In addition, organized various networking events

4. **Vice President (2020-2021) IEEE EMB, Houston Chapter**
   Coordinated a panel discussion on career transition for Ph.D. students. Later in collaboration with the NSF IUCRC BRAIN Center, organized multiple virtual lab tours of ASU and UH labs that do research in various areas of neurotechnology

5. **Vice-President (2018-2020) Graduate and Professional Student Association, UH**
   Organized over 15 academic and networking events and won the outstanding educational program as well as the outstanding collaboration award for 2019

6. **Graduate AdHoc committee member (2018-19) Graduate School, UH**
   Drafted the graduate bill of rights for the university

7. **Graduate Panelist**
   Invited to provide insight as a current graduate student in BRAIN student group panel discussion (2021), Graduate Orientation (Fall 2019), and UH National Society of Black Engineers Student Interaction (Spring 2020)

PROFESSIONAL AFFILIATIONS

Institute of Electrical and Electronics Engineers (IEEE)	2012-Present
Brain Computer Interface Society	2020-Present
Building Reliable Advances and Innovation in Neurotechnology Center	2019-Present
Graduate and Professional Student Association	2018-20
Toastmaster Internationals	2017-18

LANGUAGES

Fluent in English, Malayalam and Hindi. Conversational proficiency in Tamil

MEDIA

▶ *Videos*

1. *Nahual Demonstration at the Moody Center of Arts	Youtube* ⤴	*April 2021*
2. *Neurapod podcast	Neuralink Pros and Cons w/ Akshay Ravindran	Youtube* ⤴	*Feb 2021*
3. *Self-Conscience/Physical Memory	Kinetic, neurofeedback art installation	Vimeo* ⤴	*May 2020*
4. *The Nahual Project	Your Brain on Art	Youtube* ⤴	*Nov 2019*

SCIENCE COMMUNICATION & OUTREACH

- *K12 students lab tour*   *Spring 2017-present*
  STEAM outreach–introduce K12 students to the state-of-the-art research related to non-invasive brain-machine interface systems
  ◆ University of Houston, Houston, TX

- NAHUAL Project   Fall 2019
  STEAM outreach–art science demonstration at the intersection of neuro-engineering, artificial intelligence and visual art
  ◆ Midtown Arts and Theater Center Houston, Houston, TX

- UTHealth Stomp Out Stroke Festival   Summer 2017-2019
  Demonstration of brain imaging devices and rehabilitation robotics to the general public and people affected by stroke
  ◆ Discovery Green, Houston, TX

- Girls in Engineering · Spring 2019
  STEM outreach–Chevron outreach event for inspiring girls to choose Science, Technology, Engineering, and Math career
  📍 University of Houston, Houston, TX

- Your Brain on Wine: The Exquisite Corpse · Spring 2019
  STEAM outreach–demonstrating neuroimaging during wine tasting
  📍 Hilton College of Hotel and Restaurant Management, University of Houston, TX

- Your Brain on Art: The Exquisite Corpse · Summer 2017, 2019
  STEAM outreach–demonstrating neuroimaging during collaborative art creation by children
  📍 Children's Museum of Houston, Houston, TX

- Brain on Art workshop · Summer 2018
  Workshop and performance on music, improvisation, and technology
  📍 University of Houston, Houston, TX

- Your Brain on Music: The Exquisite Corpse · Summer 2018
  Demonstrated neuroimaging technology and visualize EEG during a live music presentation
  📍 Houston Health Museum, Houston, TX

- National Geography Documentary: The Exquisite Corpse · December 2017
  STEAM outreach–demonstrating neuroimaging during painting, music, and dance performance
  📍 University of Houston, TX

- Your Brain on Music · Spring 2017
  STEAM outreach–demonstrating neuroimaging during music improvisation
  📍 Houston Community College Spring Branch Performing Arts Center, Houston, TX

- Your Brain on Art Appreciation · Spring 2017
  STEAM outreach–demonstrating neuroimaging during art appreciation; over 100 people reached
  📍 Indianapolis Museum of Art, Indianapolis