Siddharth

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PERSONAL PROFILE

Researcher with 10+ years of experience in machine learning, bio sensing-based affective computing applications, and embedded systems prototyping. Industry experience conducting research in multiple Fortune 500 companies. Published in top-tier peer-reviewed journals and academic conferences. Awarded multiple patents, fellowships, and research grants.

AREAS OF INTEREST

Artificial Intelligence, Human Factors, Computer Vision, Bio-sensing, Affective Computing, Computational Neuroscience

EDUCATION

University of California San Diego (UC San Diego) April 2017 – June 2020
Ph.D. in Electrical Engineering (Intelligent Systems, Robotics, and Control) San Diego, CA, USA

- **Thesis**: Utilizing Multi-modal Bio-sensing Toward Affective Computing in Real-world Scenarios
- **Supervisors**: Professor Tzyy-Ping Jung, Professor Terrence Sejnowski, Professor Mohan Trivedi

University of California San Diego (UC San Diego) September 2015 – March 2017
M.S. in Electrical Engineering (Intelligent Systems, Robotics, and Control) San Diego, CA, USA

Indian Institute of Information Technology (IIIT) Allahabad July 2011 – June 2015
B.Tech. in Electronics and Communication Engineering Prayagraj, U.P., India

PROFESSIONAL APPOINTMENTS

Plaksha University July 2023 – Present
Assistant Professor Chandigarh, India

- Leading my research group with the vision to investigate and model human physiological responses to improve cognitive well-being, and enhance human safety, productivity, and creativity.
- Working towards realizing the university's vision of reimagining technology education in affiliation with the Entrepreneurship Cell, Center for Teaching, Language, and Communication, and multiple other research centers at the university.

Microsoft Human Factors Center of Excellence November 2022 – March 2023
Senior Human Factors Engineer Redmond, WA, USA

- Led the Human Factors group's efforts to understand how humans behave in Extended Reality to enable them to be more productive and creative in a hybrid work setting.
- Led the Human Factors group's efforts to design personalized user experiences through neurophysiological insights into users' preferences enabling them to be more productive and establish meaningful connections with each other.

Microsoft Human Factors Center of Excellence October 2021 – November 2022
Human-centered Machine Learning Researcher Redmond, WA, USA

- Led the Human Factors group's efforts to assess user emotion, mental state, and subjective experience through bio-sensing to inform design decisions on both software and hardware products.
- Led the Human Factors group's efforts to identify new problem areas for developing innovative personalized user experiences in the wearable space geared toward enhancing mental/physical/emotional health.

Microsoft Human Factors Center of Excellence July 2020 – October 2021
User Research Specialist Redmond, WA, USA

- Worked on Microsoft's vision of developing wearable bio-sensing solutions to gather personalized insights into users' physical and mental health and subjective experiences
- Utilized machine learning algorithms toward real-time real-world affective computing solutions that could be deployed into our products to assess users' emotions.

University of California San Diego September 2015 – June 2020
Graduate Student Researcher San Diego, CA, USA

- Conducted interdisciplinary research across multiple labs including
  Institute for Neural Computation (INC)
  Swartz Center for Computational Neuroscience (SCCN)
  Laboratory for Intelligent and Safe Automobiles (LISA)
  Computational Neurobiology Laboratory (CNL) at the Salk Institute for Biological Studies
- Conducted research toward doctoral thesis by developing real-world real-time affective computing solutions.
- Designed and evaluated machine learning-based and hardware solutions utilizing bio-sensing for evaluating human mental, cognitive, and affective states.

Facebook (Meta) Reality Labs June 2019 – September 2019
Research Intern Redmond, WA, USA

- Worked at the intersection of XR and bio-sensing to assess users' likeness for diverse content.
- Developed eye tracking and machine learning-based solutions for human interest evaluation.

Facebook (Meta) Reality Labs June 2018 – September 2018
Research Intern Redmond, WA, USA

- Worked at the intersection of ML, bio-sensing, and affective computing for assessing users' cognitive load in XR.
- Designed and conducted multiple experiments for real-life real-world evaluation of the designed prototypes.

Samsung Research America January 2015 – June 2015
Research Intern Mountain View, CA, USA

- Utilized EEG and ECG toward applications in human emotion detection.
- Conducted experiments to study the above in a virtual reality (VR) setting in real-time scenario.

French National Centre for Scientific Research (CNRS) May 2014 – July 2014
Research Intern Montpellier, France

- Worked on utilizing EEG and computer vision for controlling Europe's only HRP-4 humanoid robot.
- Designed signal processing algorithms and conducted experiments to maneuver the robot in real-time under real-world scenarios using EEG.

National University of Singapore May 2013 – July 2013
Research Intern Singapore

- Utilized computer vision algorithms to design an eye-tracking algorithm to be used on handheld computing devices.
- Conducted experiments to evaluate the algorithm's feasibility in various real-world real-time scenarios.

PUBLICATIONS

Journal Articles

- Fangzhou Xu, Fenqi Rong, Jiancai Leng, Tao Sun, Yang Zhang, Siddharth, and Tzyy-Ping Jung "Classification of Left-Versus Right-Hand Motor Imagery in Stroke Patients Using Supplementary Data Generated by CycleGAN", *Transactions on Neural Systems and Rehabilitation Engineering*, 29, 2021.
- Siddharth and Mohan M. Trivedi "On Assessing Driver Awareness of Situational Criticalities: Multi-modal Bio-Sensing and Vision-Based Analysis, Evaluations, and Insights", *Brain Sciences*, 10, 2020.

- Siddharth, Tzyy-Ping Jung, and Terrence J. Sejnowski "Impact of Affective Multimedia Content on the Electroencephalogram and Facial Expressions", *Scientific Reports*, 9, 2019.
- Siddharth, Tzyy-Ping Jung, and Terrence J. Sejnowski "Utilizing Deep Learning Towards Multi-modal Bio-sensing and Vision-based Affective Computing", *IEEE Transactions on Affective Computing*, 2019.
- Siddharth, Aashish N. Patel, Tzyy-Ping Jung, and Terrence J. Sejnowski, "A Wearable Multi-modal Bio-sensing System Towards Real-world Applications", *IEEE Transactions on Biomedical Engineering*, 66, 2018.

Conference Articles

- Siddharth and Mohan M. Trivedi, "Attention Monitoring and Hazard Assessment with Bio-Sensing and Vision: Empirical Analysis Utilizing CNNs on the KITTI Dataset", *IEEE Intelligent Vehicles Symposium (IV)*, pp. 1673-1678, 2019.
- Julia Anna Adrian, Siddharth, Syed Zain Ali Baquar, Tzyy-Ping Jung, Gedeon Deak, "Decision-Making in a Social Multi-Armed Bandit Task: Behavior, Electrophysiology and Pupillometry", *41st Annual Meeting of the Cognitive Science Society (CogSci)*, 2019.
- Siddharth, Tzyy-Ping Jung, and Terrence J. Sejnowski, "Multi-modal Approach for Affective Computing", *IEEE 40th International Engineering in Medicine and Biology Conference (EMBC)*, pp. 291-294, 2018.
- Siddharth, Aashish N. Patel, Tzyy-Ping Jung, and Terrence J. Sejnowski, "An Affordable Bio-sensing and Activity Tagging Platform for HCI Research", *International Conference on Augmented Cognition*, pp. 399-409. Springer, Cham, 2017.
- Siddharth, Akshay Rangesh, Eshed Ohn-Bar, and Mohan Trivedi, "Driver Hand Localization and Grasp Analysis: A Vision-based Real-time Approach", *IEEE 19th International Conference on Intelligent Transportation Systems (ITSC)*, pp. 2545-2550, 2016.
- Siddharth and R. C. Tripathi, "Separation of overlapped chromosome images from single chromosome images and detecting possibility of various diseases by karyotype", *IEEE International Conference on Communication and Signal Processing (ICCSP)*, 951-955, 2013.
- Siddharth and G. C. Nandi, "Human-robot communication through visual game and gesture learning", *IEEE 3rd International Advanced Computing Conference (IACC)*, 852-857, 2013.

PATENTS

- Aashish Patel, Hayden Helm, Steven Dong, Siddharth, Weiwei Yang, Amber Hoak, David Tittsworth, and Kate Lytvynets, *Presenting Bio-sensing Data in Context*, US Patent App. 17/977,672
- Aashish Patel, Weiwei Yang, Hayden Helm, Daniel McDuff, Siddharth, and Steven Dong, *Neuroergonomics API Service for Software Applications*, US Patent App. 17/944,022
- Siddharth, Tzyy-Ping Jung, and Terrence Sejnowski, *Biosensing and Eye-Tracking System*, US Patent 11,032,457
- Siddharth, Aashish Patel, Tzyy-Ping Jung, and Terrence Sejnowski, *Wearable Multi-modal Bio-sensing System*, US Patent App. 17/068,824
- Jawahar Jain, Siddharth, Sajid Sadi, and Pranav Mistry, *Emotion Evaluation*, US Patent 10,285,634
- Siddharth, R. C. Tripathi, and M. D. Tiwari, *A Method and Apparatus for Similarity Detection of Documents Based on Contents Including Texts, Tables, Flowcharts and Equations*, Indian Patent Application ref. no. 160/DEL/2014

FELLOWSHIPS, HONORS, AND AWARDS

- Facebook (Meta) Reality Labs, Research Grant, 2019
- University of California San Diego, Chancellors Research Excellence Scholarship, 2018
- Kavli Institute of Brain and Mind, Innovative Research Grant, 2018
- National Science Foundation, NCS Program, Received funding as a Graduate Researcher, 2017
- University of California San Diego, Chancellors Research Excellence Scholarship, 2017
- University of California San Diego, Center for Wearable Sensors Grant, 2017
- University of California San Diego, Frontiers of Innovation Scholars Program Grant, 2017
- University of California San Diego, Center for Wearable Sensors Grant, 2016
- Army Research Lab, Collaborative Technology Alliances, Received funding as a Graduate Researcher, 2016
- Indian Institute of Information Technology, Runner-up in the Student Project Contest at ACM-IITM, 2013
- Indian Institute of Information Technology, First prize in Electronics Quiz Competition, 2012

TEACHING EXPERIENCE

Taught undergraduate-level research courses (ECE 200, CSE 200, BENG 200) covering embedded systems, bio-sensing, and computer vision, and supervised undergraduate students' research.

Taught graduate-level research courses and supervised master's and doctoral students' research in machine learning, signal processing, and computational neuroscience.

ADDITIONAL ACTIVITIES

Books

- Published the book *Founding Generations: Democracy's Origins and Parallels in America and India* (Biblio Publishing, 2021) on the founding fathers and origins of democracy in India and the United States of America. The book has received rave reviews and blurbs from scholars and historians across the world.

Clubs/Organizations

- Graduate Fellow Editor, UC San Diego Prospect Journal of International Affairs (Sep 2019 – June 2020)
- Senior Editor, UC San Diego Prospect Journal of International Affairs (Jan 2019 – Aug 2019)
- Graduate Student Member, South Asia Initiative, UC San Diego (Jan 2019 – June 2020)

Presentations/Talks

- 2022: Invited to give a motivational talk about charting a research career path at Vinayak Vidyapeeth, Meerut, India
- 2022: Invited to address the inaugural IIIT Allahabad Global Alumni Meet as the Alumni Guest of Honor
- 2022: Invited to give a talk at the Affective Intelligence and Robotics Laboratory (AFAR), University of Cambridge, UK
- 2021: Invited to give an expert talk hosted by the IEEE-ITSS Delhi Chapter at the Jawaharlal Nehru University (JNU)
- 2021: Invited to give a "Weekend Talk" at the IIT-KGP Centre of Excellence in Safety Engineering and Analytics
- 2021: Invited to give a book talk and discussion at the South Asia Initiative at UC San Diego
- 2021: Invited to give an interview on the Meerut-based *Citi Hulchul* News Channel to inspire the youth
- 2021: Invited to a talk at the AICTE Faculty Development Programme at the Malnad College of Engineering, India
- 2020: Invited to an alumnus talk and online discussion at IIIT Allahabad
- 2018: Invited to present graduate research online at the HCII Conference Workshop, IIIT Allahabad
- 2018: Presented graduate research at IEEE EMBC 2018 Conference, Honolulu, Hawaii, USA
- 2018: Invited to present graduate research at the Center for Wearable Sensors (CWS) Summit at UC San Diego
- 2018: Presented graduate research at the 7th BCI Meeting, Asilomar, CA, USA
- 2017: Invited to present a talk on the topic North Korea on the Brink: Socio-Political Impacts of a Nuclear North Korea, Osher Lifelong Learning Institute, UC San Diego
- 2017: Invited to present graduate research at the Center for Wearable Sensors (CWS) Summit at UC San Diego
- 2017: Presented graduate research at HCII Conference, Vancouver, Canada
- 2017: Presented graduate research at the UC San Diego Center for Wearable Computing Summit
- 2016: Presented graduate research at Society for Neuroscience (SfN) Conference 2016, San Diego, CA, USA
- 2016: Invited to give an alumnus talk at IIIT Allahabad, India

Reviewer Services

- IEEE Transactions on Pattern Analysis and Machine Intelligence (PAMI)
- IEEE Transactions on Affective Computing (TAC)
- IEEE Transactions on Biomedical Engineering (TBME)
- IEEE Transactions on Human-Machine Systems (THMS)
- IEEE Journal of Biomedical and Health Informatics (JBHI)
- IEEE Access
- MIT Press Neural Computation
- ACM CHI Conference

- AffectiCom'21

Professional Memberships

- IEEE
- Society for Neuroscience (SfN)
- Brain-computer Interface (BCI) Meeting

Volunteering

- Volunteered as a judge at the Alameda County Science and Engineering Fair (ACSEF), California, 2023
- Summer research school for undergraduate students at UC San Diego, 2019
- Volunteered at the annual EEGLAB Workshop hosted at UC San Diego, 2017–19
- National Science Conclave (a congregation of Nobel laureates) at IIIT Allahabad, 2013
- National Science Conclave (a congregation of Nobel laureates) at IIIT Allahabad, 2012
- National Workshop on VLSI and Timing Signals at IIIT Allahabad, 2012
- Prayaas – Let Dreams Live On (a student-run teaching initiative) at IIIT Allahabad, 2011–12

SKILLS

Programming Languages : C++, C, Python, MATLAB, HTML/CSS, Java
Frameworks : NumPy, SciPy, Scikit-learn, Tensorflow/Keras, PyTorch, OpenCV, Git
Containers : Docker
Hardware : PCB design & bring-up, EAGLE, various embedded system and sensor platforms

REFERENCES

Professor Tzyy-Ping Jung
Associate Director, Swartz Center for Computational Neuroscience (SCCN)
University of California San Diego
jung@sccn.ucsd.edu

Professor Terrence J. Sejnowski
Francis Crick Professor and Director, Computational Neurobiology Laboratory (CNL)
University of California San Diego
terry@salk.edu

Professor Mohan Trivedi
Distinguished Professor and Director, Laboratory for Intelligent and Safe Automobiles (LISA)
University of California San Diego
mtrivedi@eng.ucsd.edu

OTHER INFORMATION

Languages : Hindi – Native, English – Proficient
Citizenship : India
Date of Birth : April 11, 1993