



## **Personal Statement**

I have over 15 years of signal processing experience, with specific focus on computational models of pathologic neural responses. In 2014, we were among the first investigators using machine learning to extract electroencephalographic (EEG) predictors of symptom severity in patients with posttraumatic stress disorder (PTSD; Shu et al, 2014b). I currently hold a 50% appointment at the Univ. of Ca. San Diego (UCSD), where I lead brain-computer interface (BCI) development and EEG informatics at the Dept. of Psychiatry's Functional Neuroscience Laboratory (FNL; Fiza Singh MD, Principal Investigator, or PI). Current FNL clinical trials include a collaboration with UCSD's Alzheimer's Disease Research Center (ADRC) to test gamma neurofeedback (gamma-NFB) to improve working memory (WM) in patients with mild cognitive impairment (MCI).

## **Education and Training**

1994-1997 BA, Molecular and Cell Biology, Northwestern University  
1998-2000 Medical School Years 1-2, Mount Sinai School of Medicine  
2000-2004 PhD in Neurosciences, Mount Sinai School of Medicine  
Dissertation: *Ventromedial Hypothalamic Regulation of Metabolism – Functional Anatomy and Changes during Diabetes and Aging*  
2004-2006 MD, Univ. of Ca. Davis School of Medicine  
2006-2010 Resident Physician, Dept. of Psychiatry, UCSD  
2010-2013 Psychiatry Research Fellow, Veterans Affairs (VA) San Diego

## **Professional History**

2015-2019 Assistant Clinical Professor of Psychiatry, UCSD  
2016-2020 Medical Director, VA San Diego community PTSD services  
2013-2021 Staff Psychiatrist, VA San Diego  
2015-2021 Principal Investigator, Research Service, VA San Diego  
2021-2022 Attending Psychiatrist, Aurora Behavioral Health  
2018-present Co-Investigator, Functional Neuroscience Laboratory, UCSD Center for Mental Health Technologies  
2019-present Associate Clinical Professor of Psychiatry, UCSD

## **Honors and Awards**

2005 Minority Fellow, American Psychiatric Association  
2013 Scholar, Young Investigator Colloquium, American Psychosomatic Society  
2013 Keynote Speaker, Dept. of Psychiatry 8th Annual Junior Faculty and Postdoctoral Research Symposium, UCSD  
2015 VA San Diego Excellent Care/Service HIGH Five Award  
2017 Faculty Development Award, Academy of Clinician Scholars, UCSD  
2018 VA San Diego Leadership Award Honorable Mention  
2023 National Institute of Aging (NIA) Startup Challenge Finalist

## **Professional Memberships and Affiliations**

2015-2020 Member, International Society for Traumatic Stress Studies

2018-2022 Member, Society for Neuroscience  
 2022 Member, Institute of Electrical and Electronics Engineers (IEEE)  
 2022 Member, IEEE Engineering in Medicine and Biology Society  
 2008-present Licensed Physician (License #A103813), Medical Board of CA  
 2009-present Member, UCSD Clinical Translational Research Institute  
 2010-present Member, American Psychiatric Association  
 2010-present Member, California Psychiatric Association  
 2010-present Member, San Diego Psychiatric Society  
 2011-present Diplomate (Psychiatry Certificate #62051), American Board of Psychiatry and Neurology  
 2024-present Member, International Neuroinformatics Coordinating Facility

### **Academic and Professional Service**

2010-2011 Member, Ethics Committee, San Diego Psychiatric Society  
 2012 Contributor, Naval Health Research Center EEG and Functional Magnetic Resonance Imaging (fMRI) Workshop  
 2013 Organizer, 9th Annual Lewis L. Judd Young Investigators Research Symposium  
 2013-2014 Consultant, Primary Care Psychiatry, VA San Diego  
 2017 Contributor, VA Clinical Sciences Research and Development PTSD Psychopharmacology Initiative Workshop  
 2017 Contributor, Research Section, VA San Diego Psychiatry Retreat  
 2013-2019 Interviewer, UCSD Dept. of Psychiatry Research Residency  
 2019 Member, VA San Diego community mental health services quality improvement committee  
 2019-2020 Member, VA San Diego Tele-Mental Health Workgroup  
 2019-2020 Member, UCSD Dept. of Psychiatry Professional Development Series Committee  
 2021 Contributor, Nature Outlook: The Spinoff Prize 2021  
 2023 Contributor, National Institute of Aging Startup Challenge Pavilion  
 2019-present Member, UCSD Dept. of Psychiatry Senior Clinical Faculty Committee  
 2023-present Contributor, UCSD NeuroElectroMagnetic data Archive and tools Resource (NEMAR)  
 2024-present Contributor, OpenNeuro (an open access platform for shared neurophysiologic data)

### **Ad Hoc Reviewer**

2004 *Brain Res*  
 2011-2012 *Int J Psychol*  
 2013-2014 *Front Hum Neurosci*  
 2014-2016 *Psychiatry Res*  
 2015-2017 *Biol Psychology*  
 2013-2019 *Depress Anxiety*  
 2020 *Eur J Psychotraumatol*  
 2020 *Neurobiol Stress*  
 2017-present *Clin EEG Neuroscience*

### **Community Service**

2014-2018 Judge, Mission Bay Montessori Academy Annual Science Fair  
 2023-2024 Assistant Coach, San Dieguito Tennis Club Junior Team Tennis

### **Patents**

1. Singh F, **Shu IW**, Hsu SH, Lin YY, Granholm E. Systems, devices and methods for neurofeedback to promote brain coherence. Filed by The Regents of the University of California, 01/09/2023 (PCT/US2023/073362). Published, 07/03/2024 (WO/2024/050545).

### **Published Manuscripts**

1. Watanabe G, Howe A, Lee RJ, Albanese C, **Shu IW**, Karnezis AN, Zon L, Kyriakis J, Rundell K, Pestell RG. Induction of cyclin D1 by simian virus 40 small tumor antigen. *Proc Natl Acad Sci U S A*. 1996 Nov 12; 93 (23): 12861-6.
2. Pena P, Reutens AT, Albanese C, D'Amico M, Watanabe G, Donner A, **Shu IW**, Williams T, Pestell RG. Activator protein-2 mediates transcriptional activation of the CYP11A1 gene by interaction with Sp1 rather than binding to DNA. *Mol Endocrinol*. 1999 Aug; 13 (8): 1402-16.
3. Morrison BM, **Shu IW**, Wilcox AL, Gordon JW, Morrison JH. Early and selective pathology of light chain neurofilament in the spinal cord and sciatic nerve of G86R mutant superoxide dismutase transgenic mice. *Exp Neurol*. 2000 Oct; 165 (2): 207-20.
4. **Shu IW**, Lindenberg DL, Mizuno TM, Roberts JL, Mobbs CV. The fatty acid synthase inhibitor cerulenin and feeding, like leptin, activate hypothalamic pro-opiomelanocortin (POMC) neurons. *Brain Res*. 2003 Sep 19; 985 (1): 1-12.
5. Mizuno T, **Shu IW**, Makimura H, Mobbs C. Obesity over the life course. *Sci Aging Knowledge Environ*. 2004 Jun 16; 2004 (24): re4.
6. Mobbs CV, Isoda F, Makimura H, Mastaitis J, Mizuno T, **Shu IW**, Yen K, Yang XJ. Impaired glucose signaling as a cause of obesity and the metabolic syndrome: the glucoadipostatic hypothesis. *Physiol Behav*. 2005 May 19; 85 (1): 3-23.
7. **Shu IW**, Onton JA, Prabhakar N, O'Connell RM, Simmons AN, Matthews SC. Combat veterans with PTSD after mild TBI exhibit greater ERPs from posterior-medial cortical areas while appraising facial features. *J Affect Disord*. 2014 Feb; 155: 234-40.
8. **Shu IW**, Onton JA, O'Connell RM, Simmons AN, Matthews SC. Combat veterans with comorbid PTSD and mild TBI exhibit a greater inhibitory processing ERP from the dorsal anterior cingulate cortex. *Psychiatry Research: Neuroimaging*. 2014 Aug; 224: 58-66.
9. Singh F, **Shu IW**, Granholm EL, Pineda JA. Revisiting EEG-Neurofeedback for Schizophrenia. *Schizophr Bull*. 2020 Jul 8; 46 (4): 741-742
10. Gandara V, Pineda JA, **Shu IW**, Singh F. A systematic review of the potential use of neurofeedback in patients with schizophrenia. *Schizophr Bull Open*. 2020 Jan; 1 (1): sgaa005.
11. Singh F, **Shu IW**, Hsu SH, Link P, Pineda JA, Granholm EL. Modulation of frontal gamma oscillations improves working memory in schizophrenia. *Neuroimage Clin*. 2020; 27: 102339.
12. Stein MB, Jain S, Simon NM, West JC, Marvar PJ, Bui E, He F, Benedek DM, Cassano P, Griffith JL, Howlett J, Malgaroli M, Melaragno A, Seligowski AV, **Shu IW**, Song S, Szuhany K, Taylor CT, Ressler KJ; LOSe-PTSD Investigators. Randomized, placebo-controlled trial of the angiotensin receptor antagonist losartan for posttraumatic stress disorder. *Biol Psychiatry*. 2021 Oct 1; 90 (7): 473-481.
13. **Shu IW**, Granholm EL, Singh F. Targeting frontal gamma activity with neurofeedback to improve working memory in schizophrenia. *Curr Top Behav Neurosci*. *Curr Top Behav Neurosci*, 2022.
14. Lin YY, **Shu IW**, Hsu SH, Pineda JA, Granholm EL, Singh Fiza. Novel EEG-based neurofeedback system targeting frontal gamma activity of schizophrenia patients to improve working memory. 44th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC), 2022: 4031-4035.

15. Palmer BW, Shir C, Chang H, Mulvaney M, Hall JMH, **Shu IW**, Jin H, Lohr JB. Increased prevalence of metabolic syndrome in veterans with PTSD untreated with antipsychotic medications. *International Journal of Mental Health*. 2023; 52 (1): 45–60.
16. Lin YY, **Shu IW**, Singh Fiza. Frontal gamma as a marker of effective training during neurofeedback to improve memory in patients with mild cognitive impairment. 11th International IEEE EMBS Conference on Neural Engineering (NER), 2023: 1-4.
17. **Shu IW**, Lin YY, Granholm EL, Singh F. A focused review of gamma neuromodulation as a therapeutic target in Alzheimer's spectrum disorders. *J Psychiatry Brain Sci*. 2024; 9: e240001.

### **News and Media**

Madhusoodanan J. Better brain training for treating psychological conditions. *Nature*. 2021 June 24. [expert source]

### **Teaching and Supervision**

- 2010 Panelist, UCSD Medical Student Psychiatry Interest Group Meeting
- 2012 Speaker, Naval Medical Center San Diego Mental Health Grand Rounds
- 2015 Faculty Discussant, International Society for Traumatic Stress Studies Student Luncheon Meeting
- 2016 Speaker, VA San Diego Quarterly Nurse Practitioner/Clinical Nurse Specialist Retreat
- 2017-2019 Faculty Discussant, UCSD Dept. of Psychiatry Resident Rounds on PTSD/Trauma
- 2017-2019 Speaker, UCSD Dept. of Psychiatry PGY3 Seminar Series
- 2019 Panelist, UCSD Dept. of Psychiatry Faculty Mentorship Seminar Series
- 2016-2021 Site director and Attending Physician, UCSD/VA San Diego PTSD Resident Clinics
- 2020-2021 Site director and Attending Physician, UCSD/VA San Diego General Mental Health Resident Clinics

### **Project Funding History**

- Targeting Dopamine Mediated Social Reward Sensitivity to Remediate Social Disconnection*

Role: Research Psychiatrist (12.5% effort) PI: Charles Taylor PhD

National Institute of Mental Health (NIMH) 1R61MH129380 04/01/2023-03/31/2026
- Enhancing Gamma Band Response to Improve Working Memory in Individuals with Mild Cognitive Impairment*

Role: Co-Investigator (25% effort) PI: Fiza Singh MD

National Institute of Aging (NIA) 5R01AG065252 04/05/2020-09/30/2025
- Endocannabinoid System Engagement and Clinical Symptom Change with Cannabidiol for Social Anxiety Disorder*

Role: Research Psychiatrist (12.5% effort) PI: Charles Taylor PhD

National Center for Complementary and Integrative Health 5R61AT011735 01/18/2022-12/31/2024
- Enhancing Gamma Band Response in Schizophrenia to Improve Working Memory*

Role: Co-Investigator (25% effort) PI: Fiza Singh MD

NIMH 5R33MH112793-050 09/15/2017-04/30/2024
- National Adaptive Trial for PTSD-Related Insomnia*

Role: Local Site Investigator (10% effort) PI: Jon Krystal MD

VA Cooperative Studies Program CSP #2016 10/01/2019-09/30/2023
- Anti-Depressant Response in Neurobiologically Defined Psychiatric Veteran Groups*

Role: Co-Investigator (2.5% effort) PI: Alan Simmons PhD

VA Clinical Sciences Research and Development 1101CX001542-01 10/01/2017-09/30/2021

7. *Enhancing Fear Extinction via Angiotensin Type 1 Receptor Inhibition: A Randomized Controlled Trial in Posttraumatic Stress Disorder* Role: Lead Psychiatrist (10% effort) PI: Murray Stein MD  
Department of Defense W81XWH-15-2-0090 10/01/2015-06/30/2020