NEELI TUMMALA

ntummala@ucsb.edu | (831) 601-3794 | www.neelitummala.com
CV updated Dec. 30, 2023

OVERVIEW

I am interested in applying my engineering and computer science background to understanding neural processing in an interdisciplinary environment. In my PhD, I am focusing on how neural computations are affected by biomechanical processes that underlie the tactile system. I am interested in leveraging my work to advance basic neuroscience, neurotechnology such as BCIs and prosthetics, and robotic sensing. My expertise lies in computational neuroscience, computer science, signal processing, data analysis, controls, and linear systems theory.

EDUCATION

June 2024 (expected)	Ph.D. in Electrical and Computer Engineering, *University of California, Santa Barbara*, GPA: 4.0/4.0 *Concentrations*: Computational Neuroscience, Haptics. *Advisor*: Dr. Yon Visell
June 2020	M.S. in Electrical and Computer Engineering, *University of California, Santa Barbara*, GPA: 4.0/4.0 *Concentrations*: Controls, Signal Processing
May 2018	B.S. in Electrical Engineering and Computer Sciences, *University of California, Berkeley*, GPA: 3.4/4.0 *Concentrations:* Signal Processing, Computer Science, Robotics

HONORS AND AWARDS

2023 - 2024	UC Santa Barbara Graduate Opportunity Fellow (*full funding for 1 year*, $53,000)
2022 - 2024	Link Foundation Modeling, Simulation, and Training Program Fellow (*full funding for 2 years*, $87,000)
2021 - 2024	P.E.O. Foundation Scholarship Recipient (*four awards*, $10,000 total)
2023 - 2024	Society of Women Engineers (SWE) Scholar ($7,500)
2023	Women in Science and Engineering (WiSE) BD Biosciences Research Accelerator Award ($8,000)
2023	Best Seminar Speaker, *2023 Graduate Simulation Seminar Series (GS^3)*, UC Santa Barbara
2023	Best Talk Award, *Festival of Touch*, Marseille, France
2023	Society for Neuroscience Trainee Professional Development Award ($1,000)
2023	Society of Women Engineers (SWE) WE23 Travel Grant ($500)
2023	Academic Senate Doctoral Student Travel Grants (*two grants*, $2,400 total)
2023	Graduate Student Association Travel Grant ($500)
2022	Runner-up for Best Technical Paper, *IEEE Haptics Symposium 2022,* Santa Barbara, CA
2021 - 2022	Intel Society of Women Engineers (SWE) Scholar ($12,000)
2021	Federal Employee Education & Assistance (FEEA) Scholarship Recipient ($1000)
2019 - 2021	Outstanding ECE Teaching Assistant Award, UC Santa Barbara (*three awards*, $8,000 total)
2014 - 2018	Regents and Chancellors Scholar, UC Berkeley ($10,000)

PUBLICATIONS

N. Tummala, G. Reardon, B. Dandu, Y. Shao, H. Saal, and Y. Visell, "Pre-neuronal biomechanical filtering modulates and diversifies whole-hand tactile encoding," *bioRxiv*, 2023. doi: https://doi.org/10.1101/2023.11.10.565040
(Best Talk Award at Festival of Touch**)**

N. Tummala*, G. Reardon*, S. Fani, D. Goetz, M. Bianchi, and Y. Visell, "SkinSource: A Data-Driven Toolbox for Predicting Touch-Elicited Vibrations in the Upper Limb," to appear in *2024 IEEE Haptics Symposium 2024*, Long Beach, CA, 2024. (*equal contribution)

N. Tummala, Y. Shao, and Y. Visell, "Spatiotemporal Organization of Touch Information in Tactile Neuron Population Responses," *2023 IEEE World Haptics Conference (WHC)*, Delft, Netherlands, 2023.

S. Dinulescu, **N. Tummala**, G. Reardon, B. Dandu, D. Goetz, S. Topp, and Y. Visell, "A Smart Bracelet Supporting Tactile Communication and Interaction," *2022 IEEE Haptics Symposium,* Santa Barbara, CA, 2022.
(Runner-up for Best Technical Paper)

TALKS AND POSTERS

Nov. 2023	**N. Tummala**, "Whole Hands on Deck! The Bigger Picture of Touch Sensation." Talk at *Graduate Division Lunch & Learn Seminar*, Santa Barbara, CA.
Nov. 2023	**N. Tummala**, G. Reardon, B. Dandu, Y. Shao, H. Saal, and Y. Visell, "Biomechanical Filtering Diversifies Tactile Encoding in Whole-Hand Pacinian Corpuscle Neuron Populations." Poster at *Neuroscience 2023*, Washington DC. **(Society for Neuroscience Trainee Professional Development Award)**
Sep. 2023	**N. Tummala**, "Measurement-Driven Neural Simulations for Understanding the Sense of Touch." Talk at *2023 Graduate Student Simulation Seminar (GS^3)*, Santa Barbara, CA. **(Best Seminar Speaker)**
Jul. 2023	**N. Tummala**, Y. Shao, and Y. Visell, "Spatiotemporal Organization of Touch Information in Tactile Neuron Population Responses." Talk at *2023 IEEE World Haptics Conference*, Delft, Netherlands.
Jul. 2023	**N. Tummala**, "Biomechanical Filtering Diversifies Whole-Hand Tactile Encoding." Invited talk at *Festival of Touch*, Marseille, France. **(Best Talk Award)**
Apr. 2022	S. Dinulescu, **N. Tummala**, "Smart Bracelet Supporting Tactile Communication and Interaction." Poster at *Materials Research Laboratory Science Teacher Workshop*, Santa Barbara, CA.
Feb. 2022	**N. Tummala**, "Understanding Our Sense of Touch." Talk at *Center for Controls, Dynamical-Systems, and Computation (CCDC) Seminar*, Santa Barbara, CA.
Jan. 2022	**N. Tummala**, "Understanding Our Sense of Touch." Talk at *Electrical & Computer Engineering Graduate Student Lightning Talks*, Santa Barbara, CA.
Jan. 2022	**N. Tummala**, "Understanding Our Sense of Touch." Invited talk at *P.E.O. Foundation Chapter Meeting*, Santa Barbara, CA.
Jul. 2020	**N. Tummala**, "Simulating Responses of Touch Receptors in the Hand." Talk at *2020 Graduate Student Simulation Seminar (GS^3)*, Santa Barbara, CA.

TEACHING

2021	Computer Science Instructor, *SWE++ (Society of Women Engineers)*, UC Santa Barbara
2019 - 2021	Teaching Assistant, *Signal Analysis and Processing*, UC Santa Barbara **(Outstanding Teaching Assistant Award)**
2019 - 2020	Teaching Assistant, *Digital Control*, UC Santa Barbara **(Outstanding Teaching Assistant Award)**
2018 - 2020	Teaching Assistant, *Feedback Control Systems: Theory and Design*, UC Santa Barbara **(Outstanding Teaching Assistant Award)**

MENTORING AND SERVICE

2023	Technical Paper Reviewer, *2024 IEEE Haptics Symposium*, Long Beach, CA
2023 - Present	Undergraduate Mentor, *Society of Women Engineers*, UC Santa Barbara
2023 - Present	Undergraduate Mentor, *Regents and Chancellors Scholar Association*, UC Berkeley
2023	Student Volunteer, *IEEE World Haptics Conference 2023*, Delft, Netherlands

2022 - Present	Research Mentor (Undergraduate Project: Decoding Emotion in Mechanical Measurements of Tactile Sign Language), *RE Touch Lab*, UC Santa Barbara
2021	Research Mentor (Undergraduate Project: Designing a Soft Biomimetic Robotic Tactile Sensing Hand), *UC Leadership Excellence Through Advanced Degrees (UC LEADS)*, UC Santa Barbara
2021	Undergraduate Mentor, *Women in Science and Engineering (WiSE)*, UC Santa Barbara
2019	Mentor (LEGtrek group), *Electrical and Computer Engineering Senior Capstone Project*, UC Santa Barbara

RESEARCH EXPERIENCE

2020 - Present UC Santa Barbara: RE Touch Lab, *Graduate Student Researcher* (Advisor: Dr. Yon Visell)
- Developed a computational neural simulation driven by vibrometry measurements of touch-elicited skin vibrations to understand the effects of hand biomechanics on tactile neural encoding using signal processing and information theory methods.
- Created an open-source MATLAB toolbox that leverages linear systems theory to produce accurate data-driven predictions of touch-elicited skin vibrations across the entire upper limb for applications in understanding human tactile perception, engineering haptic devices, and informing robotic sensing.
- Engineered a wearable tactile sensing system for facilitating tactile communication and interaction in the digital domain with applications in VR/AR and accessibility for the deafblind community.
- Created a soft biomimetic finger with an embedded array of distributed accelerometers leveraging wave propagation in soft media for robotic texture perception.

2019 Teledyne FLIR, *Research and Development Intern* (Advisor: Stephanie Lin)
- Developed image and video signal processing algorithms, performed comprehensive evaluations of various denoising techniques, and assessed signal processing challenges in thermal camera systems.
- Delivered two company-wide presentations on the development of a new signal processing algorithm and was recognized by the global FLIR intern spotlight feature.

2018 - 2020 UC Santa Barbara: Mostofi Lab, *Graduate Researcher* (Advisor: Dr. Yasamin Mostofi)
- Reconstructed occluded areas with WiFi power measurements by applying belief propagation algorithms, sparse signal processing techniques, and various wave propagation models.

2017 - 2018 UC San Francisco Department of Surgery: Wang Lab, *Undergraduate Researcher* (Advisor: Dr. Rong Wang)
- Studied potential treatments for brain arteriovenous malformations in mice by quantifying capillary diameter and blood flow velocity using two-photon, brightfield, and fluorescence microscopy.

2017 MIT Lincoln Laboratory: Communication Systems Division, *Research Intern* (Advisor: Dr. Brian Proulx)
- Developed a C++ simulation for MIMO communication systems with functionalities including routing, queue delay, and automatic re-transmission and analyzed system efficiency and latency.

2016 Naval Postgraduate School: Space Systems Academic Group, *Research Intern* (Advisor: James Horning)
- Led a multi-disciplinary team in an autonomous high-altitude balloon research project.
- Developed a payload that performed automated tasks such as parachute deployment and balloon release and remotely executed commands via radio communication.

SKILLS

General	Computational Neuroscience, Haptics, Signal Processing, Controls, Data Analysis, Computer Science
Technical	Python, MATLAB, C/C++, Java, Fortran, LaTeX, Git, Linux, ROS, Simulink, Microcontrollers