

# NEELI TUMMALA

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CV updated Oct. 30, 2023

## OVERVIEW

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I am interested in applying my engineering and computer science background to understanding neural processing, particularly how it is affected by biomechanical processes that underlie sensory systems like touch. I am also interested in leveraging my findings to advance sensory neuroscience, robotic sensing, prosthetic technology, and clinical diagnoses and rehabilitation. In addition, I strive to communicate my research effectively to broad audiences through writing and presentations. Beyond research, I enjoy teaching topics in controls, signal processing, and computer science and mentoring through organizations such as the Society of Women Engineers and Women in Science and Engineering.

## EDUCATION

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- 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, Software Engineering, Robotics

## HONORS AND AWARDS

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- 2023** Best Seminar Speaker, *2023 Graduate Simulation Seminar Series (GS<sup>3</sup>)*, UC Santa Barbara
- 2023** Society for Neuroscience Trainee Professional Development Award
- 2023** Best Talk Award, *Festival of Touch*, Marseille, France
- 2023 - 2024** UC Santa Barbara Graduate Opportunity Fellow (*full funding for 1 year*)
- 2022 - 2024** Link Foundation Modeling, Simulation, and Training Program Fellow (*full funding for 2 years*)
- 2023 - 2024** Society of Women Engineers (SWE) Scholar
- 2023** Women in Science and Engineering (WiSE) BD Biosciences Research Accelerator Award
- 2021 - 2023** P.E.O. Foundation Scholarship Recipient
- 2021 - 2022** Intel Society of Women Engineers (SWE) Scholar
- 2021** Federal Employee Education & Assistance (FEEA) Scholarship Recipient
- 2019 - 2021** Outstanding ECE Teaching Assistant Award, UC Santa Barbara
- 2014 - 2018** Regents and Chancellors Scholar, UC Berkeley

## PUBLICATIONS

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- 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". Under review. (\*equal contribution)
- N. Tummala**, G. Reardon, B. Dandu, Y. Shao, H. Saal, and Y. Visell, "Biomechanical filtering modulates and diversifies whole-hand tactile encoding". Manuscript in preparation for journal submission.  
(**Best Talk Award** at Festival of Touch)
- 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," *IEEE Haptics Symposium 2022*, Santa Barbara, CA, 2022.  
(**Runner-up for Best Technical Paper**)

## TALKS AND POSTERS

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- 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.” Upcoming poster at *Neuroscience 2023*, Washington DC.  
**(Society for Neuroscience Trainee Professional Development Award)**
- Nov. 2023**     **N. Tummala**, “Whole Hands on Deck! The Bigger Picture of Touch Sensation.” Upcoming talk at *Graduate Division Lunch & Learn Seminar*, Santa Barbara, CA.
- Sep. 2023**     **N. Tummala**, “Measurement-Driven Neural Simulations for Understanding the Sense of Touch.” Talk at *2023 Graduate Student Simulation Seminar (GS<sup>3</sup>)*, 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<sup>3</sup>)*, Santa Barbara, CA.

## TEACHING

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- 2021**     Computer Science Instructor, *SWEE++ (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

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- 2023 - Present**     Undergraduate Mentor, *Society of Women Engineers*, UC Santa Barbara
- 2023**     Student Volunteer, *IEEE World Haptics Conference 2023*, Delft, Netherlands
- 2022**     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

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- 2020 - Present** UC Santa Barbara: RE Touch Lab, *Graduate Student Researcher* (Advisor: Dr. Yon Visell)
- Developed novel computational neural simulations driven by measurements of touch-elicited skin oscillations to understand the effect of hand biomechanics on tactile neuron populations.
  - Created data-driven open-source software toolboxes enabling accurate predictions of touch-elicited skin vibrations and neural responses in the upper limb for 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 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 the effects of genetic modifications and potential treatments on brain arteriovenous malformations (BAVMs) in mice through 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

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<b>General</b>	Computational Neuroscience, Haptics, Signal Processing, Controls, Data Analysis, Software Engineering
<b>Technical</b>	Python, MATLAB, C/C++, Java, Fortran, LaTeX, Git, Linux, ROS, Simulink, Microcontrollers