NEELI TUMMALA

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EDUCATION

June 2024 (expected) Ph.D. in Electrical and Computer Engineering, *University of California, Santa Barbara*, GPA: 4.0/4.0

June 2020 M.S. in Electrical and Computer Engineering, *University of California, Santa Barbara*, GPA: 4.0/4.0
Major: Controls, *Minor*: Signal Processing

May 2018 B.S. in Electrical Engineering and Computer Sciences, *University of California, Berkeley*, GPA: 3.4/4.0

HONORS AND AWARDS

2023 Best Seminar Speaker at Graduate Simulation Seminar Series (GS^3)

2023 Society for Neuroscience Trainee Professional Development Award

2023 Research Talk Prize at Festival of Touch, Marseille, France

2023 - 2024 UC Santa Barbara Graduate Opportunity Fellow

2022 - 2024 Link Foundation Modeling, Simulation, and Training Program Fellow

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

2019 - 2021 UC Santa Barbara Outstanding ECE Teaching Assistant Award

2021 Federal Employee Education & Assistance (FEEA) Scholarship Recipient

2021 - 2022 Intel Society of Women Engineers (SWE) Scholar

2014 - 2018 UC Berkeley Regents and Chancellors Scholar

RESEARCH EXPERIENCE

2020 - Present UC Santa Barbara: RE Touch Lab, *Graduate Student Researcher* (Advisor: Dr. Yon Visell)

- Developing novel computational neural simulations driven by vibrometry measurements of touch-elicited skin oscillations to understand the effect of hand biomechanics on tactile neuron populations.
- Engineering wearable tactile sensing systems for facilitating tactile communication and interaction in the digital domain with applications in accessibility for the deafblind community.

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)

- Applied belief propagation algorithms and sparse signal processing techniques to evaluate line-of-sight and Rytov wave models for reconstructing unknown areas with WiFi power measurements.

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)

- Improved a C++ simulation for MIMO communication systems by implementing routing, queue delay, and automatic re-transmission functionalities and analyzed performance via MATLAB visualization.

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 an autonomous Raspberry Pi system using Python to perform tasks such as parachute deployment and balloon release, and remotely execute commands via radio communication.

PUBLICATIONS

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". Manuscript submitted for publication. (*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.

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" [abstract]. Accepted at *Neuroscience 2023*.

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)**

RESEARCH TALKS

Sep. 2023	"Measurement-Driven Neural Simulations for Understanding the Sense of Touch," *2023 Graduate Student Simulation Seminar (GS^3)* **(Best Seminar Speaker)**
Jul. 2023	"Spatiotemporal Organization of Touch Information in Tactile Neuron Population Responses," *IEEE World Haptics*
Jul. 2023	"Biomechanical Filtering Diversifies Whole-Hand Tactile Encoding," *2023 Festival of Touch* **(Prize Winner)**
Apr. 2022	"Smart Bracelet Supporting Tactile Communication and Interaction," *MRL Science Teacher Workshop*
Feb. 2022	"Understanding Our Sense of Touch," *Center for Controls, Dynamical-Systems, and Computation (CCDC) Seminar*
Jan. 2022	"Understanding Our Sense of Touch," *Electrical & Computer Engineering Graduate Student Lightning Talks*
Jan. 2022	"Understanding Our Sense of Touch," *P.E.O. Foundation Chapter QA Meeting*
Jul. 2020	"Simulating Responses of Touch Receptors in the Hand," *2020 Graduate Student Simulation Seminar (GS^3)*

TEACHING AND SERVICE

2023 - Present	Undergraduate Mentor, *Society of Women Engineers*, UC Santa Barbara
2023	Student Volunteer, *IEEE World Haptics Conference 2023*, Delft, Netherlands
2022	Research Mentor, *RE Touch Lab*, UC Santa Barbara
2021	Research Mentor, *UC Leadership Excellence Through Advanced Degrees (UC LEADS)*, UC Santa Barbara
2021	Undergraduate Mentor, *Women in Science and Engineering (WiSE)*, UC Santa Barbara
2021	Computer Science Instructor, *SWE++ (Society of Women Engineers)*, UC Santa Barbara
2018 - 2020	Teaching Assistant, *Feedback Control Systems: Theory and Design*, UC Santa Barbara
2019- 2020	Teaching Assistant, *Digital Control*, UC Santa Barbara
2019 - 2021	Teaching Assistant, *Signal Analysis and Processing*, UC Santa Barbara
2019	Research Mentor, *LEGtrek Undergraduate Electrical and Computer Engineering Capstone Project*, UC Santa Barbara

PROJECTS

Winter 2020 Soft Biomimetic Finger for Robotic Tactile Perception (*Advisor*: Dr. Elliot Hawkes)

- Developed a soft biomimetic finger prototype composed of silicone and gelatin, integrating an array of accelerometers to capture vibrations across the finger.
- Evaluated sensing capabilities via texture scanning experiments and mechanical modeling of the finger.

Winter 2019 Low-Cost Robotic Teleoperation System with Haptic Feedback (*Advisor*: Dr. Yon Visell)

- Developed an inexpensive, customizable, and reproducible teleoperation system with haptic feedback using a Novint Falcon haptic device to control a Lynxmotion AL5D robotic arm equipped with collision detection sensors, allowing the user to feel obstacles in a remote environment.

Spring 2018 Don't Drop the Scalpel – dontdropthescalpel.wordpress.com (*Advisor*: Dr. Ruzena Bajcsy)

- Implemented slip detection during grasping, adjusted grip force dynamically to minimize object deformation, and classified object rigidity using a Reflex Takktile hand on a Baxter robot for applications in surgical robotics.

Fall 2017 Doctor Sawyer – doctorsawyer.wordpress.com (*Advisor*: Dr. Ruzena Bajcsy)

- Programmed a 7-DOF Sawyer robot arm and microcontroller to perform medical diagnostic tasks: pulse detection, temperature measurement, and elementary tumor detection using force sensing.

Spring 2017 El Animal: Racing Car Robot (*Advisor*: Dr. Ron Fearing)

- Developed control algorithms for line-following and steering, and designed PCBs for motor control, Bluetooth communication, debugging functionality, sensor integration, and power management.

SKILLS

General	Computational Neuroscience, Haptics, Signal Processing, Controls, Data Analysis, Software Engineering
Technical	*Advanced:* Python, MATLAB, Linux, LaTeX, Git. *Intermediate*: C/C++, Microcontrollers, Java, ROS, Fortran