

Harshavardhana Gowda

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Education

University of California

PhD in Electrical and Computer Engineering GPA: 3.83/4.0

Davis, USA

Sep 2024 – May 2027

University of California

M. S. in Electrical and Computer Engineering GPA: 3.97/4.0

Davis, USA

Sep 2022 – Aug 2024

Indian Institute of Space Science and Technology

B.Tech in Avionics GPA: 8.1/10

India

Aug 2014 – May 2018

Publications

[Topology of surface electromyogram signals: hand gesture decoding on Riemannian manifolds](#)

Harshavardhana T. Gowda*, Lee M. Miller.

Journal of Neural Engineering, 2024.

[Non-invasive electromyographic speech neuroprosthesis: a geometric perspective](#)

Harshavardhana T. Gowda*, Ferdous Rahimi, Lee M. Miller.

[Geometry of orofacial neuromuscular signals: speech articulation decoding using surface electromyography](#)

Harshavardhana T. Gowda*, Zachary McNaughton, Lee M. Miller.

[Upper limb surface electromyography - geometry, spectral characteristics, temporal evolution, biometric prospect, and demographic confounds](#)

Harshavardhana T. Gowda*, Neha Kaul, Carlos Carrasco, Marcus A. Battraw, Safa Amer, Saniya Kotwal, Selena Lam, Zachary McNaughton, Ferdous Rahimi, Sana Shehabi, Jonathon S. Schofield, Lee M. Miller.

Research Focus

University of California, Davis, USA

Sep 2022 – May 2027

Graduate Researcher

- My research focuses on developing **accessible** technologies that enhance speech and language communication, particularly for individuals with clinical impairments. I design multimodal language interfaces that integrate audio, video, electromyography (EMG), and electroencephalography (EEG) to facilitate seamless interaction. My work emphasizes **efficient** neural network architectures that enable real-time performance while robustly adapting to the **idiosyncrasies** of individual users.

Major Projects

Hand gesture decoding using surface electromyography

[EMG geometry & other properties](#)

I developed fair and unbiased algorithms for hand gesture recognition using EMG, ensuring robustness across diverse population groups, including older individuals and those with a high BMI - where muscle force generation per unit cross-sectional area is reduced. My work involved analyzing the mathematical

structure of EMG and leveraging its inherent geometry to design algorithms that promote fairness and inclusivity.

Multimodal speech decoding using EMG, video, and residual audio

EMG-Speech

I am developing a speech neuroprosthesis using a multimodal approach to decode speech from EMG, video, and residual audio in individuals who have lost the ability to speak intelligibly. This includes those affected by neuromuscular diseases, stroke, trauma, or head and neck cancer - whether due to surgical interventions like laryngectomy or treatment-related toxicity, such as radiotherapy-induced damage to speech articulators.

Skills

Programming: Python, C, CUDA.

Frameworks: PyTorch, TensorFlow, Keras.

Professional Work Experience

Indian Space Research Organization

India

Satellite Design Engineer

Sep 2018 – June 2022

- Contributed to communication system design of Geosats including GSAT-20 and GISAT (EOS series).
- Contributed to power system design and electronics bus integration of human space mission crew module.
- Developed a software platform to aid the design of digital beamforming to allow coexistence of LTE and MSS. Tested the system in an anechoic chamber using S-band receive antenna. (*Member, Research Team - Novel Technologies*)
- Developed a platform for Digital Video Broadcasting Satellite Second Generation (DVB - S2) standard. Modeled RF satellite systems, communication signals, communication channels and impairments. Analyzed the performance of satellite transponder by measuring error vector magnitude for various modulation schemes. (*Member, Communication Systems Development Team*)
- Conducted failure mode, effects and criticality analysis, and worst-case circuit stress analysis for satellite electronics. Devised experimental investigation techniques to scrutinize fabrication and design errors when circuit performance does not conform to specifications in emulated space environment.

Awards & Achievements

Neuralstorm Fellowship, NSF NRT Award No. 2152260 and Ellis Fund, UC Davis, 2024
Dollars 66,551 for conducting research in neural engineering.

Department of Space Scholarship, Indian Space Research Organization, 2014
Dollars 10,000 to support undergraduate studies in space research.