Harshavardhana Gowda

(+1) 530 760 8789 | tgharshavardhana@gmail.com | LinkedIn | GitHub | Website |

Education

University of California — *Davis, USA*
PhD in Electrical and Computer Engineering *GPA: 3.83/4.0* — *Sep 2022 – May 2027*

University of California — *Davis, USA*
M. S. in Electrical and Computer Engineering *GPA: 3.97/4.0* — *Sep 2022 – Aug 2024*

Indian Institute of Space Science and Technology — *India*
B.Tech in Avionics *GPA: 8.1/10* — *Aug 2014 – May 2018*

Publications

Non-invasive electromyographic speech neuroprosthesis: a geometric perspective
*Harshavardhana T. Gowda**, Lee M. Miller.
NeurIPS 2025 TS4H Workshop (Spotlight).

emg2speech: synthesizing speech from electromyography using self-supervised speech models
*Harshavardhana T. Gowda**, Lee M. Miller.
Preprint.

Topology of surface electromyogram signals: hand gesture decoding on Riemannian manifolds
*Harshavardhana T. Gowda**, Lee M. Miller.
Journal of Neural Engineering, 2024.

A database of upper limb surface electromyogram signals from demographically diverse individuals
*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.
Scientific Data, 2025.

Geometry of orofacial neuromuscular signals: speech articulation decoding using surface electromyography
*Harshavardhana T. Gowda**, Zachary McNaughton, Lee M. Miller.
Journal of Neural Engineering, 2025.

Research Focus

University of California, Davis, USA — *Sep 2022 – May 2027*
Graduate Researcher

- My research focuses on building human–computer interaction technologies that advance both accessibility and immersive computing. I am developing non-invasive speech neuroprostheses that capture surface electromyogram (EMG) signals from the face and neck and convert muscle activity into audible speech, giving voice to individuals who have lost their larynx. In parallel, I am creating wrist-based interfaces that decode intended hand gestures and handwriting to enable natural expression for people with upper-limb loss. Beyond accessibility, I investigate how humans attend to and execute dexterous tasks using multimodal sensing — combining eye gaze, EMG, and video — to model fine-grained motor control. These insights enable subtle manipulation of objects in virtual environments and provide rich training data for robotics, bringing human intention and machine action closer together.

I ARCHITECT data and parameter efficient machine learning algorithms that can easily adapt to idiosyncrasies of different individuals.

Major Projects

Transforming human-computer interactions EMG geometry & other properties

I am building seamless technology for human-computer interaction by harnessing upper-limb EMG signals to replace traditional interfaces like keyboards, mice, and touchscreens. I am developing systems that decode natural hand gestures into real-time computer commands—turning the human body into a high-bandwidth, intuitive control interface.

Multimodal speech decoding using EMG, video, and residual audio EMG-Speech

I am developing a multimodal speech neuroprosthesis that decodes speech from EMG, facial video, and residual audio in individuals who can no longer speak intelligibly. This work targets people affected by neuromuscular disorders, stroke, trauma, or head and neck cancer—including those who have undergone laryngectomy or experienced treatment-related impairments (e.g., radiotherapy-induced articulator damage).

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.