Gopala K. Anumanchipalli, PhD

490A Cory Hall
University of California, Berkeley
CA 94720

Phone: (510) 676-3408
Email: gopala@berkeley.edu

DISCIPLINARY FIELDS

Speech Neuroscience
Speech/Audio Processing
Artificial Intelligence
Spoken Language Processing
Neural Engineering & Brain-Computer Interfaces
Assistive technologies

PROFESSIONAL POSITIONS

University of California, Berkeley   **2021 - Present**
Assistant Professor
Electrical Engineering & Computer Sciences

University of California, San Francisco   **2021 - Present**
Assistant Adjunct Professor, Dept. of Neurological Surgery
Weill Institute for Neurosciences

Computational Precision Health   **2021 - Present**
Core Faculty
UC Berkeley & UCSF

University of California, San Francisco , USA   **2017 - 2020**
Researcher, Dept. of Neurological Surgery

EDUCATIONAL BACKGROUND

University of California, San Francisco , USA   **2013 - 2017**
Postdoctoral Scholar, Dept. of Neurological Surgery

Carnegie Mellon University, USA   **2008 - 2013**
PhD in Language and Information Technologies, School of Computer Science

Instituto Superior Técnico, Portugal
PhD in Electrical and Computer Engineering

IIIT-Hyderabad, India   **2002 - 2008**
Masters in Computer Science, July 2008
B.Tech in Computer Science (with honors in *Artificial Intelligence*), July 2006

PUBLICATIONS

40. Metzger, S., Littlejohn, K., Silva, A., Moses, D., Seaton, M., Wang, R., , Dougherty, M., Liu, J., Wu, J., Berger, M., Zhuravleva, I., Tu-Chan, A., Ganguly, K., **Anumanchipalli, G.,** Chang, E. F.
"A high-performance neuroprosthesis for speech decoding and avatar control"
Accepted at *Nature*, 2023

39. Li, Y., **Anumanchipalli, G.** , Mohamed, A., Lu, Wu, J., Carney, L., Chen, P., Chang, E. F.,
"Dissecting neural computations of the human auditory pathway using deep neural networks for speech"
Accepted at *Nature Neuroscience*, 2023

38. Lian, J., Zhang, C., **Anumanchipalli, G.** , Yu, D.
"UTTS: Unsupervised TTS with Conditional Disentangled Sequential Variational Auto-encoder"
IEEE Transactions on Audio, Speech, and Language Processing, 2023

37. Wu, P., Li, T., Lu, Y., Zhang, Y., Lian, J., Black, A. W., Goldstein, L., Watanabe, S., , **Anu-manchipalli, G.**
"Deep Speech Synthesis from MRI-Based Articulatory Representations",
Interspeech 2023

36. Cho, C. J., Chang. E. F, **Anumanchipalli, G.**
"Neural Latent Aligner: Cross-trial Alignment for Learning Representations of Complex, Naturalistic Neural Data",
ICML 2023

35. Lian, J., Black, A. W., Lu, Y., Goldstein, L., Watanabe, S., **Anumanchipalli, G.**
"Articulatory Representation Learning Via Joint Factor Analysis and Neural Matrix Factorization",
IEEE ICASSP 2023

34. Wu, P., Chen, L-W., Cho, C. J., Watanabe, S., Goldstein, L., Black, A. W., **Anumanchipalli, G.**
"Towards Speaker-Independent Acoustic-to-Articulatory Speech Inversion",
IEEE ICASSP 2023 **Awarded IEEE SPS Student Travel Grant**

33. Liu, Y., Wu, P., Black, A. W., **Anumanchipalli, G.**
"A Fast and Accurate Pitch Estimation Algorithm Based on the Pseudo Wigner-Ville Distribution",
IEEE ICASSP 2023

32. Cho, C. J., Wu, P., Mohamed, A., **Anumanchipalli, G.**
"Evidence of Vocal Tract Articulation in Self-Supervised Learning of Speech",
IEEE ICASSP 2023

31. Begus, G., Zhou, A., Wu, P., **Anumanchipalli, G.**
"Articulation GAN: Unsupervised Modelling of Articulatory Learning"
IEEE ICASSP 2023

30. Metzger., et al, "Generalizable spelling using a speech neuroprosthesis in a paralyzed person",
Nature Communications 2022. **#3rd place in BCI Awards 2022**

29. Lian, J., Zhang, C., **Anumanchipalli, G. K.**, Yu, D.,
"Towards Improved Zero-shot Voice Conversion with Conditional DSVAE"
Interspeech 2022

28. Lian, J., Black, A. W, Goldstein, L., **Anumanchipalli, G.**,
"Deep Neural Convolutive Matrix Factorization for Articulatory Representation Decomposition",
Interspeech 2022

27. Wu, P., Watanabe, S., GoldStein, L., Black, A. W, **Anumanchipalli, G.**,
"Deep Speech Synthesis from Articulatory Features",
Interspeech 2022 **Awarded ISCA Student Travel Grant**

26. Moses, D. A.*, Liu, J.*, Metzger, S.*, **Anumanchipalli, G. K.** et al.,
"Neuroprosthesis for Decoding Speech in a Paralyzed Person with Anarthria",
New England Journal of Medicine, 2021. **2nd place in BCI Awards 2021**

25. Chang, E. F. & **Anumanchipalli, G. K.**,
"Toward a Speech Neuroprosthesis",
Journal of the American Medical Association, 2020.

24. Sun, P.*, **Anumanchipalli, G. K.*** & Chang, E. F.,
    "Brain2Char: A Deep Architecture for Decoding Text from Brain Recordings",
    Journal of Neural Engineering, 2020.

23. **Anumanchipalli, G. K.***, Chartier, J.*, Chang, E. F.,
    "Speech Synthesis From Neural Decoding of Spoken Sentences",
    Nature, 2019.

22. Chartier, J.*, **Anumanchipalli, G. K.***, Johnson, K. & Chang, E. F.,
    "Encoding of Articulatory Kinematic Trajectories in the Human Speech Sensorimotor Cortex",
    Neuron, 2018.

21. Baud, M., Kleen, J, **Anumanchipalli, G. K.**, Hamilton, L., Knowlton, R., Leng, T., Chang, E. F.,
    "Unsupervised learning of spatiotemporal interictal discharges in focal epilepsy",
    Journal of Neurosurgery, 2017.

20. Bouchard, K. E., Conant, D. F., **Anumanchipalli, G. K.**, Dichter, B., Chaisanguanthum, K. S.,
    Johnson, K. A., and Chang, E. F.,
    "High-Resolution, Non-Invasive Imaging of Upper Vocal Tract Articulators Compatible with Human
    Brain Recordings",
    PloS one 11.3, March 2016.

19. Livezey, J.*, **Anumanchipalli, G. K.***, Cheung, B., Prabhat, Sommer, F. T., DeWeese, M. R.,
    Bouchard, K. E., and Chang, E. F.,
    " Classifying spoken syllables from human sensorimotor cortex with deep networks" ,
    NIPS 2015 workshop on *Statistical Methods for Understanding Neural Systems*, 2015

18. **Anumanchipalli, G. K.**, Oliveira, L. C., Black, A. W,
    "Data-driven Intonational Phonology",
    Acoustical Society of America , 2013

17. Sitaram, S., **Anumanchipalli, G. K.**, Chiu, J., Parlikar, A. U., and Black, A., W,
    "Text to Speech in New Languages without a Standardized Orthography " ,
    ISCA SSW8, 2013.

16. Hovy, D., **Anumanchipalli, G. K.**, Parlikar, A., Vaughn, C., Lammert, A., Hovy, E. & Black, A. W,
    "Analysis and Modeling of "Focus" in Context",
    ISCA Interspeech 2013.

15. **Anumanchipalli, G. K.**, Oliveira, L. C. & Black, A. W,
    "Accent Group Modeling for Improved Prosody in Statistical Parameteric Speech Synthesis",
    IEEE ICASSP 2013.

14. **Anumanchipalli, G. K.**, Oliveira, L. C. & Black, A. W,
    "A Style-Capturing Approach for F0 Transformation in Voice Conversion",
    IEEE ICASSP 2013. **Best Student Paper Award**

13. **Anumanchipalli, G. K.**, Oliveira, L. C. & Black, A. W,
    "Intent Transfer in Speech-to-Speech Machine Translation",
    IEEE SLT 2012.

12. **Anumanchipalli, G. K.**, Meinedo, H., Bugalho, M., Trancoso, I., Oliveira, L. C. & Black, A. W.,
    Text Dependent Pathological Voice Detection,
    in Proceedings of Interspeech 2012, Portland, September 2012.

11. **Anumanchipalli, G. K.**, Oliveira, L. C. & Black, A. W,
    "A Statistical Phrase/Accent Model for Intonation Modeling",
    Interspeech 2011.

10. **Anumanchipalli, G. K.**, Prahallad, K. & Black, A. W,
    " Festvox: Tools for Creation and Analyses of Large Speech Corpora",
    Workshop on Very Large Scale Phonetics Research, 2011.

9. **Anumanchipalli, G. K.**, Cheng, Y-C., Fernandez, J., Huang, X., Mao, Q. & Black, A. W,
" KlaTTStat: Knowledge-based Statistical Parametric Speech Synthesis",
ISCA Speech Synthesis Workshop, 2010.

8. **Anumanchipalli, G. K.**, Muthukumar, P., Nallasamy, U., Parlikar, A., Black, A. W. & Langner, B.,
" Improving Speech Synthesis for Noisy Environments" ,
ISCA Speech Synthesis Workshop, Japan, September 2010

7. **Anumanchipalli, G. K.** & Black, A. W
" Adaptation Techniques for Speech Synthesis in Under-resourced languages" ,
Spoken Language Technologies for Under-resourced Languages (SLTU), 2010

6. Das, A., Chittaranjan, G. & **Anumanchipalli, G. K.**
" Usefulness of Text-Conditioning and a New Database for Text-Dependant Speaker Recognition Research" ,
in Proceedings of the Interspeech 2008, Australia, September 2008

5. **Anumanchipalli, G. K.**, Prahallad, K & Black, A. W
" Significance of Early Tagged Contextual Graphemes in Grapheme Based Speech Synthesis and Recognition Systems" ,
Proceedings of the IEEE ICASSP 2008

4. Bohus, D., Puerto, S. G., Huggins-Daines, D., Keri, V., **Anumanchipalli, G.K.**, Kumar, R., Raux, A., and Tomko, S.,
"ConQuest: An Open-Source Dialog System for Conferences" ,
in Proceedings of the ACL HLT-NAACL 2007.

3. **Anumanchipalli, G. K.** , Mosur, R., and Reddy, R
"Improving Pronunciation Inference using n-best list, Acoustics and Orthography" ,
IEEE ICASSP 2007

2. **Anumanchipalli, G. K.**, Chitturi, R., Joshi, S., Kumar, R., Singh, S., Sitaram, R., and Kishore, S. P.,
"Development of Indian Language Speech Databases for LVCSR" ,
International Conference on Speech and Computer (SPECOM), 2005

1. Chitturi, R., Keri, V., **Anumanchipalli, G. K.**, Joshi, S.,
"Lexical Modeling for Non-Native speech recognition using Neural Networks" ,
in Proceedings of the International Conference on Natural Language Processing (ICON), 2005.

PEER REVIEWED POSTER ABSTRACTS

5. Cho, C.J., Chang, E. F., Anumanchipalli, G. "Neural Latent Aligner: Cross-trial Alignment for Learning Representations of Complex, Naturalistic Neural Data", *CoSyne 2023*

4. **Anumanchipalli, G. K.***, *Chartier, J.*, Chang E. F.,*
"Synthesizing speech from the human sensorimotor cortex",
Cosyne *2018, SFN 2018*

3. *Chartier, J.*,* **Anumanchipalli, G. K.***, *Chang, E. F.,*
"Articulatory gesture encoding in human sensorimotor cortex during continuous speech production",
Cosyne 2017, SNL 2017, SFN 2017

2. *Livezey, J.*,* **Anumanchipalli, G. K.***, *Cheung, B., Prabhat, DeWesse, M, Chang, E. F.*
"Deep networks reveal the structure of motor control in sensorimotor cortex during speech production",
Cosyne 2016

1. **Anumanchipalli, G. K.**, *Oliveira, L. C., Black, A. W,*
"Data-driven Intonational Phonology",
Acoustical Society of America *, 2013*

PATENTS

- [Pending] "Methods of generating speech using articulatory physiology and systems for practicing the same", US Patent.

- [Pending] "Methods and systems for translation of neural activity into embodied digital avatar animation", US Patent.

MENTORING

- **Doctoral**: (BioE) : Josh Chartier (PhD 2019), Jessie Liu, Sean Metzger,
  (EECS): Kaylo Littlejohn, Jiachen Lian, Cheol Jun Cho, Peter Wu, Tingle Li, Robbie, Netzorg.

- **Post-doctoral**: Pengfei Sun, PhD (UCSF Neurosurgery), Yuanning Li (Weill Neurosciences), Ran Wang (Weill Neurosciences)

TEACHING

- EE123: Digital Signal Processing, Spring 2022, UC Berkeley

- EE225D: Audio Signal Processing in Humans and Machines, Fall 2021, 2022, UC Berkeley

- Teaching Assistant for "Introduction to Speech Systems" (IIIT Hyderabad, 2005); "Introduction to Speech Processing" (CMU, 2010); "Statistical Learning" (IST Portugal, 2012)

- Instructor for "Introduction to Linear Algebra", Lisbon Machine Learning Summer school, LxMLS 2012

SERVICE & PROFESSIONAL ACTIVITIES

- **Journal reviewer**: Special topics in Signal Processing [IEEE], Transactions on Audio, Speech and Language Processing [IEEE/ACM], International Journal for Speech Technology [Springer], Speech Communication [Elsevier] ; Computer, Speech and Language; NeuroImage [Elsevier]; Journal of Neural Engineering [IoP]

- **Program Committee/ Conference Reviewer**: Interspeech 2013–2023, ICASSP 2016–2023, LREC 2014–2020

- **Organizing Committee** : IWSLT 2012, SSW 2016, SECNS 2016

- **Session Co-chair**: BCI 2021

- **Selection Committees:** BCI Society Early Career Award 2021, NSF CISE adhoc reviewer (2021), Graduate Admissions at EECS, UC Berkeley, 2021, 2022.

CURRENT EXTERNAL RESEARCH SUPPORT

- PI for NSF Award "Collaborative Research: RI: Medium: Flexible Deep Speech Synthesis through Gestural Modeling", (Co-PIs Shinji Watanabe, CMU and Louis Goldstein, USC) $706900

- Rose Hills Innovator 2021, "Multimodal Intelligent Interfaces for Assistive Communication" $170000

- Google Research Award "Neural architectures for streaming speech synthesis from biosignals" $60000

- Meta AI for "Grounded Self-supervised Speech Representation Learning" $34000

- Noyce Computational Transformation Fellow Award $150000

- Subaward PI for NIH Award, "Primary Progressive Aphasia: Cognition, Anatomy and Progression", (Lead PI UCSF) $606,846

- Schwab Dyslexia Innovation Fund, "Automatic Speech & Language Pathology Assessment" $70000

- Society of Hellman Fellows, "Towards Perceptually Grounded Voice Modification" $60000

- JP Morgan Chase Faculty Research Award "Joint Self Supervised Learning of Speech and Text for Spoken Language Modeling" $70000

INVITED TALKS

- "A Statistical Phrase/Accent Model and Its Applications in Speech Processing", IIIT Hyderabad, 2013

- "A Statistical Approach to Intonation Modelling", ICSI Berkeley, 2014

- "Synthesizing Speech directly from the Human Brain", Phorum, Dept. of Linguistics, UC Berkeley, 2018

- "An Articulatory Kinematic Account of the Speech Motor Cortex", Cosyne 2018 Workshop on Recent advances in Neuroengineering, Breckenridge, 2018

- "Intelligible Speech Synthesis from Neural Decoding of Spoken Sentences", Center for Neural Engineering & Prostheses, Annual Retreat, UC Berkeley/UCSF 2018

- "Physiology Grounded Deep Networks for Decoding Speech and Language from the Brain", AESoP Auditory Engineering Workshop, KU Leuven, 2019

- "Physiology Grounded Deep Networks for Decoding Speech and Language from the Brain", Unbabel Inc., 2019

- "Decoding Speech and Language Representations from the Brain", CLSP Seminar, Johns Hopkins University, 2019

- 2020 Gordon Research Conference on Neuroelectronic Interfaces, Ventura, CA 2020

- Hearing Seminar, Stanford University, 2020

- EECS Seminar, UC Berkeley, 2020

- 64th Annual Meeting of the German Society for Clinical Neurophysiology and Functional Imaging, Baden-Baden, 2020

- "Recent Developments in Brain-Computer Interfaces for Communication", Neural Engineering Seminar, University of Washington, 2021

- "A Human-Centered Agenda for Spoken Language AI", BAIR Keynote, UC Berkeley 2021

- "Challenges and Opportunities in Assistive AI for Spoken Communication", BEARS 2021, UC Berkeley, 2021

- Keynote, BCI Conference, Korea, 2021

- Invited speaker, 2022 32nd Kavli Frontiers of Science Symposium, National Academy of Sciences

- Invited speaker, 2022 Gordon Research Conference, "Circuits and Specializations for Behavioral Interactions in Acoustic Communication", Boston, Massachusetts

- Invited speaker, 2022 Israeli-American Kavli Frontiers of Science Symposium, National Academy of Sciences

- Noyce Symposium, UC Santa Barbara

AWARDS & HONOURS

- Doctoral Fellowship from Foundation for Science and Technology, Portugal (2008-2013)

- "Computers that talk with people", profile in the Portuguese tech magazine **Sábado**, Jun 1, 2011.

- IEEE Spoken Language Processing **outstanding student paper** award at IEEE ICASSP 2013, Vancouver, Canada.

- "Brain activity patterns underlying fluent speech revealed", **Science Daily**, Jun 1, 2018.

- Abstract shortlisted for an exclusive *AI-bidirectional* press conference at the SFN 2018 (< 50 selected out of 13884 abstracts; declined)

- "Artificial intelligence turns brain activity into speech", **Science News**, Jan 2, 2019.

- "Scientists Create Speech from Brain Signals", covered in over **200 international news and Tech media** outlets including **New York Times**, **BBC**, **NPR**, **Reuters**, **The Guardian**, **Wall Street Journal**, **National Geographic**, **Washington Post**, **MIT Technology Review**, **Wired**, **Techcrunch**, **Scientific American** etc, Apr 25, 2019.

- "Scientists translate brain signals into speech sounds", **NIH** press release 24th April 2019.

- Radio Interview on **BBC Radio 4** *Inside Science* and **BBC World Service** *Science in Action*, 25th April, 2019.

- Recognized as one of **top 10 Breakthroughs for 2019** by Institute of Physics' **Physics World**.

- Listed among **Biggest Medical Breakthroughs of 2019**, BBC News.

- Ranked **37** among 1.3 million research outputs ($< 0.007\%$) tracked by Altmetric for the year 2019.

- Plenary speaker at the 64th Annual Meeting of the German Society for Clinical Neurophysiology and Functional Imaging, Baden-Baden, 2020.

- "Tapping Into the Brain to Help a Paralyzed Man Speak", **New York Times**, also covered in >100 national and international news outlets, July 16th 2021.

- Recognized as Rose Hills Innovator 2021.

- Expert contributor to Gizmodo article "Will It Be Possible to Upload Information to My Brain?", Sep 20th, 2021

- Awarded the prestigious BCI Award 2021 (rank 2) for work on decoding communication signals directly from the brain of a paralyzed individual.

- Selected as a Google Research Scholar, 2022.

- Kavli Fellow, 2022 (National Academy of Sciences)

- Noyce Computational Innovation Fellow, 2022.

- Hellman Fellow, 2023

- JP Morgan Faculty Research Award, 2023

REFERENCES

Available on request.