

# Crystal T. Engineer, Ph.D.

School of Behavioral and Brain Sciences

Texas Biomedical Device Center

The University of Texas at Dallas

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## EDUCATIONAL HISTORY

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- Ph.D. Cognition and Neuroscience, December 2008, The University of Texas at Dallas, Richardson TX  
Dissertation: Speech sound coding and training-induced plasticity in primary auditory cortex
- M.S. Applied Cognition and Neuroscience, August 2005, The University of Texas at Dallas, Richardson TX
- B.S. Neuroscience, August 2003, The University of Texas at Dallas, Richardson TX  
Honor's Thesis: Sequence exposure in adult rat primary auditory cortex

## PROFESSIONAL EXPERIENCE

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| <b>Assistant Professor</b><br>Neuroscience Department, School of Behavioral and Brain Sciences<br>The University of Texas at Dallas, Richardson TX                             | <b>August 2020 – present</b>         |
| <b>Affiliate Faculty, Department of Bioengineering</b><br>The University of Texas at Dallas, Richardson TX   | <b>September 2018 – present</b>      |
| <b>Research Assistant Professor</b><br>Texas Biomedical Device Center<br>The University of Texas at Dallas, Richardson TX  | <b>June 2016 – July 2020</b>         |
| <b>Affiliate Faculty, School of Behavioral and Brain Sciences</b><br>The University of Texas at Dallas, Richardson TX  | <b>October 2018 – July 2020</b>      |
| <b>Research Associate</b><br>Cortical Plasticity Lab, Advisor Dr. Michael Kilgard<br>School of Behavioral and Brain Sciences, The University of Texas at Dallas, Richardson TX | <b>January 2009 – May 2016</b>       |
| <b>Research Assistant</b><br>Cortical Plasticity Lab, Advisor Dr. Michael Kilgard<br>School of Behavioral and Brain Sciences, The University of Texas at Dallas, Richardson TX | <b>February 2003 – December 2008</b> |

## AWARDS AND HONORS

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|------|---|
| 2019 | American Physiological Society APS <i>select</i> award                  |
| 2019 | International Hearing Loss Conference Travel Award                      |
| 2018 | NARSAD Young Investigator Award   |
| 2013 | Society for Neuroscience (SfN) 2013 annual meeting 'Hot Topic' abstract |

2009	American Speech-Language-Hearing Foundation Research Grant for New Investigators
2003	B.S. awarded with School of Behavioral and Brain Sciences Honors
2003	Dean's List, The University of Texas at Dallas
2000-2004	UTD Academic Excellence Award, The University of Texas at Dallas
2000	AP Scholar

## RESEARCH INTERESTS

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- Neuromodulation
- Auditory system
- Plasticity
- Autism spectrum disorders
- Speech processing
- Vagus nerve stimulation

## RESEARCH SUPPORT

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### CURRENT RESEARCH SUPPORT

#### R01DC017480, NIH

12/1/2018-11/30/2023

\$1,912,500

*Enhancing speech processing in a rat model of autism using vagus nerve stimulation*

The goal of this project is to evaluate whether VNS paired with speech training can reverse the neural and behavioral speech processing deficits observed in a rat model of autism.

Role: PI (Co-Investigators: Seth Hays and Rob Rennaker)

#### 2021 Pilot Grant, Eagles Autism Foundation

\$400,000

4/25/2022 – 4/24/2024

*Restoring auditory processing in a rat model of Rett syndrome*

The objective of this proposal is to determine whether auditory training paired with neuromodulator release can reverse the neural and behavioral auditory processing deficits observed in heterozygous *Mecp2* rats.

Role: PI

#### Diversity supplement 3R01DC017480-04S1, NIH

\$90,500

6/2022-11/2023

*Enhancing speech processing in a rat model of autism using vagus nerve stimulation*

This research supplement to promote diversity provides support for research experiences for students from diverse backgrounds, including those from groups that have been shown to be underrepresented in health-related research. The objective of this project is to evaluate whether VNS paired with sounds alters anterior auditory field responses in a rat model of autism.

Role: PI (Recipient: Brendan Williams)

### COMPLETED RESEARCH SUPPORT

#### 2021-2022 Undergraduate Research Scholar Award

Spring 2022

\$300 lab + \$500 to the student

*Degraded behavioral processing of tone, noise burst train, and speech sounds in a rat model of autism*

The Undergraduate Research Scholar Awards are one-time competitive awards made by the Office of Undergraduate Education, supported by funding from the Office of the Provost, designed to reward the contributions and facilitate the professional development of undergraduate researchers at UT Dallas.

Role: Faculty research advisor (Recipient: Varun Pasapula)

**2018 NARSAD Young Investigator Grant, Brain & Behavior Research Foundation**

1/15/2019-1/14/2022

\$70,000

*Enhancing speech processing in a rat model of autism using vagus nerve stimulation*

The goal of this project is to evaluate whether VNS paired with speech training can reverse the neural and behavioral speech processing deficits observed in a rat model of Rett syndrome.

Role: PI (Mentors: Christa McIntyre and Rob Rennaker)

**2020-2021 Undergraduate Research Scholar Award**

Spring 2021

\$300 lab + \$500 to the student

*The Effects of Vagus Nerve Stimulation on Reversing Maladaptive Plasticity in the Rat Autism Model*

The Undergraduate Research Scholar Awards are one-time competitive awards made by the Office of Undergraduate Education, supported by funding from the Office of the Provost, designed to reward the contributions and facilitate the professional development of undergraduate researchers at UT Dallas.

Role: Faculty research advisor (Recipient: Arjun Mehendale)

**CDMRP HRRP**

9/1/2018-8/31/2021

\$853,144

*Hearing restoration through synaptic plasticity directed by vagus nerve stimulation*

The goal of this project is to evaluate the behavioral and neurophysiological effects of VNS paired with speech sounds in noise-exposed rats.

Role: Co-I (PI Mike Kilgard)

**International Rett Syndrome Foundation HeART award**

6/1/2016-5/31/2019

\$150,000

*Reversing speech sound processing deficits in Rett syndrome*

The goal of this project is to determine whether the neural and behavioral speech processing deficits observed in Rett syndrome can be reversed with IGF-1 therapy.

Role: Co-I (PI Mike Kilgard)

**R01DC010433, NIH**

4/1/2010-3/31/2016

\$1,382,588

*Animal model of speech sound processing in autism*

The major goals of this project were to identify a potential cause of speech sound discrimination impairments in autism and determine whether auditory training generates neural plasticity in the VPA model of autism.

Role: Post-Doc (PI Mike Kilgard)

**Research Grant for New Investigators, American Speech-Language-Hearing Foundation**

11/2009-10/2010

\$5,000

The goal of this project was to evaluate speech sound processing in the valproic acid animal model of autism and to quantify the beneficial effects of two common autism therapies: auditory training and environmental enrichment.

Role: PI

**PEER-REVIEWED PUBLICATIONS**

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- 1) Shivaswamy T, Souza RR, **Engineer CT**, McIntyre CK. (2022) Vagus nerve stimulation as a treatment for fear and anxiety in individuals with autism spectrum disorder. *Journal of Psychiatry and Brain Science*. 7:e220007. <https://doi.org/10.20900/jpbs.20220007>
- 2) Riley JR, Borland MS, Tamaoki Y, Skipton SK, **Engineer CT**. (2021) Auditory brainstem responses predict behavioral deficits in rats with varying levels of noise-induced hearing loss. *Neuroscience*, 477, 63-75. PMID: 34634426
- 3) Adcock KS, Chandler C, Buell EP, Solorzano BR, Loerwald KW, Borland MS, **Engineer CT**. (2020) Vagus nerve stimulation paired with tones restores auditory processing in a rat model of Rett syndrome. *Brain Stimulation*, 13(6), 1494-1503. PMID: 32800964
- 4) Adcock KS, Blount AE, Morrison RA, Alvarez-Dieppa AC, Kilgard MP, **Engineer CT**, Hays SA. (2020) Deficits in skilled motor and auditory learning in a rat model of Rett syndrome. *Journal of Neurodevelopmental Disorders*, 12:27. PMID: PMC7523346
- 5) Borland MS, Vrana WA, Moreno NA, Fogarty EA, Buell EP, Vanneste S, Kilgard MP, **Engineer CT**. (2019) Pairing vagus nerve stimulation with tones drives plasticity across the auditory pathway. *Journal of Neurophysiology*, 122(2), 659 - 671. PMID: PMC6734404 \*selected for special recognition by the American Physiological Society
- 6) Buell EP, Borland MS, Loerwald KW, Chandler C, Hays SA, **Engineer CT**, Kilgard MP. (2019) Vagus nerve stimulation rate and duration determine whether sensory pairing produces neural plasticity. *Neuroscience*, 406, 290-299. PMID: PMC6511481
- 7) Rios MU, Bucksot JE, Rahebi KC, **Engineer CT**, Kilgard MP, Hays SA. (2019) Protocol for construction of rat nerve stimulation cuff electrodes. *Methods and Protocols*, 2(1), 19. PMID: PMC6448795.
- 8) Buell EP, Loerwald KW, **Engineer CT**, Borland MS, Buell JM, Kelly CA, Khan II, Hays SA, Kilgard MP. (2018) Cortical map plasticity as a function of vagus nerve stimulation rate. *Brain Stimulation*, 11(6), 1218 – 1224. PMID: PMC6487479
- 9) **Engineer CT**, Rahebi KC, Borland MS, Buell EP, Im KW, Wilson LG, Sharma P, Vanneste S, Harony-Nicolas H, Buxbaum JD, Kilgard MP. (2018) Shank3-deficient rats exhibit degraded cortical responses to sound. *Autism Research*, 11(1), 59-68. PMID: PMC5773383
- 10) Borland MS, **Engineer CT**, Vrana WA, Moreno NA, Engineer ND, Vanneste S, Sharma P, Pantalia MC, Lane MC, Rennaker RL, Kilgard MP. (2018) The interval between VNS-tone pairings determines the extent of cortical map plasticity. *Neuroscience*, 369, 76-86. PMID: PMC5766390
- 11) **Engineer CT**, Hays SA, Kilgard MP. Vagus nerve stimulation as a potential adjuvant to behavioral therapy for autism and other neurodevelopmental disorders. (2017) *Journal of Neurodevelopmental Disorders*, 9:20. PMID: PMC5496407
- 12) **Engineer CT**, Shetake JA, Engineer ND, Vrana WA, Wolf JT, Kilgard MP. (2017) Temporal plasticity in auditory cortex improves neural discrimination of speech sounds. *Brain Stimulation*, 10(3), 543-552. PMID: PMC5410401
- 13) Borland MS, Vrana WA, Moreno NA, Hanacik EA, Sharma P, **Engineer CT**, Kilgard MP. (2016) Cortical map plasticity as a function of vagus nerve stimulation intensity. *Brain Stimulation*, 9(1), 117-123. PMID: PMC4724352
- 14) **Engineer CT**, Rahebi KC, Borland MS, Buell EP, Centanni TM, Fink MK, Im KW, Wilson LG, Kilgard MP. (2015) Degraded neural and behavioral processing of speech sounds in a rat model of Rett syndrome. *Neurobiology of Disease*, 83, 26-34. PMID: PMC4674323
- 15) **Engineer CT**, Rahebi KC, Buell EP, Fink MK, Kilgard MP. (2015) Speech training alters consonant and vowel responses in multiple auditory cortex fields. *Behavioural Brain Research*, 287, 256-264. PMID: PMC4424170

- 16) **Engineer CT**, Engineer ND, Riley JR, Seale JD, Kilgard MP. (2015) Pairing speech sounds with vagus nerve stimulation drives stimulus-specific cortical plasticity. *Brain Stimulation*, 8(3), 637-644. PMID:PMC4461522
- 17) Banerjee A, **Engineer CT**, Sauls BL, Morales AA, Kilgard MP, Ploski JE. (2014) Abnormal emotional learning in a rat model of autism exposed to valproic acid in utero. *Frontiers in Behavioral Neuroscience*, 8:387. PMID:PMC4228846
- 18) **Engineer CT**, Centanni TM, Im KW, Kilgard MP. (2014) Speech sound discrimination training improves auditory cortex responses in a rat model of autism. *Frontiers in Systems Neuroscience*, 8:137. PMID:PMC4122159
- 19) Reed AC, Centanni TM, Borland MS, Matney CJ, **Engineer CT**, Kilgard MP. (2014) Behavioral and neural discrimination of speech sounds after moderate or intense noise exposure in rats. *Ear and Hearing*, 35(6), e248-261. PMID:PMC4442319
- 20) Centanni TM, Chen F, Booker AM, **Engineer CT**, Sloan AM, Rennaker RL, LoTurco JJ, Kilgard MP. (2014) Speech sound processing deficits and training-induced neural plasticity in rats with dyslexia gene knockdown. *PLoS One*, 9(5), e98439. PMID:PMC4037188
- 21) **Engineer CT**, Centanni TM, Im KW, Rahebi KC, Buell EP, Kilgard MP. (2014) Degraded speech sound processing in a rat model of fragile X syndrome. *Brain Research*, 1564, 72-84. PMID:PMC4034469
- 22) **Engineer CT**, Centanni TM, Im KW, Borland MS, Moreno NA, Carraway RS, Wilson LG, Kilgard MP. (2014) Degraded auditory processing in a rat model of autism limits the speech representation in non-primary auditory cortex. *Developmental Neurobiology*, 74(10), 972-986. PMID:PMC4162757
- 23) **Engineer CT**, Perez CA, Carraway RS, Chang KQ, Roland JL, Kilgard MP. (2014) Speech training alters tone frequency tuning in rat primary auditory cortex. *Behavioural Brain Research*, 258, 166-78. PMID: PMC3886187
- 24) Centanni TM, Sloan AM, Reed AC, **Engineer CT**, Rennaker RL, Kilgard MP. (2014) Detection and identification of speech sounds using cortical activity patterns. *Neuroscience*, 258, 292-306. PMID: PMC3898816
- 25) **Engineer CT**, Perez CA, Carraway RS, Chang KQ, Roland JL, Sloan AM, Kilgard MP. (2013) Similarity of cortical activity patterns predicts generalization behavior. *PLoS One*, 8, e78607. PMID:PMC3797841
- 26) Centanni TM, **Engineer CT**, Kilgard MP. (2013) Cortical speech-evoked response patterns in multiple auditory fields are correlated with behavioral discrimination ability. *Journal of Neurophysiology*, 110, 177-189. PMID:PMC3727033
- 27) Perez CA, **Engineer CT**, Jakkamsetti V, Carraway RS, Perry MS, Kilgard MP. (2013) Different timescales for the neural coding of consonant and vowel sounds. *Cerebral Cortex*, 23, 670-683. PMID:PMC3563339
- 28) Engineer ND, **Engineer CT**, Reed AC, Pandya PK, Jakkamsetti V, Moucha R, Kilgard MP. (2012) Inverted-U function relating cortical plasticity and task difficulty. *Neuroscience*, 205, 81-90. PMID: PMC3299820
- 29) Shetake JA, Wolf JT, Cheung RJ, **Engineer CT**, Ram SK, Kilgard MP. (2011) Cortical activity patterns predict robust speech discrimination ability in noise. *The European Journal of Neuroscience*, 34, 1823-1838. PMID:PMC3286125
- 30) **Engineer CT**, Perez CA, Chen YH, Carraway RS, Reed AC, Shetake JA, Jakkamsetti V, Chang KQ, Kilgard MP. (2008) Cortical activity patterns predict speech discrimination ability. *Nature Neuroscience*, 11, 603-608. PMID:PMC2951886

## BOOK CHAPTERS

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- 1) **Engineer CT**, Centanni TM, Kilgard MP. Rodent models of speech sound processing. In Hickok GS, Small SL (Ed.) *Neurobiology of Language*, Elsevier (2015).
- 2) Kilgard MP, **Engineer CT**. Neural coding of speech sounds. In Jaeger D., Jung R. (Ed.) *Encyclopedia of Computational Neuroscience*. Springer Reference. Springer-Verlag Berlin Heidelberg, [http://dx.doi.org/10.1007/978-1-4614-6675-8\\_433](http://dx.doi.org/10.1007/978-1-4614-6675-8_433) (2015).

## TEACHING

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### Primary Instructor

NSC 4354 Integrative Neuroscience	Fall 2020, Fall 2021, Fall 2022
NSC 4V96 Teaching Internship	Fall 2021, Fall 2022
NSC 4V98 Directed Research	Spring 2020, Spring 2021, Fall 2021, Spring 2022, Fall 2022, Spring 2023
BIOL 3V91 Undergraduate Research in Biology	Spring 2020, Spring 2022
BIOL 3V96 Undergraduate Research in Molecular and Cell Biology	Spring 2023
ACN 6V81 Neurophysiology	Spring 2021
HCS 6323 / ACN 6323 Neurophysiology	Spring 2023
HCS 7121 Graduate Seminar in Systems Neuroscience	Spring 2022
HCS 8V89 Research in Neuroscience	Summer 2019, Fall 2019, Spring 2020, Summer 2020, Fall 2020, Spring 2021, Summer 2021, Fall 2021, Spring 2022, Summer 2022, Fall 2022, Spring 2023

### Guest Lecturer

Neural Plasticity (NSC 4371) The University of Texas at Dallas, Richardson TX	Spring 2017, Spring 2018
MATLAB for Brain Sciences (HCS 6388) The University of Texas at Dallas, Richardson TX	Fall 2013, Fall 2014, Fall 2015, Fall 2016
First year seminar (BBSU 1100) The University of Texas at Dallas, Richardson TX	Fall 2021

### Teaching Assistant

Historical Perspectives: Mind and Machine, Dr. Peter Assmann	May 2004 – July 2004
Experimental Projects, Dr. Peter Assmann	January 2005 – April 2005
Experimental Projects, Dr. Gail Tillman	May 2005 – July 2005
Neuroscience Laboratory Methods, Dr. Linda Perrotti	August 2005 – November 2005
Behavioral and Brain Sciences, The University of Texas at Dallas, Richardson TX	

## INVITED PRESENTATIONS

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- 1) Vagus nerve stimulation paired with sounds improves auditory processing in rodent models of neurodevelopmental disorders. Texas Auditory and Vestibular Research Conference, Houston, Texas, October 2022.
- 2) Restoring auditory processing in rodent models of neurodevelopmental disorders. Callier Center for Communication Disorders Friday Seminars in Speech, Language, and Hearing Bruton Conference, sponsored by the David Bruton Jr. Endowed Lecture Series on Communication Disorders, Dallas, Texas, March 2022.
- 3) Round table series discussion. Hobson Wildenthal Honors College, Richardson, Texas, February 2022.
- 4) Vagus nerve stimulation paired with sounds improves auditory processing in rat models of neurodevelopmental disorders. 4th International Brain Stimulation Conference, Charleston, South Carolina, December 2021.
- 5) Vagus nerve stimulation paired with sounds improves auditory processing in rodent models of neurodevelopmental disorders. Texas Woman's University Department of Biology lecture series, Denton, Texas, September 2021.
- 6) VNS-sound pairing to enhance auditory processing in a rat model of autism. Texas Christian University, Fort Worth, Texas, February 2021.
- 7) Restoring auditory processing in rodent models of autism spectrum disorder. Neuroscience Seminar Series, The University of Texas at Dallas, Richardson, TX, January 2020.
- 8) Speech sound training alters auditory processing in rats. 23<sup>rd</sup> International Congress on Acoustics, Aachen, Germany, September 2019.
- 9) Vagus nerve stimulation as a potential adjuvant to auditory training in rodent models of autism. Carolina Neurostimulation Conference, UNC Chapel Hill, North Carolina, June 2019.
- 10) Vagus nerve stimulation as a strategy to augment auditory rehabilitation. 3rd International Brain Stimulation Conference, Vancouver, Canada, February 2019.  
<https://doi.org/10.1016/j.brs.2018.12.360>
- 11) Speech training improves auditory cortex responses to speech sounds in a rat model of autism. Neuroscience Brownbag, The University of Texas at Dallas, Richardson, TX, April 2014.
- 12) VNS therapy to improve speech processing in autism. Congressman Pete Sessions Neuroscience Research Developments at UTD, The University of Texas at Dallas, Richardson, TX, April 2009.
- 13) Cortical activity patterns predict speech discrimination ability. Callier Center for Communication Disorders, Dallas, Texas, August 2008.

## CONFERENCE PROCEEDINGS

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- 1) **Engineer CT**. Speech sound training alters auditory processing in rats. Proceedings of the 23rd International Congress on Acoustics, Aachen, Germany, September 2019, 2252 – 2257.  
<http://pub.dega-akustik.de/ICA2019/data/articles/001369.pdf>
- 2) Tamaoki Y, Riley JR, Borland MS, Hays SA, **Engineer CT**, Kilgard MP. Reversing degraded auditory processing using targeted plasticity. Proceedings of the 23rd International Congress on Acoustics, Aachen, Germany, September 2019, 6633 – 6638. <http://pub.dega-akustik.de/ICA2019/data/articles/001483.pdf>

## CONFERENCE ABSTRACTS

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- 1) Bendea M, Smith TJ, Wu Y, Abbott J, Capadona J, **Engineer C**, Cogan S, Pancrazio J, Hernandez-Reynoso A. Temporal assessment of detection threshold stability in rodent somatosensory cortex via microelectrode array stimulation during novel operant conditioning paradigm. National Conference on Undergraduate Research (NCUR), Eau Claire, Wisconsin, April 2023.
- 2) Tamaoki Y, Pasapula V, Danaphongse T, Kroon SL, Olajubutu OI, Borland MS, **Engineer CT**. Utilizing vagus nerve stimulation to reverse maladaptive plasticity in the inferior colliculus in a rat autism model. Society for Neuroscience, San Diego, California, November 2022.
- 3) Tamaoki Y, Pasapula V, Danaphongse T, Kroon SL, Olajubutu OI, Borland MS, **Engineer CT**. Utilizing vagus nerve stimulation to reverse maladaptive plasticity in the inferior colliculus in a rat autism model. Advances and Perspectives in Auditory Neuroscience, San Diego, California, November 2022.
- 4) Danaphongse T, Carroll A, Pruitt D, Riley J, **Engineer CT**, Hays SA, Kilgard MP. Accelerated learning in auditory, motor, and cognitive tasks using vagus nerve stimulation. Society for Neuroscience, San Diego, California, November 2022.
- 5) Smith TJ, Wu Y, Abbott JR, Capadona J, **Engineer CT**, Cogan SF, Pancrazio JJ, Hernandez-Reynoso AG. Intracortical Microstimulation Behavioral Paradigm for the Evaluation of Stimulation-Evoked Somatosensory Percepts in Rodents. Society for Neuroscience, San Diego, California, November 2022.
- 6) Williams BM, Danaphongse T, Reyes A, Kroon S, Pasapula V, Jacob A, Mehendale A, **Engineer CT**. Evaluating the Effect of Vagus Nerve Stimulation on Auditory Learning in a Rat Model of Autism Spectrum Disorder. Society for Neuroscience, San Diego, California, November 2022.
- 7) Williams BM, Danaphongse T, Reyes A, Kroon S, Pasapula V, Jacob A, Mehendale A, **Engineer CT**. Evaluating the Effect of Vagus Nerve Stimulation on Auditory Learning in a Rat Model of Autism Spectrum Disorder. Advances and Perspectives in Auditory Neuroscience, San Diego, California, November 2022.
- 8) Tamaoki Y, Pasapula V, Danaphongse T, Kroon SL, Olajubutu OI, Borland MS, **Engineer CT**. Utilizing vagus nerve stimulation to reverse maladaptive plasticity in the inferior colliculus in a rat autism model. UTD Research Day 2022 grad student poster competition, Richardson, Texas, October 2022.
- 9) Smith TJ, Wu Y, Abbott JR, Capadona J, **Engineer CT**, Cogan SF, Pancrazio JJ, Hernandez-Reynoso AG. Intracortical Microstimulation Behavioral Paradigm for the Evaluation of Stimulation-Evoked Somatosensory Percepts in Rodents. UTD Research Day 2022 grad student poster competition, Richardson, Texas, October 2022.
- 10) Tamaoki Y, Pasapula V, Danaphongse T, Kroon SL, Olajubutu OI, Borland MS, **Engineer CT**. Utilizing vagus nerve stimulation to reverse maladaptive plasticity in the inferior colliculus in a rat autism model. Texas Auditory and Vestibular Research Conference, Houston, Texas, October 2022.
- 11) Riley JR, Borland MS, Tamaoki Y, Chandler CR, Skipton SK, Reyes A, Nuthi M, Carroll AM, **Engineer CT**, Kilgard MP. Paired vagus nerve stimulation enhances speech responses in hearing-impaired rats. Texas Auditory and Vestibular Research Conference, Houston, Texas, October 2022.
- 12) Raghuram A, Williams B, Tamaoki Y, **Engineer C**. Vagus nerve stimulation as a potential adjunctive therapy for improving auditory behavior in a rat model of autism. 2022 University of Texas at Dallas Summer Platform for Undergraduate Research (SPUR) symposium, Richardson, TX, July 2022. \*Arjun won a SPUR Honors presentation award
- 13) Srinivasan H, Smith TJ, Wu Y, Abbott JR, Capadona JR, **Engineer CT**, Cogan SF, Pancrazio JJ, Hernandez-Reynoso AG. A Novel Intracortical Microstimulation Behavioral Paradigm for the Evaluation of Stimulation-Evoked Somatosensory Percepts in Rodents. 2022 University of Texas at Dallas Summer

Platform for Undergraduate Research (SPUR) symposium, Richardson, TX, July 2022. \*Hari won a SPUR poster award

- 14) Tamaoki Y, Borland MS, Sousa RR, Kannappan M, Mehendale A, Olajubutu OI, Chawla K, Rao A, Tharakan LS, Skipton SK, Twining OA, Reyes A, Chandler C, **Engineer CT**. Utilizing vagus nerve stimulation to reverse maladaptive plasticity in the inferior colliculus in a rat autism model. International Society for Autism Research annual meeting (INSAR), Austin, Texas, May 2022.
- 15) Pasapula V, Tamaoki Y, Williams B, **Engineer CT**. The effect of prenatal valproic acid exposure on auditory learning. UT Dallas Undergraduate Research Scholar Award Poster Presentation, Richardson, Texas, April 2022.
- 16) Tamaoki Y, Borland MS, Sousa RR, Chandler C, Mehendale A, **Engineer CT**. Utilizing vagus nerve stimulation to reverse maladaptive plasticity in the inferior colliculus in a rat autism model. Advances and Perspectives in Auditory Neuroscience (APAN), November 2021.
- 17) Shivaswamy T, McIntyre C, **Engineer C**. Using vagus nerve stimulation to reduce fear and anxiety in individuals with autism spectrum disorders. UT Dallas Undergraduate Research Scholar Award Poster Presentation, Richardson, Texas, April 2021.
- 18) Mehendale AP, Tamaoki Y, Kilgard MP, **Engineer CT**. The effects of vagus nerve stimulation on reversing maladaptive plasticity in the rat autism model. UT Dallas Undergraduate Research Scholar Award Poster Presentation, Richardson, Texas, April 2021.
- 19) Tamaoki Y, Borland MS, Sousa RR, Kannappan M, Olajubutu OI, Chawla K, Rao A, Tharakan LS, Skipton SK, Twining OA, Reyes A, Chandler C, **Engineer CT**. Utilizing vagus nerve stimulation to reverse maladaptive plasticity in the inferior colliculus in a rat autism model. Association for Research in Otolaryngology virtual conference, February 2021.
- 20) Adcock K, Tamaoki Y, Chandler C, Borland M, Riley J, Nuthi M, Olajubutu O, Chawla K, Tharakan L, **Engineer CT**. Enhancing auditory processing in rodent models of neurodevelopmental disorders. Advances and Perspectives in Auditory Neuroscience (APAN), October 2020.
- 21) Tamaoki Y, Adcock K, Chandler C, Borland M, Riley JR, Nuthi M, Olajubutu OI, Chawla K, Tharakan LS, Kilgard M, Hays S, **Engineer CT**. Vagus nerve stimulation paired with sounds alters auditory processing in rodent models of autism. International Society for Autism Research (INSAR), June 2020. (rescheduled online as an ePoster due to Covid-19)  
<https://insar.confex.com/insar/2020/meetingapp.cgi/Paper/33283>
- 22) Adcock K, Solorzano BR, Borland M, Chandler C, Buell E, Hays S, **Engineer CT**, Kilgard M. Vagus Nerve Stimulation Therapy to Restore Auditory Processing in a Rat Model of Rett Syndrome. International Society for Autism Research (INSAR), June 2020. (rescheduled online as an ePoster due to Covid-19)  
<https://insar.confex.com/insar/2020/meetingapp.cgi/Paper/33966>
- 23) Mehendale AP, Riley JR, **Engineer CT**, Kilgard MP. The effects of targeted plasticity on speech discrimination after moderate or intense noise exposure in rats. The Anson L. Clark Annual Research Symposium, Richardson, Texas, August 2019.
- 24) Borland M, Adcock K, Tamaoki Y, Chandler C, Buell E, Vrana W, Moreno N, Solorzano B, Loerwald K, Fogarty E, **Engineer C**. Vagus nerve stimulation paired with sounds alters auditory processing in rats. International Hearing Loss Conference, Niagara on the Lake, Canada, May 2019.
- 25) Riley J, Borland M, Tamaoki Y, Skipton S, Reyes A, Nuthi M, Intharuck N, **Engineer C**, Hays S, Kilgard M. Cortical and subcortical effects of noise intensity and frequency on noise induced hearing loss in rats. International Hearing Loss Conference, Niagara on the Lake, Canada, May 2019.

- 26) Adcock K, Solorzano BR, Chandler C, Buell E, Loerwald K, Berry A, Spurlin G, McLeod S, **Engineer C**, Hays SA, Kilgard MP. Vagus nerve stimulation therapy to restore auditory processing in a rat model of Rett syndrome. Society for Neuroscience, San Diego, California, November 2018.
- 27) Tauh P, Carroll A, **Engineer C**, Kilgard MP. Accelerated learning using vagus nerve stimulation. The Anson L. Clark Annual Research Symposium, Richardson, Texas, August 2018.
- 28) Adcock K, Berry A, Riley J, Alvarez-Dieppa A, Bucksot J, Herd R, Rennaker RL, **Engineer C**, Hays SA, Kilgard MP. IGF-1 and behavioral training as potential therapeutic strategies to improve behavioral deficits in a rat model of Rett syndrome. Society for Neuroscience, Washington DC, November 2017.
- 29) **Engineer C**, Borland M, Buell E, Sharma P, Moreno N, Buell J, Kilgard M. Pairing vagus nerve stimulation with speech sounds alters multiple auditory fields. Sixth International Conference on Auditory Cortex, Banff, Canada, September 2017.
- 30) Riley J, **Engineer C**, Loerwald K, Herd R, Rahebi K, Rios M, Bucksot J, Carroll A, Kilgard M. Behavioral impact of vagus nerve stimulation paired with speech sounds in rats. Sixth International Conference on Auditory Cortex, Banff, Canada, September 2017.
- 31) Borland MS, Buell EP, **Engineer CT**, Moreno NA, Pantalia MM, Sharma P, Lane MC, Buell JM, Kilgard MP. Moderate vagus nerve stimulation directs more cortical plasticity than more intense VNS. TRI Tinnitus Conference, Ann Arbor, Michigan, June 2015.
- 32) Borland MS, Buell EP, **Engineer CT**, Moreno NA, Alam ZI, Pantalia MM, Sharma P, Lane MC, Jost CB, Do ATT, Kilgard MP. Moderate vagus nerve stimulation directs more cortical plasticity than more intense VNS. Society for Neuroscience, Washington DC, November 2014.
- 33) **Engineer CT**, Centanni TM, Im KW, Moreno NA, Vrana WA, Borland MS, Carraway RS, Shetake JA, Ranasinghe KG, Riley JR, Seale JD, Wilson LG, Kilgard MP. Auditory cortex speech sound processing impairments in a rat model of autism. Society for Neuroscience, San Diego, California, November 2013. (Selected as a SfN Hot Topic)
- 34) Centanni TM, Booker AB, Chen F, **Engineer CT**, Sloan AM, Trull K, Wasko N, Rennaker RL, LoTurco JJ, Kilgard MP. Speech sound processing deficits and training-induced neural plasticity in rats with dyslexia gene knockdown. Society for Neuroscience, San Diego, California, November 2013.
- 35) Banerjee A, Luong JA, Lella SK, Sauls BL, **Engineer C**, Kilgard MP, Ploski JE. Emotional perturbations in an environmentally induced animal model of autism. Society for Neuroscience, San Diego, California, November 2013.
- 36) Im KW, **Engineer CT**, Moreno N, Rosen TM, Vrana WA, Borland MS, Kilgard MP. Neural responses to speech sounds in a rat model of autism. 5<sup>th</sup> Annual Undergraduate Research Scholar Award Poster Presentation, Richardson, Texas, March 2012. (Won 2<sup>nd</sup> place)
- 37) Pandya PK, **Engineer CT**. Coding of Voiceless Fricatives in an Animal Model: Effects of Filtering. American Auditory Society, 36(1), p. 23, Scottsdale, Arizona, March, 2011.
- 38) Rosen TM, Sloan AM, **Engineer CT**, Cheung RJ, Main CL, Rennaker RL, Kilgard MP. Effects of inter-stimulus interval and presentation rate on speech discrimination in the adult rat. Society for Neuroscience, San Diego, California, November 2010.
- 39) Pandya PK, **Engineer CT**. Auditory cortical activity patterns to spectrally degraded stop-consonants. American Auditory Society, 35(1), p. 24, Scottsdale, Arizona, March, 2010.
- 40) Kilgard M, Engineer N, Rosellini W, **Engineer C**. Targeted Neuroplasticity to Treat TBI, Tinnitus, and PTSD. Advanced Technology Applications for Combat Casualty Care, St. Pete Beach, Florida, 2009.

- 41) Shetake JA, **Engineer CT**, Ranasinghe KG, Porter BA, Mumtaz H, Tran E, Wolf J, Cheung RJ, Kilgard MP. Effect of white noise on speech sound discrimination in primary auditory cortex of rats. Society for Neuroscience, Washington, DC, November 2008.
- 42) Perez CA, **Engineer CT**, Puckett AC, Jakkamsetti V, Chang KQ, Carraway RS, Chen YH, Perry MS, Kilgard MP. Double dissociation of consonant and vowel encoding in the rat inferior colliculus. UTMB, Galveston, Texas, June 2008.
- 43) Porter B, Alaniz J, **Engineer C**, Kilgard M. Impaired Speech Discrimination in Rats in the Presence of White Noise. ARO MidWinter Meeting (Association for Research in Otolaryngology), Phoenix, Arizona, February 2008.
- 44) **Engineer CT**, Perez CA, Carraway RS, Puckett AC, Chang KQ, Chen YH, Kilgard MP. Neural responses predict speech sound categorization by rats. Society for Neuroscience, San Diego, California, November 2007.
- 45) Puckett AC, Carraway RS, Perez CA, **Engineer CT**, Jakkamsetti V, Riley JR, Fenus HA, Badhiwala V, Choi JL, Kilgard MP. Behavioral correlates of NB-stimulation induced frequency map plasticity in primary auditory cortex of rats. Society for Neuroscience, San Diego, California, November 2007.
- 46) **Engineer CT**, Perez CA, Carraway RS, Puckett AC, Chang KQ, Chen YH, Kilgard MP. Neural responses predict speech sound categorization by rats. APAN (Tucker-Davis Symposium on Advances and Perspectives in Auditory Neurophysiology), San Diego, California, November 2007.
- 47) **Engineer CT**, Perez CA, Puckett AC, Chen YH, Jakkamsetti V, Perry MS, Carraway RS, Kilgard MP. Neural coding of speech sounds in naïve and trained rat primary auditory cortex. Society for Neuroscience, Atlanta, Georgia, October 2006.
- 48) Perez CA, **Engineer CT**, Puckett AC, Chen YH, Perry MS, Carraway RS, Floody OR, Kilgard MP. Discrimination training of speech sounds in rats. Society for Neuroscience, Atlanta, Georgia, October 2006.
- 49) Puckett AC, **Engineer CT**, Carraway RS, Heydrick CL, McMenemy AL, Perez CA, Kilgard MP. Perceptual consequences of frequency map plasticity in auditory cortex. Society for Neuroscience, Atlanta, Georgia, October 2006.
- 50) Perez CA, **Engineer CT**, Puckett AC, Chen YH, Perry MS, Carraway RS, Floody OR, Kilgard MP. Discrimination training of speech sounds in rats. International Conference on the Auditory Cortex, Grantham, UK, September 2006.
- 51) **Novitski CT**, Chen YH, Puckett AC, Jakkamsetti V, Perez CA, Perry MS, Carraway RS, Kilgard MP. Discrimination Training and Neural Coding of Speech Sounds in Rat Primary Auditory Cortex. Neuroengineering Now Richardson, Texas, June 2006.
- 52) **Novitski CT**, Chen YH, Puckett AC, Jakkamsetti V, Perez CA, Perry MS, Carraway RS, Kilgard MP. Discrimination Training and Neural Coding of Speech Sounds in Rat Primary Auditory Cortex. COSYNE (Cognitive and Systems Neuroscience Meeting) Salt Lake City, Utah, March 2006.
- 53) Puckett AC, **Novitski CT**, Engineer ND, McMenemy AL, Perry MS, Perez CA, Kan PL, Chen YH, Jakkamsetti V, Kilgard MP. Complex sound discrimination abilities in rats and the effects of multiple training manipulations. Society for Neuroscience Washington, D.C., November 2005.
- 54) Engineer ND, **Novitski CT**, Kilgard MP, Puckett AC, Pandya PK, Jakkamsetti V, Moucha R. Task difficulty influences plasticity in primary auditory cortex. COSYNE (Cognitive and Systems Neuroscience Meeting) Salt Lake City, Utah, March 2005.

## TRAINING & CERTIFICATIONS

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January 2023	Microcredential: Designing Learner-Centered and Equitable Courses, Effective Teaching Practices course, The Association of College and University Educators (ACUE)
November 2022	Microcredential: Promoting Active Learning, Effective Teaching Practices course, The Association of College and University Educators (ACUE)
September 2022	Microcredential: Creating an Inclusive and Supportive Learning Environment, Effective Teaching Practices course, The Association of College and University Educators (ACUE)
June 2020	UT Dallas online teaching certification program, level 1
January 2019	Animal Identification and Marking Systems (AIMS) tattoo certification program
October 2009	Basic rodent surgery workshop

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## PROFESSIONAL SERVICE

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### Reviewer

Audiology & Neurotology	Journal of Neurodevelopmental Disorders
Autism Research	Journal of Neurophysiology
Behavioural Brain Research	Language Learning
Brain Stimulation	Neuroscience
eNeuro	Neuroscience Letters
Frontiers in Neuroscience	npj Science of Learning
Frontiers in Systems Neuroscience	PLOS Biology
International Journal of Molecular Sciences	Scientific Reports
Journal of Molecular Pathophysiology	The Journal of Neuroscience

### Grant Reviewer

Italian Ministry of Health  
 Fondation pour la Recherche Médicale (FRM, The French Foundation for Medical Research)

### Symposium Chair

Enhancing Rehabilitation with Vagus Nerve Stimulation, 3rd International Brain Stimulation Conference, Vancouver, Canada, February 2019.

### UTD service

2019	UTD Seed Program for Interdisciplinary Research (SPIRe) Grant Program reviewer
2020-2022	Faculty advisor for the student organization Divergent, a service and education organization at UTD that aims to help people understand different neurodevelopmental disorders
2022	UTD ASPIRE <sup>2</sup> faculty liaison. ASPIRE <sup>2</sup> is a NSF grant with a goal to support 'the development, implementation and evaluation of innovative systematic change strategies that promote gender equity for STEM faculty'.

### Neuroscience department service

2020-2022	Graduate student admissions committee member
2021-2022	Systems neuroscience graduate steering committee member
2021-2022	Neuroscience seminar series committee member
2022	ENSURE undergraduate neuroscience program reviewer

2022 Neuroscience faculty hiring committee member

### Other Service

2019 Carolina Neurostimulation Conference poster award judge

2019-2021 International Society for Autism Research (INSAR) abstract reviewer for 2020, 2021, and 2022 annual meetings

2020 Sigma Xi Virtual Student Scholars Symposium judge

## COMMUNITY SERVICE

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2016, 2017, 2018, 2022 International Rett Syndrome Foundation (IRSF) Strollathon volunteer – my lab and I run the raffle, bake sale, face painting, and games.

## RESEARCH IN THE NEWS

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### Articles

[Vagus Nerve Stimulation Plus Sound May Improve Auditory Processing in Rett, Study Suggests](#), September 2020

[Using the Vagus Nerve to Help Hearing](#), November 2019

[Nerve Stimulation + Repetitive Sounds Help Improve Hearing](#), August 2019

[With training, autism rat models overcome hearing problems](#), November 2013

[Study Captures Brain's Activity Processing Speech](#), April 2008

### Podcasts

[Pairing vagus nerve stimulation with tones drives plasticity across the auditory pathway](#), September 2019

### Videos

[Rocking out Rett](#), August 2017