

**Larry Zhang B.S.**  
*Curriculum Vitae*

Telephone: (408)-952-9318

Website: <http://larryzhang.io>

Email: [larryzhang.eng@gmail.com](mailto:larryzhang.eng@gmail.com)

Github: <http://github.com/larryzhang95>

**Objective**

Apply computational and cognitive models to develop cheap and noninvasive measures of wellbeing and neuropsychiatric state. Developed measures will be used to design intelligent affective interfaces for applications such as automatic therapy analysis, stress monitoring in the workplace, and continuous monitoring systems for psychiatric risk.

**Education**

2020 - Present

**Indiana University, Bloomington**

Dual PhD in Intelligent Systems Engineering  
and Complex Network Systems

*NSF-NRT Fellowship Awardee*

2013 - 2017

**University of California, San Diego**

BS in Electrical Engineering (specialization  
in Machine Learning and Controls)

**Academic Positions & Training**

May 2021 - Present

**Indiana University, Complex Network Systems**

Research Assistant (PI: YY Ahn, Co-Advisor)

February 2021 - Present

**Indiana University, Cognitive Science**

Research Assistant (PI: Michael N. Jones)

July 2020 - Present

**Indiana University, Intelligent Systems Engineering**

Research Assistant (PI: Greg Lewis, Co-Advisor)

Research Assistant (PI: Katy Borner)

February 2020 - July 2020

**USC, Institute for Creative Technologies**

Project Assistant (PI(s): Mohammad Soleymani, Stefan Scherer)

September 2018 - July 2019

**Stanford University, Department of Psychology**

Research Assistant (PI: Ian Gotlib, Post-Doc: Tiffany Cheing Ho)

April 2018 - June 2019

**University of Washington - Seattle, Department of Neurology**

Research Manager (PI: Reza Hosseini Ghomi)

September 2016 - June 2017

**UC San Diego, Department of Electrical Engineering**

Undergraduate Researcher (PI: Kenneth Kreutz-Delgado)

## **Funding & Awards**

August 2023 - December 2023

Accelnet-Multinet Fellow

*Visiting Scholar (Conditional Acceptance)*

August 2020 - August 2022

NSF-NRT in Complex Network Systems Fellowship

*Funding for Graduate Studies*

*\$34,000 stipend per annum*

July 2019

Young Investigator Award, Sage Assembly hosted by Sage Bionetworks

## **Ongoing Projects**

Reference Organ Visualization (Brain)

Predictive Models of Semantic Memory Search

Tensor Decomposition of Edge Time Series in Functional Brain Connectivity

Vocal Analysis of Schizophrenia Patients with Oxytocin Intervention

Synchrony of Heart Rate Variability and Movement Behavior in Intimate Disclosure

## **Publications**

***Accepted, in press, or published***

\* co-first authors

8. **Zhang L**, Jones MN; Using “Semantic Scent” to Predict Item-Specific Clustering and Switching Patterns in Memory Search. *Proceedings of the 43rd Annual Meeting of the Cognitive Science Society (2022)*.

7. **Zhang L\***, Ngo AD\*, Burkhardt HA, Thomas JA, Rhoda Au, Hosseini Ghomi R; Neuropathological Test Validation of Speech Markers of Cognitive Impairment (2021). *Exploration of Medicine*. (<https://doi.org/10.37349/emed.2021.00044>)

6. Tavabi L, Stefanov K, **Zhang L**, Borsari B, Woolley JD, Scherer S, Soleymani M; Multimodal Automatic Coding of Client Behavior in Motivational Interviewing (2020). *22nd International Conference on Multimodal Interaction*. (<https://dl.acm.org/doi/10.1145/3382507.3418853>)

5. **Zhang L**, Duvvuri R, Konda Lakshmi Chandra K, Nguyen T, Hosseini Ghomi R (under review); Automated Voice Biomarkers for Depression Systems using an Online Cross-Sectional Data Collection Initiative (2020). *Depression and Anxiety*. (<https://doi.org/10.1002/da.23020>)

4. Thomas JA, Burkhardt HA, Chaudhry S, Ngo AD, Sharma S, **Zhang L**, Au R, Hosseini Ghomi R; Assessing the Utility of Language and Voice Biomarkers for Alzheimer’s Disease: Predicting Neuropsychological Measures and Dementia Status in the Framingham Heart Study Cognitive Aging Cohort (2020). *Journal of Alzheimer’s Disease*. (<https://doi.org/10.3233/JAD-190783>)

3. Phi H, Janarthanan S, **Zhang L**, Hosseini Ghomi R; Voice Biomarker Identification for Effects of Deep-Brain Stimulation on Parkinson's Disease (2020) (<https://arxiv.org/abs/1912.00866.pdf>)

2. **Zhang L**, Driscoll J, Chen X, Hosseini Ghomi R; Evaluating Acoustic and Linguistic Features of Detecting Depression Sub-Challenge Dataset (<https://doi.org/10.1145/3347320.3357693>). *AVEC 2019 9th International Audio/Visual Emotion Challenge and Workshop, ACM Multimedia 2019*

1. **Zhang L**, Chen X, Vakil A, Byott A, Hosseini Ghomi R; DigiVoice: Voice Biomarker Featurization and Analysis Pipeline (2019) (<https://arxiv.org/abs/1906.07222>).

### ***Preprints/Manuscripts Submitted, Under Revision, or Under Review***

\* co-first authors

1. **Zhang L**, Kolacz J, Rizzo AA, Scherer S, Soleymani S; *Speech Behavioral Markers Align on Symptom Factors in Psychological Distress* (2022; *Under Review*).

### ***Preprints/manuscripts in preparation***

\* co-first authors

6. **Zhang L**, Lewis GF, Cohen AS, Bradley E, Woolley J. Vocal Affect as a Key Identifier of Symptom Pathology in Schizophrenia Patients.

5. **Zhang L**, Jones MN, Todd PM. Generalization of Semantic Foraging via Switch-Cue Prediction.

4. **Zhang L**, Chou TW, Lewis GF. Cross-Modal Synchronization of Behavior and Physiology in newly-formed couples.

3. **Zhang L**, Jo Y, Betzel R, Sporns O, Ahn YY. Tensor Decomposition Methods for Measuring High Amplitude Co-fluctuation Phenomena in Functional Brain Networks.

2. Aspel M\* , **Zhang L\***, Kumar AA\*, Jones MN. Semforager: A pipeline for evaluating semantic foraging methods in semantic fluency research.

1. **Zhang L** , Chandio BQ, Bueckle A, Börner K; Cross-Mapping Anatomical Brain Atlases in MNI Space for Tissue Registration (2021).

### **Conference Presentations**

\* co-first presenters

5. Aspel M\*, **Zhang L\***, Kumar AA, Jones MN. *Semforager: A pipeline for evaluating semantic foraging methods in semantic fluency research*. Poster to be presented at SCiP(Society for Computation in Psychology) Satellite at Annual Meeting of the Psychonomics Society 2022.
4. Zhang L, Soleymani M. *Speech Behavioral Markers Align on Symptom Factors in Psychological Distress*. Poster to be presented at Conference of the International Society for Research on Emotion 2022, Los Angeles, CA.
3. **Zhang L**, Castro N, Cohen T, Hosseini Ghomi R; *Challenges in Estimating Dementia via Verbal Fluency Networks*. Poster Presented at Annual Meeting of the Psychonomics Society 2020.
2. **Zhang L**, Castro N, Cohen T, Hosseini Ghomi R; *Probing Speech Generation via Semantic Fluency Networks in Aging Populations as a Proxy of Dementia and Alzheimer's Disease*. Oral Presentation at NetSci-X 2020, Tokyo, Japan.
1. Walker J\*, **Zhang L\***, Hosseini Ghomi R, Gotlib IH, Ho TC (2019) *Acoustic Vocal Features in the Subtyping of Adolescent Depression using Machine Learning*. Poster presented at the Annual Meeting of the Society of Biological Psychiatry, Chicago, IL.

### **Service**

IU Affective Computing Special Interest Group, Founding Organizer	2022
Luddy Undergraduate Research Opportunities Center, Mentor	2022

### **Reviewing**

Reviewer, BMC BioData Mining	2021
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### **Professional Affiliations**

April 2019 - March 2020	<b>Neurolex Diagnostic Laboratories</b> Neurolex Research, Research Manager
March 2018 - April 2019	<b>Nvidia Corporation</b> Mixed Signal Design Validation Team, Engineer

### **Open Source Contributions**

Digivoice Automatic Voice Analysis Pipeline:  
<https://github.com/NeuroLexDiagnostics/Voice-Analysis-Pipeline>

DigiPsych Prosodic Feature Extraction:  
[https://github.com/NeuroLexDiagnostics/DigiPsych\\_Prosody](https://github.com/NeuroLexDiagnostics/DigiPsych_Prosody)

### **Technical Skills**

Analysis Modules: TensorFlow, Keras, Pytorch, Sci-kit Learn, Numpy, Scipy, StatsModels, Pandas, Apache Spark, NetworkX, Tensorly

Database Softwares: MySQL, Postgres

Visualization Modules: Vega, Altair, Vega-Lite, Plotly, Seaborn, Matplotlib, Gephi

Programming: Python, C, C++, Java, CSS, HTML, UNIX Bash, Julia

### **Teaching and Mentorship**

#### ***Current Mentorship:***

##### *Undergraduate Students*

Ting Wei Chou (B.Sc. 2023); Currently Computer Science Student at IU Bloomington.

#### ***Previous Mentorship:***

##### *Masters Students*

Kiranmayi Konda Lakshmi Chandra (M.Sc. 2020); Currently Data Scientist at Jio

##### *Undergraduate Students*

Anthony Dinh Ngo (B.Sc. 2022); Currently Data Scientist at Allstate

Sungmin Park (B.Eng. 2021); Currently WUSTL PhD in Imaging Science

Kathleen Williams (B.Sc. 2021); Currently University of Cincinnati PhD in Biomedical Informatics

Ali Byott (B.Sc. 2021); Currently Cloud Software Engineer at Oracle

Sanjeev Janarthanan (B.Sc.2020) Currently Data Analyst at Princeton Neuroscience Institute

Abbad Vakil (B.Sc. 2020); Currently Software Development Engineer at Amazon

Joshua Driscoll (B.Sc. 2019); Currently UNM PhD in Geography and Environmental Studies

Sherry (Xiaotong) Chen (B.Sc. 2019); Currently UCSB PhD in Computer Science

##### *High School Students*

Ethan Cantrell (2021); Currently Bioengineering Student at Georgia Tech