

# Lucas Goncalves

Dallas, TX  
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U.S. Permanent Resident

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## Education

<b>THE UNIVERSITY OF TEXAS AT DALLAS</b> , Richardson, Texas	Expected
Ph.D. in Electrical Engineering, <b>GPA 4.00/4.00</b>	Dec 2024
<b>THE UNIVERSITY OF TEXAS AT DALLAS</b> , Richardson, Texas	May 2023
M.S. in Electrical Engineering – Signals and Systems, <b>GPA 4.00/4.00</b>	
<b>UNIVERSITY OF WISCONSIN – PLATTEVILLE</b> , Platteville, Wisconsin	Dec 2018
B.S. in Electrical Engineering, <b>GPA 3.67/4.00</b>	

## Technical Skills

Languages	: Python, MATLAB, Verilog, VHDL, C++, HCS12
Operating Systems	: Linux, Windows, macOS, AS/400
Frameworks & Tools	: Pytorch, TensorFlow, Kaldi, OpenCV, SolidWorks, AutoCAD, LabVIEW, IQAN

## Work Experience

<b>Research Assistant</b> , Multimodal Signal Processing (MSP) Lab, Richardson, TX	Sept 2020 – Present
-Currently working on developing machine learning algorithms for studying expressive behavior. My research topics include emotion recognition, self-supervised learning for SER, multimodal modelling, and audio and video signal processing.	
-Collecting the largest spontaneous speech emotion dataset based on real-world podcast audios.	
<b>Electrical Design Engineer</b> , Seagrave Fire Apparatus LLC, Clintonville, WI	Jan 2019 – Aug 2020
-Principal electrical engineer on research and development of new generation of Seagrave's fire apparatus. Coordinated with mechanical and hydraulics teams updates needed to implement CAN bus J1939 protocol rate change-over from 250 to 500 kbits/s.	
-Developed a database to enable easy access from other teams to electrical parts and reduce time spent consulting with electrical engineers.	
<b>Student Researcher</b> , Pioneer Speech Signal Processing Lab, Platteville, WI	Jan 2018 – Dec 2018
-Researched statistical methods used in machine learning clustering algorithms. Studied and implemented different clustering algorithms in MATLAB, such as, k-means and hierarchical clustering. Successfully investigated and implemented techniques to improve k-means clustering, such as, optimal initialization, best number of centroids, and stopping criterion methods.	

## Publications

<b>Lucas Goncalves</b> and Carlos Busso , " Learning Cross-modal Audiovisual Representations with Ladder Networks for Emotion Recognition," in IEEE international conference on acoustics, speech and signal processing (ICASSP 2023), Rhodes Island, Greece, June 2023, accepted.	
<b>Lucas Goncalves</b> and Carlos Busso , " Robust Audiovisual Emotion Recognition: Aligning Modalities, Capturing Temporal Information and Handling Missing Features," IEEE Transactions on Affective Computing, vol. 13(4): 2156-2170, 2022.	
<b>Lucas Goncalves</b> and Carlos Busso, " Improving Speech Emotion Recognition Using Self-Supervised Learning with Domain-Specific Audiovisual Tasks" in Interspeech 2022, Incheon, Korea, September 2022.	
<b>Lucas Goncalves</b> and Carlos Busso, " AuxFormer: Robust Approach to Audiovisual Emotion Recognition" in IEEE international conference on acoustics, speech and signal processing (ICASSP 2022), Singapore, May 2022.	

## Relevant Coursework

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| • Speech & Speaker Recognition                 | • Machine Learning & Pattern Recognition |
| • Probability, Random Variables and Statistics | • Digital Image Processing               |
| • Digital Signals Processing                   | • Applied Digital Signal Processing      |

## Academic Projects

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### Real-Time Noise Reduction App

C++

Fall 2021

Implemented an Android smartphone app that implements functions used in hearing aids consisting of wide dynamic range compression (WDRC) and noise reduction (NR). The application was designed to process audio in real-time with a sampling frequency of 48k Hz and where each input frame has 256 samples. Each input audio frame is processed by the voice activity detection (VAD) and sound pressure level (SPL) functions, which measures the probability of speech presence and SPL for each frame.

### Emotion Recognition Model

Machine Learning/Python

Fall 2020

Implemented deep learning methods from scratch in python and considered facial expression action unit intensities for emotional state estimation. Performed in depth study of model's framework to identify ways to optimize it for better performance. Also explored methods to mitigate data imbalance.

### Pac-Man in VHDL

VHDL

Fall 2018

Implemented the PACMAN game on a FPGA using VHDL. The game was controlled by push buttons and switches on a DE2board. Incorporated clock dividing, memory initialization file reading, and debugging techniques into the project. Interfaced FPGA with a monitor using a VGA output. Available at: [github.com/ilucasgoncalves/PacMan-VHDL](https://github.com/ilucasgoncalves/PacMan-VHDL)

### Automatic Audio Signal Denoising

MATLAB/DSP

Spring 2018

Implemented algorithm in MATLAB to perform spectral subtraction-based noise suppression. Estimated the average amplitude spectrum noise and applied spectral subtraction with full-wave rectification of signals. Performed time-domain signal reconstruction from short-term spectra using the overlap-and-add method.

### Power Line IoT Monitoring System

Analog Design/LabVIEW

Spring 2018

Designed and implemented a power line monitoring system to monitor current, temperature, inclination, and tension on a power line. Responsible for designing and soldering PCB board for the monitoring system. Designed and implemented a testing environment for low power transducers in LabVIEW.

## Teaching Experiences & Professional Services

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Teaching Assistant, University of Wisconsin – Platteville

Fall 2017 – Fall 2018

- ELECTENG 3780 - Introduction to Microprocessors
- ELECTENG 3770 - Logic and Digital Design

Reviewer: IEEE-Transactions for Affective Computing

### Invited Talks:

**Lucas Goncalves**, Carlos Busso "Improving Speech Emotion Recognition Using Self-Supervised Learning with Domain-Specific Audiovisual Tasks" - INTERSPEECH - 2022, Incheon - South Korea, September 2022.

**Lucas Goncalves**, Carlos Busso "AuxFormer: Robust approach to audiovisual emotion recognition" - IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP 2022), Singapore, May 2022.

**Lucas Goncalves**, Hynek Bořil, "New Methods and Advancements in Deep Learning", invited talk, Center for Robust Speech Systems (CRSS), The University of Texas at Dallas, December 12, 2019.

**Lucas Goncalves**, Brandon Dane, Henry Breaker, Hynek Bořil, "Classification using Clustering; K-means and Hierarchy Clustering", invited talk, Center for Robust Speech Systems (CRSS), The University of Texas at Dallas, December 6, 2018.

## Activities & Awards

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Excellence in Education Doctoral Fellowship

May 2022

International Student & Scholar Services, Officer

Aug 2017 – May 2018

International Club Scholarship

Aug 2017; Aug 2018

Kathryn Mykel Conger Scholarship

Aug 2017

Phi Theta Kappa International Honor Society, President

Aug 2014 – May 2016

Success Center Student Highlight of the Year

2016

All USA and All Illinois Academic Team

Jan 2016