

Lucas Goncalves

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U.S. Permanent Resident

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Education

THE UNIVERSITY OF TEXAS AT DALLAS , Richardson, Texas	Expected
Ph.D. in Electrical Engineering, GPA 4.00/4.00	May 2024
UNIVERSITY OF WISCONSIN – PLATTEVILLE , Platteville, Wisconsin	Dec 2018
B.S. in Electrical Engineering, GPA 3.67/4.00	

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

Research Assistant, Multimodal Signal Processing (MSP) Lab, Richardson, TX Sept 2020 – Present
Currently working on developing machine learning algorithms for studying expressive behavior. My research interests include machine learning, emotion recognition, human computer interaction (HCI), time series modelling, audio and video signal processing.

Electrical Design Engineer, 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 kbits/s 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.

Student Researcher, 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, hierarchical clustering, and decision trees. Successfully investigated and implemented techniques to improve k-means clustering, such as, optimal initialization, best number of centroids, and stopping criterion methods.

Publications

Lucas Goncalves and Carlos Busso, " Robust Audiovisual Emotion Recognition: Aligning Modalities, Capturing Temporal Information and Handling Missing Features," IEEE Transactions on Affective Computing, Accepted, vol. to appear, 2022.

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

Lucas Goncalves 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

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		

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.		

CPU - Microsequencer Control Unit	Verilog	Spring 2018
Implemented a simple CPU on a FPGA using Verilog using a microsequencer in the control path. Performed components interconnections and mapping logic using block diagrams. The CPU was designed with four functions: Load, Store, Jump and OR with extra space allocated if more functions needed to be added to the CPU.		

Teaching Experiences & Professional Services

Teaching Assistant , University of Wisconsin – Platteville	Fall 2017 – Fall 2018
<ul style="list-style-type: none"> • 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

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