Milton O. Candela-Leal

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Education

Tecnológico de Monterrey *Monterrey, Mexico*
BS in Biomedical Engineering (GPA = 96/100 = 3.9/4.0) 2020 - Dec 2024
Highest honors (*Summa Cum Laude*) and highest co-curricular award (*Excellence Diploma*); top graduate in professional development (*Borrego de Oro*, 1/1500).

Research Experience

NSF IUCRC BRAIN Center, Tecnológico de Monterrey *Monterrey, Mexico*
Research Assistant Mar 2021 - Jul 2023, Fall 2024
Advisor: Prof. Mauricio A. Ramírez-Moreno, PhD
Projects: Biometrics (EEG, PPG/EDA, CV) and Machine Learning to predict:
Mental fatigue (2021); engineering interest (2021); emotion (2023).
- Force prediction through pose estimation keypoints and RNN (2022).
- Cognitive load in chess (2023); closed-loop BCI for attention (2024).

Boston Children's Hospital, Harvard Medical School *Boston, MA, USA*
Research Intern Aug 2023 - Jul 2024
Advisor: Prof. Kiho Im, PhD
Projects: Fetal MRI brain subplate segmentation through attention U-Net;
non-linear qMRI for CHD classification; MICCAI FeTA Challenge 2024.

NSF IUCRC BRAIN Center, University of Houston *Houston, TX, USA*
Research Intern Spring 2022
Advisor: Prof. Jose L. Contreras-Vidal, PhD
Project: EEG functional connectivity and bisprectrum analysis between actors.

Publications

(indicates equal contribution)*

Ramírez-Moreno, M.A., Hernández-Mustieles, M.A., **Candela-Leal, M.O.** *et al.* (*accepted*). Workplace Measures of Mental Fatigue. In V.B. Patel (Eds.), *The Scientific Basis of Fatigue*.

Candela-Leal M.O., Alanis-Espinosa, M., Murrieta-González, J. *et al.* (2025). Neural Signatures of STEM Learning and Interest in Youth. *Acta Psychologica*, 255, 104949. doi:10.1016/j.actpsy.2025.104949. PubMed PMID:40168892

Mandujano-Granillo, J.A., **Candela-Leal, M.O.**, Ortiz-Vazquez, J.J. *et al.* (2024). Human-Vehicle Interfaces: A Review for Autonomous Electric Vehicles. *IEEE Access*, 12, 121635–121658. doi:10.1109/ACCESS.2024.3450439

Blanco-Ríos, M.A.*, **Candela-Leal, M.O.***, Orozco-Romo, C. *et al.* (2024). Real-time EEG-based Emotion Recognition for Neurohumanities: Perspectives from Principal Component Analysis and Tree-based Algorithms. *Frontiers in Human Neuroscience*, 18, 1319574. doi:10.3389/fnhum.2024.1319574. PubMed PMID:38545515 **(Editor's Pick eBook Selection, 2024)**

Candela-Leal, M.O., Gutiérrez-Flores, E.A., Presbítero-Espinosa, G. *et al.* (2022). Multi-Output Sequential Deep Learning Model for Athlete Force Prediction on a Treadmill Using 3D Markers. *Applied Sciences*, 12(11), 5424. doi:10.3390/app12115424

Lozoya-Santos, J.J., Ramírez-Moreno, M.A., **Candela-Leal, M.O.** *et al.* (2022). Current and Future Biometrics: Technology and Applications. In R.A. Ramirez-Mendoza, J.J. Lozoya-Santos, R. Zavala-Yoé *et al.* (Eds.), *Biometry: Technology, Trends and Applications* (1st ed., pp. 1–30). Boca Raton, FL: CRC Press. doi:10.1201/9781003145240-1 ISBN: 9781003145240

Ramírez-Moreno, M.A., Carrillo-Tijerina, P., **Candela-Leal, M.O.** *et al.* (2021). Evaluation of a Fast Test Based on Biometric Signals to Assess Mental Fatigue at the Workplace—A Pilot Study. *International Journal of Environmental Research and Public Health*, 18(22), 11891. doi:10.3390/ijerph182211891. PubMed PMID:34831645

Conference Proceedings

Candela-Leal, M.O., Ramírez-Moreno, M.A., & Lozoya-Santos, J.J. (*accepted*). Task Resolution Time Estimation through Cognitive Load: An EEG Study of Chess Players. In Proceedings of the *47th Annual Meeting of the Cognitive Science Society (CogSci)*. San Francisco, CA: Taylor & Francis

Ramírez-Arceo, G.A., **Candela-Leal, M.O.**, Tudon-Martinez, J.C. *et al.* (*accepted*). Innovative Spaces with Advanced Technologies such as Research Activity Simulators for Engineering Education. In

Proceedings of the *16th Global Engineering Education Conference (EDUCON)*. London, United Kingdom: IEEE

Candela-Leal, M.O., Aguilar-Herrera, A.J., Ramírez-Moreno, M.A. *et al.* (2024). Conscious Technologies Projects as a Hub for Real Life Challenges in Engineering Education. In Proceedings of the *15th EDUCON*. Kos, Greece: IEEE. doi:10.1109/EDUCON60312.2024.10578738

Candela-Leal, M.O., Martínez-Díaz, D., Orozco-Romo, C. *et al.* (2023). Biomechanics Digital Twin: Markerless Joint Acceleration Prediction Using Machine Learning and Computer Vision. In Proceedings of the *Future of Educational Innovation-Workshop Series: Data in Action*. Monterrey, Mexico: IEEE. doi:10.1109/IEEECONF56852.2023.10104757

Candela-Leal, M.O., García-Briones, J.M., Olivas-Martínez, G. *et al.* (2021). Real-time Biofeedback System for Interactive Learning using Wearables and IoT. In Proceedings of the *6th International Conference on Industrial Engineering and Operations Management*. Monterrey, Mexico: IEOM **(best undergraduate paper award)**. doi:10.46254/NA06.20210487

Olivas-Martínez, G., **Candela-Leal, M.O.**, Ocampo-Alvarado, J.C. *et al.* (2021). Detecting Change in Engineering Interest in Children through Machine Learning using Biometric Signals. In Proceedings of the *Machine Learning-Driven Digital Technologies for Educational Innovation Workshop*. Monterrey, Mexico: IEEE. doi:10.1109/IEEECONF53024.2021.9733772

Invited Talks

Panelist, Neuroscience Laboratories @ Tec, (with Prof. Pedro Cortes, Prof. Manuel Cebral ...) 2025
NeuroTalks@Tec: Meet the Experts, Tecnológico de Monterrey

Guest Lecturer, Decoding Cognitive Performance: From Chess Puzzles to STEM Classrooms, 2024
Cognitive Neuroscience minor, Tecnológico de Monterrey - School of Humanities and Education

Invited Lecturer, Computer Vision and Facial Recognition, 2023
Computing Seminar course, UANL - School of Physics and Mathematics

Selected Presentations

Oral Presentations

Digital Twins in Education: Enhancing Student Well-being and Academic Performance with Biometric Insights and Machine Learning. *U21 Health Sciences Group 2024 Annual Meeting*, Amsterdam University Medical Centers (Amsterdam, Netherlands) **(student speaker award)** 2024

High-resolution Fetal Subplate Automatic Segmentation. *FNNDSC Research Symposium*, Boston Children's Hospital (Boston, MA) 2024

CHD Fetal Brain Analysis using Combined Quantitative MRI Features and Custom-build Loss Functions. *FNNDSC Research Symposium*, Boston Children's Hospital (Boston, MA) 2024

Biomechanics for the Digital Twin of Performance: Study Cases. *Conscious Technologies for Smart Communities Workshop* (Virtual) 2021

Harry Potter and the Prisoner of Azkaban (2004), a Cultural and Ideological Instructor of the Millennial Viewer. *51th Research and Development Congress* (Virtual) 2021

Poster Presentations

FALCONS: Fetal Automatic Landmark Computation and Optimization for Neuroimaging Segmentation. *27th International Conference on MICCAI* (Marrakesh, Morocco) 2024

Real-time Dual-feature Mental Fatigue State SVM Classification using EEG Delta Bandpower. *19th IEEE-EMBS International Conference on BSN*, MIT Media Lab (Boston, MA) 2023

Biometric Cabin for Neurohumanities Lab. *NSF IUCRC BRAIN 2023 Annual Meeting*, Arizona State University (Phoenix, AZ) 2023

Digital Twin modeling for Human Biomechanics and Office Spaces. *NSF IUCRC BRAIN 2022 Annual Meeting*, University of Houston (Houston, TX) 2022

Brain on Acting: Neural Dynamics of Actor-Actor Dyads During an Acted Scene. *NSF IUCRC BRAIN 2022 Annual Meeting*, University of Houston (Houston, TX) 2022

Identifying Engineering Interest in Children through Machine Learning using Biometric Signals. *43rd Annual Conference of the IEEE-EMBS* (Virtual) 2021

Digital Twin of Biomechanics: Joint Force Prediction using Video and AI. At the *NSF IUCRC BRAIN 2021 Annual Meeting* (Virtual) 2021

Honors and Awards

Editor's Pick eBook, Frontiers in Human Neuroscience [ebook] 2025
Top 16 of 510 papers published in 2024.
Summa Cum Laude, Tecnológico de Monterrey 2024
Highest academic honors (top 5% of the graduating class).
Borrego de Oro, Tecnológico de Monterrey [newsletter] 2024
Top graduate in professional development, among ∼1,500 Fall 2024 graduates.
Excellence Diploma, Tecnológico de Monterrey 2024
International Diploma, Tecnológico de Monterrey 2024
Student Speaker Award, U21 Health Sciences Group [newsletter] 2024
One of the two teams that won funding ($1600 USD) to present at U21 HSG '24, selected from MSc/BSc research projects across 21 universities on all continents.
Outstanding Student Award, Tecnológico de Monterrey 2023, 2024
1% of all 8000 engineering students with the most outstanding trajectories.
1st Place - Undergraduate Student Paper Competition, 6th North American IEOM 2021
1st Place - R&D Improvement Proposals ($250 USD), 18th Conexión Tec 2021
Academic Talent Scholarship, Tecnológico de Monterrey 2020

Working Papers

Candela-Leal, M.O., Wong-Cantú, C.G., Ramírez-Moreno, M.A. *et al.* (*submitted*). Enhancing Engagement with Immersive Spaces: A Biomechanical Analysis of Dance
Candela-Leal, M.O., Marrufo-Franco, L.A., Cruz-Gómez, C.F. *et al.* (*submitted*). Closed-Loop BCI with Haptic Feedback and Machine Learning for Attention Support in ADHD Students
Qiu, B., Gondova, A., **Candela-Leal, M.O.** *et al.* (*submitted*). Regional Analysis of Error Patterns from Automatic Cortical Plate Segmentation in Fetal Brain MRI
Gondova, A., **Candela-Leal, M.O.**, Yun, H.J. *et al.* (*submitted*). Attention-gated Convolutional Neural Network for Automated Segmentation of Fetal Subplate from MRI
Candela-Leal, M.O., Martínez-Hernández, A., Moreno-Salazar, I.E. *et al.* (*in prep*). Enhanced Real-Time EEG-based Emotion Recognition using an Spherical VAD Model
Candela-Leal, M.O., Tudon-Martinez, J.C., & Lozoya-Santos, J.J. (*in prep*). Multi-Sensor Fusion for Vehicle Perception and Intent Recognition in Adverse Weather: A Review

Teaching

German A2 Teacher, Mentoor MX 2022-2024
Middle School Math and Spanish Teacher, Aprendamos Juntos 2021-2022
Independent High School Physics Teacher Fall 2019
FIRST® LEGO® League Mentor, Little Minds Spring 2019

Grants

SimEmotions: An Emotion-Centered Collaborative Learning Platform, 2025-2026
Project Groups Funding: Clinical Simulation ($5000 USD), U21 Health Sciences Group, with Prof. Karien Henrico (University of Johannesburg), Prof. Sandra Monteiro (McMaster University), Prof. Ignacio Andrés Villagrán Gutiérrez (PUC Chile), Prof. Allison Mandrusiak (The University of Queensland), and Prof. John Fung (The University of Hong Kong)

Skills Summary

Languages Python (3 years), R (2 years), MATLAB (1 year), Shell (3 months), SQL (3 months)
English (C1), German (B1), Spanish
Frameworks Numpy, Scipy, Pandas, Matplotlib, Scikit-learn, OpenCV, TensorFlow, Keras, BrainFlow
FreeSurfer, FSL, MRtrix3, NiBabel, ANTs, PyDicom, IRTK, NUC, TochIO, MNE, OSC
Lattice, Dplyr, Tidyr, Caret, GA, Ggplot, Shiny
Tools Git, Anaconda, CUDA, CMake, Tableau, Microsoft Excel, G*Power, Overleaf, LaTeX
Platforms Linux, Ubuntu, ROS, Windows, Arduino, Raspberry

Press

TecScience, Neurohumanities Lab: Detecting Emotions in Real Time to Transform Education 2025
TecScience, Future Classrooms of the Future: Real-Time Monitoring of Students' Brain Activity 2025
NSF IUCRC BRAIN, BRAIN Center Spring Newsletter (pp. 4, 9-10) 2023

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