

# Milton O. Candela-Leal

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[miltoncandela.github.io](https://github.com/miltoncandela)

## 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 award for co-curricular success (*Excellence Diploma*); *Borrego de Oro* in professional development.

## 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 subplate segmentation (attention U-Net); non-linear qMRI for congenital heart disease 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 bispectrum analysis between actors.

## PUBLICATIONS

(† indicates equal contribution)

**Candela-Leal M.O.**, Alanis-Espinosa, M., Murrieta-González, J. *et al.* (accepted). Neural Signatures of STEM Learning and Interest in Youth. *Acta Psychologica*

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*.

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](https://doi.org/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](https://doi.org/10.3389/fnhum.2024.1319574). PubMed PMID:[38545515](https://pubmed.ncbi.nlm.nih.gov/38545515/)

**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](https://doi.org/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](https://doi.org/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](https://doi.org/10.3390/ijerph182211891). PubMed PMID:[34831645](https://pubmed.ncbi.nlm.nih.gov/34831645/)

## CONFERENCE PROCEEDINGS

Ramírez-Arceo, G.A., **Candela-Leal, M.O.**, Tudon-Martinez, J.C. *et al.* (2025). Innovative Spaces with Advanced Technologies such as Research Activity Simulators for Engineering Education. In Proceedings of the 16<sup>th</sup> 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 15<sup>th</sup> *EDUCON*. Kos, Greece: IEEE. doi:[10.1109/EDUCON60312.2024.10578738](https://doi.org/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](https://doi.org/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 6<sup>th</sup> *International Conference on Industrial Engineering and Operations Management*. Monterrey, Mexico: IEOM (**best undergraduate paper award**). doi:[10.46254/NA06.20210487](https://doi.org/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](https://doi.org/10.1109/IEEECONF53024.2021.9733772)
- Aguilar-Herrera, A.J., Delgado-Jimenez, E.A., **Candela-Leal, M.O.** *et al.* (2021). Advanced Learner Assistance System's (ALAS) recent results. In Proceedings of the *Machine Learning-Driven Digital Technologies for Educational Innovation Workshop*. Monterrey, Mexico: IEEE. doi:[10.1109/IEEECONF53024.2021.9733770](https://doi.org/10.1109/IEEECONF53024.2021.9733770)

## INVITED TALKS

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|---|------|
| <b>Panelist</b> , Neuroscience Laboratories @ Tec ,<br>(with professors Pedro Cortes, Manuel Cebal, Andrés Ayala, Luis Morán, and Luz María Alonso)<br><i>NeuroTalks@Tec: Meet the Experts</i> , Tecnológico de Monterrey | 2025 |
| <b>Guest Lecturer</b> , Decoding Cognitive Performance: From Chess Puzzles to STEM Classrooms,<br><i>Cognitive Neuroscience</i> minor, Tecnológico de Monterrey, School of Humanities and Education                       | 2024 |
| <b>Invited Lecturer</b> , Computer Vision and Facial Recognition,<br><i>Computing Seminar</i> course, UANL, School of Physics and Mathematics   | 2023 |

## SELECTED PRESENTATIONS

### Oral Presentations

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|---|------|
| Digital Twins in Education: Enhancing Student Well-being and Academic Performance with Biometric Insights and Machine Learning. <i>U21 Health Sciences Group 2024 Annual Meeting</i> , Amsterdam University Medical Centers (Amsterdam, Netherlands) ( <b>student speaker award</b> ) | 2024 |
| High-resolution Fetal Subplate Automatic Segmentation. <i>FNNDSC Research Symposium</i> , Boston Children's Hospital (Boston, MA)   | 2024 |
| CHD Fetal Brain Analysis using Combined Quantitative MRI Features and Custom-build Loss Functions. <i>FNNDSC Research Symposium</i> , Boston Children's Hospital (Boston, MA)   | 2024 |
| Biomechanics for the Digital Twin of Performance: Study Cases. <i>Conscious Technologies for Smart Communities Workshop</i> (Virtual)   | 2021 |
| <i>Harry Potter and the Prisoner of Azkaban</i> (2004), a Cultural and Ideological Instructor of the Millennial Viewer. <i>51<sup>th</sup> Research and Development Congress</i> (Virtual)  | 2021 |

### Poster Presentations

- |   |      |
|---|------|
| FALCONS: Fetal Automatic Landmark Computation and Optimization for Neuroimaging Segmentation. <i>27<sup>th</sup> International Conference on MICCAI</i> (Marrakesh, Morocco)            | 2024 |
| Real-time Dual-feature Mental Fatigue State SVM Classification using EEG Delta Bandpower. <i>19<sup>th</sup> IEEE-EMBS International Conference on BSN</i> , MIT Media Lab (Boston, MA) | 2023 |
| Biometric Cabin for Neurohumanities Lab. <i>NSF IUCRC BRAIN 2023 Annual Meeting</i> , Arizona State University (Phoenix, AZ)  | 2023 |
| Brain on Acting: Neural Dynamics of Actor-Actor Dyads During an Acted Scene. <i>NSF IUCRC BRAIN 2022 Annual Meeting</i> , University of Houston (Houston, TX)                           | 2022 |
| Identifying Engineering Interest in Children through Machine Learning using Biometric Signals. <i>43<sup>rd</sup> Annual Conference of the IEEE-EMBS</i> (Virtual)                      | 2021 |
| Digital Twin of Biomechanics: Joint Force Prediction using Video and AI. At the <i>NSF IUCRC BRAIN 2021 Annual Meeting</i> (Virtual)  | 2021 |

## HONORS AND AWARDS

<b>Summa Cum Laude</b> , Tecnológico de Monterrey	2024
- Highest academic honors (top 5% of the graduating class).	
<b>Excellence Diploma</b> , Tecnológico de Monterrey	2024
<b>Borrego de Oro</b> , Tecnológico de Monterrey	2024
- Top graduate in professional development, among ~1,500 Fall 2024 graduates.	
<b>International Diploma</b> , Tecnológico de Monterrey	2024
<b>Student Speaker Award</b> , U21 Health Sciences Group	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.	
<b>Outstanding Student Award</b> , Tecnológico de Monterrey	2023, 2024
1 <sup>st</sup> Place - Undergraduate Student Paper Competition, 6 <sup>th</sup> North American IEOM	2021
1 <sup>st</sup> Place - R&D Improvement Proposals (\$250 USD), 18 <sup>th</sup> Conexión Tec	2021
<b>Academic Talent Scholarship</b> , Tecnológico de Monterrey	2020

## TEACHING

German A2 Teacher, Mentoour 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
<i>Project Groups Funding: Clinical Simulation (\$5000 USD)</i> , U21 Health Sciences Group	

## PRESS

(English) TecScience: <a href="#">Neurohumanities Lab: Detecting Emotions to Transform Education</a>	2025
(English) TecScience: <a href="#">Future Classrooms: Real-Time Monitoring of Students' Brain Activity</a>	2025
(Spanish) Conecta: <a href="#">¡De oro! Reconocen a egresados del campus Mty por formación integral</a>	2024
(Spanish) Conecta: <a href="#">Reconocen su proyecto de aprendizaje con IA y lo llevan a ¡Ámsterdam!</a>	2024
(English) NSF IUCRC BRAIN: <a href="#">BRAIN Center Spring Newsletter</a> (pp. 4, 9-10)	2023

## SKILLS SUMMARY

<b>Languages</b>	Python (3 years), R (2 years), MATLAB (1 year), Shell (3 months), SQL (3 months) English (C1), German (B1), Spanish
<b>Frameworks</b>	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
<b>Tools</b>	Git, Anaconda, CUDA, CMake, Tableau, Microsoft Excel, G*Power, Overleaf, L <sup>A</sup> T <sub>E</sub> X
<b>Platforms</b>	Linux, Ubuntu, ROS, Windows, Arduino, Raspberry

*Last Update: March 2025*