# Milton O. Candela-Leal

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

## EDUCATION

**Tecnológico de Monterrey** *Monterrey, Mexico*
BS in Biomedical Engineering (GPA = 95/100 = 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 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 bisprectrum 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

**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

## CONFERENCE PROCEEDINGS

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

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

## INVITED TALKS

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| **Panelist**, Neuroscience Laboratories @ Tec, (with Prof. Pedro Cortes, Prof. Manuel Cebral ...) *NeuroTalks@Tec: Meet the Experts*, Tecnológico de Monterrey | 2025 |
| **Guest Lecturer**, Decoding Cognitive Performance: From Chess Puzzles to STEM Classrooms, *Cognitive Neuroscience* minor, Tecnológico de Monterrey - School of Humanities and Education | 2024 |
| **Invited Lecturer**, Computer Vision and Facial Recognition, *Computing Seminar* 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. *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**

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| 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 |
| 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

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

## Teaching

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| 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

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| 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) | |

## Press

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

## References

| **Kiho Im** | **Mauricio A. Ramírez Moreno** | **Jorge de-J. Lozoya Santos** |
|---|---|---|
| Associate Professor | Assistant Research Professor | Research Professor |
| Pediatrics Department | Biomedical Engineering Department | Mechatronics Department |
| Boston Children's Hospital | Tecnologico de Monterrey | Tecnologico de Monterrey |
| Harvard Medical School | NSF IUCRC BRAIN Center | NSF IUCRC BRAIN Center |
| Relationship: Research Mentor | Relationship: Research Mentor | Relationship: Research Mentor |
| +1 (781) 862-4110 | +52 (81) 1679-7809 | +52 (81) 2951-8836 |
| kiho.Im@childrens.harvard.edu | mauricio.ramirezm@tec.mx | jorge.lozoya@tec.mx |

## Skills Summary

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| **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 |

*Last Update: March 2025*