

Milton Candela

milton_candela@hotmail.com

[LinkedIn](#) | miltoncandela.com | [GitHub](#)

Education

Tecnologico de Monterrey

Monterrey, Mexico

B.S. in Biomedical Engineering | GPA: 95/100 = 3.9/4.0 | Summa Cum Laude, Borrego de Oro 2020 - Dec 2024

Summary

- RA with experience in **real-time neurophysiological signal** decoding (EEG, EMG), **deep learning** (CNN/RNN), and **closed-loop control** systems for neuroeducation and rehabilitation.
- Developed expertise in **multi-modal signal** processing, human computational **biomechanics**, fetal **brain imaging**, and **latent** spinal cord modeling.
- Interested in **computational neuroengineering**, spatiotemporal modeling of neural dynamics, and closed-loop neural interfaces for cognitive enhancement and rehabilitation.

Research Experience

Houston Methodist, Department of Neurosurgery

08/2025 - Present

Research Assistant I | Dmitry Sayenko, MD, PhD

- Built a hBCI using EEG and sEMG for multi-class upper-limb movement intention (n).
- Characterized human SCI ascending (21) and descending (n) pathways through ECAP and sEMG.
- Developed an *in silico* spinal cord model to understand differences in human SCI populations (n).
- Respiration and brain-controlled SCS to enhance diaphragm (n) and M1 (n) activity, respectively.

Tecnologico de Monterrey, Department of Mechatronics

03/2021 - 07/2023, 08/2024 - 07/2025

Undergraduate Research Assistant | Mauricio Ramirez-Moreno, PhD

- Built ML pipelines that decoded human cognitive states from multi-modal physiological data.
- Characterized neurophysiological responses: Fatigue (14), interest (17), emotion (16), load (11), attention (12).
- Implemented closed-loop audiovisual (19) and haptic (12) feedback systems.
- Predicted human biomechanical kinetics through kinematics + RNN; force via 3D markers ($0.92 R^2$) (15), acceleration via 2D pose estimation ($0.53 R^2$) (8).
- Developed interpretable facial/speech driver state monitoring (20), and emotion in clinical education (n).
- Enhanced engineering education via challenge-based learning (9), research simulators (10), and affective brain-body systems (13).

Boston Children's Hospital, Department of Pediatrics

08/2023 - 07/2024

Research Intern | Kiho Im, PhD

- Accelerated fetal brain MRI subplate segmentation via transfer-learning in attention-gated U-Net [abstr.]; further characterized in typical brain development (18).
- Boosted multi-site generalization via augmentation, expanding in-house (sub)cortical annotations [abstr.].
- Classified Congenital Heart Disease (CHD) using age-adjusted, combined qMRI features [abstr.].

Honors & Awards

Editor's Choice, *Front. Hum. Neurosci.* (3% 2024 papers) 2025

Summa Cum Laude, *Tec de Monterrey* (5% BME graduates) 2024

Borrego de Oro (Outstanding Graduate Award), *Tec de Monterrey* (1 recipient) 2024

Excellence Diploma for Integral Formation, *Tec de Monterrey* (1% graduates) 2024

International Diploma, *Tec de Monterrey* 2024

Student Speaker Award (\$1600 USD), *U21 HSG* (among 21 universities) 2024

Outstanding Student Award, *Tec de Monterrey* (1% eng. students) 2023

Best Undergraduate Paper, *6th NA IEOM* 2023

Academic Talent Scholarship, *Tec de Monterrey* 2020

Peer-reviewed Publications (* indicates equal contribution)

Journal Articles

21. Steele AG, **Candela MO**, et al. (*submitted*). Decoding Overlapping Lower-Limb Afferent Pathways from Human Epidural Spinal Recordings
20. **Candela MO**, et al. (*under review*). Interpretable Driver Behavioral State Monitoring using Facial Landmarks for Human-Autonomous Vehicle Interaction.
19. **Candela MO**, et al. (*in press*). Are you Afraid? Neurophysiological and Autonomic Responses to Fear in a Semi-Immersive Interactive Environment. *Front. Syst. Neurosci.*
18. Gondova A, Zhang J, You S, Jeong S, **Candela-Leal MO**, et al. (2026). Typical Development of the Human Fetal Subplate: Regional Heterogeneity, Growth, and Asymmetry Assessed by *in vivo* T2-weighted MRI. *PNAS*, 123(15), e2528620123. doi:[10.1073/pnas.2528620123](https://doi.org/10.1073/pnas.2528620123). PMID:[41945449](https://pubmed.ncbi.nlm.nih.gov/41945449/)
17. **Candela-Leal MO**, et al. (2025). Neural Signatures of STEM Learning and Interest in Youth. *Acta Psychol.*, 255, 104949. doi:[10.1016/j.actpsy.2025.104949](https://doi.org/10.1016/j.actpsy.2025.104949). PMID:[40168892](https://pubmed.ncbi.nlm.nih.gov/40168892/)
16. Blanco-Ríos MA*, **Candela-Leal MO***, et al. (2024). Real-time EEG-based Emotion Recognition for Neurohumanities: Perspectives from Principal Component Analysis and Tree-based Algorithms. *Front. Hum. Neurosci.*, 18, 1319574. doi:[10.3389/fnhum.2024.1319574](https://doi.org/10.3389/fnhum.2024.1319574). PMID:[38545515](https://pubmed.ncbi.nlm.nih.gov/38545515/) (**editor's choice**)
15. **Candela-Leal MO**, et al. (2022). Multi-Output Sequential Deep Learning Model for Athlete Force Prediction on a Treadmill Using 3D Markers. *Appl. Sci.*, 12(11), 5424. doi:[10.3390/app12115424](https://doi.org/10.3390/app12115424)
14. Ramírez-Moreno MA, Carrillo-Tijerina P, **Candela-Leal MO**, et al. (2021). Evaluation of a Fast Test Based on Biometric Signals to Assess Mental Fatigue at the Workplace—A Pilot Study. *Int. J. Environ. Res. Public Health*, 18(22), 11891. doi:[10.3390/ijerph182211891](https://doi.org/10.3390/ijerph182211891). PMID:[34831645](https://pubmed.ncbi.nlm.nih.gov/34831645/)

Conference Proceedings

13. **Candela MO**, et al. (2026). Toward Emotionally Adaptive Learning Spaces: Brain-Body Engagement in Immersive Dance Improvisation. *Proc. 17th IEEE EDUCON*.
12. **Candela-Leal MO**, et al. (2026). Closed-Loop Haptic Neurofeedback BCI for Real-Time Student Attention Regulation. *Proc. IFMBE 48th CNIB*. Springer.
11. **Candela-Leal MO**, et al. (2025). Task Resolution Time Estimation through Cognitive Load: An EEG Study of Chess Players. *Proc. 47th CogSci Annual Meeting*.
10. Arceo GA, **Candela-Leal MO**, et al. (2025). Innovative Spaces with Advanced Technologies such as Research Activity Simulators for Engineering Education. *Proc. 16th IEEE EDUCON*.
9. **Candela-Leal MO**, et al. (2024). Conscious Technologies Projects as a Hub for Real Life Challenges in Engineering Education. *Proc. 15th IEEE EDUCON*.
8. **Leal MOC**, et al. (2023). Biomechanics Digital Twin: Markerless Joint Acceleration Prediction Using Machine Learning and Computer Vision. *Proc. IEEE Workshop*.
7. **Candela-Leal MO**, et al. (2021). Real-time Biofeedback System for Interactive Learning using Wearables and IoT. *Proc. 6th NA IEOM*. (**best undergrad paper award**)
6. Olivas G, **Candela MO**, et al. (2021). Detecting Change in Engineering Interest in Children through Machine Learning using Biometric Signals. *Proc. IEEE Workshop*.
5. Aguilar-Herrera AJ, Delgado-Jimenez EA, **Candela-Leal MO**, et al. (2021). Advanced Learner Assistance System's (ALAS) recent results. *Proc. IEEE Workshop*.

Book Chapters & Review Articles

4. **Candela-Leal MO**, et al. (*accepted*). Biometric Assessment of Mental Fatigue, Interest, and Anxiety in Workplace Contexts. In *Occupational and Work-Related Diseases - Prevention and Treatments*. IntechOpen.
3. Ramírez-Moreno MA, Hernandez-Mustieles MA, **Candela-Leal MO**, et al. (2026). Workplace Measures of Mental Fatigue. In *The Scientific Basis of Fatigue*. Academic Press.
2. Mandujano-Granillo JA, **Candela-Leal MO**, 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)
1. Lozoya-Santos JJ, Ramírez-Moreno MA, Diaz-Armas GG, Acosta-Soto LF, **Candela-Leal MO**, et al. (2022). Current and Future Biometrics: Technology and Applications. In *Biometry: Technology, Trends and Applications*. CRC Press.

Skills

Programming: Python (4 years), MATLAB (2 years), R (1 year), SQL, Bash
ML/DL: TensorFlow (CNNs, RNNs, U-Net), state-space modeling (HMMs, DCM), multi-modal data fusion
Neuroimaging: fetal MRI/dMRI, pre-processing & surface extraction, EEG source localization (sLORETA)
Electrophysiology: EEG, sEMG, HD-sEMG, spinal cord recordings, ECAP, real-time closed-loop systems
Signal Processing: time-frequency & coherence analysis, PCA, ICA, spike train analysis (MU)
Biomechanics: kinetic/kinematic tracking, markerless motion capture, IMU sensor integration
Languages: Spanish (native), English (C1), German (B1)

Professional Development & Memberships

Selected Training

BCI & Neurotechnology Spring School	g.tec, 2022, 2025, 2026
Neural Control of Organ Disease and Regeneration Course	Houston Methodist, 2026
AI in Healthcare (LLMs) & Responsible AI Workshop	U21 HSG, 2024
9.014 Quantitative Methods and Computational Models in Neuroscience	MIT BCS, F 2023
9.66 Computational Cognitive Science	MIT BCS, F 2023
Computational Neuroscience Course	Neuromatch Academy, 2022
Deep Learning Course	Neuromatch Academy, 2021

Selected Certifications

AI for Medicine	Coursera, DeepLearning.AI, 2021
Applied Data Science with Python	Coursera, University of Michigan, 2021
Data Science	Coursera, Johns Hopkins University, 2021
Infectious Disease Modelling	Coursera, Imperial College London, 2021
Neuroscience and Neuroimaging	Coursera, Johns Hopkins University, 2020
Fundamentals of AI	edX, IBM, 2020

Work Experience

Operations Specialist	Scale AI, 2025
Software Engineering Intern	Xenetic, 2021

Memberships

SACNAS	2024 - 2027
CogSci Society	2025 - 2026
SOMIB	2025 - 2026

Grants

- | | |
|--|-------------------|
| | (Co-Investigator) |
| <ul style="list-style-type: none"> U21 HSG <i>Research Development Fund</i> (\$15k USD) - PI: MA Ramirez-Moreno (Tec Monterrey); Co-I: K Henrico (UJ), MO Candela-Leal (Tec Monterrey), S Monteiro (McMaster), IA Villagran (PUC Chile), A Mandrusiak (UQ), J Fung (HKU), "Emotions in Action: Cross-Cultural Exploration of Student Experiences in Clinical Simulation" | 2026-2027 |
| <ul style="list-style-type: none"> U21 HSG <i>Project Groups Funding: Clinical Simulation</i> (\$5k USD) - PI: K Henrico (UJ); Co-I: MA Ramirez-Moreno (Tec Monterrey), MO Candela-Leal (Tec Monterrey), S Monteiro (McMaster), IA Villagran (PUC Chile), A Mandrusiak (UQ), J Fung (HKU), "SimEmotions: An Emotion-Centered Collaborative Learning Platform" | 2025-2026 |
| | (Key Personnel) |
| <ul style="list-style-type: none"> CONAHCYT <i>Ciencia de Frontera</i> CF-2023-G-583 (\$120k USD) - PI: M Cebal-Loureda (Tec Monterrey), "Neurohumanities Lab: Engaging Experiences for Human Flourishing" | 2023-2026 |
| <ul style="list-style-type: none"> Tec Monterrey <i>Challenge Based Research Funding Program</i> E061-EHE-GI02-D-T3-E (\$ 120k USD) - PI: M Cebal-Loureda (Tec Monterrey), "Neurohumanities Lab: Engaging Experiences for Human Flourishing" | 2022-2024 |

Presentations

(Lectures)

Oral

7. Guest Lecture, *Interdisciplinary Innovation in Neuroengineering, AI, and Arts*, University of Houston, Real-Time Emotion Prediction from EEG using a VAD Framework, Aug 2025
6. Guest Lecture, *Interdisciplinary Innovation in Neuroengineering, AI, and Arts*, University of Houston, Physiological-based Emotion Recognition: Objective Emotions for Real-time Environments, Aug 2025.
5. Invited Lecture, *Educational Research Seminar*, Universidad Jose Marti, Brainwaves and Biometrics: Sensing STEM Motivation, Jun 2025.
4. Panelist. *Biomedical Engineering Week*, Tecnologico de Monterrey, From the Classroom to the Real World - EXATEC Testimonies, (with BS Salma Ruiz, BS Valeria Ceja, et al.), May 2025.
3. Panelist, *NeuroTalks@Tec: Meet the Experts*, Tecnologico de Monterrey, Neuroscience Laboratories @ Tec, (with Prof. Pedro Cortes, Prof. Manuel Cebal, et al.), Mar 2025.
2. Guest Lecture, *Cognitive Neuroscience Seminar*, Tecnologico de Monterrey, School of Humanities and Education, Decoding Cognitive Performance: From Chess Puzzles to STEM Classrooms, Sep 2024
1. Invited Lecture, *Computing Seminar*, Universidad Autonoma de Nuevo Leon (UANL), Faculty of Physical and Mathematical Science, Computer Vision and Facial Recognition, Mar 2023.

(International)

Oral

13. Closed-Loop Haptic Neurofeedback BCI for Real-Time Student Attention Regulation. 48th *CNIB*, 2025.
12. Digital Twins in Education: Enhancing Student Well-being and Academic Performance with Biometric Insights and Machine Learning. *U21 HSG Annual Meeting*, (**student speaker award**), 2024.
11. Biomechanics Digital Twin: Markerless Joint Acceleration Prediction Using Machine Learning and Computer Vision. *IEEE Future of Educational Innovation-Workshop Series: Data in Action*, 2023.
10. *Harry Potter and the Prisoner of Azkaban* (2004), a Cultural and Ideological Instructor of the Millennial Viewer. 51th *Research and Development Congress*, 2021.

Poster

9. Effects of Epidural Spinal Stimulation on Cortical Activity and Motor Output During Power Grip in Cervical Spinal Cord Injury. *InterfaceNeuro Conference*, 2026.
8. Restoring Respiratory Function with Epidural Spinal Stimulation in Motor-complete Cervical Spinal Cord Injury. *InterfaceNeuro Conference*, 2026. (co-author)
7. Task Resolution Time Estimation through Cognitive Load: An EEG Study of Chess Players. 47th *CogSci Annual Meeting*, 2025.
6. Regional Analysis of Error Patterns from Automatic Cortical Plate Segmentation in Fetal Brain MRI. 31st *Organization for Human Brain Mapping (OHBM)*, 2025. (co-author)
5. Attention-gated Convolutional Neural Network for Automated Segmentation of Fetal Subplate from MRI. 31st *OHBM*, 2025. (co-author)
4. FALCONS: Fetal Automatic Landmark Computation and Optimization for Neuroimaging Segmentation. 27th *International Conference on MICCAI*, 2024. (co-author)
3. Real-time Dual-feature Mental Fatigue State SVM Classification using EEG Delta Bandpower. 19th *IEEE-EMBS International Conference on BSN*, 2023.
2. Identifying Engineering Interest in Children through Machine Learning using Biometric Signals. 43rd *Annual Conference of the IEEE-EMBS*, 2021. (co-author)
1. ALAS: Advanced Learner Assistance System for Engineering Education using Wearable Sensors. 43rd *Annual Conference of the IEEE-EMBS*, 2021. (co-author)

(Local)

Oral

33. Closed-Loop Haptic Neurofeedback BCI for Real-Time Student Attention Regulation. *Gulf Coast Consortia (GCC) Research Rodeo*, 2025.
32. Artificial Intelligence and Biometrics for Personalized Education. 2nd *Educational Research Forum in Aguascalientes*, 2025.
31. High-resolution Fetal Subplate Automatic Segmentation. *FNNDS Research Symposium*, 2024.
30. Biomechanics for the Digital Twin of Performance: Study Cases. *Conscious Technologies for Smart Communities Workshop*, 2021.

Poster

29. Restoring Respiratory Function with Epidural Spinal Stimulation in Motor-complete Cervical Spinal Cord Injury. 45th Annual Vincent du Vigneaud Research Symposium, 2026. (co-author)
28. Effects of Epidural Spinal Stimulation on Cortical Activity and Motor Output During Power Grip in Cervical Spinal Cord Injury. *The Network Effect: TMC Young Investigator Showcase*, 2026.
27. Restoring Respiratory Function with Epidural Spinal Stimulation in Motor-complete Cervical Spinal Cord Injury. *Integrative Development, Regeneration and Repair Symposium*, 2026. (co-author)
26. Real-Time Motor Execution Decoding using EEG for Closed-Loop Neuromodulation in Spinal Cord Injury Rehabilitation. *Integrative Development, Regeneration and Repair Symposium*, 2026.
25. Neurohumanities: Educational Equity through Emotional Recognition and Fear Prediction. 25th Expo Ingenierías, 2025. (co-author)
24. Neurohumanities Lab: Emerging Experiences for Human Flourishing. *μCosmos Planet*, 2025.
23. Closed-Loop BCI with Haptic Feedback and SINDy Algorithm for Attention Support in ADHD Students. 24th Expo Ingenierías, 2024.
22. Talent Detection Tool for Early Engineering Education. *NSF IUCRC BRAIN Annual Meeting*, 2023.
21. Human Machine Interface for Fleet Electric Vehicles. *NSF IUCRC BRAIN Annual Meeting*, 2023. (co-author)
20. Biometric Cabin for Neurohumanities Lab. *NSF IUCRC BRAIN Annual Meeting*, 2023.
19. Real-Time Knee Flexion Angle for Anterior Cruciate Ligament Injury using Computer Vision. 21st Expo Ingenierías, 2023.
18. Biometric Cabin with Portable Real-Time Monitoring Technology for Smart Solutions. 21st Expo Ingenierías, 2023. (co-author)
17. Neurohumanities Lab. 21st Expo Ingenierías, 2023.
16. Comparison of Brain Synchronization between Pairs during Collaborative and Competitive Tasks. 21st Expo Ingenierías, 2023. (co-author)
15. Real-Time Knee Flexion Angle for Anterior Cruciate Ligament Injury using Computer Vision. *BMEX: Engineering and Health Sciences Symposium*, 2023.
14. Advanced Learner Assistance System (ALAS): Brain-to-Brain Synchrony. 20th Expo Ingenierías, 2022. (co-author)
13. Detection of Engineering Interest in Children - Phase II. *NSF IUCRC BRAIN Annual Meeting*, 2022. (co-author)
12. Digital Twin modeling for Human Biomechanics and Office Spaces. *NSF IUCRC BRAIN Annual Meeting*, 2022.
11. Brain on Acting: Neural Dynamics of Actor-Actor Dyads During an Acted Scene. *NSF IUCRC BRAIN Annual Meeting*, 2022. (co-author)
10. Biomechanics For the Digital Twin of Performance. 19th Expo Ingenierías, 2022.
9. Digital Twin Office for Workspace Throughput Monitoring. 19th Expo Ingenierías, 2022.
8. Advanced Learner Assistance System. 19th Expo Ingenierías, 2022. (co-author)
7. Detection of Engineering Interest in Children Through an Intelligent System Using Biometric Signals. 18th Expo Ingenierías, 2021. (co-author)
6. Real-time Biofeedback System for Interactive Learning using Wearables and IoT. 18th Expo Ingenierías, 2021
5. Biomechanics for the Digital Twin of Performance. 18th Expo Ingenierías (Virtual), 2021.
4. Digital Twin of Biomechanics: Joint Force Prediction using Video and AI. *NSF IUCRC BRAIN Annual Meeting*, 2021
3. Detection of Engineering Interest in Children Through an Intelligent System Using Biometric Signals. *NSF IUCRC BRAIN Annual Meeting*, 2021. (co-author)
2. Advanced Learner Assistance System - Biometry and IoT in Education. *NSF IUCRC BRAIN Annual Meeting*, 2021. (co-author)
1. Advanced Learner Assistance System (ALAS) for Engineering Education using Wearable Sensors. 17th Expo Ingenierías, 2021. (co-author)

Service & Media

Reviewer

IEEE EDUCON

2026

Media

Conecta, [El EXATEC que integra IA en el análisis de emociones y enfermedades](#)

2025

TecScience, Mapping Fear: How Linguistics and Technology Reveal Our Deepest Emotions	2025
TecScience, Neurohumanities Lab: Detecting Emotions in Real Time to Transform Education	2025
TecScience, Classrooms of the Future: Real-Time Monitoring of Students' Brain Activity	2025
Conecta, ¡De oro! Reconocen a egresados del campus Mty por formación integral	2024
Conecta, Reconocen su proyecto de aprendizaje con IA y lo llevan a ¡Ámsterdam!	2024

Last Update: August 2026