

Milton Candela

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Education

Tecnologico de Monterrey, Monterrey, Mexico

Bachelor of Science in Biomedical Engineering

Dec 2024

GPA: 3.9/4.0

- Graduated with highest honors (*Summa Cum Laude*, top 5% of class)
- Best in professional development (*Borrego de Oro*, <1% of graduates)

Summary

Experienced in high-density EEG/sEMG, fetal MRI, statistical/machine learning analysis, and deep learning modeling (RNN/CNN) with Python, MATLAB, and R. Research in human (1) BCIs for neuroeducation, (2) biomechanical modeling, (3) fetal brain imaging, and (4) BCIs for SCI rehabilitation. 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 with Dimitry Sayenko, MD, PhD

- Designed hBCI using EEG and sEMG for multiclass upper-limb movement decoder in human SCI (n), further paired in closed-loop with Epidural Spinal Stimulation (ESS) to improve functional outcomes (n).

Tecnologico de Monterrey, Department of Mechatronics

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

Undergraduate Research Assistant with Mauricio Ramirez-Moreno, PhD

- Designed EEG human cognitive state decoding models using subjective behavioral measures and self-collected multimodal datasets; characterized neural signatures of emotion (1), interest (2), load (15), fatigue (17), and attention (3), including closed-loop visual-auditory (1), and haptic (3) feedback systems.
- Predicted human biomechanical kinetics through kinematics + RNN; force via 3D markers (0.92 R^2) (18), acceleration via 2D pose estimation (0.53 R^2) (12).
- Enhanced engineering education via challenge-based learning (13), research simulators (14), and emotion-driven brain-body systems (16).

Boston Children's Hospital, Department of Pediatrics

08/2023 - 07/2024

Research Intern with Kiho Im, PhD

- Accelerated fetal brain MRI subplate segmentation via transfer learning in attention-gated U-Net [abstract]; further characterized in typical brain development (4). Improved multi-site generalization via spatial/resolution augmentation (FeTA Challenge) [abstract], expanding in-house cortical annotations.
- Classified Congenital Heart Disease (CHD) using age-adjusted, combined qMRI features [abstract].

Selected Works

Publications (* indicates equal contribution)

4. 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)
3. **Candela-Leal MO**, et al. (2026). Closed-Loop Haptic Neurofeedback BCI for Real-Time Student Attention Regulation. *Proc. IFMBE 48th CNIB*. Springer. doi:[10.1007/978-3-032-13729-6_28](https://doi.org/10.1007/978-3-032-13729-6_28)
2. **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/)
1. 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)

Projects

Closed-loop BCI for SCI Rehab - *Houston Methodist*

2025-2026

- Real-time ESS neuromodulation pipeline for upper-limb motor recovery (0.5 s)
- Collected 64-chan EEG and 16-chan sEMG reaching/grasping data on SCI
- Trained a 4-feature EM-HMM for continuous motor decoding (0.7 AUC)

Closed-loop BCI for Attention - *Tecnologico de Monterrey*

2024-2025

- Real-time attention-modulation haptic neurofeedback via arm-worn wearable (5 s)

- Collected 4-chan EEG CPT-II ($n = 20$), validated using a 12-min video ($n = 26$)
- Trained a 3-feature MLR for continuous attention decoding ($0.72 R^2$)

FeTA Challenge @ MICCAI - Boston Children's Hospital

2024

- Fetal brain MRI dataset (CSF, GM, WM, Ventricles, CB, Deep GM, Brainstem)
- Pre-processed multi-site data; evaluated model zoo performance on in-house data
- Trained an attention-gated U-Net with spatial and resolution augmentation (0.76 Dice)

Presentations (* denotes co-author presenting)

- Oral 53rd ASIA* (San Antonio, TX, 2026), 17th IEEE EDUCON* (Cairo 2026), 48th CNIB (Monterrey, 2025), 16th IEEE EDUCON* (London, 2025), U21 HSG (Amsterdam, 2024), 15th IEEE EDUCON* (Kos, 2024), IEEE FEI-WS (Monterrey, 2023), IEEE ML-DT* $\times 2$ (virtual-Monterrey, 2021), and 51th CID (virtual-Monterrey, 2021)
- Poster *InterfaceNeuro* $\times 2$ (Houston, TX, 2026), 47th CogSci (San Francisco, CA, 2025), 31st OHBM* $\times 2$ (Brisbane, 2025), 27th MICCAI* (Marrakesh, 2024), 19th IEEE-EMBS BSN (Boston, MA, 2023), and 43rd IEEE-EMBC* $\times 2$ (Virtual, 2021)
- Talks **(Guest)** UH-IINAA $\times 2$ (Houston, TX, 2025), **(Invited)** UJM-EdResearch (virtual-Monterrey, 2025), **(Panelist)** Tec-BME Week & Tec-NeuroTalks (Monterrey, 2025), **(Guest)** Tec-CogNeuro (Monterrey, 2024), **(Invited)** UANL-Computing (Monterrey, 2023)

Honors, Awards & Grants

Honors & Awards

Editor's Choice Selection , <i>Front. Hum. Neurosci.</i> (3% 2024 papers)	2025
Summa Cum Laude , <i>Tec de Monterrey</i> (5% BME graduates)	2024
Borrego de Oro (Outstanding Graduate Award), <i>Tec de Monterrey</i> (1 recipient)	2024
Excellence Diploma for Integral Formation, <i>Tec de Monterrey</i> (1% graduates)	2024
International Diploma, <i>Tec de Monterrey</i>	2024
Student Speaker Award (\$1600 USD) , U21 HSG (among 21 universities)	2024
Outstanding Student Award, <i>Tec de Monterrey</i> (1% eng. students)	2023
Best Undergraduate Paper, 6 th NA IEOM	2023
Academic Talent Scholarship, <i>Tec de Monterrey</i>	2020

Grants

Clinical Simulation Group , U21 HSG	(Member & Co-investigator)
• Emotions in Action: Cross-Cultural Exploration of Student Experiences in Clinical Simulation, <i>Research Development Fund</i> (\$15k USD), U21 HSG	2026-2027
• SimEmotions: An Emotion-Centered Collaborative Learning Platform, <i>Project Groups Funding: Clinical Simulation</i> (\$5k USD), U21 HSG	2025-2026

Collaborators: K. Henrico (UJ); S. Monteiro (McMaster); I.A. Villagran (PUC Chile); A. Mandrusiak (UQ); J. Fung (HKU); M.A. Ramirez-Moreno (Tec de Monterrey)

Additional Publications (* indicates equal contribution)

Journal

20. **Candela MO**, et al. (*in prep*). Interpretable Facial Affective State Recognition for Human-Autonomous Vehicle Interaction.
19. **Candela MO***, Calderón-Gurubel JE*, et al. (*in prep*). Are you Afraid? Neurophysiological and Autonomic Responses to Fear in a Semi-Immersive Interactive Environment
18. **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)
17. 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

16. **Candela MO**, et al. (2026). Toward Emotionally Adaptive Learning Spaces: Brain–Body Engagement in Immersive Dance Improvisation. *Proc. 17th IEEE EDUCON*.
15. **Candela-Leal MO**, et al. (2025). Task Resolution Time Estimation through Cognitive Load: An EEG Study of Chess Players. *Proc. 47th CogSci Annual Meeting*
14. 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*
13. **Candela-Leal MO**, et al. (2024). Conscious Technologies Projects as a Hub for Real Life Challenges in Engineering Education. *Proc. 15th IEEE EDUCON*
12. **Candela-Leal MO**, et al. (2023). Biomechanics Digital Twin: Markerless Joint Acceleration Prediction Using Machine Learning and Computer Vision. *Proc. IEEE Workshop*
11. **Candela-Leal MO**, et al. (2021). Real-time Biofeedback System for Interactive Learning using Wearables and IoT.

Proc. 6th NA IEOM (best undergraduate paper award)

10. Olivas-Martínez G, **Candela-Leal MO**, et al. (2021). Detecting Change in Engineering Interest in Children through Machine Learning using Biometric Signals. *Proc. IEEE Workshop*
9. Aguilar-Herrera AJ, Delgado-Jimenez EA, **Candela-Leal MO**, et al. (2021). Advanced Learner Assistance System's (ALAS) recent results. *Proc. IEEE Workshop*

Book Chapter & Review

8. **Candela-Leal MO**, et al. (*accepted*). Biometric Assessment of Mental Fatigue, Interest, and Anxiety in Workplace Contexts. (Book Chapter). IntechOpen
7. Ramírez-Moreno MA, Hernandez-Mustieles MA, **Candela-Leal MO**, et al. (2026). Workplace Measures of Mental Fatigue. In *The Scientific Basis of Fatigue* (Book Chapter). Academic Press
6. Mandujano-Granillo JA, **Candela-Leal MO**, et al. (2024). Human-Vehicle Interfaces: A Review for Autonomous Electric Vehicles (Review). *IEEE Access*, 12, 121635–121658
5. 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* (Book Chapter). CRC Press

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

Service & Media

Reviewer

IEEE EDUCON	2026
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Media

Conecta, El EXATEC que integra IA en el análisis de emociones y enfermedades	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

Complete Presentations

(International)

Oral

19. Restoring Respiratory Function with Epidural Spinal Stimulation in Motor-complete Cervical Spinal Cord Injury. 53rd ASIA Annual Scientific Meeting, 2026. (co-author)
18. Toward Emotionally Adaptive Learning Spaces: Brain–Body Engagement in Immersive Dance Improvisation. 17th IEEE EDUCON, 2026. (co-author)
17. Closed-Loop Haptic Neurofeedback BCI for Real-Time Student Attention Regulation. 48th CNIB, 2025.
16. Innovative Spaces with Advanced Technologies such as Research Activity Simulators for Engineering Education. 16th IEEE EDUCON, 2025. (co-author)
15. 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.
14. Conscious Technologies Projects as a Hub for Real Life Challenges in Engineering Education. 15th *IEEE EDUCON*, 2024. (co-author)
 13. Biomechanics Digital Twin: Markerless Joint Acceleration Prediction Using Machine Learning and Computer Vision. *IEEE Future of Educational Innovation-Workshop Series: Data in Action*, 2023.
 12. Detecting Change in Engineering Interest in Children through Machine Learning using Biometric Signals. *IEEE Machine Learning-Driven Digital Technologies for Educational Innovation Workshop*, 2021. (co-author)
 11. Advanced Learner Assistance System's (ALAS) recent results. *IEEE Machine Learning-Driven Digital Technologies for Educational Innovation Workshop*, 2021. (co-author)
 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

42. Closed-Loop Haptic Neurofeedback BCI for Real-Time Student Attention Regulation. *Gulf Coast Consortia (GCC) Research Rodeo*, 2025.
41. **Guest Lecture**, *Interdisciplinary Innovation in Neuroengineering, AI, and Arts*, University of Houston, Real-Time Emotion Prediction from EEG using a VAD Framework, Aug 2025
40. **Guest Lecture**, *Interdisciplinary Innovation in Neuroengineering, AI, and Arts*, University of Houston, Physiological-based Emotion Recognition: Objective Emotions for Real-time Environments, Aug 2025.
39. **Invited Lecture**, *Educational Research Seminar*, Universidad Jose Marti, Brainwaves and Biometrics: Sensing STEM Motivation, Jun 2025.
38. **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.
37. Artificial Intelligence and Biometrics for Personalized Education. 2nd *Educational Research Forum in Aguascalientes*, 2025.
36. **Panelist**, *NeuroTalks@Tec: Meet the Experts*, Tecnologico de Monterrey, Neuroscience Laboratories @ Tec, (with Prof. Pedro Cortes, Prof. Manuel Cebral, et al.), Mar 2025.
35. **Guest Lecture**, *Cognitive Neuroscience Seminar*, Tecnologico de Monterrey, School of Humanities and Education, Decoding Cognitive Performance: From Chess Puzzles to STEM Classrooms, Sep 2024
34. High-resolution Fetal Subplate Automatic Segmentation. *FNNDSC Research Symposium*, 2024.
33. CHD Fetal Brain Analysis using Combined Quantitative MRI Features and Custom-build Loss Functions. *FNNDSC Research Symposium*, 2024. (co-author)
32. Gestational Age-Conditioned Anomaly Detection in Fetal Brain MRI. *FNNDSC Research Symposium*, 2024. (co-author)
31. **Invited Lecture**, *Computing Seminar*, Universidad Autonoma de Nuevo Leon (UANL), Faculty of Physical and Mathematical Science, Computer Vision and Facial Recognition, Mar 2023.
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 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 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. *BMEEX: 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)

Last Update: May 2026