Milton Candela

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Education

Tecnológico de Monterrey, Monterrey, Mexico — Dec 2024
Bachelor of Science in Biomedical Engineering — GPA: 3.8/4.0

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

Summary

BME graduate with 5 years of research in real-time, non-invasive decoding of human cognitive states and closed-loop neurofeedback integrating haptic, TMS, and electrical stimulation. Experienced in high-density EEG/EMG, and fetal MRI statistical/machine learning analysis, and deep learning modeling (RNN/CNN) with Python, MATLAB, and R. Author of 15+ publications and 20+ international presentations on (1) BCIs for neuroeducation, (2) biomechanical modeling, (3) fetal brain imaging, and (4) spinal cord injury rehabilitation. Interested in modeling spatiotemporal neural dynamics underlying cognitive decline (e.g., memory and decision-making), to develop adaptive neural interfaces for cognitive enhancement and rehabilitation.

Research Experience

Houston Methodist — 08/2025 - *Present*
Research Assistant I
Supervisor: Prof. Dimitry G. Sayenko, PhD

- Closed-loop motor execution BCI for SCI upper-limb rehabilitation using ESS

Tecnologico de Monterrey — 03/2021 - 07/2023, 08/2024 - 07/2025
Research Assistant
Supervisor: Prof. Mauricio A. Ramírez-Moreno, PhD

- Cognitive state decoding using ML on multi-modal biometrics (EEG, PPG/EDA)
- Force and acceleration prediction through RNN from pose-estimated keypoints
- Autonomous driving and HCI systems via multi-sensor (Camera, Radar, LiDAR)
- Engineering education through project-based learning and research simulators
- Designed a project: Influence of auditive noise in chess learning environments
- 2 grants with six universities on five continents via U21 Health Sciences Group
- 5 journal articles, 3 book chapters, 8 conf. proceedings, +15 intl. presentations

Boston Children's Hospital — 08/2023 - 07/2024
Research Intern
Supervisor: Prof. Kiho Im, PhD

- Fetal brain (sub)cortical MRI segmentation through attention-gated CNN U-Net
- Congenital disorder prediction via fetal brain features (volumetric, morphological)
- 2 first-author presentations, 4 co-author presentations

Selected Peer-Reviewed Publications *(* indicates equal contribution)*

10. **Candela MO***, Calderón-Gurubel JE*, et al. (*in prep*). Are you Afraid? Neurophysiological and Autonomic Responses to Fear in a Semi-Immersive Interactive Environment
9. Gondova A, ..., **Candela MO**, et al. (*under review*). Typical Development of the Human Fetal Subplate: Regional Heterogeneity, Growth, and Asymmetry Assessed by *in vivo* T2-weighted MRI.
8. **Candela MO**, et al. (*under review*). Toward Emotionally Adaptive Learning Spaces: Brain–Body Engagement in Immersive Dance Improvisation.
7. **Candela-Leal MO**, et al. (2026). Closed-Loop Haptic Neurofeedback BCI for Real-Time Student Attention Regulation. In *48th CNIB*. Monterrey, Mexico: Springer.
6. **Candela-Leal MO**, et al. (2025). Task Resolution Time Estimation through Cognitive Load: An EEG Study of Chess Players. In *47th CogSci Annual Meeting*. San Francisco, CA: eScholarship. id:6qh4q558

5. **Candela-Leal MO**, et al. (2025). Neural Signatures of STEM Learning and Interest in Youth. *Acta Psychol.*, 255(104949), 104949. doi:10.1016/j.actpsy.2025.104949. PMID:40168892
4. 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. PMID:38545515
3. **Candela-Leal MO**, et al. (2023). Biomechanics Digital Twin: Markerless Joint Acceleration Prediction Using Machine Learning and Computer Vision. In *Future of Educational Innovation-Workshop Series: Data in Action*. Monterrey, Mexico: IEEE. doi:10.1109/IEEECONF56852.2023.10104757
2. **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
1. Ramírez-Moreno MA, ..., **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. PMID:34831645

Selected 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 EMG 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 data, further validated using a 12-min video
- 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)

Honors and Awards

2025 **Editor's Choice Selection**, Frontiers in Human Neuroscience (top 3% of 2024 papers)
2024 **Summa Cum Laude**, Tecnologico de Monterrey (top 5% of the BME graduating class)
2024 **Oustanding Graduate Award**, Tecnologico de Monterrey ($<$ 1% graduates, *Borrego de Oro*)
2024 **Student Speaker Award ($1600 USD)**, U21 Health Sciences Group (among 21 universities)
2023 **Outstanding Student Award**, Tecnologico de Monterrey (1% of all engineering students)
2021 **Best Undergraduate Paper**, 6th North American IEOM, IEOM Society International
2020 **Academic Talent Scholarship**, Tecnologico de Monterrey

Grants

2026-2027 Emotions in Action: Cross-Cultural Exploration of Student Experiences in Clinical Simulation, *Research Development Fund ($15k USD)*, U21 HSG
2025-2026 SimEmotions: An Emotion-Centered Collaborative Learning Platform, *Project Groups Funding: Clinical Simulation ($5k USD)*, U21 HSG

US & International Presentations *(* denotes co-autor presenting)*

Oral 1st *GCC-RR* (Houston, TX, 2025), *IINAA* ×2 (Houston, TX, 2025), *U21 HSG Annual Meeting* (Amsterdam, Netherlands, 2024), and *FNNDSC Research Symposium* ×3 (Boston, MA, 2024)
Poster 47th *CogSci* (San Francisco, CA, 2025), 31st *OHBM Annual Meeting** ×2 (Brisbane, Australia, 2025), 27th *MICCAI** (Marrakesh, Morocco, 2024), 19th *IEEE-EMBS BSN* (Boston, MA, 2023), *BRAIN Annual Meeting* ×3 (Phoenix, AZ, 2023), *BRAIN Annual Meeting* ×2 (Houston, TX, 2022), 43rd *IEEE-EMBC** ×2 (Virtual, 2021), and *BRAIN Annual Meeting* ×3 (Virtual, 2021)

Last Update: November 2025