# Milton O. Candela-Leal

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## EDUCATION

**Tecnológico de Monterrey** - Monterrey, Mexico                    Aug 2020 - Dec 2024
    BSc in Biomedical Engineering (94.5/100 = 3.8/4.0 GPA)
**International Baccalaureate** - Monterrey, Mexico                    Aug 2018 - May 2020
    Math HL, Psychology SL, Physics SL, ...

## RESEARCH EXPERIENCE

**Boston Children's Hospital** - Boston, MA, USA                    Aug 2023 - Jul 2024
*Harvard Medical School*
    Advisor: Kiho Im, PhD
    Projects: Fetal MRI subplate segmentation (attention U-Net), non-linear qMRI for
              congenital heart disease classification, VAE-GAN for anomaly detection.

**NSF IUCRC BRAIN Center** - Monterrey, Mexico                    Mar 2021 - Jul 2023
TMX BRAIN Site - *Tecnológico de Monterrey*
    Advisors: Mauricio A. Ramírez-Moreno, PhD & Jorge De-J. Lozoya-Santos, PhD
    Projects: Cognitive state prediction via biometrics (EEG, ECG, Computer Vision)
           and machine learning: Mental fatigue, interest in STEM, emotion.
              - Force prediction employing Computer Vision's keypoints and RNN.

**NSF IUCRC BRAIN Center** - Houston, TX, USA                    Spring 2022
UH BRAIN Site - *University of Houston*
    Advisor: Jose L. Contreras-Vidal, PhD
    Project: EEG functional connectivity and bisprectrum analysis between actors.

## JOURNAL ARTICLES

*(† indicates equal contribution)*

Blanco-Ríos, M.A.†, **Candela-Leal, M.O.**†, Orozco-Romo, C., Remis-Serna, P., ... Ramírez-Moreno, M.A. (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. PubMed PMID:38545515

**Candela-Leal, M.O.**, Gutiérrez-Flores, E.A., Presbítero-Espinosa, G., Sujatha-Ravindran, A., ... Ramírez-Moreno, M.A. (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

Ramírez-Moreno, M.A., Carrillo-Tijerina, P., **Candela-Leal, M.O.**, Alanis-Espinosa, M., ... Lozoya-Santos, J.J. (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. PubMed PMID:34831645

**Candela-Leal, M.O.**, Alanis-Espinosa, M., Murrieta-González, J., Lozoya-Santos, J.J, & Ramírez-Moreno, M.A. *(under review)*. Neurocognitive Insights into STEM Learning: An Integrated Analysis of Bandpower and Functional Connectivity among Youth. *Thinking Skills and Creativity*

## BOOK CHAPTERS

Lozoya-Santos, J.J., Ramírez-Moreno, M.A., Diaz-Armas, G.G., **Candela-Leal, M.O.**, ... Ramirez-Mendoza, R.A. (2022). Current and Future Biometrics: Technology and Applications. In R.A. Ramirez-Mendoza, J.J. Lozoya-Santos, R. Zavala-Yoé, L.M. Alonso-Valerdi, ... H.G. Gonzalez-Hernandez (Eds.), *Biometry: Technology, Trends and Applications* (1st ed., pp. 1–30). Boca Raton, FL: CRC Press. doi:10.1201/9781003145240-1. ISBN: 9781003145240

## INVITED TALKS

**Candela-Leal, M.O.**, & Valdivia-Padilla, A. (2024, August). 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. (Theme: Data Driven Health Care and Teaching) **(student speaker travel award)**

**Candela-Leal, M.O.** (2023, April). Computer Vision and Facial Recognition. Presented to Senior Undergraduate Computer Science Students at *Computing Seminar* Course, Universidad Autónoma de Nuevo León (UANL) [one of Mexico's top eight universities], Monterrey, Mexico

## CONFERENCE PROCEEDINGS

**Candela-Leal, M.O.**, Aguilar-Herrera, A.J., Ramírez-Moreno, M.A., Félix-Herrán L.C., ... Lozoya-Santos, J.J. (2024). Conscious Technologies Projects as a Hub for Real Life Challenges in Engineering Education. *15th Global Engineering Education Conference (EDUCON)*. Kos, Greece: IEEE

**Candela-Leal, M.O.**, Martínez-Díaz, D., Orozco-Romo, C., Aguilar-Herrera, A.J., ... Ramírez-Moreno, M.A. (2023). Biomechanics Digital Twin: Markerless Joint Acceleration Prediction Using Machine Learning and Computer Vision. In *2023 Future of Educational Innovation-Workshop Series Data in Action* (pp. 142-150). Monterrey, Mexico: IEEE. doi:10.1109/IEEECONF56852.2023.10104757

**Candela-Leal, M.O.**, García-Briones, J.M., Olivas-Martínez, G., Abrego-Ramos, R., ... Lozoya-Santos, J.J. (2021). Real-time Biofeedback System for Interactive Learning using Wearables and IoT. In *6th North American Industrial Engineering and Operations Management (IEOM)* (pp. 2959-2970). Monterrey, Mexico: IEOM **(best undergraduate paper award)**. doi:10.46254/NA06.20210487

Olivas-Martínez, G., **Candela-Leal, M.O.**, Ocampo-Alvarado, J.C., Acosta-Soto, L.F., ... Ramírez-Moreno, M.A. (2021). Detecting Change in Engineering Interest in Children through Machine Learning using Biometric Signals. In *2021 Machine Learning-Driven Digital Technologies for Educational Innovation Workshop* (pp. 33-40). Monterrey, Mexico: IEEE. doi:10.1109/IEEECONF53024.2021.9733772

Aguilar-Herrera, A.J., Delgado-Jimenez, E.A., **Candela-Leal, M.O.**, Olivas-Martinez, G., ... Ramirez-Mendoza, R.A. (2021). Advanced Learner Assistance System's (ALAS) recent results. In *2021 Machine Learning-Driven Digital Technologies for Educational Innovation Workshop* (pp. 26-33). Monterrey, Mexico: IEEE. doi:10.1109/IEEECONF53024.2021.9733770

## CONFERENCE PRESENTATIONS

**Oral Presentations**

| | | |
|---|---|---|
| FNNDSC Research Symposium | (Boston, MA) | Mar 2024 |
| Conscious Technologies for Smart Communities Workshop | (Virtual) | July 2021 |
| 51th Research and Development Congress | (Virtual) | Feb 2021 |

**Poster Presentations**

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| 19th IEEE-EMBS International Conference on BSN | (Boston, MA) | Oct 2023 |
| NSF BRAIN Summer Annual IAB Meeting | (Phoenix, AZ) | Jul 2023 |
| 21st Expo Ingenierías at Conexión Tec | (Monterrey, Mexico) | Jun 2023 |
| BMEX: Engineering and Health Sciences Symposium | (Monterrey, Mexico) | May 2023 |
| 19th & 20th Expo Ingenierías at Conexión Tec | (Monterrey, Mexico) | Jun, Nov 2022 |
| NSF BRAIN Summer Annual IAB Meeting | (Houston, TX) | Aug 2022 |
| 17th & 18th Expo Ingenierías at Conexión Tec | (Virtual) | Jun, Nov 2021 |
| 43rd Annual International Conference of the IEEE-EMBS | (Virtual) | Oct 2021 |

## HONORS AND AWARDS

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|---|---|
| Student Speaker Travel Award ($1600 USD) - *U21 Health Sciences* | 2024 |
| 1st Place - Undergraduate Student Paper Competition - *6th NA IEOM* | 2021 |

**Tecnológico de Monterrey**

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|---|---|
| Outstanding Student Award (top 1% best engineering trajectories) | 2023 |
| 1st Place - R&D Improvement Proposals ($250 USD) - *18th Conexión Tec* | Fall 2021 |
| Academic Talent Scholarship | 2020 |

## TEACHING

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|---|---|
| German A2 Teacher - *Mentoor* | 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 |

## SKILLS SUMMARY

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| **Languages** | Python (3 years), MATLAB (2 years), R (1 year), Shell (3 months), SQL (3 months) |
| | English (C1), German (B1), Spanish |
| **Frameworks** | Numpy, Scipy, Pandas, Matplotlib, Scikit-learn, OpenCV, TensorFlow, Keras, BrainFlow |
| | Lattice, Dplyr, Tidyr, Caret, GA, Ggplot, Shiny |
| | FSL, FreeSurfer, MRtrix3, ANTs, NiBabel, PyDicom, IRTK |
| **Tools** | Git, Anaconda, CUDA, cuDNN, Tableau, Microsoft Excel, Overleaf, LaTeX |
| **Platforms** | Linux, Ubuntu, ROS, Windows, Arduino, Raspberry |