

Highly motivated research scientist with expertise in neuronal development and learning, eager to apply my deep understanding of brain development and learning mechanisms to propel advancements in the realm of machine learning.

## Skills

Machine Learning, Information Theory, Graph Theory, Dynamical System Analysis, Simulated Robotics, Data Science, Computational Topology, CTRNNs, CNNs, RNNs, Autoencoders, Transformers, Kuramoto Models, Hopfield Networks, Hebbian Learning, Evolutionary Algorithms, Simulated Annealing, K-means, Particle Swarm Optimization

## Software

PyTorch, TensorFlow, NumPy, Hadoop, Spark, Git, Python, C++, Java, JavaScript, Scikit-learn,  $\LaTeX$ , Kubernetes

## Publications & Conferences

- Laborde, Z., & Izquierdo, E. J. (2023). **Spatial Embedding of Edges in a Synaptic Generative Model of C. elegans**. *ALIFE 2023: Ghost in the Machine: Proceedings of the 2023 Artificial Life Conference, ALIFE 2023: Ghost in the Machine: Proceedings of the 2023 Artificial Life Conference*(26). [https://doi.org/10.1162/isal\\_a\\_00611](https://doi.org/10.1162/isal_a_00611)
- Severino, G. J., Laborde, Z., & Barwich, A.-S. (2023). **The Degeneracy of Control Architectures in Cell Lineages: Implications for Tissue Homeostasis**. *ALIFE 2023: Ghost in the Machine: Proceedings of the 2023 Artificial Life Conference, ALIFE 2023: Ghost in the Machine: Proceedings of the 2023 Artificial Life Conference*(23). [https://doi.org/10.1162/isal\\_a\\_00608](https://doi.org/10.1162/isal_a_00608)
- Laborde, Z., Toler, W., Velhal, K., Farag, T., & Chakra, A. (2019). **Method and System for Implementing a Holistic Umbrella Drone**. <https://priorart.ip.com/IPCOM/000257353>
- Laborde, Z., Stephenson, D., Reiss, A., Beaton, E., & Cohen, J. (2017). **Anterior-Posterior Insular Cortex Bisection Plugin for Mango** [Poster presentation]. *Cognitive Neuroscience Society*.
- Laborde, Z., & Cohen, J. (2016). **Nostalgia and the Perception of Time**. *XULAnEXUS*, 14(1). <https://digitalcommons.xula.edu/xulanexus/vol14/iss1/1>
- Laborde, Z., Heatherton, T., & Lopez, R. (2016). **Learning to Lose Focus: Relationships Between Reward-Learning, Multitasking, and Distractibility** [Talk]. *Leadership Alliance National Symposium*.

## Education

Indiana University Bloomington Aug. 2021 - Present  
Neuroscience & Cognitive Science Ph.D.\*

Xavier University of Louisiana Aug. 2013 - May 2017  
Psychology Bachelor of Science  
Computer Science (minor)

\* coursework complete

## Research Experience

- Indiana University Bloomington Aug 2021 - Present  
Dr. Eduardo Izquierdo & Dr. Justin Wood
- Pioneered the evolution of optimal sensorimotor configurations in simulated agents using neural networks that were 50% smaller while more performant than existing networks
  - Discovered low node connectivity within the developing C. elegans connectome when compared to thousands of generative network models
  - Discovered a new biologically-realistic dynamic control system for cellular lineages with potential applications in synthetic biology and regenerative medicine and developed an online interactive application for it (see <https://nanohub.org/resources/dynsysregen>)
  - Conceived and implemented a novel level set approximation algorithm for high-dimensional manifolds significantly reducing computational complexity and resource usage by 90%

- Xavier University of Louisiana Aug 2013 - May 2017  
Dr. Jeremy Cohen
- Developed computational tools with one automating a 2-4 hour manual process

- Dartmouth College June 2016 - Aug 2016  
Dr. Todd F. Heatherton
- Compiled and analyzed gigabytes of 4-dimensional fMRI data for correlations between brain networks

## Work Experience

- IBM July 2017 - Aug 2021  
Software Engineer
- Automated entire team saving IBM \$1 000 000/year
  - Automated event analysis and prediction for operation engineers using machine learning