Louis A. Gomez

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EDUCATION

Stevens Institute of Technology, Hoboken, NJ
M.S., Computer Science, **GPA: 3.89** Aug. 2019 – Dec. 2021
Ph.D., Computer Science – Machine Learning and Healthcare Aug. 2019 – Expected May 2024

Wichita State University, Wichita, KS Aug. 2014 – Dec. 2018
B.Sc., Electrical Engineering, **GPA: 3.94**

RESEARCH INTERESTS

My research focuses on developing new machine learning and causality based methods to generate new knowledge and enhance decision-making for doctors and patients by leveraging both real-world clinical (e.g., physiological signals) and patient-generated (e.g., blood glucose) time series data.

SKILLS

Expert in **Python** for machine learning (**Scikit-learn, TensorFlow, PyTorch**), causal inference (**Networkx, Pgmpy, Tigramite**), time series data analysis (**Pandas, NumPy, Statsmodels, SciPy**), workflow (**Jupyter**), and data visualization (**Matplotlib, Seaborn**).
Proficient in using **UNIX**/Linux-based operating systems for scripting and project management.
Advanced in **Git** (**Gitlab, GitHub**) for version control and research collaborations.
Familiar with **MATLAB** and **SQL**.

WORK EXPERIENCE

ML/AI Researcher Aug. 2019 - present
Health and AI Lab, Stevens Institute of Technology Advisor: Samantha Kleinberg, Ph.D.

Classifying Levels of Consciousness Using Physiological Signals (Neuro-Care '22)

- Built **Gradient Boosted Trees (XGBoost)** based **machine learning** approach to classify states of consciousness (e.g., coma, command following) from multivariate **physiological signals** (e.g., brain oxygen level, heart rate) in patients with brain injuries.
- Achieved an Area Under the Curve (AUC) of 0.72 while overcoming missing data, variables, and limited ground truth.

Data Augmentation Simulation of Blood Glucose Time Series (JDST '23)

- Developed a simulation framework that improves simulated **blood glucose forecasting** performance by augmenting simulated data with learned data properties (e.g., missing data, error) of type 1 diabetes datasets.
- Achieved better performance than current baselines across a suite of forecasting methods such as **RNNs**, **LSTMs**, and **Random Forests**.

Detecting Meals for People with Type 2 Diabetes (JDST '23)

- Adapted a simulation-based explanation method to detect when a person (with type 2 or pre-diabetes) is eating a meal using only **continuous blood glucose time series**.
- Achieved a recall of 60% compared to wrist-worn accelerometer sensors with a recall of 40%.

Causal Discovery for Multiple Time Series Datasets with Missing Variables (preparing publication)

- Proposed a new **causal discovery** method for learning population-level causal models across multiple **time series** datasets with partially overlapping variable groups.
- Achieved the best F1-score and false discovery rate compared to several baselines for causal discovery with time series datasets.

Hardware Performance Intern at IBM Jun. 2019 – Aug. 2019
Developed a custom pipeline in Python to automate data collection of device runs, flag errors, and automate result checking for enterprise computers.

Research Intern at MIT Media Lab, Personal Robots Jun. 2018 – Aug. 2018
Detecting Engagement in Child-Robot Learning Interactions (AAAI '19) Advisor: Cynthia Breazeal, Ph.D.

- Analyzed electro-dermal activity using trend analysis and statistical tests to quantify differences in interaction states between personalized and non-personalized child-robot learning interactions.
- Presented research findings at the MIT Summer Research Symposium.

Undergraduate Research Assistant Sept. 2017 – Dec. 2018
Neuro-Robotics Lab, Wichita State University Advisor: Jaydip Desai, Ph.D.
Classifying Hand Movement Using EEG Signals for Motor-Impaired Individuals (ISSPIT '18)

- Leveraged neural networks to classify hand movement using motor imagery features from EEG signals as an assistive tool for motor-impaired users.
- Presented research findings at the IEEE Region 5 Conference (best student paper) and Kansas Undergraduate Research Forum.

Housing and Residence Life, Wichita State University Aug. 2015 – May 2018
Resident Assistant and Peer Academic Leader

- Developed, planned, and executed engineering-related programs with a budget of $1000.
- Served as liaison between students and the College of Engineering and facilitated STEM outreach through service projects in the local community.

PEER REVIEWED PUBLICATIONS

C. Popp, C. Wang, A. Hoover, **L. Gomez**, M. Curran, D. St-Jules, S. Barua, M. Sevick, S. Kleinberg, "Objective Determination of Eating Occasion Timing (OREO): Combining self-report, wrist motion, and continuous glucose monitoring to detect eating occasions in adults with pre-diabetes and obesity." Journal of Diabetes Science and Technology (JDST) 2023.

L. Gomez, A. Toye, R. Hum, S. Kleinberg, "Simulating Realistic Continuous Glucose Monitor Time Series by Data Augmentation." Journal of Diabetes Science and Technology (JDST) 2023.

L. Gomez, Q. Shen, K. Doyle, A. Vrosgou, A. Velazquez, M. Megjhani, S. Ghosal, D. Roh, S. Agarwal, S. Park, J. Claassen, S. Kleinberg, "Classification of Level of Consciousness in a Neurological ICU Using Physiological Data." Neurocritical Care 2022.

H. Park, I. Grover, S. Spaulding, **L. Gomez,** C. Breazeal, "A Model-free Affective Reinforcement Learning Approach to Active Personalization of a Social Robot Companion for Early Literacy Education." Association for the Advancement of Artificial Intelligence (AAAI) 2019.

A. Reust, J. Desai, **L. Gomez**, "Extracting Motor Imagery Features to Control Two Robotic Hands." IEEE International Symposium on Signal Processing and Information Technology (ISSPIT) 2018.

ACTIVITIES

Health Informatics (CS 544) TA	Jan. 2023 – May 2023
Reviewed for ICLR	Feb. 2020
Poster Presentation at Black in AI, Neurips	Dec. 2019, Dec. 2022
Wichita State National Society of Black Engineers	Aug. 2016 – Dec. 2018
IEEE Eta Kappa Nu (HKN)	Aug. 2015 – Dec. 2018
IEEE EPICS Go Baby Go, Team Lead	Aug. 2017 – Nov. 2017