Clara Mosquera-Lopez

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SUMMARY

- Experienced algorithms and data scientist with 10+ years of combined academic and industry experience in (biomedical) signal processing, statistical analysis, ML modeling, and translational research.
- Experienced in **leading inter-disciplinary research and development projects**, identifying data-driven opportunities to improve outcomes, and mentoring students and junior scientists.
- Skilled in **innovating with cross-functional teams** to implement and clinically validate the safety and efficacy of digital health technologies.
- Proficient in SQL, Python, Pandas, StatsModels, Scipy, Scikit-learn, TensorFlow, and PyTorch.
- Demonstrated ability to communicate complex ideas effectively through various platforms.

EXPERIENCE

Oregon Health & Science University (OHSU), Portland, OR: Assistant Professor (current) Nov 2017 – Present Multiple positions (Sr. Research Associate to tenure-track Assistant Professor). Job role involves **95% research and development**, developing and validating ML-enabled medical systems and decision support tools using multi-modal digital health data (e.g., continuous glucose monitoring, smart insulin pens and pumps, accelerometers, fitness trackers, wireless beacons) and novel modeling approaches; **2.5% teaching**, training and mentoring the next generation of biomedical engineering scientists; and **2.5% service** to the scientific community.

- Secured and managed research grants (approx. \$860K from Oregon Medical Research Foundation, NIH, Breakthrough T1D) for developing algorithms for personalized diabetes therapy optimization, digital twin technologies, and cyber-physical systems.
- Developed deep neural network model to detect meals and size from glucose data enabling automated insulin delivery in type 1 diabetes and reducing time in high glucose after meals by 10.8% in a clinical study.
- Developed evidential neural network model for predicting nocturnal low glucose in type 1 diabetes with associated prediction uncertainty with AUC 0.71-0.8, enabling the implementation of decision support app whose use reduced probability of dangerously low overnight glucose by about 30% in a randomized clinical study. Led engineering and regulatory submissions and collaborated with a clinical team to conduct the study.
- Developed a long- short-term memory (LSTM) model for forecasting glucose up to 60 minutes in the future and mixed-effects logistic regression and random forest models for predicting low glucose aroung physical activity, enabling preventive alerts to impending adverse glucose events and safe operation of automated insulin delivery systems in type 1 diabetes.
- Developed an ensemble of **random forest** models to automatically detect falls from accelerometry and position data with highly imbalanced classes, **achieving high sensitivity of 92%** and low false positive rate.
- Conducted deep-dive analysis of free-living movement patterns and identified real-time risk factors for falls in people with multiple sclerosis, enabling design of decision support app for reducing falls.
- Led the design and development of a **new digital auscultation device** that can acquire and automatically process heart sounds **using deep learning**, enabling diagnosis of valvular heart disease, particularly **detection of clinically significant aortic stenosis with sensitivity of 80%**.
- Led the development of a first-of-its-kind explainable neural ODE digital twin framework in diabetes, using state space neural networks formally verified to be conformant with physiology, enabling accurate and personalized *in-silico* pre-clinical testing of diabetes technologies (% see GitHub).
- Performed processing and statistical analysis of data collected during clinical studies and disseminated research results through publications in high impact journals including Nature Metabolism, Nature npj Digital Medicine, The Lancet Digital Health, Journal of the American Medical Informatics Association, Diabetes Technology & Therapeutics (%see Google Scholar) and presentations at national and international engineering and clinical conferences.
- Built intellectual property portfolio with multiple technology disclosures and patent applications related to MLenabled medical systems (%see OHSU Technology Portfolio).

Intel Corporation, Hillsboro, OR: Sr. Imaging Scientist

Aug 2015 – Nov 2017

Job role involved **60% software engineering**, developing critical distributed image processing software in C++ and Python, allowing real-time lithography defect metrology; **and 40% data science**, analyzing defects across various stages of chips manufacturing.

- Developed **computational lithography analysis tool** (back-end and front-end components) for accelerating chip defects detection and metrology, **allowing 5x faster image analysis and model calibration**.
- Developed unsupervised K-means clustering methodology for automated identification of design patterns leading to higher probability of chip manufacturing issues, enabling analysis of over two million images/week and faster lithography design iterations.
- My team received the 2016 Intel Technology Manufacturing Group Excellence Award (Highest honors). And my contributions resulted in two individual department-level awards.

Specialized consulting and professional services, USA and abroad: Consultant Jan 2013 – Present

- Ad hoc grant reviewer for the following National Institutes of Health panels: (1) Biomedical Sensing, Measurement and Instrumentation Small Business; (2) National Institute of Diabetes and Digestive and Kidney Disease Research Career Development awards (2024 present).
- Member of the Colombian Radiology Association AI Committee (2021 present).
- Member of the first Colombia's AI Experts Mission (2021, 2022).
- Al policy consultant for the World Economic Forum/Colombian Center for the Fourth Industrial Revolution (multiple contracts in 2019, 2020).
- Technology management consultant for Diagnosticar IPS Clinic in Colombia (2013 present).

The University of Texas at San Antonio, San Antonio, TX: Graduate Researcher Jan 2012 – May 2015

- Developed computer vision system using advanced image processing feature engineering and ML models including support vector machine and quaternion neural network to assist pathologists in detecting and grading prostate cancer from digitized biopsies, achieving diagnosis accuracy above 95%. Work resulted in two patents (US 10,055,551 and US 10,192,099), and multiple peer-reviewed publications (%see Google Scholar).
- Led recitation and review sessions for the Signals and Systems course and actively provided advice and assistance to undergraduate students as they conducted work in the Electrical and Computer Engineering Laboratory.

EDUCATION

MSc and PhD, Electrical Engineering	Graduated May 2015
Klesse College of Engineering and Integrated Design, The University of Texas, San Antonio, TX	4.0/4.0 GPA
MSc, Management of Technology	Graduated Oct 2010
School of Engineering, Universidad Pontificia Bolivariana, Medellin, COL	4.65/5.0 GPA
BSc, Electronics Engineering	Graduated Apr 2007
School of Engineering, Universidad Pontificia Bolivariana, Medellin, COL	4.57/5.0 GPA

TECHNICAL SKILLS

Technical specialties: Signal processing, data science, statistical and ML modeling, decision support tools and medical systems design, project management

Programming and scripting: Python, R, Matlab, C++, Bash

Data extract, transform, and load: SQL, Pandas, Tidyverse, Numpy

Data visualization: Matplotlib, Seaborn, ggplot2

Data analysis and modeling: Scipy, StatsModels, Ime4, Scikit-learn, Tensorflow, Pytorch, PyStan

Operating systems: Microsoft Windows, Linux

Version control systems: GIT

Languages: English (full professional proficiency), Spanish (Native)

HONORS & AWARDS

OHSU School of Medicine article of the month	March, 2023
"Modeling risk of hypoglycemia during and following physical activity in people with type 1 diabetes usir	ng explainable
mixed-effects machine learning" (Mosquera-Lopez et al., Computers in Biology and Medicine, 2023)	
Afro-Colombian of the Year	2015
National recognition for achievements in Science and Technology by Color de Colombia and El Espectador.	
The University of Texas at San Antonio Graduate Fellowship	2014-2015
Competitive Graduate Fellowship from the Department of Electrical and Computer Engineering.	
COLFUTURO Scholarship to study abroad	2011-2013
Competitive graduate scholarship from the Foundation for the Future of Colombia.	
ECOPETROL Scholarship given to top-ranked regional students in the ICFES (SAT-like) test	2002-2006
Competitive undergradute scholarship from the Colombian Petroleum Company.	