Emmanuel Contreras Guzman

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in **LinkedIn**
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Education

M.S.
Biomedical Engineering
University of Wisconsin-Madison
📅 2015-2018

B.S.
Biology
University of Wisconsin-Madison
📅 2007-2012
Certificate
Computer Science

Skills

Software: python, pandas, scikit-image, scikit-learn, regex, numpy, conda, matplotlib, seaborn, holoviews/bokeh, basic SQL

Operating systems: Windows, Linux (Ubuntu), MacOS

Hardware: Selected components and assembled various desktop computers based on computing needs

Other:
- git/github
- Image segmentation concepts and comparison metrics (F1/Dice, jaccard/IoU), morphology
- Basic cell biology knowledge
- Knowledge of fluorescence lifetime imaging concepts/time-correlated single-photon counting
- CPR Certified

Languages
- Spanish - Fluent

Work Experience

Associate Data Science Analyst

Mayo Clinic - Department of Hematology
📅 Sept 2023- Present   Rochester, MN
- Perform data science and analysis related tasks for projects that leverage disparate data including multichannel immunofluorescence and scRNA-seq datasets. Build predictive models using data available.

Data Scientist

Morgridge Institute for Research - Skala Lab
Optics lab that studies cell metabolism through fluorescence lifetime imaging
📅 October 2022 - Present   Madison, WI
- Assist projects with data science tasks including, planning experiments, performing feature extraction, data clean up, data visualization, statistical analysis and classification.

Associate Systems Programmer

Morgridge Institute for Research - Skala Lab
📅 December 2018 - September 2022   Madison, WI
- Lead programmer
- Leverage problem-solving and organizational skills to translate research problems into actionable innovative programming solutions
- Develop new tools and optimize processes to speed up analysis and increase robustness of research, saving scientists hours of work
- Researched, tested, and deployed new research and analysis tools
- Identified and acquired new skills needed to further advance projects
- Lab Github: https://github.com/skalalab

Projects

cell-analysis-tools **Python Library** | *https://cell-analysis-tools.readthedocs.io*
Library of tools to simplify and speed up single-cell data analysis, including loading, processing, and extracting features from multi-dimensional images
- Identified the need for a central codebase to perform similar tasks across projects, allowing the reuse of large amounts of code.
- Developed, documented, distributed and maintained the library which increased the robustness of research.

Metabolism of *Toxoplasma gondii* Infected Human Foreskin Fibroblast Cells
Toxoplasma gondii is a parasite that can cause serious problems for people with a weak immune system or for pregnant women. Here we aim to quantify metabolic differences during its invasion.
- Responsible for image analysis, feature extraction, data analysis, visualization, and statistical analysis.

[Optical coherence tomography of human fetal membrane sub-layers during loading](#)
Fetal membranes are understudied. This project aims to use optical coherence tomography (OCT) for its resolution compared to ultrasound to quantify various mechanical properties in human samples
- Retrained a published, open-source, fully convolutional neural network (ReLayNet) designed for layer segmentation of retinal diabetic macular edema in OCT and used it to segment a large OCT fetal membrane dataset that would have taken months to segment by hand.
- Developed various image processing algorithms to quantify features in fetal membrane layers (e.g length, thickness).
- Analyzed and visualized extracted features.

Mentoring
- Mentored several undergraduate biomedical engineering design teams and undergraduate students.

- Collaborated in designing and conducting outreach activities for middle and high school students visiting the lab.

Teaching Assistant - *General Chemistry (Chem-108)*
University of Wisconsin-Madison, Department of Chemistry
📅 Jan 2018 – May 2018   Madison, WI
- Lead two discussion sections and labs, each with 20 students
- Graded assignments, exams and lab reports

Project Assistant
University of Wisconsin-Madison, Division of Information Technology
📅 Jan 2015 – Dec 2017   Madison, WI
- Provided administration and technical support for the learning management systems on campus (Canvas and Desire2Learn)
- Created and updated documentation for various tools supported by the university.

Presentations
SPIE Photonics West
📅 February 2023   San Francisco, CA
Poster: Cell analysis tools: an open-source library for single-cell analysis of multi-dimensional microscopy images.

Publications

Sanchez-de-Diego, C., Virumbrales-Muñoz, M., Hermes, B. et al. [Griddient: a microfluidic array to generate reconfigurable gradients on-demand for spatial biology applications.](#) Commun Biol 6, 925 (2023). https://doi.org/10.1038/s42003-023-05282-3

Kayvan Samimi, **Emmanuel Contreras Guzman**, May Wu, Lindsey Carlson, Helen Feltovich, Timothy J. Hall, Kristin M. Myers, Michelle L. Oyen, and Melissa C. Skala, "[Optical coherence tomography of human fetal membrane sub-layers during loading](#)," Biomed. Opt. Express 14, 2969-2985 (2023)

Hess, N. J., Turicek, D. P., Riendeau, J., McIlwain, S. J., **Contreras Guzman, E.**, Nadiminti, K., Hudson, A., Callander, N. S., Skala, M. C., Gumperz, J. E., Hematti, P., & Capitini, C. M. (2023). [Inflammatory CD4/CD8 double-positive human T cells arise from reactive CD8 T cells and are sufficient to mediate GVHD pathology](#). Science Advances, 9(12). https://doi.org/10.1126/sciadv.adf0567

Emmanuel Contreras Guzman, Peter R. Rehani, and Melissa C. Skala "[Cell analysis tools: an open-source library for single-cell analysis of multi-dimensional microscopy images](#)", Proc. SPIE 12383, Imaging, Manipulation, and Analysis of Biomolecules, Cells, and Tissues XXI, 123830G (15 March 2023); https://doi.org/10.1117/12.2647280

Molugu K, Battistini GA, Heaster TM, Rouw J, **Guzman EC**, Skala MC, Saha K. *[Label-Free Imaging to Track Reprogramming of Human Somatic Cells](#)*. GEN Biotechnol. 2022 Apr 1;1(2):176-191. doi: 10.1089/genbio.2022.0001. Epub 2022 Apr 20. PMID: 35586336; PMCID: PMC9092522.

Kayvan Samimi, **Emmanuel Contreras Guzman**, Steven M. Trier, Dan L. Pham, Tongcheng Qian, and Melissa C. Skala, *"[Time-domain single photon-excited autofluorescence lifetime for label-free detection of T cell activation](#),"* Opt. Lett. 46, 2168-2171 (2021)

Qian T, Gil DA, **Contreras Guzman E**, Gastfriend BD, Tweed KE, Palecek SP, Skala MC. [Adaptable pulsatile flow generated from stem cell-derived cardiomyocytes](#)

using quantitative imaging-based signal transduction. Lab Chip. 2020 Oct 21;20(20):3744-3756. doi: 10.1039/d0lc00546k. Epub 2020 Sep 7. PMID: 33048070; PMCID: PMC7699819.

Wang, Z., **Guzman, E. C.**, Nimunkar, A., Keil, K. P., Vezina, C. M., Ricke, W. A., Macoska, J., & Bjorling, D. E. (2019). _Void sorcerer: an open source, open access framework for mouse uroflowmetry._ American journal of clinical and experimental urology, 7(3), 170−177.

Patents
Systems and methods for classifying t cell activation state | WO2021232011A1
https://patents.google.com/patent/WO2021232011A1/en?oq=WO2021232011A1+