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Felipe Gutierrez Barragan

Research Interests

Computational imaging, computer vision, machine learning, low-power sensing, modeling and simulation, sustainability.

Education

2016–2022 (anticipated) **Ph.D. and M.S. in Computer Sciences**, *University of Wisconsin-Madison*.
- Passed thesis proposal (2021). Passed computer vision and machine learning qualifying exam (2018).

2012–2016 **B.S. in Applied Math, Engineering, & Physics (AMEP)**, *University of Wisconsin-Madison*.

Additional Training (Application Required).
WISCIENCE Public Service Fellows (2021); Morgridge Entrepreneurship Bootcamp (2017); Argonne Training Program in Extreme-Scale Computing (2016); Blue Waters High-Performance Computing Workshop (2015).

Selected Peer-reviewed Publications[1]

In Prep. **F. Gutierrez-Barragan**, A. Ingle, M. Gupta, A. Velten. Photon-by-photon spatio-temporal compression for high-resolution single-photon 3D cameras.

IEEE CVPR 2022 **F. Gutierrez-Barragan**, A. Ingle, T. Seets, M. Gupta, A. Velten. Compressive Single-Photon 3D Cameras.

IEEE WACV 2022 Y. Liu, **F. Gutierrez-Barragan**, A. Ingle, M. Gupta, A. Velten. Single-Photon Camera Guided Extreme Dynamic Range Imaging.

IEEE TCI. 2021 **F. Gutierrez-Barragan**, H. Chen, M. Gupta, A. Velten, J. Gu. iToF2dToF: A Robust and Flexible Representation for Data-driven ToF Imaging. Presented at ICCP 2021

IEEE CVPR 2019 **F. Gutierrez-Barragan**, S.A. Reza, A. Velten, M. Gupta. Practical Coding Function Design for Time-of-Flight Imaging. Demo presented at ICCP 2021.

NeuroImage 2017 **F. Gutierrez-Barragan**, V. Ithapu, C. Hinrichs, C. Maumet, T.E. Nichols, S.C. Johnson, V. Singh. Accelerating Permutation Testing in Voxel-wise Analysis through Subspace Tracking:A plugin for SnPM.

Patents & Applications

Filed Jan. 2022 Systems, methods, and media for high dynamic range imaging using single-photon and conventional image sensor data.

Granted May 2019 Systems, methods, and media for encoding and decoding signals used in time of flight imaging. US Patent App. 15/699,623 (**Licensed**).

Selected Positions

Industry

06/2019 - 08/2020 **SenseBrain, Research Intern, New Sensors Team** , *San Jose, CA*.
- Research and development on the data-driven design and optimization of time-of-flight imaging systems.
- Developed a synthetic image generation pipeline with temporal and spatial light coding support.
- Submitted 2 internal patent applications and 1 academic publication.

Spring 2019 **Light, Research Intern, Computational Imaging Team** , *Redwood City, CA*.
- Research and implementation of multi-frame image fusion and super-resolution algorithms.

Summer 2016 **Cray Inc, Intern, Performance Team**, *St Paul, MN*.
- Contributed to the parallel implementation of a bioinformatics application and benchmarked its performance.

Summer 2014 **Microsoft Corporation, Intern, Maps App Team**, *Seattle, WA*.
- Developed the desktop, phone and tablet UX that allows Maps app users to interact with the available layers.

[1] Blue text links to project pages

Academic/Research

2016–present **UW-Madison, Computational Imaging Research Assistant**, *Madison, WI*.

- Research novel designs of direct and indirect time-of-flight 3D cameras to reduce their power consumption, reduce data transmission, and increase their precision.
- Implemented data-driven optimization and performance evaluation procedures for time-resolved imaging systems.
- Implemented our novel time-of-flight imaging system designs in a commercial camera module.
- Built a configurable time-of-flight camera from off-the-shelf optics and electronics.
- Lead author and co-author of academic publications (4x; 1x in prep.), patents (3x; 1x licensed, 1x submitted, 1x in prep.), and grant proposals (2x; 1x funded).

2016-2018, Fall 2020 **UW-Madison, Teaching Assistant**, *Madison, WI*.

- Computer Vision (Spring 2017, Fall 2020), Intro to HCI (Spring 2018), Intro to Signal Processing (Fall 2017), Matlab Programming (Summer 2017), Lead for Math/Science/Languages in the PEOPLE program (Fall 2016).

2015–2016 **UW-Madison, Research Assistant, Wisconsin ADRC Imaging Group**, *Madison, WI*.

- Developed an open-source MATLAB toolbox that accelerates permutation testing in neuroimaging studies by leveraging matrix completion methods.

2013–2016 **UW-Madison, Research Assistant, Simulation-Based Engineering Lab**, *Madison, WI*.

- Investigated and implemented parallel programming techniques for distributed fluid-solid interaction simulations.
- Developed the full-stack of a web app that records and displays the performance and testing metrics of *Chrono*.
- Developed web-based and scripting tools for pre/post processing tasks such as: model setup and rendering.

Outreach, Professional Service, and Leadership

Basil Data	Public Service Fellowship Practicum - Software consultant for a web-based impact assessment tool.
Mentorship	Yuhao Liu, UW-Madison, 2020-2021 (now Rice U. Ph.D.).
Reviewer	IEEE Transactions on Computational Imaging (2021), Elsevier Optics and Lasers in Engineering (2021).
PEOPLE	Math/Science/Languages Academic Lead at James Madison Memorial HS PEOPLE program (2016).
ProCSI	Co-coordinator of Promoting the Computational Science Initiative outreach program at UW-Madison in 2013 and 2015. Directed CAD and intro to programming modules.
Alfabetizacion	Volunteered weekly as a tutor for groups of 2-4 K-8 students in math and english (2010-2011).

Selected Achievements/Awards

2020	Led $50,000 Draper TIF grant proposal awarded by the Wisconsin Alumni Research Foundation.
2016	Meritorious Winner in the 2016 Mathematical Contest in Modeling (MCM).
2016	AMEP Leadership Prize - UW-Madison Math Department.
2015	Blue Waters Student Internship Program - National Center for Supercomputing Applications.
2014	Frontier Fellowship - Wisconsin Institutes for Discovery.
2013	Welton Honors Summer Sophomore Apprenticeship Grant - UW-Madison Honors Program.

Languages

Spanish	Fluent	*Native Language*
English	Fluent	*12 years of study. Lived and studied in the US for 4+ years.*
French	Intermediate (B1+ level)	*3 years of study. Studied 6 months in France.*

Software and Hardware Skills

10,000+ lines	Python, Matlab, C, C++.
ML Tools	PyTorch, Tensorflow, CVX, CVXPY
Parallel Tools	CHTC/Condor, Charm++, MPI, OpenMP, ArrayFire, CUDA.
Tools	Docker, Unix-based systems, CMake, Makefiles, Git, LaTeX .
Hardware	LabView, Verilog, optics alignment, general laboratory equipment.
Web and App	Jekyll, Javascript, HTML/CSS, WebGL, Flask, Windows App Dev.