

# Felipe Gutierrez Barragan

## Research Interests

Computational imaging, computer vision, machine learning, biomedical imaging, physics-based modeling and simulation.

## Education

- 2016–present **University of Wisconsin-Madison, M.S. and Ph.D. Candidate in Computer Science.**
- Advisors: Andreas Velten, Mohit Gupta.
  - Completed M.S. Fall 2018. Passed Qualifying Exam in Computer Vision and Machine Learning Fundamentals.
- 2012–2016 **University of Wisconsin-Madison, B.S. in AMEP and Computer Science.**
- Applied Math, Engineering, and Physics. Senior Project Advisor: Dan Negrut.
  - Computer Sciences. Thesis Advisor: Vikas Singh.
- 2016, 2017 **Summer Schools.**
- Morgridge Entrepreneurship Bootcamp (2017), Argonne Training Program in Extreme-Scale Computing (2016).

## Publications

### Peer-reviewed Conference & Journal Articles

- In preparation **F. Gutierrez-Barragan**, H. Chen, J. Gu, M. Gupta, A. Velten. iToF2dToF: A Robust and Flexible Representation for Data-driven ToF Imaging.
- CVPR 2019 **F. Gutierrez-Barragan**, S.A. Reza, A. Velten, M. Gupta. Practical Coding Function Design for Time-of-Flight Imaging.
- 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.
- ASME IDETC 2014 D. Kaczmarek, A. Bartholomew, **F. Gutierrez**, H. Mazhar, D. Negrut. Chrono::Render: A graphical visualization pipeline for multibody dynamics simulations.

### Patents & Applications

- 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**).

### Conference Abstracts, Presentations, & Posters

- ICCP 2020 **F. Gutierrez-Barragan**, A. Velten, M. Gupta. A Coding Theory of Time-of-Flight Imaging.
- IDETC/CIE 2016 **F. Gutierrez**, A. Pazouki, D. Negrut. Distributed Memory Fluid-Solid Interaction Simulations via Chrono::HPC. Presented at *ASME IDETC/CIE*, 2016 and *Blue Waters Symposium 2016*.

## 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 currently under review.
- Spring 2019 **Light, Research Intern, Computational Imaging Team**, San Francisco, 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.

## Academic/Research

- 2016–present **UW-Madison, Research Assistant, Wisconsin Imaging and Computer Vision Lab, Madison, WI.**
- Designed novel coding functions for continuous-wave time-of-flight imaging robust to high noise levels.
  - Developed a time-of-flight imaging system performance simulation framework.
  - Built a configurable time-of-flight camera from off-the-shelf optics and electronics.
- 2016-2018 **UW-Madison, Teaching Assistant, Madison, WI.**
- Intro to HCI (Spring 2018), Intro to Signal Processing (Fall 2017), Matlab Programming (Summer 2017), Computer Vision (Spring 2017), Lead for Math/Science/World 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.
- Fall 2016 **UW-Madison, Project Assistant, PEOPLE Program, Madison, WI.**
- Math, Science, and World Languages Academic Lead at James Madison Memorial High School.

## Selected Achievements/Awards

- 2016 Meritorious Winner in the 2016 Mathematical Contest in Modeling (MCM).
- 2016 AMEP Leadership Prize - UW-Madison Math Department.
- 2016 Blue Waters Symposium Travel Grant.
- 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.

## Software and Hardware Skills

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

## Languages

- |         |                          |   |
|---------|--------------------------|---|
| Spanish | Fluent                   | <i>Native Language</i>  |
| English | Fluent                   | <i>12 years of study. Lived and studied in the US for 4+ years.</i> |
| French  | Intermediate (B1+ level) | <i>2 years of study. Studied 6 months in France.</i>                |

## Outreach and Leadership

- 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 Volunteer tutor once a week for groups of 2-4 elementary and middle school children in math and english (2010-2011).
- Waterski UW-Madison Waterski team captain, trick coach, and competing member (2012-2016).