# Francisco Huizar

Data-driven drug discovery scientist

#### Contact

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Camarillo, CA U.S. Citizen

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Google Scholar

Personal Website

#### Skills

#### Transferable and Professional

- Innovative problem solver
- Collaborate cross-functionally
- Project management
- Information, data management

Excellent

- S.M.A.R.T. goals and objectives
- Leadership and initiative
- Professional self-awareness
- Communicate effectively

Very Good

## **Technical and Software**

- Biostatistics and data analysis
- R for biostatistics
- Python, Pandas, Matplotlib
- MATLAB and SimBiology

Excellent

- Computational biology
- Model simulation and development
- Unix, Linux, Cloud Computing
- PyTorch, Keras, TensorFlow

Very Good

- GitHub, Git, GitLFS
- MySQL, SQL, Tableau
- STAN, MCMC for Bayesian inference
- C++ for object-oriented programming

Experienced

- AWS, Azure, GCP
- Seurat, ScanPy, STAR, Cell Ranger
- Pharmacometrics and PKDM
- PK/PD, pharmacology modeling
- NONMEM, Monolix, Phoenix NLME, WinNonLin
- Exposure-response modeling of discrete and time-to-event data

Actively Learning!

#### Education

**Ph.D., Bioengineering**University of Notre Dame (Jul 2018 – Current)

M.S., Computational Statistics
University of Notre Dame (Jul 2018 – Current)

**B.S., Chemical Engineering** *University of Notre Dame (May 2018)* 

B.S., Computational Statistics University of Notre Dame (May 2018)

## Mission statement

- I am a collaborative cross-functional scientist with expertise in computational biology, mathematical modeling, science-based decision making, and interdisciplinary communication.
- The core mission of my professional endeavors is to serve patients afflicted by genetic-related disease with therapeutic approaches and innovative biotechnology in a clinical setting.
- To achieve **my mission** of service, I aim to utilize **my talents** of communication and execution to perform **my passion** of planning and analyzing by using data-driven approaches for drug discovery.

# Summary of qualifications

- Articulate communicator with expertise in data visualization and scientific presentation resulting in 1 <u>academic journal front cover</u>, 14 conference and 5 seminar presentations.
- Self-motivated project manager with excellent communication, innovation, and strategic planning abilities resulting in 4 first-author publications and 5 fellowships totaling \$96,000 in funding.
- Versatile learner committed to professional development as demonstrated by integration of 3 computational modeling, pharmacometrics, and clinical drug development training workshops.
- Inspiring leader with expertise in fostering patience, encouragement, collaborative environments, and collective success as evidenced by mentoring 8 undergraduate and 9 graduate students.
- Dedicated and dependable scientist committed to integrity and accountability resulting in 3 discoveries in therapeutic research for oncology and neurodegenerative preclinical disease models.

## Professional experience

## Quantitative systems biologist, model simulation and drug discovery

As Graduate Research Assistant (Dec 2019 - Current)

University of Notre Dame, Indiana

- Integrated quantitative systems pharmacology (QSP) and model-informed drug development (MIDD) modeling software for mechanistic modeling of oncology resulting in 2 collaborations.
- Explored multimodal single-cell omics cancer data with the Seurat and ScanPy genomics toolkits
  resulting in attainment of 3 bioinformatics analysis approaches in oncology and disease biology.
- Responsible for collaborative relationship building by leading 4 cross-functional teams spanning drug discovery, machine learning, computational biology, simulation, and mathematical modeling.
- Developed a Gaussian process surrogate model (PyTorch) for prediction and simulation of therapeutic viability of 1,498 compounds to 172 kinase targets for cancer research.
- Implemented 2 machine learning approaches for de novo therapeutic design as a scientific approach for identification and simulation of new therapeutics using generative models.
- Utilized machine learning, mathematical modeling, and cloud computing for rapid simulation and data classification of 4 unique calcium signatures in developmental biology.
- Operated mechanistic modeling tools to discover 2 distinct cell populations in developing epithelial tissue via simulation and analytic techniques.

#### Computational biologist, data management and data science

As Graduate Research Assistant (Jul 2018 - Dec 2019)

University of Notre Dame, Indiana

- Participated in cross-function teams to collaborate with other scientists that led to development of a cloud computing project to manage datasets consisting of 13,324 images.
- Executed innovation in data democratization as demonstrated by generating 2 open-source repositories for biotechnology software (simulation and biostatistics) for non-technical users.
- Performed in vivo gene expression of 425 human disease related genes in Drosophila Melanogaster.
- Spearheaded design and innovation of a more efficient coverslip plating protocol for in vivo calcium signaling imaging that increased throughput by a factor of 2.
- Deployed bioinformatics, data processing, and data science methods for analysis of phenomic datasets to identify 4 lead therapeutic candidates using Python and MATLAB.

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•	Berthiaume Institute for Precision Health Summer Graduate Research Fellowship	May 2022 – Aug 2022
•	$10^{\rm th}$ Annual Harper Cancer Research Institute Research Day Presentation Moderator	Mar 2022
•	Notre Dame CBE Lead Graduate Student Mentor	Jan 2022 – Current
•	Harper Cancer Research Institute Interdisciplinary Interface Training Program Grant	Jul 2020 – Jul 2022
•	Leahy-Filipi Graduate Fellowship for excellence in neuroscience research	May 2020 – May 2021
•	Notre Dame Annual Building Bridges Reception Keynote Speaker	Sep 2019
•	Harper Cancer Research Institute Research Day Oral Presentation Award	Apr 2019
•	Stem Cells & Regenerative Medicine Research Fellowship	May 2017 – Aug 2017
•	Notre Dame CBE Early Start Fellowship	Jul 2018 – Aug 2018
•	Provost Scholarship for academic achievement	Aug 2013 – May 2017
•	Kaneb-Gillen Hispanic Scholar for academic achievement	Aug 2015 – May 2017

### **Publications**

- Kumar, N., †Huizar, F.J., Farfán-Pira K.J., Brodskiy, P., Soundarrajan, D.S., Nahmad, M., Zartman, J.J.; MAPPER: An open-source, high-dimensional image analysis pipeline unmasks differential regulation of *Drosophila* wing features. *Frontiers in Genetics* (2022). https://doi.org/10.3389/fgene.2022.869719.
  - †Co-first authorship.
- Huizar, F.J., Hill, H., Bacher, E., Eckert, K., Gulotty, E., Rodriguez, K., Tucker, Z., Banerjee, M., Wiest, O., Zartman, J. and Ashfeld, B.L. (2022), Rational Design and Identification of Harmine-Inspired, N-Heterocyclic DYRK1A Inhibitors Employing a Functional Genomic In Vivo Drosophila Model System. ChemMedChem. (2022). <a href="https://doi.org/10.1002/cmdc.202100512">https://doi.org/10.1002/cmdc.202100512</a>
- Soundarrajan, D., †Huizar F.J., Paravitorghabeh, R., Robinett, T., Zartman, J. (2021), From spikes to intercellular waves: Tuning intercellular calcium signaling dynamics modulates organ size control. PLOS Computational Biology. 2021 Nov 1;17(11):e1009543. https://doi.org/10.1371/journal.pcbi.1009543 †Co-first authorship.
- Huizar, F.J., Soundarrajan, D., Paravitorghabeh, R, Zartman, J.J., Interplay between morphogen-directed positional information systems and physiological signaling. Developmental Dynamics. 2020; 249: 328–341. <a href="https://doi.org/10.1002/dvdv.140">https://doi.org/10.1002/dvdv.140</a>
- Kumar, N., Huizar, F.J., Unger, M., Soundarrajan, D., Velagala, V., Koren, J., Zartman, J.J. (2020). Neurotransmitter Receptors as Key Physiological Regulators of Epithelial Morphogenesis. Biophysical Journal. <a href="https://doi.org/10.1016/j.bpj.2019.11.673">https://doi.org/10.1016/j.bpj.2019.11.673</a>
- Brodskiy, P.A., Wu, Q., Soundarrajan, D.K., **Huizar, F.J.**, Chen, J., Liang, P., Narciso, C., Levis, M., Arredondo-Walsh, N., Chen, D., Zartman, J.J. (2019). Decoding calcium signaling dynamics during *Drosophila* wing disc development. Biophysical Journal. https://doi.org/10.1016/j.bpj.2019.01.007
- Brodskiy, P.A., Wu, Q., Kumar, N. Velagala, V. Snyder, K. **Huizar, F.J.**, Tautges, S., Snyder. M, Zartman J.J. (2018). Mapping the calcium signalsome during *Drosophila* wing development. IFAC-PapersOnLine. <a href="https://doi.org/10.1016/j.ifacol.2018.09.019">https://doi.org/10.1016/j.ifacol.2018.09.019</a>
- Brodskiy, P. A., Wu, Q., **Huizar, F. J.**, Soundarrajan, D. K., Narciso, C., Levis, M., ... Zartman, J. J. (2017). Intercellular calcium signaling is regulated by morphogens during *Drosophila* wing development. bioRxiv, 104745. *Pre-print*. <a href="https://doi.org/10.1101/104745">https://doi.org/10.1101/104745</a>

# Conference and seminar presentations

- Huizar, F.J. et al., "Flying" over pre-clinical barriers: Machine learning approaches to characterize novel DYRK1A inhibitors as potential cancer therapeutics. Notre Dame Quantitative Biology Retreat. Poster. April 08, 2022.
- Huizar, F.J. et al., "Flying" over pre-clinical barriers: Machine learning approaches to characterize novel DYRK1A inhibitors as potential cancer therapeutics. Cancer Research Institute Cancer Research Day. Selected graduate student presenter. Poster. March 14, 2022.

- **Huizar, F.J. et al.,** "Flying" over pre-clinical barriers: Development of a rapid, low-cost platform for pre-clinical evaluation of novel therapeutics in vivo. **Notre Dame Bioengineering Seminar.** Main speaker. Main speaker. Multidisciplinary Research Building, Notre Dame, IN. Nov 18, 2021.
- Huizar, F.J., Hill, H., Kumar, N., Bacher, E., Ashfeld, B., Zartman, J.J., Rational Design and Identification of N-Heterocyclic DYRK1A Inhibitors as Potential Anticancer Therapeutics. Cancer Biology Training Consortium annual retreat. Poster. Graduate Hotel Nashville. Nashville, TN. Oct 25, 2021.
- Huizar, F.J., Hill, H.M., Bacher, E.P., Eckert, K.E., Gulotty, E.M., Rodriguez, K.X., Tucker, Z.D., Wiest, O., Zartman, J., Ashfeld, B.L., Novel N-heterocyclic DYRK1A inhibitors ameliorate overgrowth of epithelial tissue. IU Simon Comprehensive Cancer Center Cancer Research Day. Presentation. Online. October 14, 2021.
- **Huizar, F.J.,** Using a black hole to identify novel therapeutics: SVGP regression as a statistical framework for drug discovery. **Notre Dame Bioengineering Seminar.** Main speaker. Online. June 22, 2021.
- Huizar, F.J., Kumar, N., Robinett, T., Farfan-Pira K.J., Soundarrajan, D., Unger, M., Brodskiy, P., Nahmad, M., Zartman, J.J., MAPPER: A new image analysis pipeline unmasks differential regulation of *Drosophila* wing features. Genetics Society of America annual *Drosophila* research conference. Poster. Online. March 31, 2021.
- Huizar, F.J., Hill, H., Kumar, N., Bacher, E., Ashfeld, B., Zartman, J.J., In vivo drug discovery "on-the-fly": Towards high-throughput assessment of novel therapeutics in humanized *Drosophila melanogaster*. Harper Cancer Research Institute Cancer Research Day. Selected graduate student presenter. Online. March 29, 2021.
- Huizar, F.J., Hill, H., Kumar, N., Bacher, E., Ashfeld, B., Zartman, J.J., In vivo drug discovery "on-the-fly": Towards high-throughput assessment of novel therapeutics in humanized *Drosophila melanogaster*. Cancer Biology Training Consortium annual retreat. Poster. Online. Oct 27, 2020
- Huizar, F.J., Hill, H., Kumar, N., Bacher, E., Ashfeld, B., Zartman, J.J., In vivo drug discovery "on-the-fly": Towards high-throughput assessment of novel therapeutics in humanized *Drosophila melanogaster*. Notre Dame Bioengineering Seminar. Main speaker. Multidisciplinary Research Building, Notre Dame, IN. Sep 29, 2020.
- Maini, P., Huizar F.J., Oliveri, H., Baraban, M., Kumar, N., Parel, K., Telele. C., Modeling shape & size in biological multicellular tissues. Workshop Presentation. Lorentz Center modeling biological development workshop. Online. Aug 28, 2020.
- Huizar, F.J., Bacher, E., Kumar, N., Gleason, B., Koren, J., Ashfeld, B., Zartman, J.J., Regulation of DYRK1A activity through an integrated inhibitor scaffold design and phenotypic analysis approach. Poster. 7<sup>th</sup> Annual AD&T Symposium: Extreme Diagnostics, Notre Dame, IN. Mar 6, 2020.
- **Huizar, F.J.,** Wu, Q., Tautges, S., Eckert, K., Bacher, E., Ashfeld, B., Zartman, J.J., Toward a high-throughput *in vivo* screening pipeline for testing new therapeutics using *Drosophila melanogaster* as a disease-model. **Eli Lilly and Company HCRI Notre Dame Alumni Panel**. Poster. Eli Lilly and Company Headquarters, Indianapolis, IN. May 17, 2019.
- **Huizar, F.J.,** *Drosophila melanogaster* as a high-throughput model for drug screening and decoding G-protein coupled receptor interactions. **Notre Dame Bioengineering Seminar.** Main speaker. Multidisciplinary Research Building, Notre Dame, IN. Apr 12, 2019.
- Huizar, F.J., Bacher, E., Wu, Q., Tautges, S., Kumar, N., Ashfeld, B., Zartman, J.J., A high-throughput in vivo screening pipeline for testing novel DYRK1A inhibitors against triple negative breast cancer using *Drosophila melanogaster* as a disease model. 8th Annual HCRI Cancer Research Day. Selected Presenter. Harper Cancer Research Institute, South Bend, IN. Apr. 8, 2019.
- Huizar, F.J., Wu, Q., Tautges, S., Eckert, K., Bacher, E., Ashfeld, B., Zartman, J.J., Toward a high-throughput in vivo screening pipeline for testing new therapeutics using *Drosophila melanogaster* as a disease-model. 8th Annual HCRI Cancer Research Day. Poster. Harper Cancer Research Institute, South Bend, IN. Apr 8, 2019.
- Huizar, F.J., Mechanisms of serotonin (5-HT) signaling in development. Harper Cancer Research Institute Seminar. Main speaker. Harper Cancer Research Institute, South Bend, IN. Feb 4, 2019.

- Huizar, F.J., Wu, Q., Brodskiy, P.A., Zartman, J.J., Regulation and relevance of intercellular calcium signaling. Poster. Notre Dame College of Science Joint Annual Meeting, Notre Dame, IN. May 4, 2018.
- **Huizar, F.J.**, Levis, M., Zartman J.J., *In vivo* analysis of spontaneous intercellular Ca<sup>2+</sup> waves in *Drosophila* wing discs. Poster. **5**<sup>th</sup> **Midwest Quantitative Biology Symposium**, Notre Dame, IN. Apr 8, 2017.

## Research interests

- Translational and clinical research for genetic-related diseases
- Modeling and simulation of virtual clinical trials
- Drug development, pharmacodynamics, and pharmacokinetics
- Scientific computing and machine learning approaches in bioinformatics
- Gene regulatory network modeling
- Phenomics, proteomics, and genomics association analysis

#### **Affiliations**

- American Institute of Chemical Engineers (AIChE)
- Notre Dame CBE graduate student organization mentor
- Notre Dame MSPS Building Bridges Mentoring Program
- Notre Dame Hispanic Scientists and Engineers
- Notre Dame CBE First-Year Graduate Student Peer Group Program (Mentor)
- Notre Dame Leadership Advancing Socially Engaged Research (Graduate Mentor)