Francisco Huizar

Data-driven drug discovery scientist

Contact

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Who I've worked with

Dr. Brandon Ashfeld,
Associate Professor, Biochemistry

Prof. Ashfeld has been a research collaborator with me for four years.

"Francisco has established himself as an exemplary researcher and has demonstrated the leadership qualities one hopes to see from a graduate student at such an early stage. A defining characteristic of Francisco is independence and self-reliance in project management at the graduate student level where he has demonstrated a remarkable ability to identify key holes in the literature and develop an approach toward addressing these vacancies as they pertain to our specific objectives."
— Brandon Ashfeld

Skills

Linear regression

Excellent

Generalized linear regression

Excellent

Why I want to be at Amgen

Deep down I know everyone is created to fulfill a unique role, to be a part of something bigger, and to be the change they want to see. **The core mission of my research endeavors is to be someone of service.** Helping, guiding, leading, lifting, and caring for others fills my heart, gives me motivation, and creates unbounding feelings of significance. I am driven by my desire to heal, listen to, protect, and love others. To achieve **my mission** of service, I have found I was created to use **my talents** of communication, instruction, execution, and discernment to perform **my passions** of planning, advising, solving, and analyzing by using state of the art biotechnology to discover novel treatment approaches for patients. Because Amgen's core mission to serve patients matches my own mission, I **strongly believe** the work environment will enable me to grow professionally and push towards actualizing a common goal: to be of service to patients in need.

How I can add value

- Acknowledged for producing work of high scientific quality and merit through receiving an academic journal front cover highlight of my drug-discovery related research.
- Adaptive data analyst passionate about leading the forefront of biotechnology, drug discovery, and pre-clinical therapeutics through data-driven decision making.
- Self-motivated professional with excellent communication, strategic planning, and problem solving abilities.
- Meticulous researcher adept in data collection, analysis, interpretation, simplifying complexities, and data visualization.
- Acknowledged for excellence in neuroscience and cancer therapeutics research through multiple fellowship and grant awards.
- Committed to a willingness to learn, integrity, and dependability.
- Interdisciplinary educational background has enabled high proficiency in wet-lab data collection and dry-lab data analysis.
- Enthusiastic advocate for organization, time management, responsibility, staying focused, and taking action.
- Passionate leader that values collaboration, listening, patience, encouragement, instructing others, and achieving success together.
- Adept in critical thinking, open-mindedness, and assessing multiple viewpoints to analyze complex issues.
- Animated presenter when sharing and explaining exciting results.

Where I've been

Jul 2018 – Current

Graduate Research Assistant, University of Notre Dame

Advisor: Dr. Jeremiah Zartman — *South Bend, Indiana*

- Currently implementing Gaussian process regression to develop a machine learning model that predicts binding affinity of a molecule to a protein.
- Utilized statistical learning for analysis of phenotypic data for rapid in vivo drug screening.
- Developing approaches for machine learning classification of molecular descriptors to identify kinase inhibitors.
- Employed Bayesian inference to identify associating molecular descriptors that explain kinase selectivity.
- Utilized machine learning and neural networks for rapid data classification of calcium activity during developmental processes.
- Utilized differential equation modeling to discover necessary and sufficient conditions for calcium activity in developing *Drosophila* epithelial tissue.
- Performed categorical data analysis and generalized linear regression to discover a relationship between the Gαq protein and cellular proliferation.

- Performed quantitative reverse transcription PCR and analyzed subsequent data to identify low abundance GPCRs not yet recorded in literature.
- Aided in identifying novel neural receptors that regulate epithelial morphogenesis.
- Developed cloning vectors for creating transgenic *Drosophila* lines to optimize a drug screening assay.
- Aided in development of a rapid in vivo *Drosophila* drug screening assay.
- Utilized tissue immunostaining to evaluate protein localization in developing tissues.
- Transfected *Drosophila* cells with a fluorescent calcium reporter.
- Utilized confocal microscopy to image developing *Drosophila* brains and wing discs.
- Developed lecture slides to present to students on cell line engineering to a junior level chemical engineering course.
- Presented on methods, applications, and future direction of cell line engineering.
- Composed homework and exam problems based on lecture material.
- Oversaw, educated, guided, and advised five undergraduate students on laboratory experiments and research projects.
- Maintained laboratory operations, updated and revised standardized operating procedures, and oversaw lab inventory.
- Organized, scheduled, held, and led weekly group meetings during my advisor's sabbatical.

Jan 2017 – May 2018

Undergraduate Researcher, University of Notre Dame

Advisor: Dr. Jeremiah Zartman   *South Bend, Indiana*

- Utilized the GAL4/UAS system to study in vivo gene expression of *Drosophila* with fluorescent microscopy.
- Developed a more efficient coverslip plating protocol for in vivo calcium signaling imaging that increased throughput two-fold.
- Created a pipeline data analysis program for classification of in vivo imaging data using MATLAB.
- Performed statistical analysis using R to create figures for manuscripts.
- Identified a power-law relationship between calcium signaling and tissue size during development of *Drosophila* using a Box-Cox transformation.
- Improved a genetic screening project to identify key regulatory genes of calcium by developing a data collection protocol.
- Instructed and supervised new graduate and undergraduate students on basic laboratory protocols.
- Completed a thesis detailing significance of calcium signaling in developing tissue.

What I've learned

Jul 2018 – Current

Ph.D. Bioengineering

University of Notre Dame, South Bend, IN

- **Relevant Coursework Completed:** Statistical and computational methods for scientists and engineers; Nonlinear and stochastic optimization; Advanced topics in machine learning; Advanced cell biology; Molecular biology; Stem cell engineering; Systems biology; Biocomputing; Advanced Biostatistical Methods

Jul 2018 – Current

M.S. Applied Computational Mathematics and Statistics

University of Notre Dame, South Bend, IN

Skills (sidebar)

Python — Excellent

MATLAB — Excellent

LaTeX — Excellent

Google Drive — Excellent

MS Office — Excellent

Unix — Very Good

ImageJ — Very Good

InkScape — Very Good

SAS — Good

RStan (MCMC algorithms) — Good

GitHub — Good

MySQL — Good

C++ — Good

Object Oriented Programming — Good (Learning!)

Languages

English — Excellent

Spanish — Very Good

- **Relevant Coursework Completed:** Statistical inference; Applied linear models; Intermediate probability; Mathematical biology; Applied Bayesian statistics; Applied generalized linear models

Aug 2013 – May 2018

B.S. Chemical and Biomolecular Engineering
University of Notre Dame, South Bend, IN
- **Thesis:** Regulation and relevance of intercellular calcium signaling in *Drosophila* wing development
- **Minor:** Bioengineering

Aug 2013 – May 2018

B.S. Applied Computational Mathematics and Statistics
University of Notre Dame, South Bend, IN
- **Concentration:** Biological sciences

Honors

- Berthiaume Institute for Precision Health Summer Graduate Research Fellowship — May 2022 – Aug 2022
- 10th 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). https://doi.org/10.1002/cmdc.202100512

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. https://doi.org/10.1002/dvdy.140

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. https://doi.org/10.1016/j.bpj.2019.11.673

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. https://doi.org/10.1016/j.ifacol.2018.09.019

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*. https://doi.org/10.1101/104745

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. **7th 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^{2+} waves in *Drosophila* wing discs. Poster. **5th Midwest Quantitative Biology Symposium**, Notre Dame, IN. Apr 8, 2017.

Research interests

- Translation and clinical research for genetic-related diseases
- Genetic engineering approaches to generate in vivo model organisms
- 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)