

Jorge I, Barrera

Assistant Professor, Analytics and Big Data
Department of Agricultural and Biological Engineering, ABE
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PURPOSE

Advance and apply, data and science-based solutions, in agriculture and complementary fields, focusing on projects with positive effects on society.

INTERESTS

- Big Data
- Data Sciences
- Operations Research
- Industrial Organization (Market Structure)
- Optimization (deterministic and heuristic algorithms)

EDUCATION

Ph.D. Systems Engineering

May 2013

University of Virginia, Charlottesville, VA

Dissertation: “Mechanism Design for the Optimal Allocation of Networked Resources”

Major: Operations Research

M.Sc. Electronic Engineering

Sept 2008

Universidad de los Andes, Colombia

Thesis: “The Use of Meta-Heuristics for the Dynamic Resource Assignment Problem in Multicellular Systems”

Major: Electronics and Computer Engineering

B.Sc. Electronic Engineering

May 2006

Universidad Pontificia Bolivariana, Colombia

Thesis: “Swarm Intelligence for Common Problems in Engineering”

RESEARCH EXPERIENCE

Assistant Professor

since October 2016

Department of Agricultural and Biological Engineering
Institute of Food and Agricultural Sciences
University of Florida, Gainesville, FL

Main Programs:

- **Data Literacy:** This program develops projects that help the UF family and friends, increase the adoption of technologies related to data, to increase the efficiency of scientific research and extension activities.
- **Data based Applications:** With the help of state of the art technologies and infrastructure, that institutions like our University can provide, we create data-intensive web applications. These applications have significant scientific and/or social value, for example:
 - Retention payoff prediction for cattle ranchers using machine-learning techniques.
 - Water Quality Analytics using EPA and USGS large data sets.
 - Good of fitness evaluation for hydrological models
- **Agri-Food Supply Chain Management:** With the upsurge of data-driven models, and modern (computationally intensive) optimization techniques, there is an evident opportunity to improve the efficiency of operation for Agri-food systems. Current models for supply chain in the Agri-food literature, are mainly based on linear models used to maximize revenue. In this program, we expand this approach by allowing the integration of linear and non-linear models. We also introduce means to account for variations depending on the attention given to product quality, degradation, logistic possibilities like storing conditions at different stages, and different type of customers.

Research Associate/Assistant

2009 - 2014

Department of Systems and Information Engineering
University of Virginia, Charlottesville, VA

Main topics of research:

- **Smart Markets (Mechanism Design)** to promote the efficient use of congestible resources, such as wireless spectrum, service capacity, and bandwidth. For these resources, the utility of a user depends not only on her individual consumption but also on the aggregate use of the resource.
- **Smart Markets** for the efficient allocation of cross-border capacity in the integration of local electric power markets.

Worked in a diversity of multidisciplinary projects providing mathematical modelling and quantitative analysis:

- Designed and analyzed regulations and incentives for optimal power dispatch.
- Developed and implemented a stochastic model of a type I diabetic patient in order to evaluate different control policies.
- Assessed different capstone teams in projects related to the design of auctions for the allocation of wireless channels.
- Results of these works have been published in scientific journals and presented in conferences.

TEACHING EXPERIENCE

Teaching Assistant

2009-2014

Department of Systems and Information Engineering
University of Virginia, Charlottesville, VA

Courses:

- Decision Analysis (graduate level).
- Economics of Engineering Systems, (graduate and undergraduate levels).

Responsibilities included grading, holding office hours and designing complementary activities such as final projects and problem sessions. Also trained students in the use of quantitative tools like Matlab and CPLEX.

PUBLICATIONS

Archived Journals

- J. Barrera, R. Suthar, and J. Judge. “Rethinking the Modeling of Ag-Food Production and Supply Chain. A novel framework”. Under Review: International Journal of Production Economics.
- J. Barrera and A. García. “Auction Design for the Efficient Allocation of Service Capacity Under Congestion”. Operations Research, vol. 63, (no. 1). January 2015.
- J. Barrera and A. García. “Dynamic Incentives for Congestion Control”. IEEE Transactions on Automatic Control, vol. 60, (no. 3). February 2015.
- A. Garcia, M. Hong and J. Barrera. “Cap and Trade for Congestion Control”. Dynamic Games and Applications, vol. 2, (no. 3), pp. 280-293. June 2012.
- A. García, J. Alzate and J. Barrera. “Regulatory Design and Incentives for Renewable Energy”. Journal of Regulatory Economics, vol. 41, (no. 3), pp. 315-336. June 2012.
- M. Hong, A. Garcia, J. Barrera and S. Wilson. “Joint Access Point Selection and Power Allocation for Uplink Wireless Networks: Equilibria and Algorithms” IEEE Transactions on Signal Processing, vol. 61, (no. 13), pp. 3334-3347. July 2013.
- J. Barrera and A. García. “Distributed Channel Selection for Ad-Hoc Networks in the Presence of Jamming”. Lecture Notes of the Institute for Computer Sciences, Social

Informatics and Telecommunications Engineering, vol. 28. Ed. Jun Zheg et al. Springer Berlin Heidelberg, 2010, pp. 667-678.

Conferences

- J. Barrera, A. García and M. Hong. “Auction Design for Spectrum Allocation Under Interference Constraints”. GLOBECOM, 2013 Proceedings IEEE, pp. 3035-3041, 9-13 Dec 2013.
- M. Hong, A. Garcia and J. Barrera. “Joint Distributed Access Point Selection and Power Allocation in Cognitive Radio Networks”. INFOCOM, 2011 proceedings IEEE, pp. 2516-2524, 10-15 April 2011.
- M. Hong, A. García, J. Barrera. “Joint distributed access point selection and power allocation in cognitive radio networks”. INFOCOM, Proceedings IEEE, 2011.
- J. Barrera, S. Patek and Q. Zhang. “Decision Theory Enables Self-Treatment Re-engineering in Diabetes Mellitus Type 1”. Poster at Diabetes Technology Meeting, San Francisco, CA 2011.
- J. Barrera, J. Pena and R. Hincapié. “Epsilon-PSO: A particle Swarm Optimizer with Epsilon-Greedy Action Selection”. CLEI 2005, XXXI Latin American Informatics Conference, 2005.

Invited Talks

- J. Barrera, A. Garcia. “Auction Design for Market Coupling”, presented at Trans-Atlantic INFRADAY, Washington, DC. Nov. 2013.
- J. Barrera, A. Garcia. “Distortions in the Reliability Charge Auction”, presented at Congreso Mercado Electrico Mayorista (Wholesale Electricity Market Conference), Medellin, Colombia, Nov. 2012.
- J. Barrera, A. Garcia, J. Alzate. “Regulatory Design and Incentives for Renewable Energy”, presented at Trans-Atlantic INFRADAY, Washington, DC. Nov. 2011.

Extension Publications

- J. Barrera, G. Pachitariu. “Big Data: What is it? Is my data big data?” to appear in Resource Magazine.

INDUSTRY EXPERIENCE

Business Intelligence, Data Scientist **2014-2016**
Trivago GmbH,
Duesseldorf, Germany
Optimal personalization of international business-to-consumer platforms.

Infrastructure Engineer **2007-2008**
AON Risk Services, Colombia
Acquisition and administration of Technological Infrastructure.

SKILLS

Computer

- Matlab
- R
- Mathematica
- Python
- Excel
- CPLEX

Languages

- English (near native)
- Spanish (native)
- German (beginner)

AWARDS

- Scholarship for M.Sc. Degree for having the highest score in admission exam (Electronic Engineering), Bogotá, Colombia. August 2006.
- Award to the highest scored M.Sc. thesis work. Bogotá, Colombia. September 2008.

MEMBERSHIPS

- Institute for Operations Research and the Management Sciences (2011-present)
- Institute for Electrical and Electronics Engineers (IEEE) (2011-present)
- Omega Rho - Operations Research and Management Science Honor Society (2011-present)
- Golden Key -International Honor Society (2010-present)