

Omar Santander

Contact Information	Address: 4210 Red River St., Unit 108, Austin, TX 78751 Website: http://sites.utexas.edu/baldea/people/	Email: osantander@utexas.edu Mobile: 512-758-3455
Professional Summary	More than 8 years of professional and international experience with a balanced manufacturing (paper production, coatings, and capacitors finishing), technical (simulation, control, optimization and machine learning (ML)) and corporate (supply chain) background.	
Education	University of Texas at Austin. PhD candidate in Chemical Engineering, GPA: 3.81/4. University of Waterloo (Canada). MAsc in Chemical Engineering, GPA: 95.75/100. UNAM (Mexico). (Honours) BAsc in Chemical Engineering, GPA: 9.5/10.	Sep '17-Present Jan '16 Sep '11
Academic Research	PhD Research: Integration of Planning-Scheduling-Process Control and ML applications. Advisor: Michael Baldea (University of Texas at Austin). Investigating and developing algorithms for the integration of production planning, short-term production scheduling and (advanced) process control in batch and large-scale continuous (e.g. refinery operation) processes. I develop detailed dynamic models of an industrial fluid catalytic cracker-fractionator unit and refine the models using industrial insight. The project involves formulating regulatory and advanced controllers and solving the production planning and scheduling decision-making processes as stochastic optimization problems. In addition, I am also studying the application of machine learning methods in APC, production planning and production scheduling. MAsc Research: Economic Nonlinear Model Predictive Control (Economic NMPC). Advisor(s): Hector Budman and Ali Elkamel (University of Waterloo). Devised a novel robust economic NMPC that successfully integrated real time optimization (RTO) and NMPC into a single optimization layer, allowing its utilization in periodic operation regimes under model uncertainty and demonstrating economic superiority compared to published benchmarks.	Sep '17-Present Jan '14-Jan '16
Academic Projects	Kaggle competition for binary classification (top 15 with a public AUC score of 0.9239). Xylitol production plant design (1 st place).	Oct '20 May '11
Work Experience	Process Engineer (leader), Kemet Corporation, Mexico. Supervised and enhanced the productivity/efficiency of the capacitor's packaging process (150 reeling machines in 14 production lines with more than 200 operators) reducing scrap level to historical minimum (less than 1%). Scheduled activities and projects of process technicians and a junior engineer. Utilized customer feedback to implement process improvements as part of a multidisciplinary team comprising members from a wide range of units (quality, production, maintenance etc.). Managed major projects that involved the acquisition of new equipment, raw materials and machine development/enhancement. Developed/upgraded detailed operating manuals and guidelines. Review/update APQP, FMEA, PPAP. Characterized/solved major quality problem related to "stuck" capacitors. Consultant Engineer, Schneider Electric, Mexico. Modeled and simulated (dynamically) relevant large-scale industrial processes employing in-house developed software (Dynsim). Specifically, I worked in the modeling/simulation of a gas processing plant compression train of an energy company based in Mexico. Supply Chain Specialist (Engineer), Kimberly-Clark, Mexico.	Jun '16-Aug '17 Mar '16-Jun '16 Jan '12-Jan '14

raw material price trends and negotiated supply agreements (valued in more than \$45 M USD). Solved supply issues and monitored material stock.

(Intern) R&D Scientist, UNAM, Mexico.

Jan '11-Sep '11

Investigated water treatment processes. In particular, I characterized the reaction kinetics of chlorine dioxide with aromatic organic compounds (benzaldehyde and styrene) by using a UV-Spectrophotometer. In addition, I studied alternative ways to synthesize chlorine dioxide.

(Intern) R&D Engineer, 3M, Mexico.

May '10-Aug '10

Produced adhesives and coatings with medical and automotive applications by employing batch reactors. Characterized products (performed physical tests such as viscosity, density etc.) by using laboratory equipment. Troubleshoot manufacturing problems related to batch production, and evaluated product functionality by making both industrial and pilot plant tests.

**Work
Training**

FCC Fundamentals: BASF. Intensive theoretical FCC training.

Kaizen: Kemet Corporation. Applied Kaizen culture to improve production efficiency.

Lean manufacturing: Kimberly-Clark-Deacero. Intensive theoretical-practical training.

Paper Production: Kimberly-Clark. Intensive theoretical-practical training for wadding machines.

**Journal
Publications**

O. Santander, M. Baldea, On the integration of process control and short term production scheduling of batch processes under uncertainty, (submitted).

O. Santander, V. Kuppuraj, C. Harris, M. Baldea, On the integration of production planning and APC (MPC) in the refining industry (FCC-Fractionator process) under economic uncertainty (In preparation).

O. Santander, V. Kuppuraj, C. Harris, M. Baldea, An open source dynamic FCC-Fractionator model for machine learning, data generation, improved decision making, fault detection and APC, (In preparation).

O. Santander, C. Betts, E. Archer, M. Baldea, On the interaction and integration of production planning and (advanced) process control, Comput. Chem. Eng., 133 (2020) 1-17.

O. Santander, A. Elkamel, H. Budman, Robust economic model predictive control: disturbance rejection, robustness and periodic operation in chemical reactors, Eng. Opt., 51 (2019) 896-914.

O. Santander, A. Elkamel, H. Budman, Economic model predictive control of chemical processes with parameter uncertainty, Comput. Chem. Eng., 18 (2018) 1-19.

**Conference
Presentations**

O. Santander, M. Baldea, The interaction and integration of production planning and (advanced) process control. FCC application, 2020 TWCCC spring meeting, Austin, TX. Feb '20

O. Santander, M. Baldea, The interaction and integration of production planning and (advanced) process control, 2019 TWCCC spring meeting, Austin, TX. Feb '19

O. Santander, M. Baldea, A new big data benchmark problem: Fluid Catalytic Cracker under Model Predictive Control, 2018 AIChE fall meeting, Pittsburgh, PA. Oct '18

O. Santander, C. Betts, M. Baldea, Closing the Gap: Integration of production planning and supervisory process control, 2018 AFPM annual meeting, Atlanta, GA. Sep '18

O. Santander, A. Elkamel, H. Budman, Economic model predictive control of chemical processes, 2015 Statistics and control annual meeting, Toronto, Canada. May '15

Posters

O. Santander, M. Baldea, A rigorous FCC dynamic model for advanced process control and optimization of refinery operations, 2020 AIChE fall meeting, San Francisco, CA. Nov '20

O. Santander, M. Baldea, The interaction and integration of production planning and (advanced) process control, 2019 AIChE fall meeting, Orlando, FL. Nov '19

Awards

SENER. Sep' 18. Mexican Government Secretary of Energy Scholarship.

SEP. Oct '14. Mexican Government Secretary of Education Fellowship.

CONACYT. Jan '14-Jan '16. Mexican Government Science and Technology Scholarship.

PAPIIT. Sep '10. UNAM Research Fellowship.

Telmex. Sep '09- Sep '11. America Movil Scholarship.

PAEA. Sep '08-Sep '09. UNAM Scholarship.

Software

Python (numpy, pandas, scikit-learn, keras etc.), Matlab, GAMS, YALMIP, R, Pro II, Dynsim, Aspen-HYSYS, AX Dynamics, SAP, Minitab, Latex, Office.