

Carlos F. Alcalá

Milwaukee, WI. | ☎ (+1) 414-426-6814 | ✉ alcala21@gmail.com | 🏠 www.alcala21.org | 📷 [alcala21](#) | 🌐 [alcala21](#) | 🎓 Carlos F. Alcalá

Data Scientist

Summary

Accomplished Data Scientist with extensive experience developing and implementing data-driven and machine learning solutions in the Building Efficiency and Chemical industries. Highly skilled in data gathering, transformation and visualization, and algorithm analysis, development and deployment. Award winning scholar with multiple patents and research articles.

Expertise

- Multivariate Statistical Analysis
- Machine Learning
- Mathematical Analysis
- Data Analytics and Visualization
- Application Development
- Research and Development

Experience

Johnson Controls

PRINCIPAL RESEARCH ENGINEER

Milwaukee, WI

Oct. 2011 - Jan. 2020

Dec. 2017 - Jan. 2018

- Utilized advanced optimization and data analytics methods to improve the efficiency of heating, ventilation and air conditioning (HVAC) systems.
- Key role in the transfer of newly developed technology into products and applications.
- Multiple patents granted.

SENIOR RESEARCH ENGINEER

Milwaukee, WI

May 2015 - Dec. 2017

- Developed methods for monitoring the performance of PID controllers, to detect steady state operation of HVAC equipment, and reduce energy consumption in wireless thermostats while keeping acceptable comfort standards. Applied advanced mathematical tools to develop these methods, as well as artificial intelligence, machine learning and traditional statistical methods.

SENIOR RESEARCH ENGINEER

Mexico City, Mexico

Jan. 2013 - May 2015

- Developed data-driven methods for fault detection and diagnosis in connected chillers.

SENIOR RESEARCH ENGINEER

Milwaukee, WI

Oct. 2011 - Jan. 2013

- Developed a method for adaptive sampling of PID controllers.

Internship Experience

The Dow Chemical Company

SUMMER RESEARCH INTERN

Freeport, TX

May 2010 - Aug. 2010

- Developed an Excel application for multivariate statistical monitoring of continuous and batch processes.

Capstone Technology

SUMMER ENGINEERING INTERN

Seattle, WA

2006 - 2009

May. 2009 - Aug. 2009

- Developed a multivariate image analysis application to monitor combustion efficiency in furnaces.

SUMMER ENGINEERING INTERN

May. 2007 - Aug. 2007

- Developed a multivariate statistical application for statistical modeling and prediction in chemical processes.

SUMMER ENGINEERING INTERN

May. 2006 - Aug. 2006

- Developed a multivariate statistical application for detection and diagnosis of sensor and process faults.

- Developed a multivariate statistical application for monitoring the operation of a semiconductor manufacturing process.

Education

Doctor of Philosophy in Chemical Engineering

Los Angeles, CA

Aug. 2007 - Aug. 2011

UNIVERSITY OF SOUTHERN CALIFORNIA

- Awarded a Roberto Rocca Fellowship.

Master of Science in Chemical Engineering

Austin, TX

Aug. 2005 - May 2007

THE UNIVERSITY OF TEXAS AT AUSTIN

- Fulbright Scholarship Recipient.

Bachelor of Science in Chemical Engineering, summa cum laude

Ciudad Madero, Mexico

Aug. 1999 - Dec. 2003

INSTITUTO TECNOLÓGICO DE CIUDAD MADERO

Skills

Programming R, Python, SQL, Matlab, VBA, C#

Markup \LaTeX , Markdown, RMarkdown

Frameworks/Libraries PyTorch, Tensorflow, numpy, pandas, dplyr, ggplot2

Applications Bash, Git, Docker

Languages English, Spanish (native)

Certifications

Computational Thinking using Python

MIT

June, 2020

EDX

Credential ID: d3560c0c0c2541b1a5a38ca2fd6ebd08

Statistics with R

Duke University

Oct. 29, 2018

COURSERA

Credential ID: UWG3PS5EXMBJ

Machine Learning

University of Washington

Feb. 1, 2017

COURSERA

Credential ID: 2VHFDHW5GUK6

Data Science

Johns Hopkins University

Apr. 20, 2016

COURSERA

Credential ID: W9DB45S3CGDZ

Publications

Patents

Newton-based extremum-seeking control system

Timothy I Salsbury, Kirk H Drees, John M House, Carlos F. Alcala Perez

US Patent 10,824,127, 2020

System and method for output compensation in flow sensors using pulse width modulation

Carlos F. Alcala Perez, Kirk H Drees, Timothy I Salsbury

US Patent 10,558,227, 2020

Control system with dimension reduction for multivariable optimization

Timothy I Salsbury, Carlos F. Alcala Perez, John M House

US Patent 10,558,177, 2020

Building management system with voting-based fault detection and diagnostics

Carlos F. Alcala Perez

US Patent 10,747,187, 2020

Thermostat with efficient wireless data transmission

Timothy I Salsbury, Carlos F. Alcala Perez, Homero L Noboa

US Patent 10,739,028, 2020

Building management system with predictive diagnostics

Samuel F Hamilton, Carlos F. Alcala Perez

US Patent 10,700,942, 2020

Control system with asynchronous wireless data transmission

Carlos F. Alcala Perez, Kirk H. Drees

US Patent 10,333,810, 2019

Control system with response time estimation and automatic operating parameter adjustment

Carlos F. Alcala Perez, Timothy I. Salsbury

US Patent 10324424, 2019

Control system with response time estimation

Carlos F. Alcala Perez, Timothy I. Salsbury

US Patent 10317856, 2019

Building climate control system with decoupler for independent control of interacting feedback loops

Timothy I. Salsbury, Carlos F. Alcala Perez, John M. House, Christopher R. Amundson

US Patent 10253997, 2019

Building control system with decoupler for independent control of interacting feedback loops

Timothy I Salsbury, Carlos F Alcala Perez, John M House, Christopher R Amundson

US Patent 10,253,997, 2019

Feedback control system with normalized performance indices for setpoint alarming

Timothy I. Salsbury, Carlos F. Alcala Perez, Michael J. Ajax

US Patent 10,197,977, 2019

Systems and methods for steady state detection

Carlos F. Alcala Perez

US Patent 10,495,334, 2019

Normalized indices for feedback control loops

Timothy I. Salsbury, Carlos F. Alcala Perez

US Patent 9920943, 2018

Systems and methods for adaptive sampling rate adjustment

Carlos F. Alcala Perez, Timothy I. Salsbury

US Patent 9395708, 2016

Journal Papers

Self-perturbing extremum-seeking controller with adaptive gain

Timothy I. Salsbury, John M. House, Carlos F. Alcala

Control Engineering Practice 101 (2020) p. 104456. 2020

A method for setpoint alarming using a normalized index

Carlos F. Alcala, Timothy I. Salsbury

Control Engineering Practice 60.3 (2017) pp. 1–6. 2017

An extremum-seeking control method driven by input–output correlation

Timothy I Salsbury, John M House, Carlos F Alcala, Yaoyu Li

Journal of Process Control 58 (2017) pp. 106–116. Elsevier, 2017

Analysis and generalization of fault diagnosis methods for process monitoring

Carlos F. Alcalá, S. Joe Qin

Journal of Process Control 21.3 (2011) pp. 322–330. 2011

Generalized reconstruction-based contributions for output-relevant fault diagnosis with application to the tennessee eastman process

Gang Li, Carlos F. Alcalá, S. Joe Qin, Donghua Zhou

Control Systems Technology, IEEE Transactions on 19.5 (Sept. 2011) pp. 1114–1127. 2011

Reconstruction-based contribution for process monitoring with kernel principal component analysis

Carlos F. Alcalá, S. Joe Qin

Industrial & Engineering Chemistry Research 49.17 (2010) pp. 7849–7857. 2010

Reconstruction-based contribution for process monitoring

Carlos F. Alcalá, S. Joe Qin

Automatica 45.7 (2009) pp. 1593–1600. 2009

Conference Papers

Self-optimizing Control of an Air Source Heat Pump

Zhongfan Zhao, Yaoyu Li, Timothy I Salsbury, Carlos F Alcalá, John M House

2019 American Control Conference (ACC), 2019

Identification of a Self-Optimizing Control Structure from Normal Operating Data

Carlos F Alcalá, Timothy I Salsbury, John M House

2019 American Control Conference (ACC), 2019

Decoupling Method for PI Controllers via Setpoint Modification Applied to HVAC Systems

Timothy I Salsbury, John M House, Carlos F Alcalá

ASME 2018 Dynamic Systems and Control Conference, 2018

Reduction of Transmissions in Wireless Thermostats with Send-on-Delta Sampling and a Deadband Filter

Carlos F Alcalá, Timothy I Salsbury

2018 Annual American Control Conference (ACC), 2018

Decoupling Method for PI Controllers via Setpoint Modification Applied to HVAC Systems

Timothy I. Salsbury, John M. House, Carlos F. Alcalá

Proceedings of the Dynamic Systems and Control Conference, 2018

Reduction of Transmissions in Wireless Thermostats with Send-on-Delta Sampling and a Deadband Filter

Carlos F. Alcalá, Timothy I. Salsbury

Proceedings of the 2018 Annual American Control Conference (ACC), 2018

Model Selection for Predicting the Return Time from Night Setback

John E Seem, John M House, Carlos F Alcalá

Proceedings of the International High Performance Buildings Conference, 2016

Two new normalized EWMA-based indices for control loop performance assessment

Timothy I. Salsbury, Carlos F. Alcalá

Proceedings of the American Control Conference (ACC), 2015

Monitoring of dynamic processes with subspace identification and principal component analysis

Carlos F. Alcalá, Ricardo Dunia, S. Joe Qin

Proceedings of the 8th IFAC International Symposium on Fault Detection, Supervision and Safety of Technical Processes, 2012, Mexico City, Mexico

Unified analysis of diagnosis methods for process monitoring

Carlos F. Alcalá, S. Joe Qin

Proceedings of the 7th IFAC International Symposium on Fault Detection, Supervision and Safety of Technical Processes, 2009, Barcelona, Spain

Unification of contribution analysis for process monitoring

Carlos F. Alcalá, S. Joe Qin

Proceedings of the 2008 AIChE Annual Meeting, 2008, Philadelphia, USA

Reconstruction-based contribution for process monitoring

Carlos Alcalá, S. Joe Qin

Proceedings of the 17th IFAC World Congress, 2008, Seoul, Korea