José Carlos Hernández Azucena

Ph.D. Candidate
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Education

University of Arkansas	**Fayetteville, AR, USA**
Ph.D. in Industrial Engineering	Expected Fall 2023
M.Sc. in Industrial Engineering	Fall 2022
Advisor: Dr. Haitao Liao	
Lehigh University	**Bethlehem, PA, USA**
Gene Golub SIAM Summer School (G2S3)	07/31/2023-08/11/2023
on Quantum Computing and Optimization	
Escuela Superior de Economía y Negocios	**La Libertad, El Salvador**
Post-Graduate Diploma	02/2015
Quantitative Methods for Business and Economics	
Business Engineering Bachelor	01/2014
Magna Cum Laude	
Hochschule Furtwangen University	**Baden-Württemberg, Germany**
International Engineering	Winter 2012
Visiting student	

Professional Experience

- **Senior Graduate Research Assistant, 01/2018-present**
  Department of Industrial Engineering, University of Arkansas. AR, USA.

  Research focused on Data Analytics and Machine Learning methods.

  Worked on research projects and one publication related to Deep Learning, Machine Learning, and Data Analytics. Relevant courses include Deep Learning, Artificial Intelligence, Data Mining, Computational Statistics, and Modern Statistical Techniques.

  The current research includes Machine Learning, Deep Learning, Computer Vision, Natural Language Processing, Quantum Computing, and Statistical Analysis. Applications in Reliability Engineering, Logistics and Transportation, Disaster Relief, Maintenance and Prognostics.

- **Business Intelligence Coordinator, 11/2015-01/2018**
  Termoencogibles S.A. de C.V., El Salvador.

  Data and insights support for the B2B sales team. Automation of reports, market intelligence analysis, sales forecasts, budget, and sales goals monitoring and control.

- **Trainee of General Management, 04/2014-10/2015**
  Grupo Editorial Altamirano, El Salvador.

  Rotational program. First as data and analysis support for the distribution department. Then, as Financial Information Systems Manager.

Programming and Data Analytics Expertise

- **Applications Explored** - Data Analytics and Machine Learning. Systems Reliability, Geo-spatial Analysis, Time Series Analysis, Computer Vision, Natural Language Processing, Deep Reinforcement Learning, Supervised Learning, Unsupervised Learning, Bayesian Optimization, Stochastic Variational Inference, and Quantum Computing for Optimization
- **Machine Learning** - SciKit Learn, XGBoost, H2O
- **Deep Learning** - PyTorch, Tensorflow, OpenAI-Gym
- **Coding** - Python, R, Java, Scala, LaTeX, VBA, and Julia
- **Database Management** Oracle PL/SQL, MongoDB
- **Simulation** - NetLogo, JSL
- **Probabilistic Programming** - Pyro, PyMC3, STAN
- **Systems Reliability** - ReliaSoft: BlockSim, Weibull++
- **Quantum Computing** - IBM Qiskit for Universal Gate Circuits, D-Wave for Quantum Annealing

Publications

Refereed Journal Articles

1. **Azucena, J.C.H.**, Wang, H., Jin, Y. and Liao, H.T., "Modeling and analysis of two Normal populations based on an unlabeled paired sample". *Communications in Statistics - Simulation and Computation.* 2022. DOI: `https://doi.org/10.1080/03610918.2022.2134895`.

2. **Azucena, J.C.H.**, Alkhaleel, B., Liao, H.T. and Nachtmann, H., "Hybrid simulation to support interdependence modeling of a multimodal transportation network", *Simulation Modelling Practice and Theory*, Vol. 107, pp. 102237, 2021.
DOI: `https://doi.org/10.1016/j.simpat.2020.102237`

Articles in Refereed Conference Proceedings

1. Aghamohammadghasem, M., **Azucena, J.C.H.**, Hashemian, F., Liao, H.T., Zhang, S., and Nachtmann, H.L., "Preventive Maintenance Planning for an Inland Waterway Transportation System Using Deep Reinforcement Learning", Proceedings of the IISE Annual Conference and Expo 2023. New Orleans, LA. May 20-23, 2023

2. **Azucena, J.C.H.**, Hashemian, F., Liao, H.T. and Pohl, E.A., "Applying Machine Learning to Improve All-Terminal Network Reliability", Proceedings of the 69th Annual Reliability and Maintainability Symposium. Orlando, FL. January 23-26, 2023

3. **Azucena, J.C.H.**, Wells, H., Liao, H.T., Sullivan, K. and Pohl, E.A., "Applying Deep Reinforcement Learning to Improve the Reliability of an Infrastructure Network", Proceedings of the 60th ESReDA Seminar: Advances in Modelling to Improve Network Resilience. France. May 4-5, 2022

4. Bipasha, T., **Azucena, J.C.H.**, Alkhaleel, B., Liao, H.T. and Nachtmann, H., "Hybrid Simulation to Support Interdependence Modeling of a Multimodal Transportation Network", Proceedings of the 2019 Winter Simulation Conference. National Harbor, MD. December 8-11, 2019

5. **Azucena, J.C.H.** and Liao, H.T., "Prognostic Using Dual-Stage Attention-Based Recurrent Neural Networks", Proceedings of the 11th International Conference on Mathematical Methods in Reliability. Hong Kong. June 3-7, 2019

Accepted in Refereed Conference Proceedings

1. Aghamohammadghasem, M., **Azucena, J.C.H.**, Hashemian, F., Liao, H.T., Zhang, S., and Nachtmann, H.L., "System Simulation and Machine Learning-Based Maintenance Optimization for an Inland Waterway Transportation System", Proceedings of the 2023 Winter Simulation Conference. San Antonio, TX. December 10-13, 2023

Teaching Experience

- **Instructor, 05/2020-06/2020 and 05/2021-06/2021**
  Department of Industrial Engineering, University of Arkansas. AR, USA.
  Course: Engineering Economic Analysis
- **Teaching Assistant, 01/2020-05/2020**
  Department of Industrial Engineering, University of Arkansas. AR, USA.
  Course: Engineering Economic Analysis

- **Teaching Assistant, 08/2019-12/2019**
  Department of Industrial Engineering, University of Arkansas. AR, USA.
  Courses: Production Planning and Control and, Applied Probability and Statistics II

- **Teaching Assistant, 2011-2014**
  Escuela Superior de Economía y Negocios, El Salvador. Selected courses: Statistical Inference and Probability, Rational Mechanics, R for Statistics

Presentations and Invited Talks

- **Azucena, J.C.H.**, Hashemian, F. and Liao, H.T. "Need-based Sampling and Training in Machine Learning with Application to All-terminal Network Reliability Assessment". IISE Annual Conference and Expo 2023. New Orleans, LA. May 20-23, 2023
- **Azucena, J.C.H.**, Kheirandish, M., and Hashemian, F. "Causal Inference for Predicting Treatment Outcome in Breast Cancer - DAIS Data Challenge". IISE Annual Conference and Expo 2023. New Orleans, LA. May 20-23, 2023
- **Azucena, J.C.H.**, Hashemian, F., Liao, H.T. and Pohl, E.A. "Applying Machine Learning to Improve All-Terminal Network Reliability". The 69th Annual Reliability and Maintainability Symposium. Orlando, FL. January 23-26, 2023
- **Azucena, J.C.H.**, Wells, H., Liao, H.T., Sullivan, K. and Pohl, E.A., "Applying Deep Reinforcement Learning to Improve the Reliability of an Infrastructure Network". The 60th ESReDA Seminar: Advances in Modelling to Improve Network Resilience, France, May 4-5, 2022
- Harvey, W., **Azucena, J.C.H.**, Stubblefield, J. and Saldivar, C., "Reinforcement Learning with Connect Four", NSF EPSCoR Workshop: Artificial Intelligence (AI) with No-Boundary Thinking (NBT) to Foster Collaborations in Research, Education and Training, Little Rock, AR, April 3-7, 2022. https://aicamp.us/connect4
- Bipasha, T., **Azucena, J.C.H.**, Alkhaleel, B., Liao, H.T. and Nachtmann, H., "Hybrid Simulation to Support Interdependence Modeling of a Multimodal Transportation Network", Winter Simulation Conference, National Harbor, MD, December 8-11, 2019.
- **Azucena, J.C.H.** and Liao, H.T., "Automatic Insect Count from Incomplete Scenes Using Convolutional Neural Networks", INFORMS Annual Meeting, Seattle, WA, October 20-23, 2019.

- Jin, Y., Ruiz, C. and **Azucena, J.C.H.**, "Data Augmentation for Rare Events in Multivariate Time Series - QSR Data Challenge", INFORMS Annual Meeting, Seattle, WA, October 20-23, 2019.
- Liao, H.T. and **Azucena, J.C.H.**, "Prognostic Using Dual-Stage Attention-Based Recurrent Neural Networks", MMR, Hong Kong, June 3-7, 2019.
- **Azucena, J.C.H.** and Liao, H.T., "Use of Deep Markov Models for Prognostics", ISERC, Orlando, FL, May 19-21, 2019.
- **Azucena, J.C.H.** and Liao, H.T., "Dual-stage Attention-based Recurrent Neural Networks for Prognostics and Smart Maintenance", INFORMS Annual Meeting, Phoenix, AZ, November 4-7, 2018.

Awards and Honors

- KaggleX BIPOC Mentorship Program. Mentee in Cohort 3 (08/2023-11/2023). Mentor: Cole Ingraham
- **Azucena, J.C.H.**, Kheirandish, M., and Hashemian, F. (05/2023) Finalist of IISE DAIS Data Challenge: Causal Inference for Predicting Treatment Outcome in Breast Cancer. New Orleans, LA
- Outstanding Graduate Student 2023 (04/2023). Department of Industrial Engineering, University of Arkansas. Fayetteville, AR
- Society of Reliability Engineers (SRE) Hans Reiche RAMS Scholarship. At the 69th Annual Reliability and Mantainability Symposyum. (01/2023) Orlando, FL.
- **Azucena, J.C.H.**, Hashemian, F., Liao, H.T. and Pohl, E.A. Society of Reliability Engineers (SRE) Stan Ofsthun Best Student Paper Award for "Applying Machine Learning to Improve All-Terminal Network Reliability". At the 69th Annual Reliability and Mantainability Symposyum. (01/2023) Orlando, FL.
- Harvey, W., **Azucena, J.C.H.**, Stubblefield, J. and Saldivar, C. (04/2022) Student Award Presentation at NSF EPSCoR Workshop: Artificial Intelligence (AI) with No-Boundary Thinking (NBT). Little Rock, AR
- Alkhaleel, B. and **Azucena, J.C.H.** (11/2019) Jack Buffington Outstanding Student Poster Award, Mack-Blackwell Transportation Center, University of Arkansas. Fayetteville, AR
- **Azucena, J.C.H.**, Ruiz, C., and Jin, Y. (10/2019) Finalist of INFORMS QSR Data Challenge. Seattle, WA
- Distinguished Doctoral Fellowship (01/2018-05/2022). University of Arkansas. Fayetteville, AR
- Scholarship to the Excellence (2011-2013). Escuela Superior de Economía y Negocios. Santa Tecla, El Salvador

Professional Affiliations

- Member of Alpha Pi Mu, IISE, INFORMS, SRE, and SIAM

Research Interests

- Data Engineering
- Machine Learning
- Deep Learning and Reinforcement Learning
- Quantum Information Science

Latest update in 08/2023.