

Javier Viaña



Expertise: Explainable Artificial Intelligence

University Education



Postdoctoral AI Researcher

Massachusetts Institute of Technology - Department of Physics
Kavli Institute for Astrophysics and Space Research

Aug 2022 – Present

- Advisor: Dr. Andrew Vanderburg. Project: Improvement of Astronet-AI pipeline for detection of transiting exoplanets with TESS and Kepler.
- Development of explainable deep learning techniques for anomaly detection and knowledge extraction in the processing of the target light curves.



Doctoral AI Researcher

Massachusetts Institute of Technology - Department of Physics
Kavli Institute for Astrophysics and Space Research

Sep 2021 – Aug 2022

- Advisor: Dr. Andrew Vanderburg. Project: AI-based spectral characterization of polluted white dwarfs using the Large sky Area Multi-Object fiber Spectroscopic Telescope (LAMOST) data.
- Designed the transfer learning architecture from an overlapping autoencoder for signal reconstruction to a deep neural network for spectral flux prediction based on the atmospheric physical properties of the white dwarfs.



Ph.D. in Explainable Artificial Intelligence

University of Cincinnati – Department of Aerospace Engineering
College of Engineering and Applied Sciences

Sep 2019 – Aug 2022
3.92 GPA

- Advisor: Prof. Dr. Kelly Cohen, Head of the Aerospace Department, Brian H. Rowe Endowed Chair.
- Thesis: “CEFYDRA: Cluster-first Explainable FuzzY-based Deep self-Reorganizing Algorithm”
- Published different novel algorithms in various international conferences: LACCI, DCASS, NAFIPS (10+ papers), DSCC, ISCOMI, etc.

University Education



Hands-On AI Program

Stanford University

Institute for Computational & Mathematical Engineering, Continuing Studies

- Developed an algorithm for prediction of Tesla's daily stocks based on published Twitter data using natural language processing together with an ad-hoc convolutional neural network.

May 2020 – Aug 2021

4.0 GPA



M.Eng. in Fuzzy Artificial Intelligence

University of Cincinnati - Department of Aerospace Engineering

- Advisor: Prof. Dr. Kelly Cohen. Developed a fuzzy-based recurrent algorithm that served as a fault tolerance tool for human-machine interactions. Application to the Boeing 737 Max 8 conflict resolution in a high-fidelity scenario.

Aug 2018 – Aug 2019

3.9 GPA



M.Sc. in Mechanical Engineering, Focus on Algorithms

University of the Basque Country - Department of Mechanisms & Machine Theory

- Advisor: Dr. Charles Pinto.
- Theoretical development of planar kinematics formulas for generative design of mechanisms.

Sep 2017 – Jun 2018

10/10 With Honors

University Education



B.Sc. in Mechanical Engineering, Focus on Algorithms

University of the Basque Country - Department of Mechanisms & Machine Theory

Sep 2013 – Jun 2017
9.92/10 Highest Honors

- Advisor: Dr. Victor Petuya. Created a novel formula for kinematic analysis of mechanisms, awarded with the best national investigation article of mechanical engineering of 2016 of Spain.



Entrepreneurship, Innovation & Design Thinking Summer Program

University of Cincinnati - Carl H. Lindner College of Business

Jun 2017 – Jul 2017
4.0 GPA

- Advisor: Dr. Charles Matthews. Intensive start-up bootcamp, from product conceptualization to rapid prototyping.



Internship on Image Processing Algorithms

**University of Florida - Astronomy Department
Bryant Space Science Center**

May 2016 – Sep 2016

- Advisor: Prof. Dr. Rafael Guzman, Head of the Astronomy Department.
- Deconvolution image enhancement algorithms for micro-scale space-cameras in Earth monitoring missions, in collaboration with Satlantis Microsatellites.

Teaching Experience



Instructor of Probability Theory applied to Aerospace Engineering **University of Cincinnati - College of Engineering and Applied Science**

Aug 2019 – Jul 2020
Cincinnati, Ohio

- The curriculum included an introduction to statistics, probability, optimization and artificial intelligence with real-world engineering problems. Student evaluations' score: 4.9/5 (2019 best instructor in the Aero Dept.).
- Sophomore level core course AEEM 2014, class of 50 students. Appointed Teaching Assistant: Sameer Pokhrel, Ph.D. in Aerospace Engineering.



Lecturer of Resonance in Spacecraft Design **Cambridge University - Jesus College**

Jun 2018 – Jul 2018
Cambridge, UK

- Undergraduate level Aerospace summer course, with co-lecturer Dr. Alvaro Menduina Fernandez.
- Topics included: Vibration theory, periodic and damped oscillations, normal modes, and structural design.



Mentor and Lecturer of the UC Fuzzy AI Lab **University of Cincinnati – Department of Aerospace Engineering**

Jul 2020 – Jul 2022
Cincinnati, Ohio

- Laboratory with 20 undergraduate students focused on the development of custom AI architectures to solve different engineering problems.

Reviews as Instructor at the UC

- “Wonderful Professor, very approachable and helpful, wanted students to do well, and went above and beyond to offer help to students who needed the extra help. Thank you for a wonderful semester, Javier!!”
- “Very motivated, enthusiastic, and humorous professor. You can tell he is truly passionate about his field and academic work. Honestly my favorite professor this semester- I admire the work he has done despite him being so young. His accomplishments push me to do the same. His office hours are very flexible, and he is always willing to help out students. I'd love to have him teach future classes.”
- “The professor was extremely helpful and supportive. Not only did I learn the material, but his enthusiasm and expression of support for the students greatly helped in reducing stress and ultimately made class a more enjoyable experience.”
- “Thank you, Javier, you are amazing, personable, kind, and one of my favorite teachers of all time.”
- “Taking a course taught by Javier Viana was absolute pleasure, he turned a subject that I had no particular interest an absolute delight to learn. He treated his students with a great deal of respect and was always open to meet and discuss whatever was on our mind. I hope I get to take another course taught by him.”
- “Professor Viana was very approachable and was keen to make sure the course material was understandable, he also explained the real-world applications of the material.”
- “Professor was very helpful whenever I needed it and gave very helpful responses in a timely manner. Javier was very approachable for questions, and you know he wanted the best for us while taking the class.”
- “Professor Viana is so understanding, approachable, and helpful and focused on us understanding the material and doing our assignments well by giving us lots of extra time. He was always enthusiastic and kept the class interesting by having "Queen questions" and giving people who answered the questions small prizes. He also went out of his way to offer help on materials not related to the class such as preparing for the career fair and was just overall amazing and adored by the class. I hope he teaches more classes in the future!”
- “Professor Viana is a fantastic professor all around. After an initial adjustment period to get used to his accent, his presentation of the material was extremely easy to understand, and he is the most approachable professor I've had yet. His assignments and tests, while challenging due to the material they used, were always fair and he was always willing to curve or give extensions if the class as a whole was struggling.”
- “My favorite professor I have had up to this point, very engaging and makes it fun to come to class consistently.”
- “Loved loved loved Javier. A very great first year professor.”

Experience



Harvard University, Center for Astrophysics (CfA), **Advisor in AI**

Cambridge, Massachusetts, USA

Feb 2023 - Present

- Research group: Center for Astrophysical Machine Learning (CAMEL)
- Principal Investigator: Cecilia Garrafo



CVG International Airport, **Explainable AI Architect**

Northern Kentucky, USA

May 2021 - Present

- Designed and coded tailored XAI algorithms for passenger flow prediction at the security checkpoint using fuzzy-based inference systems.
- The software created allows the airport authority know in advance the exact time at which the passengers will arrive at the airport, as well as their passenger profile (i.e., destination, if they are regular flyers, the purpose of the trip, number of companions, etc.).
- This ultimately equipped the airport managers with information to perform a data-driven deployment of necessary airport resources, including staff allocation.



MyDataMood, **Advisor of Explainable AI**

Madrid, Spain

Aug 2021 – Sep 2022

- In charge of the GDPR compliant (European General Data Protection Regulation) Explainable AI cascading fuzzy-based architecture for the inference of additional user features. Software development supervisor.



Aether, **Chief Explainable AI**

Barcelona, Spain

Jul 2021 - Sep 2022

- Creation of the algorithm for tailored time-dependent prediction of oxygen supply in hospitalized patients with Chronic Obstructive Pulmonary Disease and respiratory insufficiency
- Currently partnering with 5 major Spanish hospitals, Quirón (leader in the private healthcare sector of Spain) and the University Hospital of Vall d'Hebron in Barcelona, among others.

Experience



Genexia, Machine Learning Engineer

Cincinnati, Ohio, USA May 2020 - Aug 2020

- Development of novel explainable AI algorithms for the prediction of Remaining Useful Life of Jet Engines (in different operational modes & configurations).
- Authored a successful medical image segmentation algorithm for breast arterial calcification detection in X-Ray mammograms.
- Most Promising Startup by Cincinnati Business Courier within framework of the 2020 Innovation and Technology Awards.



Aurora Flight Sciences (A Boeing Company), Software Development Intern

Lucerne, Switzerland May 2019 - Aug 2019

- Led the AI architecture of the PAV Project (Passenger Air Vehicle) whose client was Uber.
- Created an entire toolbox for fatigue data analysis (Post-Processing), which was then integrated in all the ongoing projects of the company.
- Reduced the work hours of the engineers approximately by 100 by automating the computation of the rainflow algorithms for flight data interpretation.
- Coded the aircraft's critical component's life expectancy determination algorithms.



Satlantis Microsatellites, Space Technology Engineer

Bilbao, Spain Nov 2015 – Jul 2018

- R & D Department. Development of the Optomechanical Structure iSIM, lightweight athermal microsatellite camera design for Low Earth Orbit (LEO) which is now operational in the International Space Station. The designs were essential for the startup to close successfully a round of 50M\$.
- Training stay in IDOM, Advanced Design Analysis Department. Assembly, Integration & Verification (AIV). Structural Design of microsatellites; Payloads & platforms.
- Collaborative stay in the Department of Astronomy at the University of Florida. Optical characterization of the binocular structure & TRL 6.
- Company Awarded with the Start-up Space Challenge Prize 2017, London Space Week, Royal Astronomical Society of London.



European Space Agency, Systems Engineering Training

Redu, Belgium May 2018-May 2018

- Application of the Concurrent Engineering in the design of a lunar mission at the ESEC (European Space Security & Education Centre).
- In charge of the lunar rover design and the integration of the science instruments for the mission.
- Lead engineer at the Optics & Instruments Subsystem: Selected together with 20 more engineers from all over Europe to carry out the concurrent analysis and the viability of the mission.

Publications

Book Chapters 1/2

- Viaña, J., Ralescu, S., Kreinovich, V., Ralescu, A., Cohen, K. (2023). **Single Hidden Layer CEFYDRA: Cluster-first Explainable FuzzY-based Deep self-Reorganizing Algorithm**. In: Dick, S., Kreinovich, V., Lingras, P. (eds) Applications of Fuzzy Techniques. NAFIPS 2022. Lecture Notes in Networks and Systems, vol 500. Springer, Cham. https://doi.org/10.1007/978-3-031-16038-7_29
- Viaña, J., Ralescu, S., Kreinovich, V., Ralescu, A., Cohen, K. (2023). **Multiple Hidden Layered CEFYDRA: Cluster-First Explainable Fuzzy-Based Deep Self-reorganizing Algorithm**. In: Dick, S., Kreinovich, V., Lingras, P. (eds) Applications of Fuzzy Techniques. NAFIPS 2022. Lecture Notes in Networks and Systems, vol 500. Springer, Cham. https://doi.org/10.1007/978-3-031-16038-7_30
- Viaña, J., Ralescu, S., Kreinovich, V., Ralescu, A., Cohen, K. (2023). **Initialization and Plasticity of CEFYDRA: Cluster-first Explainable FuzzY-based Deep self-Reorganizing Algorithm**. In: Dick, S., Kreinovich, V., Lingras, P. (eds) Applications of Fuzzy Techniques. NAFIPS 2022. Lecture Notes in Networks and Systems, vol 500. Springer, Cham. https://doi.org/10.1007/978-3-031-16038-7_31
- Holguin, S., Viaña, J., Cohen, K., Ralescu, A., Kreinovich, V.: **Why Sine Membership Functions**. In: Dick, S., Kreinovich, V., Lingras, P. (eds) Applications of Fuzzy Techniques. NAFIPS 2022. Lecture Notes in Networks and Systems, vol 500. Springer, Cham. https://doi.org/10.1007/978-3-031-16038-7_9
- Courcier, B., Richard Desjardins, S., Farges, C., Cazaurang, F., Cohen, K., Pickering, L., Viaña, J.: **Genetic Fuzzy System for Pitch Control on a F-4 Phantom**. In: Dick, S., Kreinovich, V., Lingras, P. (eds) Applications of Fuzzy Techniques. NAFIPS 2022. Lecture Notes in Networks and Systems, vol 500. Springer, Cham. https://doi.org/10.1007/978-3-031-16038-7_4
- Viaña, J., Ralescu, S., Cohen, K., Ralescu, A., Kreinovich, V. (2022). **Localized Learning: A Possible Alternative to Current Deep Learning Techniques**. In: Castillo, O., Melin, P. (eds) New Perspectives on Hybrid Intelligent System Design based on Fuzzy Logic, Neural Networks and Metaheuristics. Studies in Computational Intelligence, vol 1050. Springer, Cham. https://doi.org/10.1007/978-3-031-08266-5_29

Publications

Book Chapters 2/2

- Viaña, J., Ralescu, S., Cohen, K., Ralescu, A., Kreinovich, V. (2023). **Extension to Multidimensional Problems of a Fuzzy-based Explainable & Noise-Resilient Algorithm**. In: Ceberio, M., Kreinovich, V. (eds) Decision Making Under Uncertainty and Constraints. Studies in Systems, Decision and Control, vol 217. Springer, Cham. https://doi.org/10.1007/978-3-031-16415-6_40
- Viana, J., Cohen, K. (2021). **Evaluation Criteria for Noise Resilience in Regression Algorithms**. In: Rayz J., Raskin V., Dick S., Kreinovich V. (Eds.). Explainable AI and Other Applications of Fuzzy Techniques. Lecture Notes in Networks and Systems, vol 258 (pp. 473-485). Springer, Cham, Switzerland. https://doi.org/10.1007/978-3-030-82099-2_43
- Viana, J., Cohen, K. (2021). **Fuzzy-based Noise-Resilient Explainable Algorithm for Regression**. In: Rayz J., Raskin V., Dick S., Kreinovich V. (Eds.). Explainable AI and Other Applications of Fuzzy Techniques. Lecture Notes in Networks and Systems, vol 258 (pp. 461-472). Springer, Cham, Switzerland. https://doi.org/10.1007/978-3-030-82099-2_42
- O'Grady, K. L., Viana, J., Cohen, K. (2021). **Predicting Diabetes Diagnosis with Binary-to-Fuzzy Extrapolations and Weights Tuned via Genetic Algorithm**. In: Rayz J., Raskin V., Dick S., & Kreinovich V. (Eds.). Explainable AI and Other Applications of Fuzzy Techniques. Lecture Notes in Networks and Systems, vol 258 (pp. 321-331). Springer, Cham, Switzerland. https://doi.org/10.1007/978-3-030-82099-2_29
- Viaña, J., Cohen, K. (2020). **ExTree – Explainable Genetic Feature Coupling Tree using Fuzzy Mapping for Dimensionality Reduction with Application to NACA 0012 Airfoils Self-Noise Data Set**. In: Bede, B., Ceberio, M., De Cock, M., & Kreinovich, V. (Eds.). Fuzzy Information Processing, Proceedings of NAFIPS'2020, Springer, Cham, Switzerland, (2020). https://doi.org/10.1007/978-3-030-81561-5_24
- Viaña, J., Cohen, K. (2020). **Fast Training Algorithm for Genetic Fuzzy Controllers and application to an Inverted Pendulum with Free Cart**. In: Bede, B., Ceberio, M., De Cock, M. & Kreinovich, V. (Eds.), Fuzzy Information Processing 2020, Proceedings of NAFIPS'2020, Springer, Cham, Switzerland. https://doi.org/10.1007/978-3-030-81561-5_25

Publications

Journal Papers

- Viaña, J. et al.: **Explainable Algorithm to Predict Passenger Flow at CVG Airport**. Transportation Research Record (Accepted, to appear).
- Viaña J, Ralescu S, Cohen K, Ralescu A, Kreinovich V. **Explainable Fuzzy Cluster-based Regression Algorithm with Gradient Descent Learning**. Complex Engineering Systems 2022; 2:8. <http://dx.doi.org/10.20517/ces.2022.14>
- Viaña J, Ralescu S, Cohen K, Ralescu A, Kreinovich V. **Why Cauchy Membership Functions: Reliability**. Advances in Artificial Intelligence and Machine Learning 2022; 2:2, 385-393. <http://dx.doi.org/10.54364/AAIML.2021.1106>
- Viaña J, Ralescu S, Cohen K, Ralescu A, Kreinovich V. **Why Cauchy Membership Functions: Efficiency**. Advances in Artificial Intelligence and Machine Learning 2021; 1:1, 81-88. <https://dx.doi.org/10.54364/AAIML.2022.1125>
- Viaña J, Petuya V. **A Proposal for a Formula of Absolute Pole Velocities between Relative Poles**. Mechanism and Machine Theory Journal, 2017; 114, 74-84. <https://dx.doi.org/10.1016/j.mechmachtheory.2017.03.016>

Publications

International Conference Papers 1/2

- Viaña, J., Vanderburg, A., Fang, M.: [A Neural Network Based Search for Earth Analogs in Kepler Data](#), Proceedings of the 2023 Emerging Researchers in Exoplanet Science Symposium (ERES VIII). Yale University, New Haven, USA (2023).
- Viaña, J., Vanderburg, A.: [Forcing the Network to use Human Explanations in its Inference Process](#), Proceedings of the 2023 Annual Conference of the North American Fuzzy Information Processing Society (NAFIPS 2023), University of Cincinnati, Cincinnati, OH, USA (2023).
- Viaña, J. et al.: [Review of a Fuzzy Logic based Airport Passenger Flow Prediction System](#), Proceedings of the 2023 Annual Conference of the North American Fuzzy Information Processing Society (NAFIPS 2023), University of Cincinnati, Cincinnati, OH, USA (2023).
- Viaña, J. et al.: [ACRP Graduate Research Award: Explainable Algorithm for Passenger Flow Prediction at the Security Checkpoint of CVG Cincinnati / Northern Kentucky International Airport](#), Transportation Research Board 102nd Annual Meeting (TRB 2023), Committee on Airport Terminals and Ground Access (AV050), Washington D.C. (2023).
- Viaña, J., Ralescu, S., Kreinovich, V., Ralescu, A., Cohen, K.: [Single Hidden Layer CEFYDRA: Cluster-first Explainable FuzzY-based Deep self-Reorganizing Algorithm](#), Proceedings of the 2022 Annual Conference of the North American Fuzzy Information Processing Society (NAFIPS 2022), Saint Mary's University, Halifax, NS, Canada (2022).
- Viaña, J., Ralescu, S., Kreinovich, V., Ralescu, A., Cohen, K.: [Multiple Hidden Layered CEFYDRA: Cluster-first Explainable FuzzY-based Deep self-Reorganizing Algorithm](#), Proceedings of the 2022 Annual Conference of the North American Fuzzy Information Processing Society (NAFIPS 2022), Saint Mary's University, Halifax, NS, Canada (2022).
- Viaña, J., Ralescu, S., Kreinovich, V., Ralescu, A., Cohen, K.: [Initialization and Plasticity of CEFYDRA: Cluster-first Explainable FuzzY-based Deep self-Reorganizing Algorithm](#), Proceedings of the 2022 Annual Conference of the North American Fuzzy Information Processing Society (NAFIPS 2022), Saint Mary's University, Halifax, NS, Canada (2022).
- Holguin, S., Viaña, J., Cohen, K., Ralescu, A., Kreinovich, V.: [Why Sine Membership Functions](#), Proceedings of the 2022 Annual Conference of the North American Fuzzy Information Processing Society (NAFIPS 2022), Saint Mary's University, Halifax, NS, Canada (2022).
- Courcier, B., Richard Desjardins, S., Farges, C., Cazaurang, F., Cohen, K., Pickering, L., Viaña, J.: [Genetic Fuzzy System for Pitch Control on a F-4 Phantom](#), Proceedings of the 2022 Annual Conference of the North American Fuzzy Information Processing Society (NAFIPS 2022), Saint Mary's University, Halifax, NS, Canada (2022).
- Viaña, J., Ralescu, S., Cohen, K., Ralescu, A., Kreinovich, V.: [Localized Learning: A Possible Alternative to Current Deep Learning Techniques](#), New Perspectives on Hybrid Intelligent System Design based on Fuzzy Logic, Neural Networks and Metaheuristics, Tijuana Institute of Technology, Mexico (2021).
- Viaña, J., Ralescu, S., Cohen, K., Ralescu, A., Kreinovich, V.: [Extension to Multidimensional Problems of a Fuzzy-based Explainable & Noise-Resilient Algorithm](#). Constraint Programming and Decision Making (CoProD 2021), Online (2021).

Publications

International Conference Papers 2/2

- Viana, J., Cohen, K., [Evaluation Criteria for Noise Resilience in Regression Algorithms](#). Proceedings of the 2021 Annual Conference of the North American Fuzzy Information Processing Society (NAFIPS 2021), West Lafayette, IN, USA (2021).
- Viana, J., Cohen, K., [Fuzzy-based Noise-Resilient Explainable Algorithm for Regression](#). Proceedings of the 2021 Annual Conference of the North American Fuzzy Information Processing Society (NAFIPS 2021), West Lafayette, IN, USA (2021).
- O'Grady, K. L., Viana, J., Cohen, K., [Predicting Diabetes Diagnosis with Binary-to-Fuzzy Extrapolations and Weights Tuned via Genetic Algorithm](#). Proceedings of the 2021 Annual Conference of the North American Fuzzy Information Processing Society (NAFIPS 2021), West Lafayette, IN, USA (2021).
- Viana, J., Scott, D., Kumar, M., Cohen, K., [Dynamic Genetic Algorithm for Optimizing Movement of a Six-Limb Creature](#). Proceedings of the ASME 2020 Dynamic Systems and Control Conference, ASME (DSCC 2020), Pittsburgh, PA, USA (2020).
- Chhabra, A., Patel, D., Viana Perez, J., Pickering, L., Li, X., Cohen, K., [Understanding the Effects of Human Factors on the Spread of COVID-19 using a Neural Network](#). 7th International Conference on Soft Computing and Machine Intelligence (ISCMi 2020), Stockholm, Sweden (2020).
- Pickering, L., Viana Perez, J., Li, X., Chhabra, A., Patel, D., Cohen, K., [Identifying New Inputs in COVID - 19 AI Case Predictions](#). 7th International Conference on Soft Computing and Machine Intelligence (ISCMi 2020), Stockholm, Sweden (2020).
- Viaña, J., Cohen, K., [ExTree – Explainable Genetic Feature Coupling Tree using Fuzzy Mapping for Dimensionality Reduction with Application to NACA 0012 Airfoils Self-Noise Data Set](#). Proceedings of the 2020 Annual Conference of the North American Fuzzy Information Processing Society (NAFIPS 2020), Redmond, WA, USA, (2020).
- Viaña, J., Cohen, K., [Fast Training Algorithm for Genetic Fuzzy Controllers and application to an Inverted Pendulum with Free Cart](#). Proceedings of the 2020 Annual Conference of the North American Fuzzy Information Processing Society (NAFIPS 2020). Redmond, WA, USA, (2020), (Recognized with the Outstanding Research Paper Award.)
- Viaña, J., Cohen, K., [Fault Tolerance Tool for Human and Machine Interaction & Application to Civilian Aircraft](#). 6th IEEE Latin American Conference on Computational Intelligence (LA-CCI), Guayaquil, Ecuador (2019). DOI: 10.1109/LA-CCI47412.2019.9037045

Additional Achievements

Books

- Viana, J. (2022). **CEFYDRA: Cluster-first Explainable FuzzY-based Deep Reorganizing Algorithm** [Doctoral dissertation, University of Cincinnati]. OhioLINK Electronic Theses and Dissertations Center. http://rave.ohiolink.edu/etdc/view?acc_num=ucin1659530496763669
- Viaña, J. (2019). **Theoria Temporis**. ISBN: 978-84-09-13631-5, pp. 86. Theoretical Relativistic Physics.
- Viaña, J. (2017). **Teoría de Centromas**. Ed. Gomylex. ISBN: 978-84-175176-99-2, pp. 170. Application and registration number: Bi- 512-17. Theoretical Planar Kinematics.
- Viaña, J. (2015). **Faro de Puertos**. Ed. Gomylex. ISBN: 978-84-15176-49-7, pp. 100. Literary work of poetry.

Patents

- **Human Tissue Tubular Structure Image Reconstruction Algorithm, United States Patent and Trademark Office**. Ongoing US Provisional Patent.
- **System and Methods for Image Classification and Generating Personalized Medical Treatment, United States Patent and Trademark Office**. Ongoing US Provisional Patent.
- **Systems and Methods for Predicting Airport Passenger Flow, United States Patent and Trademark Office**. International Publication Number: WO 2023/012939 A1. International Publication Date: 16.02.2023.
- **Ellipses Drawing Device, Registered in the Marcs and Patents Spanish Office**. International Classification: B43L11/055 (2006.01). Number of Publication: ES1103530 U (18.03.2014), BOPI. Patent date Issued Mar 2014 Patent issuer and number: ES1103530 U (18.03.2014).

Special Issues Edited

- **Explainable AI Engineering Applications, Complex Engineering Systems**. Viaña J., Arnett T., Cohen K., Bede B. (Eds.), ISSN 2770-6249.

Honors & Awards

May 2023

Best Ph.D. Thesis Award

North American Fuzzy Information Processing Society, NAFIPS 2023

Aug 2022

John Leland Atwood Award

American Institute of Aeronautics and Astronautics (AIAA)

Apr 2022

Best Paper Award, and Best Student Paper Award

North American Fuzzy Information Processing Society, NAFIPS 2022

Aug 2021

Airport Cooperative Research Program Graduate Research Award

Sponsored by the Federal Aviation Administration

Administered by the Transportation Research Board and The National Academy of Sciences

Managed by the Virginia Space Grant Consortium

Feb 2021

Graduate Engineer of the Month & Professional Trajectory Interview

College of Engineering and Applied Sciences, University of Cincinnati

Aug 2020

La Caixa Fellowship for Postgraduate Studies in North America

“La Caixa” Banking Foundation (ID 100010434). Grant code: LCF / BQ / AA19 / 11720045

Honors & Awards

- Aug 2020** **Written Letter of Academic Recognition from HH. MM. King Felipe VI. The Royal House of Spain**
- Aug 2020** **Outstanding Research Paper Award**
North American Fuzzy Information Processing Society, NAFIPS 2020
- May 2020** **Professor R. T. Davis Memorial Award for Academic Performance in Computational Science**
Department of Aerospace Engineering, University of Cincinnati
- Jul 2019** **Best Nova Talent of the Month**
NOVA Talent, Spain
- Oct 2018** **Ohio State Excellence Scholarship & Recognition Grant**
Hispanic Chamber of Commerce, Cincinnati, Ohio, USA
- Sep 2018** **International Studies Transfer Program Scholarship**
Basque Government
- Aug 2018** **Excellence Training Scholarship**
Provincial Council of Biscay

Honors & Awards

- Feb 2018** **University Graduate Scholarship, College of Engineering and Applied Sciences**
University of Cincinnati, Ohio, USA
- Oct 2017** **2nd Award of the National Olympiad on Mechanisms and Machine Science, OTM-AEIM**
Mechanical Engineering Spanish Association
- Oct 2016** **Best National Investigation Article of 2016, Spain**
Spanish National Congress of Mechanical Engineering, CNIM-AEIM
- Oct 2016** **Best Presentation of the Year, 2016, Spain**
Spanish National Congress of Mechanical Engineering, CNIM-AEIM
- Sep 2016** **Academic Excellence Scholarship, IKASIKER**
Basque Government
- Sep 2016** **Biscay Talent, Excellence of Young Postgraduate**
Provincial Council of Biscay

International Projects



Boeing 737 MAX 8 Fault Tolerance Tool

Mar 2019 – May 2019

- Design of a soft computing fuzzy-based algorithm that ratifies the coherence between the data obtained from all the sensors of a given system.
- Creation of the “Coherence Module” for assessment of fault tolerance in the control system. Tested in a high-fidelity simulation scenario of sensors, actuators, and human operator, replica of the Boeing 737 MAX 8 aircraft.



AIRBRACE · Baggage Location Awareness Systems

Sep 2018 – Jan 2019

- In-airport luggage tracking RFID scanners ("Air-Spot") to increase passenger's & airline's awareness of the baggage location.
- Development of the AI-based master software that minimizes luggage mishandling in ground operations.



BLI (Boundary Layer Ingestion) Technology Demonstrator - NASA / Aurora Flight Sciences D8 Airliner

Jan 2019 – Mar 2019

- Design and modeling of the aircraft. Aerodynamic, mechanical & thermo-mechanical analysis of the fuselage enclosure and inner structure.
- Double-bubble interference analysis.
- 3D printed model fabrication and wind tunnel testing at the Aero-Labs of Baldwin Hall at the University of Cincinnati.



ROVERSPACE · Commercial Lunar Rovers

Apr 2018 – Jun 2018

- The project was supervised by the Concurrent Design Facility at the European Space Research and Technology Centre, ESTEC, and it involved 15 European aerospace engineers.
- Design of a low-weight, deployable structure for lunar exploration.



IMITATE · Motion Technology Systems

Jul 2017 – Mar 2018

- Software development for the recording of human limb motion. Input data acquired through gyroscopic sensors and accelerometers installed in a wearable electronic device. Crafting of the pattern trajectories recognition and motion imitation algorithms.
- Company Awarded with the Eiken Cluster Market Chance, Department of Economic and Territorial Development of the Provincial Council of Bizkaia.

Volunteering Projects



MIT Technology Review Organizing Committee EmTech Digital 2022, EmTech Digital 2023, Future Compute

Mar 2022 – Present
Cambridge, Massachusetts

/FUTURE
COMPUTE/



- EmTech Digital delivers editorially curated content to understand the implications of AI breakthroughs from the leaders in academia and business for those demanding real-world execution strategies.

THALES

Co-Founder and Organizer of the Explainable Fuzzy AI Challenges - XFC 2021 & 2022 In collaboration with Thales, NAFIPS and the UC

Jun 2020 – Present
Cincinnati, Ohio



- International Competition for undergraduate and graduate students that tests their skills in coding, AI and transparent inference. The students had to create a fully autonomous genetic-fuzzy explainable algorithm in Python capable of playing the famous Python Arcade Game “Asteroid Smasher”. The game consists of a multiagent system of 2-dimensional spacecrafts that move to avoid collisions with numerous asteroids of different shapes, sizes and velocities that appear in the environment.
- Member of the Student Activities Committee of NAFIPS 2021 Annual Conference, Purdue University.

UNIVERSITY OF
Cincinnati



Participated in the NASA International Space Apps Challenge 2020 NASA - National Aeronautics and Space Administration

May 2020 – May 2020
Online



- Development of an eXplainable AI algorithm that predicts the COVID-19 cases of different hub areas across the US. A data-driven decision-making tool for the government and local authorities, "Safe Planet AI". The software uses genetic fuzzy artificial intelligence leveraging climatic and pollution data from the satellite Sentinel-5P (ESA) to predict the spread of the disease.

Community Involvement

Editorial Board Member, Complex Engineering Systems (Sep 2022 – Present)

Member, IEEE, Institute of Electrical and Electronics Engineers (Sep 2021 – Present)

Member, Royal Aeronautical Society, RAeS, UK (Apr 2021 – Present)

Chair of the Session of Robotics and Artificial Intelligence, Dayton-Cincinnati Aerospace Sciences Symposium, DCASS 2021, USA (Mar 2021)

Graduate Chair, College of Engineering and Applied Science, CEAS, (University of Cincinnati) (Nov 2019 – Aug 2020)

Graduate Representative, Aerospace Engineering Department GSA (University of Cincinnati) (Oct 2019 – Present)

Member, European Society for Fuzzy Logic and Technology, EUSFLAT (Aug 2019 – Present)

Member, American Institute of Aeronautics and Astronautics, AIAA, USA (Nov 2018 – Present)

Adhered Graduate, Official College of Industrial Engineers of Biscay, CIIB (Sep 2017 – Present)

Associate Member, Spanish Association of Mechanical Engineering, AEIM (Sep 2014 – Present)

Board Member, Department of Applied Mechanics (Higher Technical School of Engineering of Bilbao) (Oct 2013 – May 2018)

Researcher of Planar Kinematics, Research Group CompMech, Analysis and Design of mechanisms (Sep 2014 – May 2017)

Representative of the Student Council, Department of Applied Physics (Higher Technical School of Engineering of Bilbao) (Sep 2015 – Apr 2017)

Letter of Recognition from

HH. MM. King Felipe VI.

The Royal House of Spain

August 2020



mayo 2020

Estimado Javier,

Me es muy grato darte la enhorabuena por la beca de la Fundación "la Caixa" que, gracias a tu talento y esfuerzo, has recibido con todo merecimiento.

Como sabes, en estas fechas se solía celebrar la tradicional ceremonia de entrega de diplomas a los becarios de "la Caixa", un acto solemne que me enorgullece presidir, junto a la Reina, desde 2015.

La Corona ha apoyado este excelente programa de Becas prácticamente desde sus inicios en 1982, como muestra de respaldo institucional a la educación y la investigación. Este programa encarna perfectamente el vínculo entre conocimiento y progreso. Y la ceremonia nos ofrece, año tras año, la posibilidad de conocer los proyectos que cada uno lleváis a cabo, y de conoceros personalmente junto a vuestros familiares presentes. Se trata de una ocasión única para comprobar, con hechos y sobre el terreno, el talento que nuestro país es capaz de generar.

Atendiendo a las circunstancias excepcionales que estamos viviendo, que reclaman de todos nosotros la máxima prudencia y responsabilidad, y de común acuerdo con el presidente de la Fundación "la Caixa", Don Isidro Fainé, este año la entidad se ha visto obligada a cancelar la ceremonia de entrega de diplomas. No tengo duda de que sabrás comprender y compartir esta decisión, que, aunque triste, resulta totalmente necesaria.

Precisamente por ello, me gustaría comunicarte, a través de esta carta y ante la imposibilidad de hacerlo en persona, mi sincero reconocimiento y mis mejores deseos, a los que se une la Reina, para esta etapa que ahora inicias y que ha de abrirte un gran porvenir.

Quiero también apelar a tu compromiso personal para pedirte, en nombre de nuestros ciudadanos, que multipliques, si cabe, tu esfuerzo durante los próximos meses, para alcanzar el máximo nivel de excelencia en tu educación.

En estos últimos años, hemos podido comprobar personalmente que todos los becarios de "la Caixa" tenéis, por un lado, el privilegio de disfrutar de un talento excepcional, y por otro, la fortuna de recibir el respaldo de una Fundación que os ofrece, con gran generosidad, los recursos para que completéis vuestra formación en las mejores universidades del mundo.

Este doble privilegio reclama de vosotros el más alto grado de responsabilidad, exigencia y compromiso social. Sobre todo, teniendo en cuenta los retos que España tiene por delante.

La crisis sanitaria provocada por la enfermedad del covid-19 nos ha llevado a vivir unos momentos excepcionalmente complejos en todo el mundo. Se trata, sin duda, de una realidad extrema y muy dolorosa, que nos pone a prueba y nos marca un único objetivo posible: la superación. Una meta que precisa del esfuerzo y el compromiso del conjunto de la sociedad –ciudadanos e instituciones–.

Tengo la convicción de que sabréis honrar la confianza que se deposita en todos vosotros y estoy seguro de que juntos superaremos estos tiempos de dificultad. Porque esta dura experiencia nos va a ayudar como sociedad a ser más fuertes y capaces de afrontar los desafíos que están por venir. Y vosotros, todos los becarios de "la Caixa", contribuiréis de forma destacada a ello. No tengo la menor duda.

Junto a la Reina, quiero desearte los mayores éxitos personales y profesionales, con un saludo lleno de afecto.

V- el Rey R

Señor
DON JAVIER VIAÑA PÉREZ

Impact

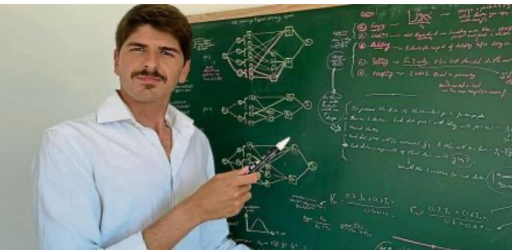
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CONTROL OF TECHNOLOGY

The man with transparent algorithms

Javier Viaña Pérez innovates in the design of artificial intelligence so that it does not escape human understanding



Javier Viaña Pérez is completing his doctorate in fuzzy artificial intelligence applied to aerospace engineering at the University of Cincinnati (LV)

Mayte rius Barcelona 07/03/2021 06:00 | Updated 07/03/2021 09:08

"It is essential to understand the guts of an algorithm ; if we don't understand how it works, we can't let it make decisions like where a plane is going." Javier Viaña Pérez (Bilbao, 1995) is an industrial and aerospace engineer, but in recent years he has focused his efforts and his research on artificial intelligence and, more specifically, on its "explicability", in which the decisions made by algorithms are transparent and understandable to the human mind.

Link

"la Caixa" Foundation In Collaboration with: "la Caixa" Fellows' Association

Fellowships

Artificial Intelligence: algorithms that improve our lives

30 June 2021

now analyse great swathes of data, store it and use it to make predictions. What's more, machine can now learn from their own experience, they adapt to new data and can carry out tasks that once were only doable by humans. But could AI go beyond our capacities and work without our intervention?

Javier Viaña Pérez is wary of this possible scenario, and he's sure that it's of the utmost importance to understand machine reasoning and algorithms from a human perspective. "In my sector, this feature is known as 'explainability,'" he said. This is precisely what he's researching with the support of a "la Caixa" Foundation fellowship at the University of Cincinnati, Ohio, in the USA, where he's doing a PhD in aerospace engineering. "In certain applications, such as aviation, if a system doesn't meet this requirement, it's inexcusable," he said.



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LA VANGUARDIA 2 JULIO 2021

El hombre de los algoritmos transparentes

JAVIER VIAÑA PÉREZ Este investigador innova en el diseño de la inteligencia artificial para que no escape a la comprensión humana

Quien es el hombre que está diseñando algoritmos que mejoran nuestra vida? ¿Por qué se preocupa tanto por que los algoritmos que diseñamos sean transparentes? ¿Por qué se preocupa tanto por que los algoritmos que diseñamos sean transparentes? ¿Por qué se preocupa tanto por que los algoritmos que diseñamos sean transparentes?

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UC student aims to better interpret artificial intelligence

www.uc.edu

CINCINNATI

UC NEWS

UC student aims to better interpret artificial intelligence

Javier Viaña Pérez is using genetic fuzzy systems to provide clarity into artificial intelligence

By Anya Rao 513-556-8373

May 24, 2021

Link

John Weidner • 1st Dean of Engineering and Applied Science

The University of Cincinnati - College of Engineering and Applied Science Graduate Student of the Month, Javier Viaña Pérez, has already helped develop a camera in use on the International Space Station.

242 25 comments

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zamora24horas.com

CASTILE AND LEON

Javier Viaña: "There are companies that do not care about arguments and make decisions based on the algorithm"

Doctor in transparent Artificial Intelligence, Viaña gives the keys to the importance of incorporating it in companies

December 16, 2021 (8:35 AM)

Javier Viaña

Javier Viaña, doctor in Transparent Artificial Intelligence at the Aerospace Department of the University of Cincinnati (USA) traveled this Wednesday to the heart of Castilla y León to shine a light on and analyze Artificial Intelligence in the Future of Employment.

Link



UC Center for Entrepreneurship @uofcincyEship · 21h
 Connecting the dots @UC_DigiFutures grand opening today and #startopcincy next unicorn was just born @rywalker Javier Viana @schigel @MostAeroKelly @UCVPRResearch @UCResearch



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Aerospace exploration and industry: could one exist without the other?
 lacaixafellows.net

"la Caixa" Foundation

Aerospace exploration and industry: could one exist without the other?

06 July 2021

Álvaro Romero, Iñigo Alforja, Ismael Román, Javier Viaña

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javier viaña



CONFERENCIA EN VALLADOLID DE JAVIER VIAÑA : "LA IA EN EL FUTURO DEL EMPLEO"

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Junta de Castilla y León

COMMUNICATION
 of the Junta de Castilla y León

VICE PRESIDENT IGEA PARTICIPATES IN THE CONFERENCE 'ARTIFICIAL INTELLIGENCE IN THE FUTURE OF EMPLOYMENT'

December 15, 2021

Castile and Leon | Minister of Transparency, Spatial Planning and Foreign Action

The vice president, spokesperson and counselor for Transparency, Spatial Planning and Foreign Action, Francisco Igea, has participated today in the conference 'Artificial Intelligence in the future of employment', organized by the Asociación Visión Responsable de Castilla y León. The event took place at the Official Chamber of Commerce and Industry of Valladolid and also featured a presentation by the industrial and aerospace engineer Javier Viaña.

During the conference, emphasis was placed on the importance of transparency when implementing artificial intelligence in different sectors, while it was highlighted that, in Castilla y León, artificial intelligence is present in the automotive business fabric, in the agri-food or health sector.

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News

OCTOBER 24, 2022

Historic Record of the MIT Rowing Club in the Head of the Charles



The Men's 8+ boat of the MIT Rowing Club competed in the largest regatta of the world, the Head of the Charles. With an official race time of 16 minutes and 11 seconds the team established a new record in all the 25 years of history of the club.

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UC NEWS
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CVG and UC put AI to work to shorten airport lines

UC engineering student's algorithm helps airport predict crowding

By **Michael Miller** | Email Michael | 513-556-6757

4 minute read | 552 words | February 25, 2022

The University of Cincinnati is teaming up with Cincinnati/Northern Kentucky International Airport to address crowding.

UC College of Engineering and Applied Science doctoral student Javier Viaña used airport technology that identifies the number of people entering the terminals to build a custom algorithm that can help the airport predict surges of travelers in 15-minute increments.

This information could help the Transportation Security Administration anticipate when to open new lines, Viaña said.



"The main objective of this work is to improve the passenger experience and inform operational decision-making at the airport," said Candace McGraw, CEO of Cincinnati/Northern Kentucky International Airport.

"The modelling done by Javier provides the airport and our business partners reliable data to prepare our operations based on passenger arrival predictions, potentially reducing crowding and wait times along the travel journey from parking and check-in to security screening and concessions."

UC used an artificial intelligence based on fuzzy

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WVXU 1A | NEXT UP: 12:00 PM

CVG is using AI to predict passenger movement. For you, that means shorter lines

By **Ann Thompson** | Published March 7, 2022 at 6:36 AM EST

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Airport Technology

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News February 25, 2022

CVG and UC join forces to develop airport crowding prediction solution

Under this partnership, airport data will be utilised for developing a software programme.

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CVG Airport and UC put AI to Work To Help Predict Crowding And Enhance Passenger Experience

Feb. 25, 2022

Related To: Cincinnati/Northern Kentucky International Airport (CVG)

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CVG partners with UC to create more efficient passenger experience through AI

by Brad Underwood, WKRC | Tuesday, March 15th 2022

HEBRON, Ky. (WKRC) – The Cincinnati/Northern Kentucky International Airport is partnering with the University of Cincinnati to create a better and more efficient passenger experience.

CVG partners with UC to create more efficient passenger experience through AI (WKRC file)

Thanks to artificial intelligence, the airport can predict crowd trends and make adjustments before problems happen. At the airport, there's no

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CVG, UC Partner on Crowd Management Tech

by airportxadmin | Feb 25, 2022 | News Flash

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CVG and UC put AI to work to help airport predict crowding and enhance the passenger experience

Cincinnati, Oh. (February 24, 2022) – The Cincinnati/Northern Kentucky International Airport (CVG) is teaming up with the University of Cincinnati (UC) to predict crowding and enhance the passenger experience throughout the airport.

CVG engaged UC College of Engineering and Applied Science aerospace engineering doctoral student Javier Viaña to utilize airport data to create a software program to help the airport predict when travelers arrive at the airport, broken down into 15-minute increments. By leveraging data collected by another program previously developed by CVG, Viaña has been able to specifically model queue lines at the security checkpoint.

“What makes this model unique is how UC is using artificial intelligence based on fuzzy logic, a type of computer decision making that allows us to provide a human-like explanation for its predictions,” said Javier Viaña. “We refer to this type of algorithms as explainable and transparent.”



Javiar Viaña, UC doctoral student

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CVG Airport and UC employ AI to help anticipate congestion and enhance the passenger experience

February 25, 2022, 1:15 AM



Cincinnati/Northern Kentucky International Airport (CVG) is working with the University of Cincinnati (UC) to anticipate congestion throughout the airport and enhance the passenger experience.

CVG asked UC College of Engineering and Applied Science aerospace engineering doctoral student Xavier Viana to use airport data to help predict airports in 15-minute increments upon arrival at the airport. divided. By leveraging data collected by another program previously developed by CVG, Viana is able to model queue lines exclusively at security checkpoints.

“The main objective of this work is to improve the passenger experience and inform operational decision-making at the airport,” said CVG CEO Candace McGraw. “The modeling done by Javier provides the airport and our business partners with reliable data to tailor our operations based on passenger arrival predictions, potentially reducing congestion and parking and checks with travel travel. -In waits until security screening and concessions.”

Viana said, “What makes this model unique is how UC is using artificial intelligence based on fuzzy logic, a type of computer judgment that allows us to provide human-like explanations for its predictions.” gives.” “We refer to these types of algorithms as interpretable and transparent.”

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