Dr. Pedro Juan Rivera Torres

MSCA Fellow - University of Salamanca, Fellow of St. Edmund's College, University of Cambridge
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EDUCATION

Date	Degree	Institution
1994-2001	*Bachelor of Science* in Computer Engineering	University of Puerto Rico-Mayagüez
2002-2004	*Certificate* in Project Management	University of Wisconsin
2002-2005	*Master of Science* in Engineering	University of Wisconsin
2006-2008	*Master* of Telematic Engineering	Universidade de Vigo
2006-2008	*Diploma of Advanced Studies* in Telematic Engineering	Universidade de Vigo
2011-2017	*Doctor of Philosophy.* in Telecommunications Engineering	Universidade de Vigo
2019-2021	*Master* of Computer Engineering	Universitat Oberta de Catalunya
2018-2022	*Master* of Telecommunications Engineering	Universitat Oberta de Catalunya
2020-2023	*Postdoctoral Fellowship* in Complexity Science	Universidad Nacional Autónoma de México (UNAM)
2023-2024	*Postdoctoral Training* in Low-Cost Control for Manufacturing Systems	University of Cambridge
2024-Present	*Marie Curie Postdoctoral Fellowship*	Universidad de Salamanca
2021-Present	*Doctor of Philosophy* in Biomedical Engineering	Universitat Politècnica de Catalunya
2024-Present	*Degree* in Law	Universitat Oberta de Catalunya

LANGUAGES

English	Fluent, Written and Spoken
Spanish	Fluent, Written and Spoken (native)
Galician	Spoken (basic), Reading (advanced), Written (basic)
Portuguese	Fluent, Written and Spoken
Catalan	Reading (basic), Written (basic), Comprehension (basic)

PROFESSIONAL LICENSE

Licensed to practice the regulated profession of Telecommunications Engineering in the Kingdom of Spain, Member of the Official College of Telecommunications Engineers (Colegio Oficial de Ingenieros de Telecomunicación, COIT). Member number: C19914.

EMPLOYMENT HISTORY

University of Salamanca **July 2024 to present**

María Skłodowska Curie Actions Postdoctoral Fellow Salamanca, Spain

Responsible for the development of the BioPdM project, which aims to create predictive maintenance tools based with biomimetic, complex-adaptive systems. This research utilizes complex systems, applied to engineering problems, specifically towards the solution of industrial problems. I currently research the use of Probabilistic Boolean Networks in predicting single, multiple, and new faults and failures in different industrial, smart power, and manufacturing environments, to develop a bio-inspired system that can perform Predictive Maintenance, to forecast and prevent the occurrence of equipment failure, through monitoring the condition of the assets of a system.

University of Cambridge **March 2023 to present**

Research Associate (2023-2024) Cambridge, United Kingdom

Institute for Manufacturing

Department of Engineering

Postdoctoral Research Associate, St. Edmund's College (2023-2024), Bye-Fellow, St. Edmund's College (2024-present)

Research Associate of the Distributed Information and Automation Laboratory (DIAL) of the Institute for Manufacturing (IfM) of the Department of Engineering. Part of the *Smart Manufacturing Data Hub* (SMDH) Project. Research in the *Digital Manufacturing on a Shoestring*, and SMDH projects, specializing in providing Low-Cost Smart Manufacturing solutions to Small and Medium Enterprises (SME), so that they may have simple and accessible, but effective solutions such as Job tracking, temperature monitoring and Power Monitoring, using SoC Computers (Raspberry Pi and Rock), Microcontrollers and sensors (temperature, air quality, barcode scanners, vibration, and others), and for creating an environment of data sharing and analysis for the benefit of SMEs. Responsible for the Job Location Tracking solution and its deployment across different partners. Responsible for designing the maintenance support

solution. Tasked to build and design low-cost solutions for aiding the digitalization of Small to Medium Enterprises in the UK and assuring the exchange of data into SMDH's Manufacturing Data Exchange Platform (MDEP). As a Bye-Fellow of St. Edmund's College, I support the college with my research activities, and by coordinating cultural activities for the benefit of the fellowship.

National Autonomous University of México **Oct. 2019 to March 2023**

Research Associate (Oct. 2019 - Sept. 2021), México City, México

Postdoctoral Fellow (Sept. 2021- March 2023)

Complexity Sciences Center (C3)

Postdoctoral and Associate researcher in Complex-Adaptive Systems. Research includes Antennas Based on Complex-Adaptive Systems, Range Diversity, Criticality and Heterogeneity, Learning using Probabilistic Boolean Networks, heterogeneity, anti-fragility, smart-grids, reliability, robustness, and resilience. Responsible for supervising also master and doctoral students. Teaching assistant for the Adaptive Computing (2022) and Introduction to Complexity Science (2021), with Carlos Gershenson. Postdoctoral Supervisor: Prof. Carlos Gershenson García.

University of Puerto Rico at Río Piedras **Sept. 2017 to Aug. 2019**

Assistant Professor - Department of Computer Science, San Juan, Puerto Rico

Faculty of Natural Sciences

Professor of Computer Sciences. Courses taught: Introduction to Computer Science in Python, Introduction to Programming in C++, High-Level Programming Languages, and Computer Networks. Researcher in Complex Systems, Machine Learning and Artificial Intelligence. Established research collaborations with researchers in Spain, Mexico, France, Brazil, Cuba, and the United States that resulted in several peer-reviewed publications, presentations in international conferences, and transdisciplinary research. Active participant in the accreditation process of the Computer Science program with ABET.

Jones, Lang and La Salle **Jan. 2017 to Sept. 2017**

Reliability Engineer Manatí, Puerto Rico

JLL manages industrial facilities and maintenance for Bristol-Myers Squibb (Oral and Parenteral Drugs), for Critical (GMP) and non-critical facilities equipment. As the Reliability Engineer, I was responsible for providing engineering support for planning, construction, operation and maintenance of buildings and utilities, developing and implementing programmatic methods to ensure safe operation and high equipment reliability/availability, cost effective maintenance, in a continuous improvement culture, and regulatory compliance. Responsible for applying efficient end use technologies to lighting, heating, ventilation, air-conditioning, utility, process, and power systems with the goal of reducing operating costs. This role includes applying maintenance strategies and predictive technologies (Condition-Based Monitoring, PdM) while optimizing a system's operational performance, life cycle cost, and payback. This includes developing a Reliability-Centered Maintenance strategy.

Honeywell Aerospace Inc. **Jul. 2014 to Jan. 2017**

Radiation Effects Systems Engineer Aguadilla, Puerto Rico

Radiation Effects Systems Engineer. Worked in Defense and Space projects for NASA, Boeing and Lockheed-Martin. I was responsible of conducting radiation effects tests on electrical/electronic components, units (such as Inertial Measurement Units), and other devices for characterization, failure analysis and Lot Acceptance, according to MIL-STD-883 (Total Ionizing Dose, Prompt Dose, Single Event Effects), developing Radiation Effects Test Reports (Prompt Dose, Total Ionizing Dose, Single Event Effects), Plans and Analyses, conducting Prompt Dose and Total Ionizing Dose Tests, and other Radiation Effects Tasks such as shielding and radiation hardening. Also performed tasks related to Validation and Verification of requirements for the Orion Multipurpose Crew Vehicle. I have performed work for a Radiation-Tolerant General-Purpose Processor (RTGPP, a single-board computer used in avionics), in CompactPCI and SpaceVPX versions, and its interfacing with other devices through MIL-STD-1553, Spacewire, and SRIO. I've also worked in the validation of other avionics components, such as the Self-Checking Processor (SCP) onboard of the Orion MPCV's Vehicle Management Computer (VMC). The VMC is one of the most critical parts of the MPCV and it is composed of

several redundant components/boards. Also performed Flight Software Validation and Verification.

Universidade de Vigo

University of Puerto Rico -Mayagüez, **Jan. 2012 to Mar. 2017**

Research Assistant – Bioinformatics and Complex Systems Mayagüez, Puerto Rico

Vigo, Galicia, Spain

Research Assistant in Complex Systems Theory and Bioinformatics. Work included the application of Probabilistic Boolean Networks as a tool to model Manufacturing Systems and predict failures. Also, intervention to the PBN has been developed, to guide the evolution of the network and avoid undesired/failed states. In the past, these bio-inspired mechanisms have been researched and applied to Electrical Power Generation Systems, specifically the IEEE-RTS-1979. We used the PRISM model Checker as a tool to simulate and formally check our proposed model. We also worked with Probabilistic Timed Automata to create a formal model that fits a proposed micro-grid power distribution system, with the purpose of creating a mechanism that determines the optimal policy of several Reinforcement Learning Agents that we have formulated. We described these RL agents that are Markov Decision Processes as PTAs and ultimately as a composition of several PTAs that we will model with the Uppaal Model Checker, in order simulate our proposed model and formulate questions to verify its correctness. Néstor Rodríguez, Domingo Rodríguez – Research Tutors. Luis E. Anido Rifón – Ph.D. Dissertation Advisor.

New Mexico State University **Aug. 2009 to Dec. 2010**

Research Assistant – Bioinformatics Las Cruces, New Mexico, USA

Research Assistant in an NSF-Funded Project, related to Ontologies in Biological Systems. CDAO is an evolutionary biology ontology developed using OWL and Protégé and provides a framework for understanding data in the context of evolutionary-comparative analysis. Work achieved in the project consisted of creating visualization tools for the ontology and integrating the use of *prefuse*, a visualization tool written in Java. The resulting software is a tool that allows

the researchers to import an existing CDAO matrix into a Java application using the *prefuse* visualization library and allowing manipulations of the matrix and the creation of new matrices resulting from these manipulations.

Asociación de Maestros de Puerto Rico **Jan. 2009 to Aug. 2009**

Information Technology Manager Hato Rey, Puerto Rico

IT Manager for AMPR, a teacher's union in Puerto Rico. Responsible for supervising projects in IT infrastructure, telecommunication expansions, software migrations, and healthcare software data management. Liaison between the administration and external service providers. Responsible for helpdesk and technical support personnel. Supervision of 6 FTEs and several contractors.

University of Puerto Rico-Mayagüez **Aug. 2008 to Dec. 2008**

Instructor Mayagüez, Puerto Rico

Instructor of the following undergraduate courses: Programming Languages, Fundamentals of Computing, for two Computer Engineering cohorts. Responsible for assessment, grading, and reporting, as well as participation in institutional committees, departmental meetings, among others.

Affiliated Engineers Incorporated **Mar. 2006 – Dec. 2007**

Information Technology/Audiovisual Project /Commissioning Engineer Madison, Wisconsin

As part of the Information Technology Division at AEI, I worked with the design of IT infrastructure for projects related to health care, mainly hospitals and other buildings, designing Information Technology and Audiovisual infrastructure. Part of the Flad Affiliated Companies. Responsibilities and tasks included:

- Developed a new Audiovisual Systems Practice within the organization, adding a new service of value to clients.
- Designed Telecommunications and Audiovisual Systems for the IT healthcare market, completing designs of structured cable, telecommunications, infotainment, and audiovisual for

some of the most important hospitals and medical schools of the nation, including UW Hospitals and Clinics, UNC Hospitals and Clinics, UKY Hospitals and Clinics and Columbia-St. Mary's Hospitals.

- Involved in Technology Consulting and the Structured Cabling Design of two Armed Forces Facilities.
- Created CSI Master Specifications and Basic Drawing Templates for the AV practice. Developed guidelines and master documents for commissioning audiovisual systems.
- Participated in meetings with Presidents, CIOs, CEOs, CTOs, IT and AV Managers and other technology stakeholders in the IT Healthcare and Education Markets, serving as a technology consultant and liaison between internal customer departments and the design teams. Served as the subject-matter expert for the architectural design team and other engineering trades.
- Responsible for supervising the work of junior engineers and designers in projects owned. Participated in quality reviews of other projects within the department and the organization.
- Evaluated new and prototype equipment for Telecommunications and audiovisual systems. Educated clients with the pros and cons of said equipment.
- Experience as a Commissioning Engineer doing the following:

- Developing commissioning test plans for equipment and systems to verify design requirements and specifications. Developing new tools to commission audiovisual systems.

- Performing startup testing activities and providing field vendor support to meet schedules. Completing those activities with minimal impact to operations.

Principal designs included work for the Structured Cabling Systems, IT Infrastructure Design, commissioning and Audiovisual Designs for University of Cincinnati, University of Kentucky, University of Chicago, Columbia St. Mary’s Hospitals and Clinics, University of North Carolina Hospitals, Northwestern Mutual, Hamilton-Sundstrand, Novartis, Gap Stores, Panduit, Department of Homeland Security, and the United States Army.

University of Wisconsin School of Medicine and Public Health **Mar. 2004 – Mar. 2006**

Educational Technology Manager/Liaison Madison, Wisconsin

Worked in management and technical support field of the Information Technology division supporting staff and faculty and managing internal projects. Responsibilities included:

- Managing technical support and resources to assist faculty and staff in the selection and use of appropriate technology for medical student courses.
- Supporting the development of strategies and incorporation of new learning technology resources for Medical School curriculum and academic administration.
- Management of software and hardware projects that support the school's mission and its curriculum.
- Assessing and evaluating medical student IT needs, including those assigned to state-wide campus sites.
- Acting as liaison between Academic Affairs and the Applications Development Group.
- Directing, coordinating, and managing the development of new and existing web pages related to instructional technology.
- Directing everyday activities of the Educational Technology Area, including budget, operations, strategic planning, personnel supervision, and administration.
- Writing institutional policy regarding information technology and instructional technology.
- Develop new areas of service and maintain acceptable levels of support for internal customers.
- Directing the implementation, maintenance, strategic direction and development of the course management, testing, and other instructional softwares.
- Supporting AV Network Infrastructure by diagnosing and resolving problems related to the systems and software of the AV Network.
- Providing maintenance and support to AV equipment.
- Supporting the Video Capture Operation and the Classroom Help Desk.

Graber Products **Jul. 2000 to Jan. 2003**

IT Manager Madison, Wisconsin

Worked as Information Technology Manager of a bicycle products manufacturing company. Responsibilities included: Provided on-site information systems management and technical services/support; Network equipment configuration and support; Server installation and support; Provided help desk support to customer in person and telephone; Installation of software applications and operating systems such as MS Windows Family, Mac OS and Linux; Setup and configuration and design of medium (100 clients) Local Area Networks; Recommended and implemented system improvements, installation of new hardware components; Basic training to individuals in the usage of the Internet, programming languages, and office applications; Administration of Windows NT/2000/xp/9x and Linux Networks; Web Development and Web Server Administration.

Herzing University **Jan. 2003 to Mar. 2004**

Assistant Professor – Software Engineering and Computer Networking Technology Madison, Wisconsin

Full-Time Faculty of Herzing College, Department of Computer Information Systems, teaching Information Systems and Network Technology courses such as: Business Systems Analysis, Advanced Java Programming, IT Security, Linux Administration, Introduction to Java Programming, TCP/IP, Unix Shell Scripting, Windows 2000 Active Directory Services Administration, Windows 2000 Network Infrastructure Design, Computer Troubleshooting and Repair (A+), Windows 2000 Networking Infrastructure, Computer Networks (Network+), Programming Logic, Computer Applications, and other courses.

Other responsibilities include course design, course module design, student evaluation, monitoring, and grading, and participation on faculty committees. Active participant in the accreditation process of the College with the North-Central Association Committee on Accreditation and School Improvement.

Madison Area Technical College **Jan. 2002 to Dec. 2007**

Adjunct Professor Madison, Wisconsin

Responsible for teaching Mathematics (College Algebra, Pre-Calculus, Intermediate Algebra), Computer Science (Introduction to Computer Programming, Java, Web Programming), Computer Networks and Computer Literacy (Introduction to Computer Systems), teaching courses for associate degree, Transfer, and Certificate Students. Other responsibilities included evaluation, translation of curriculum materials and laboratory manuals to Spanish, and curriculum development.

PUBLICATIONS

Peer-Reviewed Journal Articles

Rodríguez Ramos, Adrián, **Rivera Torres, Pedro Juan**, Silva Neto, Antônio José, Llanes Santiago, Orestes. Machine Learning-Based Condition Monitoring with Novel Event Detection and Continuous Learning for Industrial Faults and Cyberattacks. Processes, MDPI, 2025.

Rodríguez Ramos, Adrián, **Rivera Torres, Pedro Juan**, Llanes Santiago, Orestes. A computational intelligence-based proposal for cybersecurity and fault diagnosis with continuous learning in chemical processes. Actuators, MDPI, 2025.

Rivera Torres, Pedro Juan, Chen, C., Rodríguez González, S., Llanes Santiago, O. A learning Probabilistic Boolean Network Model of a Manufacturing Process with applications to system asset maintenance. Entropy, MDPI. 2025.

Rivera Torres, Pedro Juan, Chen, C., Macías-Aguayo, J.E., Rodríguez González, S., Prieto Tejedor, J., Llanes Santiago, O., Gershenson García, C., Kanaan Izquierdo, S. A learning Probabilistic Boolean Network model of a smart grid with applications to system maintenance. Energies, MDPI, 2024.

Rivera Torres, Pedro Juan, Rodríguez Solís, Rafael A., Rodríguez González, Sara, Prieto Tejedor, Javier, Gershenson García, Carlos, Kanaan Izquierdo, Samir. Microstrip antenna based on aperiodic tilings. Inventions, MDPI. 2025 (under review).

Sánchez Puig, F., Lozano-Aranda, R., Pérez-Méndez, D., Colman, E., Morales-Guzmán, A.J., Pineda, C., **Rivera Torres, Pedro Juan**, Pineda, C., and Gershenson García, C. Language statistics at different spatial, temporal, and grammatical scales, Entropy, MDPI, 2024.
Rivera Torres, Pedro Juan, Gershenson García, Carlos, Kanaan Izquierdo, Samir. Fault Detection and Isolation in Smart-Grid Networks of Intelligent Power Routers Modeled as Probabilistic Boolean Networks. Complexity, Wiley/Hindawi, 2023.

Llanes Santiago, O. Silva Neto, A. J., Quiñones Grueiro, M., Prieto Moreno, A., Rodríguez Ramos, A. Bernal de Lázaro, J. M., Verde Rodarte, C., Camps Echevarría, L., Verdegay Galdeano, J.L., Cruz Corona, C., Sánchez Rivero, M. Campos Knupp, D., **Rivera Torres, Pedro Juan**, Campos Velho. H. Nuevos paradigmas en el diagnóstico de fallos en sistemas industriales. Anales de la Academia de Ciencias de Cuba. e1033, 2022.

Rivera Torres, Pedro Juan, Gershenson García, Carlos, Kanaan Izquierdo, Samir. Reinforcement Learning with Probabilistic Boolean Network Models of Smart Grid Devices. Complexity, Wiley/Hindawi, 2022.

Guerrero, Daniel., **Rivera Torres, Pedro Juan**, Febres, Gerardo L., Gershenson García, Carlos. Towards a Measure for Characterizing the Informational Content of Audio Signals and the Relation Between Complexity and Auditory Encoding. Entropy 23(12), 1613, MDPI, 2021.

Rivera Torres, Pedro Juan, Llanes Santiago, O. An approach to model-based fault diagnosis of manufacturing processes and machines using Probabilistic Boolean Networks. Revista Venezolana de Computación, Vol. 7, No. 1, pp.1-9, December 2020.

Rodríguez Ramos, A., Silva Neto, A. J., **Rivera Torres, Pedro Juan**, Llanes Santiago, O. A Hybrid Algorithm for Fault Diagnosis using Fuzzy Clustering Tools. Fuzzy Optimization and Modeling Journal, Vol. 1, No. 1, IAU, 2020.

Rodríguez Ramos, A., Domínguez Acosta, C., **Rivera Torres, Pedro Juan**, Serrano Mercado, E.I., Beauchamp Baez, G., Llanes Santiago, O. An Approach to Multiple Faults Diagnosis using Fuzzy Logic, Journal of Intelligent Manufacturing, Vol 30, No. 1, pp. 429-439, Springer, 2019.

Rivera Torres, Pedro Juan, Serrano Mercado, E.I., Llanes Santiago, O., & Anido Rifón, L. Modeling Preventive Maintenance of Manufacturing Processes with Probabilistic Boolean Networks with Interventions, Journal of Intelligent Manufacturing, Vol. 29, No. 8, pp. 1941-1952, Springer, 2018.

Rivera Torres, Pedro Juan, Serrano Mercado, E.I., and Anido Rifón, L. Probabilistic Boolean Networks and Model Checking as an Approach for DFMEA for Manufacturing Systems, Journal of Intelligent Manufacturing, Vol. 29, No. 6, pp. 1393-1413, Springer, 2018.

Rivera Torres, Pedro Juan, Serrano Mercado, E.I., & Anido Rifón, L. Probabilistic Boolean Network Modeling of an Industrial Machine, Journal of Intelligent Manufacturing, Vol. 29, No. 4, pp. 875-890, Springer, 2018.

Peer-Reviewed Conference Proceedings Papers

Chen, C., Guan, P., Li, L., **Rivera Torres, Pedro Juan**, Kolcun, R. Mortier, R. EFaaS: Energy-efficient Function Orchestration in Serverless Edge Computing. 45th IEEE International Conference on Distributed Computing Systems (ICDCS). Glasgow, Scotland, UK, 20-23 July 2025.

Rivera Torres, Pedro Juan, Chen, C. Macías-Aguayo, J.E., Llanes Santiago, O., Gershenson García, C., Rodríguez González, S., Prieto Tejedor, J., Kanaan Izquierdo, S. A

Smart-Grid Device Model that Learns by Probabilistic Boolean Network. 21st Scientific Convention on Engineering and Architecture, La Habana, Cuba, 25-29 Nov. 2024.

Chen, C., Hawkridge, G., Mukherjee, A., **Rivera Torres, Pedro Juan,** Ling, Z., Santos, C. and McFarlane, D.C. Intelligent Low-Cost Monitoring for Smart Digital Manufacturing. 1st Workshop on Low-Cost Digital Solutions for Industrial Automation (LoDiSA 2023). Cambridge, UK 25-26 September 2023.

Rivera Torres, Pedro Juan, Chen, C. Maintenance on a Shoestring: The low-cost journey from zero to predictive maintenance. 1st Workshop on Low-Cost Digital Solutions for Industrial Automation (LoDiSA 2023). Cambridge, UK, 25-26 September 2023.

Rivera Torres, Pedro Juan, Gershenson García, C., Sánchez Puig, M.F., Franco, M. and Kanaan Izquierdo, S. Reinforcement Learning with Probabilistic Boolean Networks in Smart Grid Models. in Studies in Systems, Decisions and Control: Proceedings of the 19th Latin American Control Congress (LACC 2022), Havana, Cuba, 28 November-2 December 2022, Orestes Llanes-Santiago (Ed.), Vol.464, pp. 215-224, Springer, 2023.

Rivera Torres, Pedro Juan, Llanes Santiago, O. An approach to model-based fault diagnosis of manufacturing processes and machines using Probabilistic Boolean Networks. 8th Technological and Scientific Symposium in Computing / National Conference on Computing, Informatics and Systems, Caracas, Venezuela, November 2020.

Rivera Torres, Pedro Juan, Silva Neto, Antônio J., Llanes Santiago, O. Multiple Fault Diagnosis in Manufacturing Processes and Machines using Probabilistic Boolean Networks. in Advances in Intelligent Systems and Computing, Martínez Álvarez F., Troncoso Lora A., Sáez Muñoz J., Quintián H., Corchado E. (eds), Proceedings of the 14th International Conference on Soft Computing Models in Industrial and Environmental Applications (SOCO 2019), Sevilla, Spain, Vol. 950, pp. 355-365, Springer, 2020.

Rivera Torres, Pedro Juan, Llanes Santiago, O. Model-based Fault Diagnosis of Manufacturing Processes and Machines using Probabilistic Boolean Networks. 19th Scientific Conference of Engineering and Architecture, ISPJAE, La Habana, Cuba, November 2018.

Rivera Torres, Pedro Juan, Serrano Mercado, E.I. Probabilistic Boolean Network Modeling as an aid for DFMEA in Manufacturing Systems. 18th Scientific Conference of Engineering and Architecture, ISP-CUJAE, La Habana, Cuba, November 2016.

Technical Reports

Rivera-Torres, Pedro Juan, Seguel, Jaime, Rodríguez-Martínez, Manuel, and Irizarry-Rivera, Agustín, *Formal Methods for the Design and Analysis of Electrical Power Distribution Systems Endowed with Intelligent Power Routers*, Submitted as Final Report for PO 4100307844 – LMCO - 2012, a grant funded by Lockheed-Martin, 2012.

Dissertations and Theses

Rivera Torres, Pedro Juan, Contributions to the theoretical modeling of manufacturing systems through Probabilistic Boolean Networks (Original title: Contribuciones al modelado teórico de sistemas de fabricación mediante Redes Booleanas Probabilísticas). Dissertation for the title of Doctor of Telematic Engineering, Universidade de Vigo, Spain. International Doctor Mention, Doctoral Excellence Award (Premio Extraordinario de Doctorado). Defense date: 23-March-2017. Degree Date: 30-March-2017. Dissertation Grade: Excellent Cum Laude, 10/10.

Rivera Torres, Pedro Juan. Complex Engineering Systems: Expanding the Bioengineering Solutions Toolset with Biomimetic and Complexity Science-Based Solutions to Engineering Problems. Dissertation for the title of Doctor of Biomedical Engineering, Polytechnic University of Catalunya (in progress).

Rivera Torres, Pedro Juan. A microstrip antenna based on quasicrystals. Thesis for the title of Official Master of Telecommunications Engineering, Universitat Oberta de Catalunya, 2022.

Rivera Torres, Pedro Juan Contributions to Reinforcement Learning through Probabilistic Boolean Networks. Thesis for the title of Official Master of Computer Engineering, Universitat Oberta de Catalunya, 2021 (Grade: Matrícula de Honor; 10/10).

Rivera Torres, Pedro Juan Contributions to the Distributed Self-Organized Systems in Ambient Intelligence Environments, Diploma of Advanced Studies Thesis, University of Vigo, Spain, 2008.

Book Chapters

Rivera Torres, Pedro Juan, Llanes Santiago, O. Fault Detection and Isolation in Smart Grid Devices using Probabilistic Boolean Networks. Computational Intelligence in Emerging Technologies for Engineering Applications. February 2020, Springer.

Project Funding

Master's Project Funding

Funding Body: Organization of American States-Universitat Oberta de Catalunya (2017-2019) Fellowship: OAS-UOC Fellowship (Master's degree in Telecommunications Engineering, and Master's degree in Computer Engineering). Funding: 62,000 EUR. Role: Researcher, Master Student. Projects: Antennas based on quasicrystals, Reinforcement Learning through Probabilistic Boolean Networks.

Doctoral Project Funding

Project: Formal Methods for the Design and Analysis of Electrical Power Distribution Systems Endowed with Intelligent Power Routers. Role: Researcher (Doctoral). Funding Body: Lockheed-Martin Corporation, PO 4100307844 – LMCO - 2012. Funding: $500,000 USD. Duration: 2011-2015.

Postdoctoral Project Funding

Project: PBN-PdM. Role: Researcher (Postdoctoral Fellow). Funding Body: Center for Complexity Sciences (C3) at the National Autonomous University of Mexico. Funding: $768,000 MXN. Duration: 2021-2023.

Project: Smart Manufacturing Digital Hub. Funding Body: UKRI. Responsible Academic Partners: University of Ulster, University of Cambridge. Funding: 60,116,000 EUR. Duration: 2022-2025.

Project: BioPdM. Role: Co-PI, *Marie Curie Postdoctoral Fellow*. Funding Body: European Union Horizon 2020. Funding: 183,900 EUR. Duration: 2024-2027.

Peer-Reviewed Conference Posters

Rivera Torres, Pedro J., Kanaan Izquierdo, Samir. Contributions to Reinforcement Learning using Probabilistic Boolean Networks, Conference on Complex Systems 2020, Thessaloniki, Greece, 4-11 December 2020.

Presentations in International Conferences/Congresses

Chen, C., Guan, P., Li, L., **Rivera Torres, Pedro Juan**, Kolcun, R. Mortier, R. EFaaS: Energy-efficient Function Orchestration in Serverless Edge Computing. 45th IEEE International Conference on Distributed Computing Systems (ICDCS). Glasgow, Scotland, UK, 20-23 July 2025.

Rivera Torres, Pedro J., Chen Chen, Jaime E. Macías Aguayo, Orestes Llanes Santiago, Carlos Gershenson García, Sara Rodríguez González, Javier Prieto Tejedor and Samir Kanaan Izquierdo, A Smart-Grid Device Model that Learns by Probabilistic Boolean Network, Conferencia Internacional en Ingeniería Informática y de Sistemas, Convención Científica de Ingeniería y Arquitectura, La Habana, Cuba, Noviembre 2024.

Rivera Torres, Pedro J., Rodríguez Solís, Rafael A., Gershenson García, C., Rodríguez González, S., Kanaan Izquierdo, S. A microstrip antenna based on aperiodic tilings. Conference on Complex Systems (CCS 2024), Exeter, United Kingdom, 2-6 September 2024.

Rivera Torres, Pedro J., Chen, C. Maintenance on a Shoestring: The low-cost journey from zero to predictive maintenance. 1st Workshop on Low-Cost Digital Solutions for Industrial Automation (LoDiSA 2023). Cambridge, UK, 25-26 September 2023.

Rivera Torres, Pedro J., Gershenson García, C., Kanaan Izquierdo, S. Fault Detection and Isolation in Smart-Grid Networks of Intelligent Power Routers Modeled as Probabilistic Boolean Networks. Conference on Complex Systems (CCS 2023), Salvador, Bahia, Brazil, 16-20th October 2023.

Rivera Torres, Pedro J., Gershenson García, C., Sánchez Puig, M.F., Franco, M., Kanaan Izquierdo, S. Reinforcement Learning with Probabilistic Boolean Network Models of Smart Grid Systems. 19th Latin American Control Congress. Havana, Cuba, 28 November-2 December 2022.

Rivera Torres, Pedro J., Kanaan Izquierdo, Samir. Contributions to Reinforcement Learning using Probabilistic Boolean Networks, Conference on Complex Systems 2020, Thessaloniki, Greece, 4-11 December 2020.

Rivera Torres, Pedro J., Llanes Santiago, O. An approach to model-based fault diagnosis of manufacturing processes and machines using Probabilistic Boolean Networks. 8th Technological and Scientific Symposium in Computing / National Conference on Computing, Informatics and Systems, Caracas, Venezuela, November 2020.

Santiago Buitrago, Zoraida, Sánchez Zambrana, Carlos, **Rivera Torres, Pedro J.** Hegemonías y resistencias: una mirada decolonial y transdisciplinaria sobre la Salsa y la Nueva Canción, para su resignificación y preservación. Conference: "Teorizando el giro decolonial: reflexiones en torno a Puerto Rico", Aguadilla, Puerto Rico, July 2019.

Rivera Torres, Pedro J. Multiple Fault Diagnosis in Manufacturing Processes and Machines using Probabilistic Boolean Networks. 14th International Conference on Soft Computing Models in Industrial and Environmental Applications (SOCO 2019), Seville, Spain, May 2019.

Rivera Torres, Pedro J. Model-based Fault Diagnosis of Manufacturing Processes and Machines using Probabilistic Boolean Networks. 19th Scientific Conference of Engineering and Architecture (CCIA 2018), ISPJAE, La Habana, Cuba, November 2018.

Rivera Torres, Pedro J. Probabilistic Boolean Network Modeling as an aid for DFMEA in Manufacturing Systems. 18th Scientific Conference of Engineering and Architecture (CCIA 2016), ISPJAE, La Habana, Cuba, November 2016.

PATENTS

Submisison number: MX/a/2023/003065. Title: "Antenas de parche microstrip basadas en teselaciones aperiódicas" (Microstrip antennas based on aperiodic tesselations). Country: Mexico. Date: March 2023.

CERTIFICATIONS

- Certified Six Sigma Green Belt, Honeywell, 2015.
- Graduate Certificate in Project Management – University of Wisconsin, 2005.
- CompTIA A+, Network +, i-Net+, Security+ and Linux+ Certified Professional.
- Certified Internet Webmaster (CIW) Associate.
- ITIL v3 Certified, Honeywell, 2015
- Past: ASQ CMQ/OE (2016-2022), Avixa CTS.

SKILLS

Specialized Software: PRISM Model Checker, Uppaal Model Checker, Matlab/Simulink, Minitab, among others. Special training for Radiation Testing, Software Quality and Validation/Verification Tools.

Programming Languages: C/C++, Matlab, Java, PRISM, UNIX Shell Scripting Languages.

IT Skills: Certified as IT Technician in several areas, including PC/Macintosh troubleshooting, repair and upgrading, maintenance and software installation/configuration, Routers, switches and firewall configuration, and a variety of security-related software packages.

Low-Cost SoC Computers and Sensors: Experience with Raspberry Pi 3 and 4 integrations for Low-cost IoT, control and automation solutions for Small to Medium Enterprise. Solutions include Power Monitoring, Maintenance Support, Temperature Monitoring, Scrap Monitoring, Maintenance Support, and Job Tracking. Sensors for ambient/process/equipment temperature, volatile organic chemicals, and power monitoring (single and three phase). Experience in the design of new low-cost solutions for maintenance support and condition-based maintenance. Experience in integrating agricultural equipment to microcontrollers and SoC computers and automating agricultural processes in the meat and milk industries.

Special Courses: *Graduate* – Engineering Management (Master): Optimization and Operations Research, Quality Management, Project Management I and II, Systems Engineering Management.

Graduate – Telecommunications (PhD): Network Security and Administration, Digital and Interactive Television, Computer Security and Encryption, Programing Languages Structure 2, Analysis of Algorithms, Discrete Event Simulation and Traffic Engineering, Advanced Software/Hardware Architectures, Intelligent Systems and Distributed Artificial Intelligence, Ubiquitous Computing, Mobile and Wireless Computing, Optical Networks, Multimedia Traffic Management, Quality of Service.

Graduate – Telecommunications Engineering (Master): Telecommunications Networks Design and Planning, Radionavigation Systems, Advanced Signal Processing, Next-Generation Networks, Distributed Systems and Networks, Optical Telecommunication Systems, Discrete Signals and Systems, Telecommunications Electronics, Digital Communications Systems,

Communication Systems Theory, Strategic Management in IT, Antenna Theory, Telecommunications Systems Design, Antenna Systems Design, Networks and Services, Instrumentation Electronics, Advanced Microelectronics, Digital Electronics, Mobile Communications, Optical Fiber Networks.

Graduate – Computer Engineering (Master): Advanced Software Project Management, Strategic Management for Technology, Usability Engineering, Advanced Software Engineering Techniques, Advanced Artificial Intelligence, Simulation, Information Security Management Systems, Mobile Device Technology and Development, Large Scale Distributed Systems, Multimedia Content Distribution and Publishing Platforms, High-Performance Computing.

Undergraduate – Computer Engineering (BS): Java Programming, Virtual Reality, Object-Oriented Programming and Design, Special Topics in Comparative Literature (Advanced Undergraduate/Graduate), Special Topics in Music (Advanced Undergraduate), Microprocessors Interfacing, Software Engineering, Human-Computer Interaction, Operating Systems and Network Security, Undergraduate Research.

Aerospace Technologies: Single-board computers, radiation hardening, radiation effects testing (Total Ionizing Dose (HDR, ELDRS), Prompt Pulse, SEE), MIL-STD-813, MIL-STD-1553, SpaceWire, SRIO, SpaceVPX, Reliability, Failure Analysis, Component Characterization, Derating, Inertial Measurement Units, Accelerometers.

Professional Musician: Instruments: Voice, Guitar (Classical), Puerto Rican Cuatro, and other stringed instruments, Piano. Singer-Songwriter. Received the 2012 and 2016 National Foundation for Popular Culture Awards for being among the Best 10 and Best 20 productions of the year.

HONORS AND AWARDS

- **Maria Skłodowska Curie Actions Fellow** - University of Salamanca, Spain (2024 to present).
- **Bye-Fellow** - St. Edmund's College, University of Cambridge, UK (2024 to present).

- **Post-doctoral Research Associate** - St. Edmund's College, University of Cambridge, UK (2023-2024).
- Recipient of the 2021-2023 **Postdoctoral Fellowship** - National Autonomous University of Mexico.
- **2020 Technical Sciences Award**, National Academy of Sciences of Cuba. Research Team Member.
- **Principal's Award 1994** – Ramón José Dávila High School, Coamo, P.R., Outstanding Student Award.
- University of Puerto Rico at Mayagüez, Dept. of Band and Orchestra, Chamber and Concert Choir. **Full-Tuition Musical Scholarship** for five years.
- Puerto Rico Aqueduct and Sewage Authority Workers' Union – **Honor Scholarship** 1994-1998.
- Student Representative-University of Puerto Rico at Mayagüez, College of Engineering Student Council (1997).
- **UVigo International Doctor Distinction**: Requires mobility (the candidate must perform research outside Spain by invitation from another institution or University), writing the dissertation or a substantial part of it in a language other than the languages spoken in the Spanish community, and a review of the dissertation by minimum of two experts with the title of doctor from an institution that is not in Spain. The dissertation tribunal must be composed by at least one doctor from a foreign university.
- **UVigo Doctoral Excellence Award** (Premio Extraordinario de Doctorado): Every Spanish University selects within all the dissertations defended per year the best dissertations amongst the ones that have received the grade of "Sobresaliente Cum Laude" (Outstanding, with honors). My dissertation was awarded the highest scoring in my area, second in the field of Engineering and Technology, and the third highest scoring of all the dissertations defended in the university, receiving the *Medal of the University of Vigo*.
- **Master's Degree OAS Fellowship Recipient, 2017-2019.** Organization of American States-Universitat Oberta de Catalunya.

- Organizing Committee: **Session Chair** - 3rd International Symposium of Applied Engineering Modeling. La Habana, Cuba - November 2018.
- Selected among the **best publications** of the 8th CoNCISa Conference held in Caracas, Venezuela, Nov. 2020.
- **Member** of the International Program Committee, **Executive Coordinator**, and **Chair** of the Low-Cost Systems and Biomedical Applications Session. 19th Latin-American Control Congress, Havana, Cuba, 28-November-2022.
- **Chair** of the Doctoral Consortium (II) session of the 22nd International Conference on Distributed Computing and Artificial Intelligence, University of Lille, France, 25-27 June, 2025.
- **Reviewer** – Journal of Intelligent Manufacturing Systems – Springer-Verlag, 2015-present.
- **Reviewer** – Complexity – Hindawi, 2019-present.
- **Reviewer** – IEEE Access –2018 to present.
- **Reviewer** - IEEE Circuits and Systems - 2019 to present.
- Invited to perform at the Cubadisco International Music Festival, Havana, Cuba – 2009.
- Invited to perform at "Festival Cancionistas 2019", Querétaro, Mexico, 2019.
- Invited to perform at "BarrancaFest" 2019, 2021, 2022, Uruapan, México.
- "Las 20 mejores de 2012" – **Awarded** #10 of 20 among the best musical productions of 2012 for the album "Café Colao Orchestra, Vol. 1", by Fundación Nacional para la Cultura Popular de Puerto Rico, 2012.
- "Las 20 mejores de 2016" – **Awarded** #14 of 20 among the best musical productions of 2016 for the album "Yo no quiero… ser normal", by Fundación Nacional para la Cultura Popular de Puerto Rico, 2016.

ALBUMS/RECORDINGS

- (Yo no quiero) Ser normal – Pedro Juan Rivera – 2016. Selected as one of the top 20 productions of 2016 by the National Foundation for Popular Culture

- Café Colao Orchestra, Vol 1. – Pedro Juan Rivera feat. Walter Morciglio, 2012. Selected as one of the top 10 productions of 2012 by the National Foundation for Popular Culture.
- Buscando Sentido – Pedro Juan Rivera – July 2010.
- Sotavento – Álbum: Llegar; Song: A contraluz – Voice.
- Cantar por lo nuestro – Compilation. 2015.
- Protesto - Single - 2021.

Presenter: Atractores Artísticos. A program created for the Complexity Sciences Center (C3) at UNAM, where we explored the connections between Complexity Sciences and the performing arts (music, literature, poetry, musicology, etc.). 7 episodes.
https://www.youtube.com/playlist?list=PL-vC4ufR8FvJGCB-fN5AAl6EnmVz5ANGV

REFERENCES

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