

# ANTONIO JAVIER NAKHAL AKEL

## RESEARCH ACTIVITIES

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- 11/2023 – Ongoing **Post-doctoral Researcher at “Sapienza University of Rome”**  
The research involves the study and modeling of industrial systems to highlight socio-technical interactions in facilities subject to energy transition and their respective critical operational and management issues. These activities contribute to the “Resilience Engineering for Safe Energy Transition” (RESIST) research project, which is funded under the BRIC 2022 funding scheme titled “Analisi dei sistemi industriali socio-tecnici nell’ambito della transizione energetica”.  
*\*Contract starts in November 1<sup>st</sup> 2023. Doctorate in January 23<sup>rd</sup> 2024.*
- 09/2022 – 03/2023 **Visiting Researcher and Guest Lecturer at “Clemson University”**  
Visiting researcher at the “Adaptive Performance in Complex Systems Lab” in the following projects:  
- Data analysis of the traffic collision reporting system of the South Carolina Department of Transportation.  
- Analysis of simulation training data in rail traffic management system’s supervisory, control, and monitoring.  
Guest Lecturer in the course “Cognitive Systems and Resilience Engineering” on the topic “System Theory and System Dynamics fundamentals”.

## EDUCATION AND TRAINING

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- 11/2020 – 01/2024 **Ph.D. in Industrial and Management Engineering, Sapienza University of Rome, Rome, Italy - three-years full-time fellowship**  
Ph.D. research focuses on resilience analysis for the evolution of industrial sociotechnical systems in critical or highly complex contexts in the issues related to safety management and risk analysis. The research aims to identify the different safety methodologies to model and analyze the modern industrial socio-technical systems.
- 10/2018 – 10/2020 **MSc in Mechanical Engineering, focus on Management of Industrial and Production Systems, Sapienza University of Rome, Rome, Italy**  
*Final grade: 106/110*  
*MSc Thesis: “A Business Intelligence approach to support the analysis of industrial accident reporting systems”.* During the thesis, a data model has been developed and tested to identify and describe information within the safety database MHIDAS.
- 05/2018 – 05/2018 **BSc in Mechanical Engineering, Sapienza University of Rome, Rome, Italy**  
*Final Grade: 98/110*  
Obtained in accordance with the double Degree Program between Central University of Venezuela and Sapienza University of Rome
- 03/2013 – 11/2021 **BSc in Mechanical Engineering, Central University of Venezuela, Caracas, Venezuela**  
*Final Grade: 15.54/20*  
Obtained in accordance with the double Degree Program between Central University of Venezuela and Sapienza University of Rome.

## TEACHING ACTIVITIES

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- 11/2020 – Ongoing **Adjunct Tutor & Assistant Lecturer at “Sapienza University of Rome”**  
For the courses in Mechanical and Management Engineering degree guiding students throughout their academic courses and supporting them through exercises, Q&A meetings, solution of theoretical and practical academic doubts:  
- Gestione degli Impianti Industriali (MSc course, 9 CFU) – In Italian  
- Gestione della Qualità (MSc course, 6 CFU) – In Italian  
- Impianti Industriali (BSc course, 9 CFU) – In Italian  
- Operations Management (MSc course, 9 CFU) – In English  
- Smart Factory (MSc course, 6 CFU) – In Italian

- 10/2014 - 05/2018 **Teaching assistant of Mechanical Design in Engineering at “Central University of Venezuela”**  
The position is earned by an annual public call application (by three consecutive years). This call application consists of a written exam that must be passed with a minimal score of 15 of 20 or more and a 90-minute master class in which a random subject is chosen by the commission in which the applicant must be presented. The average of the application in the three years was 18 of 20. In which the application was the second better grade out of 5 applicants. The position are in charge of: (i) Laboratory practice (4 hours of dedication per week) with groups of 15 students for each practice. (ii) Solution of practical and theoretical doubts (2 hours of dedication per week once a week throughout the semester).
- 12/2016 – 03/2018 **Teaching assistant of Mechanical Vibrations at " Central University of Venezuela"**  
The position is an annual public call application consisting of a written exam that must be passed with a score of 15 of 20 or more and a 90-minute master class in which a random subject is chosen by the commission to later be presented by the applicant. The average of the application was 17 of 20. In which the application was the second better grade out of 4 applicants. The position are in charge of: (i) Organization and creation of laboratory practices (2 hours of dedication per week). During the semester at least 6 laboratory practices must be performed. (ii) Laboratory practice (2 hours of dedication per week) with groups of 6 students for each practice. (iii) Solution of practical and theoretical doubts (2 hours of dedication per week once a week throughout the semester).

## PROFESSIONAL EXPERIENCES

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- 01/2022 – 04/2022 **Business Intelligence analyst at aiComply s.r.l.**  
Design and implementation of Business Intelligence report to create an interactive platform to support strategic decision making for a pharma enterprise.

## RELEVANT PROJECTS

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### Principal Investigator

- 11/2022 – 11/2023 **From System Theory to Probabilistic Modeling: a semi-quantitative safety management approach for industrial plants at “Sapienza University of Rome”**  
The study intends to develop a semi-quantitative model that can be used to examine and predict the impacts of an unexpected event in industrial plants.

### Research team member or Associated researcher

- 05/2023 – Ongoing **Resilience Engineering for Safe Energy Transition (RE-SET) at “Sapienza University of Rome” in collaboration with “INAIL” and “University of Messina”**  
Research project funded under the Bando Ricerche in Collaborazione (BRIC) 2022 programme.  
The project involves the development of analysis and evaluation tools to assist companies and establishments (in the Seveso sector) in the energy transition, identifying intervention priorities and improvement actions in the criticalities of the system. The project aim to model through the System-Theoretic Accident Model and Process (STAMP) technique the system interactions, then converted into a Knowledge Graph to analyze the system and validate the results by empirical data obtained through laboratory tests.
- 10/2023 – Ongoing **RESilience management to Industrial Systems Threats (RESIST) at “Sapienza University of Rome” in collaboration with University of Bologna, and University Politecnica delle Marche**  
Research project funded under the Research Projects of National Interest (PRIN) 2022 programme.  
The project aims to develop a Digital Twin simulation environment for assessing the resilience of industrial socio-technical plants against cyber-attacks. The project seeks to build a simulation methodology to explore Cyber-Socio-Technical Systems resilience performance. Beyond the methodological development, a validation in a real-world plant extend recommendations for adapting the methodology to diverse industrial domains.
- 10/2023 – Ongoing **Artificial Intelligence for Emergencies Services (AI4ES) at “Sapienza University of Rome” in collaboration with ISED s.p.a., Geosystems s.r.l.**  
Research funded under the Regional Programme FESR Lazio 2021-2027, Ambito 4, Modello 1 “RIPOSIZIONAMENTO COMPETITIVO RSI”. The project aims to develop a decision support tool based on Artificial Intelligence to assist the

management of logistics in medical emergency-urgency scenarios, and, in turn, the management and resolution of requests for assistance.

- 11/2023 – 02/2024 **Reconfiguration of internal logistic and warehouse design at “Sapienza University of Rome”** in collaboration with A.S. Roma  
Conduct an analysis of various solutions for the internal logistics of A.S. Roma's retail operations, including a feasibility design study for warehouse optimization. The objective of the project is to modernize the warehouse design and conduct cost analysis to assist the business in determining the most suitable logistics management approach.
- 07/2022 – 10/2022 **Business Intelligence, Business Analytics and Machine Learning for product and organization management** in collaboration with aiComply s.r.l.  
Design and implementation of Business Intelligence tools and Machine Learning algorithm to build a dynamic user-friendly and interactive report to support decision making by the top management of a pharmaceutical company.
- 10/2015 – 07/2016 **Member of the SAE AreoDesingUCV team at the "Universidad Central de Venezuela"**  
Annual Engineering academic competition event. The aim is a real-world design challenge designed to compress a typical aircraft development program into one calendar year, taking participants through the system engineering process of breaking down requirements. It exposes participants to the nuances of conceptual design, manufacturing, system integration/test, and sell-off through demonstration. The research activities has been performed in the structure design and simulation analysis teams.

## PUBLICATIONS

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(Updated until February 20<sup>th</sup> 2024)

### Scopus

*h-index* : 4  
*Documents* : 12  
*Citations* : 49

### Google Scholar

*h-index*: 4  
*Documents*: 13  
*Citations*: 60

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### Journal papers

- 05/2023 Campari, A., **Nakhal Akel, A. J.**, Ustolin, F., Alvaro, A., Ledda, A., Agnello, P., Moretto, P., Patriarca, R., & Paltrinieri, N. (2023). Lessons learned from HIAD 2.0: Inspection and maintenance to avoid hydrogen-induced material failures. *Computers and Chemical Engineering*, 173. <https://doi.org/10.1016/J.COMPHEMENG.2023.108199>
- 07/2023 **Nakhal A., A.J.**, Patriarca, R., De Carlo, F., Leoni L. (2023) *A System-Theoretic Fuzzy Analysis (STheFA) for systemic safety assessment*. Paper in press at the Journal Process Safety and Environmental Protection.
- 02/2023 Simone, F., **Akel, A. J. N.**, Gravio, G. Di, & Patriarca, R. (2023). Thinking in Systems, Sifting Through Simulations: A Way Ahead for Cyber Resilience Assessment. *IEEE Access*, 11, 11430–11450. <https://doi.org/10.1109/ACCESS.2023.3241552>
- 06/2022 **Nakhal A., A. J.**, Hovstad, J. S., Ruth, M. S., Parmeggiani, S., Patriarca, R., Paltrinieri, N., (2022). *A Machine Learning approach to analyze natural hazards accident scenarios*. Paper published at the Journal Chemical Engineering Transactions, June 2022 and presented in the 10th International Conference on Safety & Environment in Process & Power Industry (CISAP 10), May 2022; Firenze; Italy.
- 06/2022 **Nakhal A., A.J.**, Di Gravio, G., Fedele, L., Patriarca, R., (2022). *Learning from Incidents in Socio-Technical Systems: A Systems-Theoretic Analysis in the Railway Sector*. Paper published at the Journal Infrastructures, June 2022.
- 06/2022 **Nakhal A., A.J.**, Patriarca, R., Tronci, M., Agnello, P., Ansaldi, S. M., Ledda, A., (2022). *A STAMP model for safety analysis in industrial plants*. Paper published at the Journal Chemical Engineering

Rome, February 20<sup>th</sup> 2024

Antonio Javier Nakhal Akel

Transactions, June 2022 and presented in the 10th International Conference on Safety & Environment in Process & Power Industry (CISAP 10), May 2022; Firenze; Italy.

- 06/2021 **Nakhal A., A.J.**, Patriarca, R., Di Gravio, G., Antonioni, G., Paltrinieri, N., (2021). *Business Intelligence for the Analysis of Industrial Accidents Based on MHIDAS Database*. Paper published at the Journal Chemical Engineering Transactions, June 2021 and presented in the 15th International Conference on Chemical and Process Engineering (ICheaP 15), May 2021; Naples; Italy.
- 07/2021 **Nakhal A., A.J.**, Patriarca, R., Di Gravio, G., Antonioni, G., Paltrinieri, N., (2021). *Investigating occupational and operational industrial safety data through Business Intelligence and Machine Learning*. Paper published at the Journal Loss Prevention in Process Industries, July 2021.

*\*Journal paper under review*

- 2024 **Nakhal A., A. J.**, Nazari, N., Hegde, S., Piratla, K., Chalil Madathil, K., Momeni, A., Albert, A., Fedele, L., Patriarca, R. (2023). *Data-Driven analysis of Transportation Collision Reports: Unveiling patterns and insights for enhanced Accident Prevention Strategies*.

### **Book Chapters**

- 08/2022 **Nakhal A., A.J.**, Paltrinieri, N., Patriarca, R., (2022). *Business Analytics to advance industrial safety management*. Chapter 17 published at the book Engineering Reliability and Risk Assessment published by Elsevier, August 2022.

### **Conference proceedings**

- 06/2022 Tomascelli, N., **Nakhal A., A.J.**, Patriarca, R., Paltrinieri, N., Cruz, A., (2022). *Are we going towards "no-brainer" risk management? A case study on climate hazards*. Paper published and presented in the 16<sup>th</sup> International Conference on Probabilistic Safety Assessment and Management (PSAM 2022), June 2022; Honolulu; United States of America.
- 08/2022 **Nakhal A., A.J.**, Patriarca, R., Tronci, M., (2022). *Socio-technical Systems-Theoretic analysis of industrial processes*. Paper published and presented in the 2022 Reliability & Quality Design Conference (ISSAT 2022), August 2022; Miami; United States of America.
- 09/2022 Simone F., **Nakhal A., A. J.**, Patriarca R. (2022). *Investigating inventory data to support warehouse management through Machine Learning*. Proceedings of XXVII Summer School "Francesco Turco": "Unconventional Plants: Technologies, tools and Methodologies for emerging domains", 7-9 September 2022; Riviera dei Fiori, Italy.

*\*Conference proceedings in press*

- 04/2023 **Nakhal A., A.J.**, Simone, F., Stefana, E., Di Gravio, G., Patriarca, R. (2023). *System Theoretic Model Checking for safety management in industrial plants*. Proceedings of XXVIII Summer School "Francesco Turco": "Unconventional Plants: Technologies, tools and Methodologies for emerging domains", 7-9 September 2023; Genova, Italy.
- 09/2023 Simone F., **Nakhal Akel A. J.**, Alvino A., Ansaldi S. M., Agnello P., Milazzo M. F., Di Gravio G., Patriarca R., (2023). *Extending safety control structures: a knowledge graph for STAMP*. Proceedings of 31th European Safety and Reliability Conference (ESREL 2023). 03 - 08 September 2023, Southampton (United Kingdom).

## HONOURS AND AWARDS

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- 07/2023                    **Young Talent in Resilience Engineering.**  
Awards for the best young researchers in the field of Resilience Engineering, in the Young Talents in Resilience Engineering Program, managed by the Resilience Engineering Association (REA) for the REA symposium 2023.
- 08/2021                    **IEOM Outstanding Student Leadership Award.**  
Awarded by the Industrial Engineering and Operations Management Society during the 4th IEOM European Conference, 2-5 August 2021; Rome; Italy.

## SCIENTIFIC BOARD & COMMITTEE MEMBERSHIPS

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- 08/2024 (to be held)    **Technical committee member**  
“NEESSC 2024” – New Energy and Energy Storage System Control Summit Forum  
*Hohhot, China (August 29-31, 2024)*

## REVIEWING ACTIVITIES

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- Since 2024                    **Journal of Process Safety and Environmental Protection (Elsevier)**
- Since 2023                    **Journal of Artificial Intelligence (AI) in Business and Management (IGI Global)**
- Since 2023                    **Qeios**
- Since 2022                    **Jordan Journal of Mechanical and Industrial Engineering (JJMIE)**
- 2023                            **18<sup>th</sup> IFKAD – International Forum on Knowledge Asset Dynamics**  
*Matera, Italy*  
Managing Knowledge for Sustainability.
- 2022                            **5<sup>th</sup> IEOM – European Conference on Industrial Engineering and Operations Management**  
*Rome, Italy*  
Fostering Sustainable, Human-Centric and Resilient Manufacturing.

## MEMBERSHIPS & CERTIFICATIONS

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- Since 2021                    **Junior Member, Italian Association of Operations Management Professor (AIDI)**
- 2019 - 2022                    **Member, Project Management Institute (PMI)**

## LANGUAGES

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<b>Spanish</b>	Mother's tongue
<b>English</b>	Fluent, Professional Competence
<b>Italian</b>	Fluent, Professional Competence