Saja Hani Al-Rifai, Ph.D., P.E.

Work Authorization: U.S. Citizen

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Summary

Mechanical Engineer (Ph.D., P.E.) with **over 5 years of experience** in **product design**, **computational modeling**, and **Multiphysics simulation**. I have taught **graduate and undergraduate mechanical engineering courses** for more than **two years** and have **5+ years of research experience** focused on **CFD**, **CAD design**, **AI-driven modeling**, **combustion analysis**, **HVAC**, and **thermal systems**. I have a proven track record of **leading multidisciplinary teams** and **independently managing complex projects**, achieving both **technical goals** and **cost efficiencies**. My work is grounded in **simulation-driven product development**, supported by **hands-on experience** across both **academic and industrial environments**. I am proficient in **advanced engineering tools** (such as **ANSYS**, **Abaqus**, **SolidWorks**) and **programming languages**, which enhance my effectiveness in both **teaching** and **research-based problem solving**.

Professional Experience

Visiting Assistant Teaching Professor

Mechanical and Materials Engineering Department, FIU, Miami, Florida | 12/2022-current

- Taught graduate and undergraduate courses in mechanical engineering, focusing on **computational Fluid Dynamics (CFD), Computer Aided Design for engineers (CAD),** fluid mechanics, energy systems and thermodynamics, and heat transfer.
- Worked closely with students on **computational projects**, enhancing their understanding of simulation tools and data-driven decision-making.
- Coordinated academic support, providing additional guidance to students and fostering an interactive learning environment.

Research Experience

Florida International University | 08/2018–12/2022

- **Multidisciplinary CFD and FEA Simulation**: Modeled and simulated complex thermofluidic systems for multidisciplinary research projects, securing $47k in annual funding through competitive grants.
- **CFD Combustion Modeling**: CFD-based combustion analysis **using RANS and LES models** for gas turbine engines, in collaboration with the Air Force Institute of Technology (AFIT). Improved combustion efficiency through advanced CFD techniques. Presented research findings at national conferences to advance knowledge in aerospace combustion.
- **Nanoporous Transport Membrane Condenser (TMC) Development**: Led R&D efforts in the design and optimization of nanoporous TMC systems for energy-efficient heat exchangers. **Utilizing CFD** to enhance thermal performance and efficiency. Presented at national conferences and published results in leading scientific journals.
- **Multiphase Flow Simulation**: Modeled heat and mass transfer in high-temperature, high-pressure environments, with a focus on enhancing energy efficiency and material durability.
- **Molecular Dynamics**: Conducted multiphase flow studies within nanoporous ceramic materials, exploring thermal properties and fluid behavior at the molecular level.

Jordan University of Science and Technology | 2012–2015

- **HVAC System Optimization**: Designed and optimized solar ejector cooling systems using TRNSYS-EES to improve energy efficiency in HVAC applications

CFD/CAE Engineer (part time) | 05/2023–02/2025
Cerrozone, A Marmon/Berkshire Hathaway Company| 2023–Present

- **Led technical analysis and product design** optimization through advanced **CFD** simulations using **ANSYS** Fluent and CFX and SOLIDWORKS, contributing to reduced prototype costs and shortened time-to-market.
- Conducted airflow, thermal, and acoustic simulations to meet product performance standards, offering solutions to complex engineering challenges.
- Collaborated with cross-functional teams to align product development with customer requirements and expectations, ensuring high-level customer satisfaction.

Staff Engineer
ALTEK Engineering, Miami, Florida | 08/2015–09/2020

- **CFD simulation** and analysis for airflow and thermal analysis-based HVAC system.
- Designed residential **HVAC** systems, developed engineering reports, and created technical drawings.
- Collaborated with project managers to streamline project execution and technical deliverables.

Technical Skills

- Simulation & Modeling: ANSYS, Fluent, COMSOL, ABAQUS, StarCCM+, CFD code development, TRNSYS, TECplot, Paraview
- Design & CAD: SOLIDWORKS, AutoCAD, Inventor, Revit, SpaceClaim
- Programming: MATLAB, Python, FORTRAN, C/C++, CFD code development
- Software & Platforms: Microsoft Office, Linux Ubuntu, EES, PVSOL, LAMMPS

Core Competencies

- CFD & FEA Simulation (Multiphase/Single-phase, Heat & Mass Transfer, Steady/Transient)
- Product Design & Development, Research & Development (R&D)
- HVAC & MEP Systems Optimization
- Combustion, Acoustics, & Thermofluidic
- Technical Consulting & Communication

Education

- Ph.D. in Mechanical Engineering | Florida International University | 2022
  Key Coursework: Computational Fluid Dynamics, Heat Transfer, Thermodynamics, Optimization.
- M.Sc. in Mechanical Engineering and Renewable energy| Jordan University of Science and Technology | 2015.
- B.Sc. in Mechanical Engineering | Jordan University of Science and Technology | 2007.

Certifications & Licenses

- Professional Engineer, PE: License No. 100901
- Florida Engineer Intern License: No. 1100020531

Publications - Full List (Google Scholar)

- Saja H. Al-Rifai, Cheng-Xian Lin, Brian T. Bohan, Marc D. Polanka, 2021, "A Numerical Sensitivity Study of Modeling Parameters in the Combustion of a SWIRLER," Proceedings of ASME Turbo Expo 2021, Virtual, GT2021-59392.
- Saja Al-Rifai, Cheng-Xian Lin, 2021, "Heat and Mass Transfer Correlations for Staggered Nanoporous Membrane Tubes in Flue Gas Crossflow", Journal of Heat Transfer. Jun 2022, 144(6): 062702.

- Saja Al-rifai, Yiding Cao, 2023, "Multiphase modeling of heat and mass transfer inside transport membrane condenser (TMC) tube bundle", International Journal of Heat and Mass Transfer, Vol. 214, 124429.
- Bourhan Tashtoush, Aiman Alshare, Saja AL-Rifai, 2015, "Hourly Dynamic Simulation of Solar Ejector Cooling System using TRNSYS for Jordanian Climate," Energy Conversion and Management, Vol. 100, pp. 300-310.

Awards

- **Summer Faculty Fellowship Program (SFFP):** Awarded three times (2020, 2021, 2022) by the Air Force Research Laboratory (AFRL) and Air Force Institute of Technology (AFIT), Wright-Patterson Air Force Base (WPAFB), for outstanding contributions to research in combustion modeling and CFD.
- **Doctoral Evidence Acquisition Fellowship:** Received in 2021 from Florida International University for excellence in doctoral research and academic achievement.
- **International Internship:** Selected for an internship at the International Institute for Industrial Environmental Economics (IIIEE), Lund University, Sweden, as part of the EU-funded MANSUR project (2013).

Professional Memberships and Services

- **Professional Memberships**: Active member of the American Society of Mechanical Engineers (ASME), the American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE), and the American Chemical Society (ACS).
- **Reviewer**: Peer reviewer for the ASME Journal of Heat Transfer and ASME's International Mechanical Engineering Congress & Exposition (IMECE), contributing to the advancement of mechanical engineering research.
- **Community Volunteer**: Dedicated to community service through volunteer efforts, supporting various local initiatives.