Varad Karkhanis, Ph.D.

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Personal Website | **Google Scholar** | **LinkedIn Profile**

Summary

- **10+ years of experience** in Systems Engineering across automotive and industrial domains, including **hydrogen fuel cell EVs**, electrification systems, and safety-critical product development
- **Subject Matter Expert (SME)** in ISO 26262 Functional Safety, MBSE practices, and multidisciplinary system integration
- **Proven track record** of executing systems engineering V-cycle (requirements, architecture, integration, verification & validation)
- Technical Leader and Internal **Trainer at ZF (Mentored 80+ Engineers at ZF)** for functional safety and system simulation
- **Design for Six Sigma Green Belt** | **TÜV SÜD Certified (ISO 26262 L1)** | Strong exposure to DOORS, JAMA, Rhapsody
- **Ph.D. in Mechanical Engineering** with mathematical model implemented in HPC code for LANL (USA)
- Published research works in several peer reviewed Journal Publications with **324 citations** by other researchers in the world and **h-index of 9** as of May 2025- Link to List of Publications

Employment Experience

Senior Technical Lead **Oct 2023 – present**
ZF Group, Hyderabad, India

- Lead **System Engineering Activities** for fuel cell systems & EV applications; drive cross-functional requirement definition
- Own **Functional Safety Deliverables** per ISO 26262: Item Definition, HARA, Safety Goals, FSRs, TSRs
- Develop **System Simulations** in MATLAB/Simulink to validate behavior of mechatronic systems
- Implement **MBSE** methodologies using tools like Cameo and PTC/DOORS; act as cross-domain integrator
- Serve as **Functional Safety Mentor** and company-level internal trainer across departments
- Led internal innovation project on **Virtual Sensor Development** for fuel cell mass flow prediction, securing internal funding

Lead Engineer- Systems and Functional Safety **Sept 2021 – Oct-2023**
Eaton Corporation, Pune, India

- Architected **BLDC/PMSM motor drive systems** using SysML, V-model, and MBSE techniques
- Led creation of ISO 26262 safety work products, including FMEA, FTA, FSC, and TSC
- Delivered cross-domain system requirement analysis for EV subsystems; refined technical risk through simulations
- Contributed to **DfX efforts and Design for Six Sigma practice** using ProLaunch and 8D tools
- Collaborated closely with cross-functional teams spanning electronics, firmware, and control software

Systems Engineer (R&D) **Aug 2017 – July 2021**
SP Scientific, NY

- Led R&D for Lyophilization processes and **low-GWP refrigeration system design**
- Conducted technical risk analysis (FMEA) and acted as a **cross-domain technical consultant**
- Partnered across electrical, software, and mechanical domains to drive next-gen system architecture

Adjunct Faculty **Jan 2019 – July 2021**
State University of New York at New Paltz, NY

- Taught undergraduate courses in **Computer Simulation** and **Heat Transfer** with excellent feedback (4+ / 5 SEI scores)

Ph.D. Research Assistant **Jan 2014 – July 2017**
Laboratory for Multiscale Computational Fluid Dynamics (LMCFD), NC

- Developed a mathematical model for **ejecta velocities in shocked metals** using FLASH CFD software
- Model adopted in **HPC codes at Los Alamos National Lab** for use in classified simulations

Engineer **July 2008 – June 2010**
Honeywell Automation India Limited, Pune

- Designed HVAC automation systems using **BACnet protocols and programmable controllers**

Education

Ph.D. in Mechanical Engineering **Jan 2014 – July 2017**
University of North Carolina at Charlotte

- Dissertation: Hydrodynamic simulations of ejecta production from shocked metallic surfaces
- Advisor: Dr. Praveen Ramaprabhu
- GPA: 3.910/4.0

M.S. in Mechanical Engineering **Aug 2011 – Dec 2013**
University of North Carolina at Charlotte

- Dissertation: Doubly-shocked Richtmyer-Meshkov Instability
- Advisor: Dr. Praveen Ramaprabhu
- GPA: 3.833/4.0

B.E. in Mechanical Engineering **July 2004 – July 2008**
University of Pune, Pune, India

- Grade: First class with Distinction

CERTIFICATIONS & TECHNICAL SKILLS

- **Certifications:** ISO 26262 (TÜV SÜD, L1), DFSS Green Belt (Eaton), DfX, FMEA/FTA

- **MBSE & SysML Tools:** Cameo Systems Modeler, IBM DOORS NG, JAMA, MATLAB-Simulink

- **Simulation/Programming:** MATLAB, Simulink, Python, C/C++, Octave

- **Systems Engineering Competencies:**
  - Requirements Engineering (Flow-down, Traceability)
  - System Architecture, Integration, V&V
  - Compliance with ISO 26262, ISO/IEC15288, DO-160/178 (exposure), ARP4754/4761 (aware)
  - V-Cycle Execution, Trade Studies, Technical Risk Management
  - Cross-domain leadership across mechanical, firmware, controls, and electronics

Key Achievements

- **Pinnacle Award**
  Recognized by ZF Group with the Pinnacle Award for exceptional leadership in fuel-cell system integration and delivering cross-functional projects on schedule (Jan 2025)

- **Innovation Funding & Leadership**
  Secured prestigious internal R&D funding at ZF and led a multidisciplinary team to develop a virtual sensor platform for hydrogen compressor mass-flow prediction, enhancing system accuracy and reliability

- **Excellence Award**
  Honored by ZF Group (Q2 2024) for outstanding leadership in fuel-cell system integration and delivering cross-functional projects ahead of schedule

- **High-Impact Ph.D. Research**
  Developed an ejecta-velocity prediction model during Ph.D., which was integrated into HPC simulation codes at Los Alamos National Laboratory to accelerate shock-driven multiphase flow studies

Professional Affiliation

Society of Automotive Engineers (SAE), American Physical Society (APS), American Society of Mechanical Engineers (ASME), American Institute of Aeronautics and Astronautics (AIAA)