Muhammad TP

System Design and Simulation Engineer (Fuel cell Electric Vehicle)

Contact

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Education

M-Tech: Mechanical Engineering (Thermal)

- INDIAN INSTITUTE OF TECHNOLOGY (IIT) MADRAS
- 2016-2018
- CGPA :9.4/10

B-Tech: Mechanical Engineering

- NATIONAL INSTITUTE OF TECHNOLOGY (NIT) CALICUT
- 2010-2014
- CGPA: 7.2/10

Language

- English: Fluent
- Arabic: Intermediate
- Hindi: Fluent
- Malayalam: Fluent

Personal Info.

- Gender: Male
- Married
- Nationality: Indian
- Driving Licence: India
- Can Join Immediately

Career Summary

Experienced Systems Engineer with over 6 years in fuel cell electric vehicle (FCEV) development, specializing in system simulation, hydrogen delivery systems, and thermal management. Expertise in model-based design (MBD) using MATLAB-Simulink, Dymola, and GT-Suite for vehicle-level integration and performance optimization. Led end-to-end simulation and validation of India's first hydrogen FCEV bus, aligning with global compliance standards. Strong background in DFMEA, DVP, and cross-functional team

Skills Summary

•Programming/Scripting

M-Scripting, Modelica, VBA, Python

•Tools and Software

MATLAB, Simulink, DYMOLA, MS Excel, GT Suite, AVL Boost

•Simulation

1D simulation: GT Suite, AVL Boost, AVL Cruise

•Hard Skills

Fuel cell electric vehicle integration, Design Validation Plans (DVP), DFMEA, Fuel cell Electric vehicle Thermal system design

•Soft Skills

Project planning and management, Strong Stakeholder Management, People Management, Excellent communication, Cross functional team Collaboration, Leader ships

•Domain Knowledge

Powertrain simulation, Hydrogen storage, Hydrogen Safety Design Fuel cell, Balance of plant component sizing (Compressor, humidifier, ejector, etc.), Electric vehicle thermal system, Electric vehicle

•DATA Visualization

MS Office, MS Excel, MATLAB

Awards and Certificates

- **Innovation Excellence Award**
  - From Tata Motors: Development of a tool to select a turbocharger from thermodynamic parameters.
- **Leadership Award**
  - From TATA Motors in May 2021 for showing leadership behavior on developing Self and other.

Professional Experience

1.Tata Motors, Pune: Senior Manager **August 2018-April 2025**

1.1. Hydrogen Fuel cell electric vehicle projects: Buses and Long-Haul trucks

• Engaged in cutting-edge technologies in **hydrogen fuel cell electric vehicles (FCEVs),** focusing on advanced **system simulation, hydrogen storage, and thermal management** for next-generation commercial vehicles

• Orchestrated cross-functional teams to enhance **supplier quality analysis** and streamline vendor selection processes, culminating in a **25% improvement** in supply chain efficiency for EV components and as per safety standards

• Generated **RFIs/RFQs** for key FCEV aggregates and conducted detailed **techno-commercial evaluations** to support supplier selection and procurement decisions.

• Directed the **simulation and selection** of **radiator, hydrogen fuel delivery system**, pumps, and **fuel cell power system** using **MATLAB-Simulink and Dymola**, improving accuracy by 30%.

• Developed and facilitated comprehensive **DVP processes to align FCEV components** with global compliance standards using **DFMEA** and industry best practices

• Worked with a cross-functional team to successfully achieve CMVR certification through ARAI for India's **first hydrogen fuel cell vehicle**, in compliance with AIS 157 — the **first such certification in the country**.

• Worked on the **design and simulation of thermal systems** for FCEV bus and fuel cell long-haul truck, **optimizing radiator fan duty cycles** and integrating the results into the overall vehicle control strategy.

1.2. Indigenous development projects: PEM Fuel cell system

• Led **project planning activities for a 2-year hydrogen** PEM fuel cell development program, including timeline definition, resource allocation, and finalization of budget requirements.

• Managed the end-to-end development of a hydrogen PEM fuel cell system, overseeing simulation, subsystem integration, and component-level validation.

• Performed **zero-dimensional modelling of key balance of plant (BoP) components, including compressors, humidifiers, ejectors, and pumps**, to support early-stage system design and performance assessment.

• Executed **model-based design of thermal, air, and hydrogen subsystems, enabling optimized component selection and control strategy** development.

• Conducted **1D simulation of cathode and anode flow paths** to assess pressure, flow, and thermal behavior across various load cycles.

• Led component-level **testing and data analysis** to validate system models and support **performance optimization** of the integrated fuel cell system.

• Developed **control strategies for various components and subsystems** in PEM fuel cell systems, **including thermal management, air supply, and hydrogen delivery**, to ensure efficient and reliable operation across drive cycles.

1.3. Turbocharger selection and EGR distribution of IC engines

• Performed **1D simulation of engine systems using GT-Power, AVL BOOST**, and Ricardo WAVE to enable **virtual testing and performance evaluation**, supporting early-stage design decisions and minimizing reliance on physical prototyping

• Conducted **3D CFD simulations to analyze EGR** (Exhaust Gas Recirculation) **mixture distribution in engine** intake systems, enhancing combustion efficiency and emissions performance.

• Developed **mean value engine models** using **Excel VBA for turbocharger** selection in both commercial and passenger vehicles, enabling performance analysis of boost pressure, transient response, and fuel efficiency

Key Achievements

- **Ranked 2nd in MTech (Mechanical Engineering - Thermal) program at IIT Madras, 2018 — CGPA: 9.4/10**
- **Copyright: Design of an Ejector for Anode Recirculation in a PEM Fuel Cell Using 1D Numerical Calculation**

• A toolchain to develop the ejector for all general applications of PEM fuel cells. Reduced man hour substantially.

- **Indigenous Hydrogen Fuel cell bus certification**

•Actively involved for achieving ARAI CMVR certification for the first indigenous Hydrogen FCEV bus in India as per AIS 157.

- **Copyright: Automation of thermo-dynamic modeling of turbocharger selection using Excel-VBA**

•Reduced manual calculation time by 60%, enhancing accuracy and efficiency for the engineering team.

- **Copyright: Thermal system optimization model for FCEV platform in DYMOLA**

•The model used to analyse the thermal system used in FCEV projects at various operating conditions

Publication

- **A Computational Study of Air Motion Inside the Engine Cylinder of a Small Spark Ignited Engine, Incorporating Boundary Conditions from 1-D Modelling.**
- Proceedings of the 7th International and 45th National Conference on Fluid Mechanics and Fluid Power (FMFP) December 10-12, 2018, IIT Bombay, Mumbai, India
- **Hydrogen Refilling Optimizations Through 1-D Simulations for Commercial Vehicles.**
- T. P. Muhammad, Jacob Joe, Bhaveshkumar Bhut, and Abhijeet Chougule, SAE Technical Paper, 2024

Training/Courses

- Introduction to BMS and ECS modelling on Courcera, University of Colorado Boulder
- Model-based design: Udemy Master
- CAN protocol completely (CAN+CAN-FD): UDEMY
- Model-based Development for ADAS using MATLAB and Simulink: Skill Lync Academy: MiL, SiL testing, Project: Model-based design of Tilt/Telescopic adjustment of steering wheel
- Swagelok Tube fitting installation Inspection Essential certification: Swagelok Bombay
- Hydrogen system design for commercial vehicle application: AVL

Academic Projects

- **M-Tech project:**
- Development of a Computational Fluid Dynamic Model of a Small Spark Ignition Engine, Incorporating Boundary Conditions from 1-D Modelling Approach
- **B Tech project**
- Material Development-Determination of tribological properties of Al6061 matrix alloy reinforced with Boron carbide and Molybdenum disulphide

Position And Responsibility

- Organizing committee member of COPEN-8 international conference held at NITC
- Coordination committee member RAGAM-14 (Cultural Fest -NITC)
- Committee member for TATHVA 12 and RAGAM 13 Conducted by NITC
- Active member of NITC NSS unit