DHRUVAL JAVIA

Dhruval is an ingenious mechanical engineer, enthusiastic about solving global climate and energy problems through innovation and sustainability-driven outlook. With two years of experience, he is adept in thermal and electrochemical system modelling and analysis.

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EDUCATION

Year	Institute	Qualification
2024 – present (Expected 06/2026)	Stanford University (CA, United States)	M.S. in Mechanical Engineering (Depth in Energy Systems)
2018-2022	Indian Institute of Technology, Bhubaneswar (Odisha, India)	B. Tech. in Mechanical Engineering

ACADEMIC PROJECTS

EFFICIENT BATTERY THERMAL MANAGEMENT SYSTEMS FOR EV

2021-2022 | Final year B. Tech. thesis project | Supervisor: Dr. B. R. Pattabhi

- The project was aimed at *improving the effectiveness and efficiency of the battery thermal management system* by reducing the *cell capacity degradation caused due to temperature effects.*
- An **air-cooled cylindrical battery pack** was considered for this purpose and different **cell arrangements and flow patterns** were studied *to reduce the temperature variation across the cells and the peak cell temperature.*
- The degradation studies were done through **numerical simulations** in **COMSOL** software. For this, a **coupled 1-D electrochemical and 2-D thermal model of the battery pack** was used for the numerical simulations. This was further *coupled* with a **capacity fade model** to account for *cell capacity degradation*.
- A *tapered cell arrangement of 26650 type of Li-ion cells* was found to have the best overall performance.
- The work was published in a paper titled **"Design of lithium-ion battery packs for two-wheeled electric vehicles"** in the **"Energy Storage"** journal having an *impact factor of* **3.2**.
- The project work was also nominated for the "*Best Thesis Award*" in my batch at IIT Bhubaneswar.

MACRO-SCALE DESIGN ASPECTS OF EV BATTERY PACK

2021 | Summer research internship project | Supervisor: Dr. Sundararajan Natarajan (IIT Madras) and Dr. B. R. Pattabhi (IIT Bhubaneswar)

- *Performed preliminary battery pack design calculations* by initially developing a system of equations in **EXCEL** and later implementing it in a **MATLAB app** for a better GUI experience. The app can also be used to *analyse the effect of critical battery pack design parameters on the performance of the battery pack.*
- Wrote **MATLAB code** for *generating data for single cell current variation with time based on the adopted vehicle velocity profile* by using a simple **vehicle dynamics equation**. This was used as an input to the microscale numerical simulation of cell discharge done by the other group member.

TECHNICAL SKILLS

SolidWorks • ANSYS • COMSOL • Arduino • Python • MATLAB

WORK EXPERIENCE

THERMAX LTD. | Graduate Engineer Trainee | August 2022 – July 2024

- Expanded my knowledge and gained practical experience, particularly in areas of **mathematical modelling, manufacturing process, product troubleshooting, failure analysis and commissioning** related to a **boiler** and **thermic fluid heater**.
- Performed tasks such as **boiler furnace modelling** in EXCEL using **stirred reactor** and **plug flow models**, **data driven modelling of boiler** in EXCEL, *tracking a boiler unit on factory shop floor stage-wise end-to-end and suggesting points for manufacturing process improvement and automation,* site visit & subsequent report generation for **Residual Life Analysis (RLA)** and **Root Cause Analysis (RCA)** activities.
- Worked on a team project involving **standardisation of the design and techno-commercial offering of a biomass-fired thermal oil heater**. Activities involved include *P&ID study, calculations for efficiency, grate sizing & BOP/auxiliary equipment sizing, layouting and thermal & pressure drop simulations.*
- The project led to a **7.4% reduction in total weight** and a **10.2% decrease in total footprint area** as compared to the previous design.
- As part of the project, I developed a simplified **thermal model** of the **APH**, **Economizer** and **MPA furnace** in **EXCEL** with **VBA automation** *to iteratively design the heater*, and *validated it with existing data*. The model provided *inlet/outlet temperature values* within **2%**, **6%** and **10% error** in APH, Economizer and MPA furnace respectively.