

PROFESSIONAL SYNOPSIS

1. Proficient in Process Optimization, Data analysis and Modeling using AI/ML techniques, Troubleshooting of Methanol, Alumina Refineries.
2. Hands-on experience in Data Analytics, Process Engineering, PFD, P&ID, and Process Simulations.
3. Expertise in Engineering calculations related to Heat & Mass balances.
4. Capable of handling a team and independent assignments for delivering fast track projects.
5. Strong analytical and problem-solving skills, with the ability to work independently or as part of a team.

SKILLSETS

RAPID MINER

PYTHON

ANSYS FLUENT

ASPEN PLUS

MICROSOFT OFFICE

SQL

FORECASTING

Education

- M Tech in Chemical Engineering, BITS Pilani, Pilani Campus.
CGPA – 9.04 (2017-19)
- B Tech in Chemical Engineering, JNTU-H.
CGPA – 8.39 (2012-16)

Publications

- “CFD Modeling of Gas Suspension Calciner in an Alumina Refinery” in ICSOBA Conference proceedings November 16-18, 2020.

Certifications:

- Certificate of Excellence for FY’22-23 and FY’23-24 at Ingenero Technologies.
- Won “Team Titan” award for overall team performance at Ingenero Technologies.
- Employee of the month at Aditya Birla Group in 2021.
- Certificate of Appreciation by ICSOBA, 2020.
- Machine Learning, Signal Preprocessing and Feature Extraction for Data Analytics by MATHWORKS in 2019.
- Certificate as a resource person for taking sessions to educators and students at CBIT, Hyderabad on Data Science for real time plant monitoring

PROFESSIONAL EXPERIENCE & TECHNICAL PROJECTS

Ingenero Technologies: Sub Lead –Data Scientist,

Apr 2022 – Present

- Working on several digitalization projects using data science for real time performance monitoring of four different methanol plants for SABIC, Saudi Arabia using AI/ML solutions.
- Through AI/ML solutions, diagnosed and identified gaps were prescribed for set point changes to realize identified opportunity.
- Hybrid model has been built using first principles and data based modeling for evaluating optimum/ economic catalyst change over at EOR.
- Expertise with ICI low pressure quench methanol reactor system comprising of adiabatic beds with synthesis gas quenching for cooling the exothermic reactions from the process and dual type methanol synthesis reactor having a shell and tube configuration.
- Expertise in various technologies of Methane steam reforming comprising single reforming unit and auto thermal reforming unit along with pre reforming for higher heavier hydrocarbons in feed.
- Leading a team of 5 people for successful development of several projects at SABIC for various methanol plants on real time plant monitoring, forecasting, and soft sensor developments.
- Involved in Troubleshooting, process calculations, simulations and process optimization.
- Involved in developing an effective operation excellence tool – Continuous Proactive Operations Guidance on achieving targets on specified KPIs.
- Involved closely in the automation of data modeling pipelines for the streamlining and faster development and deployment of multiple projects for the client.
- Developed multiple self-re-training forecasting ML models of NOx emissions, Carbon yield of a methanol reactor, catalyst activity in reformer using multiple techniques including ARIMA, GLM, RF, XGB and DL models.
- Aspen modeling for the methanol process has been carried out for closing Heat and mass balances along with identification of wrong thermocouples/ flow meters in the plant.
- Developed soft sensors for compositions at the outlet of a methanol reformer and vent gas using ML models for real time plant monitoring.
- Through effective real time plant monitoring, realized a monetary benefit of 5 cr/annum in methanol synthesis reactor system at SABIC.
- Successfully led the value capture discussions with clients for approvals and realizations.

- Involved in deployment of developed data science models for various petrochemical plants in dev, QA and prod servers at Jubail, Saudi Arabia for SABIC petrochemical refinery.

Aditya Birla Science and Technology private Co Ltd: Scientist,

Jul 2019 – Mar 2022

Modeling and Simulation projects:

- Digital Twin development of Utkal Calciner in an Alumina Refinery (2019-22)
 - Physics based models for Calcination system at Hindalco Alumina refinery for the development of Digital Twins
 - CFD modeling was carried out using Ansys Fluent 2019 R2, 2021 R1 for entire Calcination system comprising fluidized bed calciners, cooling and pre-heating cyclones.
 - Through the combined systems modeling, where each unit operation has been modelled with output of each cyclone going as an input to the next cyclone till the calciner system and pre-heating cyclones. This study has been done to create an integrated overall system model to capture the effect of each unit operation as a part of Digital twin development.
 - Carried out simulations comprising several Turbulence models, discrete phase modeling and combustion modeling.
 - In addition to digital twin modeling, various optimum advisories were also recommended and implemented at Utkal Alumina International Ltd for optimization of Heavy fuel oil consumption.
 - Realized a benefit of 1 Kg of HFO reduction per ton of Alumina at the plant leading to a cost benefit of ~7-8 cr/annum.
 - Suggested several critical sensors after verifying the P&ID diagrams for additional validations of models to plant team.
 - Data driven machine learning predictive models for prediction of product quality to enhance operational decision making. (2020-22)
 - Prior to the machine learning model developments, an in-depth data analysis (Time series) using Tableau & Minitab was carried out.
 - From the plant historian operational data, XGBoost regressor based machine learning model was developed for product quality Prediction every minute.
 - Offline validations were carried out at the plant DCS for a period of 1 month.
 - Working with plant team and IT teams for deploying validated model in Plant server by integrating models with plant historian.
 - Data visualization from MySQL using Tableau for monitoring of the feature correlations was carried out.

Experimentation Projects:

- Hydrolysis of Sugarcane Bagasse and Wheat Straw to sugar using Graphene Oxide as Catalyst – **Thesis at BITS Pilani** (2018-19)
 - Wheat straw and Sugar cane bagasse were taken as raw materials while graphene oxide catalyst was prepared from Natural Graphite powder using Improved Hummer’s method for use as catalyst to produce sugars in an Autoclave reactor.
 - Design of experiments (DOE) was prepared to extract the optimum conditions of raw material to catalyst proportions for conversion to glucose and several other sugars.
 - In addition, Synthesis of Graphene oxide by preparing graphite powder directly from agricultural waste (Sugar cane bagasse) was carried out in a muffle furnace.
- An Energy roadmap through a Sanky Diagram was prepared to identify the key areas consuming energy consumptions in an Alumina Refinery.
- Energy Baseline study of entire Bayer Alumina process through mass and energy balances was carried out. (2021-22)
- Experimental analysis for reduction of soda loss in red mud through calcification process. (2019-20)
 - A detailed mass balance was carried out for the red area of an alumina refinery.
 - Carried out various characterization techniques to understand phases, compositions and particle sizes.

S&S Technomark private Co Ltd: Graduate Apprentice, May 2016 – June 2017

- Assisted in carrying out detailed literature survey along with mass and energy balances.
- Assisted in creating process flow diagrams, verifying technical drawings and preparation of Detailed Project Report (DPR).

Core competencies

Machine learning & Deep learning

Data Visualization

Process Simulation

Process Optimization

Digital Twin

Industry 4.0

Achievements & Responsibilities

- Delivered sessions as a resource person at Chaitanya Bharati Institute of Technology (CBIT), Hyderabad on Data Science and its applications in manufacturing industries to educators and students.
- Won the “Certificate of Excellence” for the overall yearly performance at Ingenero Technologies for FY’22-23 and FY’23-24.
- Won “Team Titan” award for overall team performance at Ingenero Technologies for FY’23-24.
- Promoted as a Sub Lead with a five member team for the overall performance in April 2023.
- The work on digital twin of Calcination Unit was proposed for “ABG PRIDE award” in 2021.
- Won “Employee of the month” at Aditya Birla Group.
- The work on “CFD Modeling of Gas Suspension Calciner in an Alumina Refinery” was presented in Virtually held “38th International Conference on Study of Bauxite, Alumina and Aluminum (ICSOBA)”
- Presented the work on Hydrolysis of Wheat Straw and Sugarcane Bagasse to sugars using Graphene oxide catalysis in International conference, CHEMCON 2K19
- Cleared All India Graduate Test in Engineering, GATE 2018 with a Score of 380.
- Stood First in a Paper Presentation during National Level Technical Fest AAGAMA 2K14 on production of Biodiesel - Anurag Group of Institutions.
- Worked as Junior Placement Committee member at BITS PILANI, India.
- Served as a member of Governing body – EXTROPY 2K18 at BITS PILANI, India.
- Served as a vice president in National Level Technical Fest – RASAYANIKA 2K14 – Anurag Group of Institutions, India.