Ankit Singh

Junior Undergraduate
Chemical Engineering | Minors in Computer Science and Engineering
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ACADEMIC DETAILS

Degree	Specialization	Institute	Year
B.Tech.	*Chemical Engineering*	IIT Gandhinagar	2022-Present
Class XII	*Physics, Chemistry, Maths*	Maharishi Vidya Mandir	2021-2022
Class X		Maharishi Vidya Mandir	2019-2020

EXPERIENCES

- **Spectroscopy Lab, IIT Gandhinagar** [Jun '24 - Jul'24]
  (Advisor - Prof. Saumyakanti Khatua) | *Project Link*
  - Developed a mobile spectroscopy app using ReactNative, Python, enabling real-time spectral analysis through camera integration and image processing techniques, ensuring precise scientific measurements and data visualization.
  - Implemented KDTree for efficient color-to-wavelength mapping, leveraging OpenCV and Matplotlib for comprehensive data visualization capabilities, enhancing accuracy and usability in scientific.

PROJECTS

- **Human Activity Recognition** [Aug '24 - Sep'24]
  (Prof. Nipun Batra, IIT Gandhinagar) | *Project Link*
  - Executed comprehensive Human Activity Recognition (HAR) project by preprocessing accelerometer data, performing Exploratory Data Analysis (EDA) with PCA, and training decision tree models to classify activities, achieving insights into model performance and feature importance.
  - Utilized Python libraries such as Scikit-Learn for training decision tree models, TSFEL for feature extraction, and PCA for dimensionality reduction in the Human Activity Recognition project to enhance data analysis and model performance.

- **Next Word Prediction** [sep '24 - oct'24]
  (Prof. Nipun Batra, IIT Gandhinagar) | *Project Link*
  - Developed a text generation system using a Multi-Layer Perceptron (MLP) architecture, leveraging text tokenization, embedding creation, and model training/validation.
  - Built an interactive text generation application using Streamlit, allowing user input and parameter customization.

- **Pharmacy Management System** [Oct'24 - Dec'24]
  Project Link
  - Developed a cross-platform Pharmacy Management Application using Tauri for the frontend and Rust for the backend, ensuring a lightweight, high-performance desktop solution with secure user authentication and role-based access.
  - Integrated MongoDB for scalable data management, implemented email verification via SMTP for user authentication (signup and password recovery), and optimized medicine inventory tracking with real-time updates.

- **C and C++ Implementation of Classic Logic and Strategy Games** [Aug'23 - Nov'23]
  (Prof. Balagopal Komarath, IIT Gandhinagar) | *Project Link*
  - Developed a suite of classic games (Sudoku Solver, Connect 4, Tic-Tac-Toe) in C and C++, employing advanced algorithms such as backtracking and minimax to optimize game logic and player interactions.
  - Designed efficient data structures and algorithms to handle game states, move validation, and winning conditions, ensuring optimal performance and correctness in each game implementation.

- **Vapor Compression AC System Design** [Dec'24]
  (InterIIT Tech Meet 13.0) | *Project Link*
  - Designed and simulated a vapor compression-based air conditioning system using **MATLAB/Simulink**, implementing advanced control strategies for optimal cooling, dehumidification, and energy efficiency under dynamic load conditions.
  - Developed a **thermodynamic model** with safety interlocks and performance optimization, achieving accurate load simulations and ensuring compliance with operational limits for a real-world refrigeration system.

- **Laundry App for IIT Gandhinagar** [Feb'24 - May'24]
  Project Link
  - Designed and developed a feature-rich mobile application using ReactNative to assist students in efficiently managing and tracking their laundry records and status, ensuring a seamless and user-friendly experience.
  - Implemented a robust real-time database integration with Firebase, enabling seamless synchronization of laundry status and details across all users, ensuring efficient management and enhanced user experience.

- **Computational Analysis of Encapsulated Microbubbles** [Aug'23 - Nov'23]
  (Prof. Dilip Srinivas Sundaram, IIT Gandhinagar) | *Project Link*
  - Developed a comprehensive **mathematical model** to analyze the impact of encapsulation elasticity on microbubble dynamics, improving understanding for medical imaging and drug delivery applications.

- Conducted extensive literature review and implemented numerical simulations using **MATLAB**, applying techniques such as the **Runge-Kutta method** to solve ordinary **differential equations** (ODEs).
- Investigated key factors influencing microbubble behavior, including surface tension, encapsulation material properties, and gas diffusion, leading to enhanced stability and performance predictions.

- **Fund Raising Application (Sahayak)** [Jun'24 - Sep'24]
  Project Link
  - Developing a mobile fundraising application using **ReactNative**, which empowers users to efficiently raise funds for medical needs and various personal causes, providing a user-friendly platform for effective financial support.
  - Designing and implementing a scalable backend infrastructure using **Flask** and **Firebase**, guaranteeing seamless data storage and retrieval, and integrating with a MongoDB for efficient data management and scalability.
  - Building a user-centric platform that simplifies fundraising campaign creation, donation tracking, and social sharing, prioritizing intuitive user experience and fostering meaningful engagement in fundraising initiatives.

- **Modified Rankine Cycle for Power Plants** [Aug'23 - Nov'23]
  (Prof. Atul Bhargav, IIT Gandhinagar) | *Project Link*
  - Optimized the ideal Rankine cycle to achieve >47% thermal efficiency and >90% steam quality by maintaining boiler pressure at 15 MPa, condenser pressure at 10 kPa, and turbine temperature below 500°C.
  - Applied reheating and feedwater heating techniques, using **Cantera and MATLAB**, leading to a thermal efficiency of 47.45% and steam quality of 90.42%.
  - Conducted a parametric study on boiler and condenser pressures (12 MPa to 15 MPa and 5 kPa to 10 kPa) and evaluated their effects on efficiency and net work output, visualized through MATLAB plots.
  - Created detailed MATLAB plots to visualize the effects of varying boiler and condenser pressures on the Rankine cycle's efficiency and net work output, providing clear insights into the performance impacts and optimization opportunities.

- **Design of a Temperature Regulation System Using Phase-Change Materials (PCM)** [Jan'24 - Apr'24]
  (Prof. Biswajit Saha, IIT Gandhinagar)
  - Designed and analyzed a temperature regulation setup using phase-change materials (PCM) to enhance thermal management in the system.
  - Conducted experiments to compare temperature profiles and calculate the efficiency of the setup with and without paraffin wax as the PCM.

RELEVANT COURSES

- **Institute Courses:** Data Structures and Algorithms-1, Machine Learning, Data-Centric Computing, Introduction to Partial Differential Equations, Ordinary Differential Equations, Numerical Methods.
- **Online Courses:** *Supervised Machine Learning: Regression and Classification.*

ACHIEVEMENT

- Represented IIT Gandhinagar in the **InterIIT Tech Meet 13.0**, showcasing expertise in thermodynamic system modeling and simulation.
- Selected for the Yuva Unstoppable Scholarship and Ministry Scholarship.
- Secured admission to IIT Gandhinagar through self-study, without any formal coaching.

TECHNICAL SKILLS

- **Programming Languages:** Python, C++, C, JavaScript, Rust.
- **Tools:** React/React Native, Tauri, Flutter, Matlab, Autodesk Inventor Pro, Polymath, Git, GitHub, MongoDB, Jupyter Notebook, Latex, Django, Firebase, IndexedDB, SQL.
- **Libraries:** Numpy, Pandas, Scikit, Matplotlib, kivy, openCV, Flask, Tensorflow.

POSITIONS OF RESPONSIBILITY

- **Technical Co-coordinator, E-cell(EII), IITGN** [Feb'24 - Aug'24]
  - As a Technical Co-coordinator at E-Cell IITGN, I design, develop, and maintain the organization's website, collaborating with the team to resolve technical issues, enhance functionality, and ensure a seamless user experience that aligns with E-Cell's goals and showcases its initiatives and events globally.

EXTRA-CURRICULAR ACTIVITIES

- Freelancer as a **MERN Stack Developer**
- Passionate about **Data Structue and Alogrithm** and **Competitive Programming**,
- **Organizer** at HallaBol, a sports fest of IITGN.
- A football enthusiast showcasing teamwork, dedication, and a competitive spirit.