AKSHAT SINGH

akshat1799@utexas.edu singhakshat1799@gmail.com

EDUCATION

B.Tech Indian Institute of Technology, Delhi (IIT Delhi) July 2021
Chemical Engineering
Grade: 9.357/10

CBSE DAV Pushpanjali, Delhi May 2017
AISSCE, Class XII
Grade: 96.6%

ACHIEVEMENTS, HONORS AND AWARDS

IIT Delhi, Department Rank 3 2021
Ranked 3rd (academically) among 120 students in the Department of Chemical Engineering

IIT Delhi Semester Merit Award 2017-2021
Awarded the *IIT D Semester Merit Award* 4 times in 8 semesters for securing a position amongst the top 7% students in the department

Summer Undergraduate Research Award (SURA) 2020
Conferred the prestigious *SURA* by IIT Delhi for successful completion of the fully funded research project named 'Mathematical Modeling of Impedance Data to Elucidate Bacterial-drug Interaction'

CBSE Certificate of Merit 2017
Honored with the *CBSE Certificate of Merit* for outstanding academic performance in All India Senior School Certificate Examination (Class XII) and for being among the ***top 0.1% of successful candidates in Chemistry*** across the nation

Junior Science Talent Search Examination (JSTSE) Scholar 2014
Secured 33rd rank in the entire union territory of Delhi in JSTSE conducted by Delhi Directorate of Education

INTERNSHIP

Hindustan Unilever Limited, Mumbai Apr 2020 – June 2020
Product Development R&D | *Advisor: Narayanan Subrahmaniam (Global Project Leader - Fabric Solutions)*

- Interned in the Home Care segment of HUL focusing on detergent powder related issues

A) Modeling the slipperiness rendered by bentonite to the wash solution

- Studied swelling of bentonite in suspension & effects of pH, electrolytes, surfactants on its rheology
- Provided phenomenological explanation for the slipperiness benefits provided by bentonite, helping the firm evaluate its 'consumer friendliness' in comparison to sodium carbonate
- Successfully suggested a weight efficient alternative for bentonite basis above explanation

B) Improving the extent & rate of dissolution of detergents in water

- Identified the transition of surfactants from anisotropic lamellar liquid crystal phase to isotropic micellar phase as the key hindrance to dissolution of detergents (rate determining)
- Proposed hydrotropes- tetraethylammonium chloride & alkyl polyglycoside to improve dissolution given their abilities to alter critical packing parameter & prevent hydrophobic interactions respectively

C) Reducing the in-pack caking of detergent powder

- Studied phenomena responsible for caking, namely liquid bridge & solid bridge formation
- Suggested materials that could compete for moisture, increase critical relative humidity & glass transition temperature for reduced caking & increased flowability of the detergent

RESEARCH EXPERIENCE

Mathematical modeling of bacterial-drug interactions using impedance spectroscopy(IS) May 2019 - Jan 2020
Project was awarded SURA | *Advisor: Professor Shalini Gupta, IIT Delhi*

- Hypothesized that the action of drug on a bacterial cell would cause maximum electrophysiological alterations (namely conductivity & permittivity changes) at the target layer
- Performed frequency & time dependent IS to probe bacterial suspensions with & without drugs
- Enhanced the sensitivity of interdigitated microelectrodes employing dielectrophoresis technique
- Determined an equivalent circuit model mimicking bacterial suspension's properties through simulations
- Suggested possible improvements to the experimental system such as application of flow cytometry to avoid the effect of non-uniform settling of bacteria in varying drug environments

Contact angle simulations using molecular dynamics Aug 2020 to Jan 2021
Bachelor's degree thesis | *Advisor: Professor Rajesh Khanna, IIT Delhi*

- Developed C++ code for determination of contact angle for any 3 phase heterogenous system
- Used first principles namely – Newton's laws and the Ideal gas law for system development
- Modeled atomic interactions through Lennard-Jones potential, imparted initial velocities to atoms ensuring zero overall momentum by applying momentum correction over the system
- Applied periodic and mirror boundary conditions along X&Y(sides) and Z axis (bottom & top) respectively
- Generated the structure of equilibrated droplet for Pt-CO_2-H_2O system at different temperatures

Lean NOx trap modeling Nov 2020 to Dec 2020
Course project | *Advisor: Professor Divesh Bhatia, IIT Delhi*

- Developed governing equations for 1D lean NOx trap through heat and mass transfer concepts
- Simplified the entire model by minimizing coupling between the partial differential equations
- Simulated the outlet NOx concentration given oscillating input NOx, by coding on MATLAB

TEACHING EXPERIENCE & EXTRA CURRICULAR ACTIVITIES

TeachingAssistant for undergrad. courses on 'Transport Phenomenon'&'Intro. To Biology for Engineers'(2021)

- One of the few undergraduates to be selected as semester long teaching assistants for core engg. courses
- Taught tutorials, developed quizzes and exams, coordinated grading with a team of 4 teaching assistants

Business case / Innovation challenges: Podium finishes in multiple PAN India college case competitions

- **Winner: NSUT**- Strategized business plan through SWOT & P&L analysis of multiple alternatives (2020)
- **Runners Up: IIT Delhi NSS**- Ideated & presented solutions to tackle the issue of microplastics (2020)
- **8/840: DTU NSS**- Proposed procurement & supply chain model to improve UP's healthcare sys.(2020)

Marketing & Finance Coordinator, Chemical Engineering Society, CAIC (2019-2020)

- Organized talks, workshops & interactive sessions b/w professors & students on chemical engineering
- Successfully led a team of 7+ executives, pitched companies, brought monetary/in-kind sponsorships

TECHNICAL SKILLS

- **Programming languages:** C, C++, MATLAB, Octave, Java, SQL
- **Softwares :** Autodesk Inventor, ZView, Origin Pro, ImageJ, Latex, MS Office

TEST SCORES

- **TOEFL : 118/120** (2021)
  Reading – 28/30; Listening – 30/30; Speaking – 30/30; Writing – 30/30
- **GRE : 329/340** (2020)
  Quantitative Reasoning – 170/170; Verbal Reasoning – 159/170; Analytical Writing – 4/6