Rahul Nandakumar

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EDUCATION

National Institute of Technology, Andhra Pradesh, India *2018 − Present*
*B.Tech, Chemical Engineering − Cumulative GPA: **8.20/10**. First Class with Distinction.* *Expected Graduation 2022*

RESEARCH EXPERIENCE

Research Intern, *Sept 2021 − March 2022*
Advanced Manufacturing Technology Development Center − Indian Institute of Technology, Madras
- Selected and received funding from the Ministry of Heavy Industries − Govt. of India, to work on an autonomous robotic development project for the removal of plastic waste from beaches, in collaboration with the Maxelerator Foundation.
- Designed a visual inspection system making use of a 3D camera for object detection, and a LiDAR for range determination.
- Collected and annotated over 1000 images using Roboflow, and implemented Transfer Learning using pre − trained models from Tensorflow 2 Model Zoo running on a NVIDIA Jetson Nano Processor. Also compared their relative performances.
- Collaborated with the Autonomous Guidance and Digital Twin teams, working in parallel to create a Digital Twin of the robot, and integrated a ESP32 WiFi Module to the Jetson Nano to enable real − time data analytics.
- Simulated the navigation of the Robot using Unity3D, with further work to be carried out in the robotic arm simulation and the implementation of ROS for autonomous navigation.
- Co − authored a manuscript with collaborators from the Digital Twin and Autonomous Guidance teams, documenting the results.

Assistant, *Apr 2021 − Aug 2021*
Supervisor: Dr. Prince Kumar Baranwal
- Actively conducted literature surveys on the chemistry of Deep Eutectic Solvents and their applications to the field of electrochemistry.
- Co − authored a manuscript, under scrutiny for publication. Areas of focus include the processes of electrodeposition and electropolishing of metals, with emphasis on the factors affecting electrodeposition.

PROFESSIONAL EXPERIENCE

Data Science Intern, *April 2022 − Present*
Twimbit
- Enhanced data collection procedures from various sources such as Algolia, Heap, Matomo and Segment.
- Currently conducting adhoc analysis to reduce product friction and increase user engagement. This includes tracking user behaviour and product performance over various segments.
- Primarily involved in building in all-in-one analytics platform. Also selected features, built and optimized classifiers using machine learning techniques.

Data Analyst, *Oct 2021 − Nov 2021*
St. Louis University and GlobalShala
- Led a team of 8 interns, in collecting and organizing data from the Marketing team of 'GlobalShala' on Facebook ad campaigns run for an event called 'Superhero U'.
- Analyzed the data collected and performed an in − depth analysis. Created interactive visuals to support observations of the data analysis.
- Proposed a plan of action to the Marketing and Finance team for discontinuing 3 ad campaigns in order to cut costs incurred to the company by $\sim 5\%$.

Intern, *Aug 2021 − Sept 2021*
Dept. of Industrial and Management Engineering − Indian Institute of Technology, Kanpur
- Carried out literature surveys on inventory transportation Problems, transportation problems considering stakeholder behavioural tendencies, and integrating lean, sustainable development and logistics into a lean sustainable logistics model.
- Implemented a heuristic algorithm for optimizing material flow based on the research paper by Raju Rajkanth., G. Srinivasan., Mohan Gopalakrishnan., 'Material flow optimisation in a multi − echelon and multi − product supply chain'.
- This involved optimizing the distribution costs and the vehicle transportation costs over the multi − period, multi − mode network.

Project Intern, *Jul 2021 − Aug 2021*
Indian Institute of Chemical Engineers
- Underwent training by industry experts in the Six Sigma methodology by analyzing a multitude of real − life case studies.
- The project to be implemented was to reduce the chloride levels in the effluent stream of a wastewater treatment plant.
- The requirement was fulfiled by following the DMAIC strategy, analyzing the data collected, and identifying a source with high chlorine usage by conducting a Root Cause Analysis, with proposals given for a control strategy to be followed. This led to a decrease of $\sim 20\%$ in the concentration of chlorine in the effluent stream.

Machine Learning Intern, *Jun 2019 – Jul 2019*
Verzeo Edutech (AEP Microsoft)
- Trained in supervised and unsupervised Machine Learning algorithms and tool kits, and the fundamentals of Azure ML.
- Implemented a Natural Language Processing model for determining the topic of an article.
- Utilized the nltk and sklearn toolkits and followed the Latent Dirichlet Allocation approach.

PUBLICATIONS AND PRESENTATIONS

Conference Presentations
- Rahul N., PK Baranwal., *'A Review on Electrochemical Applications of Deep Eutectic Solvents in the Electrodeposition of Metals'.* presented at the International Conference on Advances in Chemical and Materials Sciences, 'ACMS – 2022'.

Other Works:
- PK Baranwal., Upasana Mahanta., Rahul N., *'Deep Eutectic Solvents for applications in Electrochemistry'.* (Journal Paper in preparation).

PROJECTS

Deep Learning integrated with modeling a medical waste gasification-power production plant *(Supervised by Dr. P Dinesh Sankar Reddy, NIT Andhra Pradesh)*
- Conducted literature surveys on the sources, types, effects, of medical waste generated, and the various properties associated with characterizing medical waste.
- Developed a Deep Learning model using PyTorch, to simulate thermodynamic equilibrium modeling of a downdraft gasifier for the conversion of medical biomass to energy.

Optimizing material flow in a multi – echelon, multi – mode, multi – product Supply Chain Network.
- Implemented a 2 – stage heuristic algorithm, to optimize transportation and distribution costs in multi – echelon, multi – mode, multi – product Supply Chain Network. The heuristic was based on the total opportunity penalty cost method (TOPCM), which yielded solutions within 5% from the LP relaxation solution. Compared the performance with other algorithms such as VAM, Russel's Method and TOM.

Impact on Smog Formation: A study of particulates, greenhouse gases and the mean temperature.
- Formulated a research problem to analyze the effect of levels of particulates and greenhouse gases such as $PM_{2.5}$, PM_{10}, CO, NO_2, SO_2, and the mean temperature, on the level of smog in the Delhi region. Studied the mean temperature, condition (smoke/haze), dew point, humidity, heat index, air quality index, and its impact on the fog level. Concluded that the larger the diameter of the particles around which the water can condense (such as in $PM_{2.5}$, PM_{10}, NO_2, SO_2), the greater the chance of smog formation causing visibility degradation in the region.

Supply Chain Management Strategy for Medical Technologies Corporation.
- Implemented a Supply Chain Management Strategy, to successfully manage a complex network of companies in a real – life scenario. Cost saving solutions were formulated in the domains of Logistics, Operations, Planning, and Sourcing (LOPS) due to 10% reduction in profits owing to taxes on medical devices. Proposed a complete redesign of the Supply Chain to remove third party logistics firms, and integrating Enterprise Resource Planning systems like Oracle or SAP. Also performed demand forecasting and a Make vs Buy Analysis for the current off – site sterilization process.

INDEPENDENT COURSEWORK

- Supply Chain Operations & Disruptions Management: A Way Forward by National Institute of Industrial Engineering. *Nov 2021*
- Data Science for Engineers by IIT Madras and NPTEL (Top 5% score in proctored exam). *Oct 2021*
- Six Sigma: Green Belt Specialization by University System of Georgia. *Jul 2021*
- Applied Data Science with Python Specialization by University of Michigan. *Jul 2021*
- Google Data Analytics Professional Certificate by Google on Coursera. *Jun 2021*
- Operations Research: Models and Applications, Algorithms by National Taiwan University. *Jun 2021*
- Supply Chain Management Specialization by Rutgers the State University, New Jersey. *May 2021*
- Deep Learning Specialization by DeepLearning.AI. *Aug 2020*
- Machine Learning with Python. *Jun 2019*

EXTRA – CURRICULAR ACTIVITIES AND AWARDS

- Chief Editor and Design Lead at ABSORB, The ChE Magazine, NIT – Andhra Pradesh. *Aug 2020 – Present*
- Secretary *(Previously Joint Secretary)* at the Chemical Engineering Association, NIT – Andhra Pradesh. *Sept 2019 – Present*
- Core Technical Team Member at the Developer Student Club, NIT – Andhra Pradesh. *Sept 2018 – Sept 2020*
- Joint Secretary at the Entrepreneurship and Innovation Cell, NIT – Andhra Pradesh. *Aug 2018 – Aug 2020*
- Operations Team Co – ordinator at the Task Force, NIT – Andhra Pradesh. *Oct 2019 – Aug 2021*
- Volunteer, Swachh Bharat Mission – Swachhata Pakhwada 2020. *Jan 2020 – Feb 2020*
- Regional Topper, Informatics Practices – Class XII, CBSE examinations awarded by TVS Motor Limited. *Aug 2017*
- Secured 94.4% in Class XII, CBSE and a Cumulative GPA of 10.0/10.0 in Class X, CBSE. *2017*
- International Science and Mathematics Olympiad Gold, Bronze Medal winner, organized by Science Olympiad Foundation. *2015*