ABHISHEK SHARMA

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EDUCATIONAL QUALIFICATIONS

Year	Degree/ Certificate	Institute/ School, City	CGPA/ Percentage
2021	B.Tech., Chemical Engineering	Indian Institute of Technology, Kanpur	7.1/10.0
2017	AISSCE, XII (CBSE)	DAV Public School, Kota	88.2%
2015	AISSCE, X (CBSE)	Modern School, Kota	9.6/10.0

AWARDS AND ACHIEVEMENTS

- Awarded the prestigious **MCM scholarship** consecutively in the academic year **2018-19** and **2019-20**
- Achieved **state rank 13th** in the **7th National Cyber Olympiad (NCO)**

INTERNSHIPS AND WORK EXPERIENCE

COVID-19 infection rate prediction *(Mentors: Prof. H. Sharma, R. Mangal, H. Katkar)* *(Ongoing)*

AIM:	To study the spread of COVID-19 in India and the various factors responsible for the same
APPROACH:	We aim to gain insights into the spread of COVID-19 across different states in India and the effect of different strategies, such as lockdown, using a ***mathematical modeling approach*** such as the susceptible-infected-recovered ***(SIR) modeling***

Deep Learning methods for semantic segmentation *(Mentor: Dr. Sergey Axyonov, TPU- Russia)* *(Dec'19-Jan'20)*

AIM:	To develop a solution to determine objects such as buildings, trees, roads on satellite images using ***deep learning*** and ***semantic segmentation*** with acceptable accuracy and ***inference speed close to real-time***
APPROACH:	Prepared data set using satellite imagery, researched ML algorithms and ***computer vision techniques for semantic segmentation,*** and trained the dataset on several new models like ***ENET*** and ***UNET,*** used ***hybridized clustering algorithms*** for improving the inference speed, made modifications to the driver code.
IMPACT:	***Achieved 95% accuracy*** and improved the inference speed. The project continues aimed to ***deploy*** the program on ***mobile devices*** and ***drones,*** received ***letter of recommendation*** for the excellent work done.

Particle Tracking (*Mentors: Prof. H. Sharma & Prof. R. Mangal)* *(May'19-May'20)*

AIM:	To develop a ***mobile and efficient solution to track molecular motion*** for catalysis and reaction monitoring of reactant on video recorded using a microscope.
APPROACH:	We developed two working prototypes using deep learning and computer vision that tracked the molecules with acceptable accuracy and gave the trail along with the coordinated of each molecule. **1)** Recorded ***video converted to grayscale***, performed ***background subtraction*** and ***edge detection*** (using canny edge detection), which resulted in particles and disturbances as blobs in the frame **2)** Blobs greater than a set threshold were retained ***(blob analysis)***, then contours, and the centroids of particles in each frame stored along with the blob radius and returned, particles were ***tracked by their track-IDs***. **3)** The whole process was left to train for a set number of frames, and the ***Hungarian algorithm*** was used to determine and assign the detected blobs to their correct track-IDs. ***Kalman filtering*** used to predict and correct/update tracks, and the tracks displayed on the output window, the obtained coordinates were exported in an xls file. Implementation made in ***python 3.7***, used ***OpenCV, NumPy, SciPy***, another implementation made in MATLAB
IMPACT:	The solution developed using python ***achieved 95% accuracy,*** potential research paper to be published for the exemplary work.

Intelligent Oil-Life Monitor *(KPIT Technologies Ltd.)* *(May'20-July'20)*

AIM:	To develop an intelligent solution for an oil change in a conventional automotive with ECU implementation
APPROACH:	**1)** Given the ***OBD-II, J1939,*** for the vehicle, we identified the parameters that affect the engine oil life. **2)** Performed ***exploratory data analysis***, made ***classification models*** to predict DPF regeneration for the trips corresponding to some oil cycles. Models made: ***XGBOOST, LDA, and Logistic regression***.
IMPACT:	We were able to ***achieve 97% accuracy on the test-set*** using XGSBOOST.

- Due to the confidentiality of data and the time constraint, we could not do ECU implementation

ACADEMIC PROJECTS

- **Rigorous Simulation of Multi-component Distillation Column (CHE352A)** *(Prof. Vishal Agrawal, IIT Kanpur)*
  - **1)** Simulated a five component non-reactive distillation column using **Napthali Sandholm Algorithm**.
  - **2)** Dealt with non-ideal system, considering activity and compressibility of each component.
  - **3)** Calculated the number of stages, Reboiler, Condensor duty, Reflux ratio, and purity of the components at each stage.
  - **4)** Final results were tested against **ASPEN** simulations and experimental data was used to set benchmarks at each step.
- **Mechanical can crusher (TA 201A)***(Prof. K. Balani, IIT Kanpur)* *(Jan'19 – April'19)*

1) Worked in a group of 6 members to build a small scale 3D model of a metal can crusher
2) Designed a model of the machine on ***Autodesk Invento***r and developed a prototype
3) Employed various manufacturing processes: ***casting, welding, brazing and sheet metal operation***

- **Drain Cleaning Vehicle (TA 202A)** *(Prof. A. Kumar, IIT Kanpur)* *(Aug'18 – Nov'18)*
  1) Worked in a group of 7 members to build a small scale 3D model of a garbage collecting machine
  2) Designed a model of the vehicle on ***Autodesk Fusion*** and then developed a prototype
  3) Employed various manufacturing processes: ***milling, drilling, lathing*** on mild steel

CERTIFICATIONS AND SPECIALIZATIONS

** denotes ongoing*

Data Structures and Algorithms (Udemy)
Deep-Learning Specialization* (deeplearning.ai)
DeepLearning.AI TensorFlow Developer*
Introduction to Git and GitHub (Google)

Technical Skills

Programming Languages: C, C++, Python

Skills: Data Structures & Algorithms, Data-Science

RELEVANT COURSES

Microeconomics	Introduction to computing	Linear Algebra
Chemical Engineering Thermodynamics	Computational Methods in Engineering	Heat and Mass Transfer
Chemical Process Design*	Fluid Mechanics	Chemical process Industries

POSITION OF RESPOSIBILITY

- **Senior Executive (DJ War Antaragini'18, IIT Kanpur)**
  1) Played a vital role in conducting preliminary rounds in **Bangalore, Mumbai,** and **Chandigarh**
  2) Coordinated with Event heads for smooth conduction of events
  3) Worked in a small team to do the mammoth task of getting sponsors to organize the event
- **Secretary, Photography Club (Media and Cultural Council, IIT Kanpur)**
  1) Part of the team that conducted photography workshops for the campus community
  2) Increased junior participation
  3) Personally mentored 3 juniors and enhanced their skills

EXTRACURRICULAR ACTIVITIES

- Making a ***video lecture course*** on ***Data Structures And Algorithms in C++*** to be soon released on ***Udemy*** *(ongoing)*
- Represented IIT Kanpur in ***Inter IIT Cultural Meet*** held in Roorkee *(2018)*
- ***First*** in Galaxy in all the photography events for ***two consecutive years*** (Intra College Competition) *(Feb'18 & Feb'19)*