Surabhit Gupta

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Education

Indian Institute of Technology (BHU), Varanasi **CPI: 9.01/10**
Bachelor of Technology in Mechanical Engineering *Aug 2019 - May 2023*

Aklank Public School, Kota (RJ) **89.2%**
AISSE, Central Board of Secondary Examination, India *2017 - 2019*

DAV Public School, Bilaspur (CG) **CGPA 10/10**
AISSCE, Central Board of Secondary Examination, India *2015 - 2017*

Publications

1. Ian Enriquez, Colin Noronha, Katrina Teo, Anubhav Saramah, **Surabhit Gupta**, Ankush Nandi, Blake Fishbeck, Micah J. Green, and Aniruddh Vashisth (2022) *Closed Loop Composite Welding and Bonding System Using Radio-frequency Heating and Pressure* in peer-review in ***Journal of Manufacturing Processes***

2. **Surabhit Gupta**, Kartik Garg, Yashasvi Singh and Lakshay Taneja (2022-23) *Robust, multi-stage disaster response planning with demand uncertainty***(Manuscript in preparation)**

3. **Surabhit Gupta**, Ankit Gupta, Yiwen Zheng and Aniruddh Vashisth (2022-23) *Accelerating reaction kinetics using reactive molecular dynamics and machine learning***(Manuscript in preparation)**

Relevant Coursework

- Ubiquitous Computing
- Advanced Mechanics of Materials
- Machine Learning (Coursera)
- Measurement and Control Systems
- Material Science for engineers
- Engineering Mathematics I and II
- Computer Programming
- Dynamics of Machines
- Soft Computing
- Mathematical Modelling
- Basic Electrical Engineering
- Vehicle Dynamics

Experience

EPFL, Lausanne, Switzerland **June 2022 – present**
under Ankit Gupta *Remote*

- Used Graph Neural Networks to predict the outcome of accelerated molecular dynamics simulations.
- Investigated reaction kinetics as a functional of spatial arrangement of reactive sites using a combined framework of machine learning and reactive molecular dynamics.

Precision Manufacturing Lab, IIT Guwahati **May 2022 – July 2022**
under Prof. Manas Das *Guwahati, AS*

- Built an indigenous single-pulse solid-state power supply for Electric Discharge Machining (EDM) to isolate individual craters for study.
- Simulated the EDM melt pool for steel in COMSOL. Validated the simulation result with experimental samples

University of Washington, Seattle **November 2021 – April 2022**
Intern under Prof. Aniruddh Vashisth *Remote*

- Quantitatively determined the damage area and direction in successive layers in a series of composite tubes with different resin chemistries using their pulsed thermograms using image processing techniques.
- Implemented data science and heuristic model to classify the damage into pre-existing artifact of the manufacturing process or projectile-induced damage. Processed the pulsed thermograms to study damage propagation.

Tata Motors Limited (*Industrial*) **May 2020 – August 2020**
Product Planning Intern, Electric Vehicle Unit *Pune, MH*

- Worked in the product planning group and worked on streamlining the new car conceptualization procedure. Reduced **10 days** from the overall vehicle development timeline. Handled a part of the newsletter sent out to 300+ dealers.
- Created a comprehensive report on "The Technological and Market Outlook for Solid State Batteries". Investigated 8 companies and 4 technologies in depth.

Control and Hardware Intern, Cisco **May 2019 – August 2019**
under Dr. Sachin Negi *Varanasi, UP*

- Worked to optimise the mechanical design of a 1-DoF prosthetic ankle and ideated different actuation mechanisms.
- Created a state-space model in Simulink to record the inputs from 3 sensors and implemented PID control for the magneto-rheological damper and servo motors for the ankle to respond to terrain in real time.
- Practical experience with **3D printing, laser cutting, CNC, Microcontroller programming (TI Launchpad, C language) and Multimeter.**

Projects

iOTA | *Modular Bots with Cluster level Control* **January 2021**

- Designed the Hardware, control system and implemented Differential Drive and connected it to the planning algo.
- One of the 5 projects to represent IIT BHU at EC, 9th Inter IIT Tech Meet. Poster presented at national level event consisting of all IITs.
- We proposed a novel solution by designing an efficient formulation for the RL algorithm using two main concepts of Hierarchical Reinforcement Learning and Multi-Agent RL. The intersection of the two fields has very little literature and no implementation has ever been done on a full fledged robotic system.

Sample-level data selection for federated learning | *Enhancing clients' privacy in ML models* **November 2021**

- Proposed novel additions to the paper of the above mentioned name for CSE-332 course project.
- Accelerated the model calculation on low powered IoT devices using augmented random search.
- Used K-means clustering to more effectively calculate data intersection without the dataset leaving the host device.

Jerbot 2.0 Beta | *SolidWorks, Pybullet, GeoGebra, MuJoCo* **November 2020**

- Created a servo driven bipedal bot in SolidWorks. Iterated the design through Ansys simulations.
- Built and verified the kinematics across the entire range of motion to iterate the most efficient design and reduce shock on servos. The morphology was inspired by Jerboa, a desert rodent.
- First of its kind active balancing bot driven entirely by servos for aglility and cost effectiveness.

Leadership / Extracurricular

Robotics Research Group **August 2021 – Present**

Techincal Lead, Hardware and Dynamics *IIT(BHU)*

- Lead the team to conceptualize projects such as iOTA, Flipkart Grid 2.0, Simultaneous Multi-tasking Agent
- Responsible for trainning and leading a team of 10 sophomores in the HDS track.
- Managed a team of 6 mentors in the collaboration with **Nanyang Technical University, Singapore**
- Organized an open-sourced summer camp specialization in hardware and dynamics. [Github]

Volunteering and Outreach

Share-a-skill, Kashi Utkarsh **August 2020 – June 2021**

Teaching *Varanasi*

- Taught mathematics and science to two class 7th school students over phone who could not access online classes during the COVID lockdown.
- Mentored them to apply to Jawahar Navodaya Vidyalaya(JNV), a free government boarding school.

Research Community **November 2021 – Present**

Research Volunteer *IIT(BHU)*

- Organized QAs, connecting alumni in academia with undergrad students of similar interests.
- Mentored 2 batches of sophomores in helping them to get started with the research happening in their departments
- Documented and audited the funds of the 10000 USD Graduate School Application Fellowship 2021, IIT(BHU) Alumni Association

Achievements

- Selected for IBGAA GSAS Scholarship worth USD 450 for grad school application by IIT BHU Global Alumni Assosiation.
- All India Rank of **3874 out of 1.2 million** candidates in JEE Advance 2019.
- **Selected for Summer Research Fellowship Programme 2022** conducted by IASc-NASI-INSA.
- **Zonal rank 1 among 8 North-Eastern states** in SOF National Science Olympiad out of 10,000 students
- Qualified National Talent Search Examination, Stage 1 from Chhattisgarh state (**Top 130 among 15,000** candidates)
- Represented IIT(BHU) at Inter-IIT Cult Meet'19 as Official member of the Quiz Club contingent
- Received an offer from Bechtel Corp. to work on the Corpus Christi, Texas' LNG cascade in on-campus internship process, 2022.