Hitesh Arunagiri

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Research Interests

Impact cratering, numerical simulation, planetary remote sensing and planetary science.

Academic Qualifications

Year	Degree/Certificate	Institute	CPI/%
2024 - 2025	M.S. in Earth Sciences	Indian Institute of Technology Kanpur	9.7/10
2020 - 2024	B.S. in Earth Sciences	Indian Institute of Technology Kanpur	8.0/10
2020	CBSE(XII)	Army Public School, Bangalore	95%
2018	CBSE(X)	Army Public School, Bangalore	89%

Research Experience

- **Thesis: Numerical modeling of High-Velocity Impact using Discrete Element Method (DEM)** (*May'24- May'25*)
  Supervisor: Prof. Amar Agarwal, *Department of Earth Sciences, IITK*
  - Developing a model using DEM to analyze the ejecta emplacement and morphology of the impact crater.
  - Utilizing a custom bonded particle model in DEM to account for material strength and its influence on crater morphology.
  - Implementing strain-rate effect on the material strength during deformation.
  - Benchmarking the DEM model against iSALE-2D with a focus on stress wave propagation and strain accumulation.
  - Validating the model with MEMIN experiments to simulate the Lonar crater morphology.
- **Evaluating the potential existence of a Hydrothermal System within La Moinerie Crater** (*May'23- July'23*)
  Supervisor: Prof. Gordon Osinski, *Department of Earth Sciences, Western University*
  - Examined petrographic samples from the La Moinerie crater using an optical microscope and scanning electron microscope (SEM) to identify hydrothermal alteration and deduce the progression of the impact-induced hydrothermal system.
  - Examined Apollo samples using an optical microscope to classify lunar rock breccias and distinguish the rock type.
  - Logged core samples from the Brent crater, documenting geological characteristics and stratigraphy.
  - Reviewed literature on impact cratering, impact lakes and hydrothermal alteration.
- **Morphological survey of Ejecta Pattern of Impact Craters on the moon** (*May'22- July'22*)
  Supervisor: Prof. Deepak Dhingra, *Department of Earth Sciences, IITK*
  - Analyzed lunar crater ejecta patterns to classify them based on their radial orientation from the crater rim.
  - Used ENVI to study spectral data, providing insights into ejecta composition and mineral distribution.
  - Applied ArcGIS with Digital Elevation Model to assess how topography influences ejecta patterns and crater features.
  - Examined the relationship between impact angles and ejecta angles to understand their role in shaping patterns.
- **Geological Mapping of Impact Ejecta of the Lonar Crater** (*Dec'22*)
  Supervisor: Prof. Amar Agarwal, *Department of Earth Sciences, IITK*
  - Led a field expedition to Lonar crater to map impact ejecta, document its distribution, and study the geological aftermath.
  - Used ArcGIS to classify and study the ejecta based on their grain size distribution around the crater.

Relevant Projects

- **Formation of Ni-Cu-PGE sulfide mineralization in the Sudbury Impact Melt Sheet** (*Sept'22*)
  Supervisor: Prof. Govindarao Bodepalli, *Department of Earth Sciences, IITK*
  - Studied genetic models of the Main Mass and Offset Dykes in the Sudbury Igneous Complex (SIC).
  - Analyzed precious metal data to understand the relationship between rocks and the formation of Ni-Cu-PGE sulfide deposits.
  - Linked mineral structures to the thickness of overlying noritic rocks based on empirical findings.

Field Based Training

- **Field Training: Geological Survey** (*Oct'22*)
  Supervisor: Prof. Amar Agarwal, *Department of Earth Sciences, IITK*
  - Systematically identified various structural features within the outcrop along the lesser Himalayas.
  - Conducted a comprehensive investigation to determine the orientation, dip, and strike of all geological features in the outcrop.
  - Utilized a stereo-net to systematically plot and map the geological data gathered from the outcrop.
- **Field Training: Geophysical Survey** (*Jan'24*)
  Supervisor: Prof. Animesh Mandal, *Department of Earth Sciences, IITK*
  - Conducted surveys in Babina, Jhansi, to investigate subsurface features, focusing on the Banded Iron Formations (BIFs).
  - Conducted Electric Resistivity Tomography (ERT) to analyze conductivity variations and identify mineralized zones.
  - Utilized Gravimeter and Magnetometer to measure gravity and magnetic anomalies, interpreting subsurface structures.
  - Applied GIS for mapping and data visualization, enabling detailed analysis of geophysical survey results.

Scholastic Achievements

- Received Academic Excellence Award from the institute for the year 2023 - 2024.
- Received the Student Undergraduate Research Graduate Excellence SURGE-2022 internship.
- Received the Mitacs Global Research Internship for the year 2023-2024.
- Winner of the ISL (International Student League) competition conducted by Vedantu in the year 2018.
- Received Merit in the *Green Olympiad* conducted by The Energy and Resources Institute (*teri*).
- Obtained an Academic Excellence Award for achieving High-Distinction in the Class 12th Board Exam.

Technical Skills

- **Programming Languages:** C/C++, Java, Python, SQL.
- **Software:** ArcGIS Pro, ENVI, GMT, GranOO, iSALE-2D, MATLAB, MUSEN, SolidWorks.

Positions of Responsibility

- **Senior Team Member, Mechanical Subsystem** | *Autonomous Underwater Vehicle(AUV)-IITK* (*Jan'21-Dec'22*)
  - Assisted in building the third autonomous underwater vehicle *Tarang*, for the Robosub2021 competition.
  - Designed and constructed the camera capsule for the underwater vehicle *Tarang* through SolidWorks.
  - Assisted the team with the reconstruction and testing of our second autonomous underwater vehicle *Anahita*.
  - Created specific props for testing and analysis of the vehicle *Tarang* for the Robosub2021 competition.
  - Collaborated with the Business Subsystem to recruit sponsors and network with AUV teams worldwide.
- **Organizer, Events** |*Udghosh'23 IITK Sports Festival* (*April'22-Oct'23*)
  - Led a 3-tier team of 80+ students responsible for organizing formal and informal events during the fest Udghosh'23.
  - Contacted and managed 150+ referees for 15 different sports from the Uttar Pradesh sports organization.
  - Initiated Udaan, a social initiative for specially-abled students, with the help of the CDAP community.
  - Organized UNOSQ, Poker, Chess, and E-sports events across the country with 5000+ participants.
  - Projected to organize Road trips in 10+ cities across India to increase the reach of the festival.
  - Successfully hosted the sport of Basketball for three days, with the participation of 30+ institutions.
  - Assisted in updating the database of colleges and finalising deals with various companies for *Udghosh'23*.
- **Secretary** | *Earth Science Society - IITK* (*Aug'23-Aug'24*)
  - Collaborating with a team of 15 to facilitate the seamless organization of various sports and cultural events.
  - Reached out to organizations, forging partnerships to establish student chapters with the department, fostering academic and professional growth opportunities for both graduates and undergraduates.
  - Organized a comprehensive event for 100+ undergraduate students, aiming to educate them about the various opportunities and career prospects within the field of Earth Sciences.

Relevant Courses

Introduction to Mechanics*	Thermodynamics
Exploration Geophysics	Fluid Mechanics and Rate Processes
Solar System Process and Space Mission	Geological Remote Sensing and GIS*
Geomorphology and Earth Surface Processes	Mathematics for Earth Sciences*
Fundamentals of Geophysics	Advance Structural Geology*

* Demonstrated Excellent Performance in coursework.

Extra-Curricular Activities

- Secured 3rd place in a power-lifting competition hosted by the Games and Sports Council, IITK.
- Participated in Airridle, Astro Quiz, and BlackBox competitions during Tech-week hosted by SnT Council, IITK.
- Achieved the Runner-up position in the Inter-house Boxing competition held during Junior high school.
- Earned a Silver Medal for outstanding performance in the Inter-House Shot-put competition during High school.
- Secured 3rd place in *Designathon*, a start-up competition hosted by the *Entrepreneurship Cell* at IITK, where our team presented a start-up idea along with the prototype of the product.