# Sunil Kumar

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## EDUCATION

| Duration | Degree/Certificate | College/School | CGPA (10)/% |
|---|---|---|---|
| July 2024 - Present | Ph.D. Civil Engineering (Hydraulics) | IIT Gandhinagar | 10.0 |
| July 2014 - August 2018 | B.Tech (Civil Engineering) | IIT Patna | 7.57 |
| May 2011 - June 2013 | Senior Secondary Examination | RBSE | 88.80 |
| May 2009 - May 2011 | Secondary Examination | RBSE | 88.50 |

## PUBLICATIONS

[1] I. M. Tripathi, **S. Kumar**, A. Modi, A. M. Bhat, C. Bhagat, P. K. Mohapatra, and M. L. Kansal, "Towards Water Sensitivity: A Critical Review of Urban Water Management Strategies," *Water Resources Management*, 2025, (accepted).

[2] **S. Kumar**, A. M. Bhat, and P. K. Mohapatra, "Flood inundation management in the Narmada basin: An AIML application for the upstream area of Sardar Sarovar Dam," 2026, (Under Preparation).

[3] **S. Kumar** and P. K. Mohapatra, "Unsteady and Non-Newtonian Flow in Vortex Drop Shafts: A Critical Review," 2026, (Under Preparation).

[4] **S. Kumar** and P. K. Mohapatra, "Numerical investigation of multiphase flow hydrodynamics in a vortex drop shaft with tangential inlet," 2026, (Under Preparation).

[5] **S. Kumar** and P. K. Mohapatra, "Application of Computational Fluid Dynamics (CFD) in vortex drop shafts: A critical review," 2026, (Under Preparation).

## DOCTORAL THESIS

**Numerical Simulation of Vortex Drop Shaft Hydrodynamics under Multiphase Flow Conditions**
(Supervisor: Prof. Pranab K. Mohapatra) *Proposal Defended: Oct 8, 2025*

- **Research Scope:** Numerical and experimental investigation of vortex drop shafts using tangential inlet designs.
- **Methodology:** Utilizing Computational Fluid Dynamics (CFD) to model complex multiphase flow conditions.
- **Experimental Validation:** Designing a physical experimental setup in the hydraulics laboratory using tangential inlets to validate numerical models.
- **Coursework:** Applied Hydraulic Transients, Advanced Hydraulic Engineering, Advanced Engineering Hydrology, Microwave Remote Sensing.

## EXPERIENCE

- **Junior Research Fellow (JRF), cNarmada Project, IIT Gandhinagar** *July 2024 – Present*
  - Developing an integrated river basin management plan for the Narmada River.
- **Graduate Teaching Fellow (GTF) IIT Gandhinagar, Gujarat, India** *August 2025 – November 2025*
  - Conducted tutorials and guided 39 M.Tech students in a PG writing course.
- **Teaching Assistant (TA) IIT Gandhinagar, Gujarat, India** *January 2025 – April 2025*
  - Assisted with the undergraduate Fluid Mechanics course for 2nd and 3rd year B.Tech students.
- **Junior Research Fellow (JRF) Water4Change Project, IIT Gandhinagar** *Sept 2022 - July 2024*
  - Contributed to an Indo-Dutch initiative for urban water challenges in India.
- **Summer Internship NWR Jaipur, India** *May 2017 – July 2017*
  - Conducted a study on managing performance in shed installation and initial steps of railway track construction.

## RESEARCH & PROJECTS

- **Numerical Simulation of Vortex Drop Shaft Hydrodynamics, IIT Gandhinagar** *Ongoing*
  - Investigating the complex fluid dynamics of vortex drop shafts using experimental methods and advanced numerical modeling (CFD).
  - Modeling multiphase flow in vortex drop shafts to analyze flow behavior and efficiency.
- **Ground Response Analysis of Soil Deposit, IIT Patna** *July 2017 - May 2018*
  - Analyzed the ground response of soil deposits at the IIT Patna campus under the guidance of Dr. Amarnath Hegde.
  - Observed how response parameters like Peak Ground Acceleration (PGA) and maximum shear strain are affected by variations in input motion and shear wave velocity.
- **Steel and Reinforced Concrete Design Projects, IIT Patna** *Sept 2016 - April 2017*
  - Designed an industrial steel shed for a manufacturing unit using ETABS under Dr. Vaibhav Singhal.
  - Executed the design of a reinforced concrete structure for a three-story framed residential building using SAP2000.
- **Sociology of Development Project, IIT Patna** *Jan 2017 - April 2017*
  - Conducted a water quality check in the nearby area of the IIT Patna campus to assess environmental conditions.

## TECHNICAL SKILLS

- **Software & Simulation:** FLOW-3D, FLOW-3D HYDRO, HEC-RAS, ANSYS Fluent, DeepSoil, SAP2000, ETABS.
- **Design & GIS:** AutoCAD Civil 3D, AutoCAD 2D Drafting, QGIS, ArcGIS, QSWAT.
- **Programming:** Python, MATLAB, Java, C/C++, LaTeX.
- **Laboratory & Surveying:** Vectrino+ (ADV), Dumpy Level, Auto Level, Theodolite, Total Station.

## ACHIEVEMENTS & AWARDS

- **Inspire Scholarship:** Awarded by the Department of Science & Technology, Government of India.
- **MCM Scholarship:** Awarded Merit-cum-Means Scholarship two times during undergraduate studies.
- **Competition Rank:** Secured 1st rank in Hydraulic Arm designing competition.
- **State Award:** Awarded with a Laptop by the Rajasthan Government for academic excellence.

## REFERENCES

| **Dr. Pranab K. Mohapatra** | **Dr. Amarnath Hegde** | **Dr. Vaibhav Singhal** |
|---|---|---|
| Professor, Homepage | Associate Professor, Homepage | Asst. Professor, Homepage |
| IIT Gandhinagar, India | IIT Dharwad, India | IIT Patna, India |
| PhD Supervisor | B.Tech Project Guide | B.Tech Project Guide |
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