BHOOMIKA S

Final year Postgraduate, Hydraulics and Water Resources Engineering
Department of Civil Engineering, IIT Kanpur

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ACADEMIC QUALIFICATIONS

Year	Degree	Institute	CPI/%
2024 – Present	M.Tech - HWRE	Indian Institute of Technology, Kanpur	7.06/10
2023	B.Tech - CE	JSS Science and Technology University, Mysuru	8.76/10
2019	12th	Gopalswamy Integrated PU College	76.5%
2017	SSLC (X) - STATE	Bharatiya Vidya Bhavan	92%

MTech Thesis

- **M.Tech Thesis (Ongoing)** – In collaboration with Well Labs *Supervisor: Prof. Tushar Apurv*
  - **"Factors Influencing Conjunctive Use of Surface and Groundwater for Irrigation and Its Impact on Agricultural Productivity"**, Raichur Canal Command Area, Karnataka.
  - Focused on sustainable irrigation strategies in semi-arid regions under unequal canal water distribution and groundwater overextraction.
  - Applied **Water Evaluation and Planning (WEAP)** model for surface–groundwater interaction and irrigation demand estimation.
  - Used **MODFLOW** for aquifer simulation and groundwater balance assessment under varying pumping scenarios.
  - Designed conjunctive use strategies through **optimization modeling** in LINGO/Python, balancing water allocation across crops and seasons.
  - Conducted **crop-water requirement analysis** using CROPWAT and validated with field data from Raichur Canal Command.
  - Performed **statistical analysis** (ANOVA, regression, chi-square) to identify socio-economic and hydrological drivers affecting conjunctive use adoption.
  - Visualized spatial variability with **QGIS** (groundwater maps, water stress zones, crop yield distribution).
  - Generated plots: rainfall vs. groundwater depth trends, crop yield vs. irrigation adequacy, temporal canal discharge vs. pumping demand.
  - Integrated **Python** (NumPy, Pandas, Matplotlib, Seaborn) for data preprocessing, trend analysis, and scenario comparison.
  - Evaluated policy scenarios: equitable water sharing, groundwater pumping restrictions, and improved canal scheduling.
  - Outcome: Developed decision-support insights to enhance agricultural productivity while ensuring **long-term water sustainability**.

COURSE PROJECTS

- **Optimal Water Allocation Modeling for Cauvery River Basin (KRS Reservoir, Karnataka–Tamil Nadu)**
  Course Project: CE718 Water Resources System Analysis | *Mentor:* Dr. Tushar Apurv (CE Dept., IITK) ***(April 2025)***
  - System Specification: KRS Reservoir and downstream water demands for Karnataka and Tamil Nadu, including hydrological variability and policy constraints.
  - Designed and Developed: An optimization model to simulate reservoir operations and interstate water allocation strategies.
  - Methodology: Data-driven analysis integrating hydrological variability, policy constraints, and state-level water demands to optimize year-round releases from KRS Dam.
  - Performance and Impact: Ensured equitable water distribution, minimized water stress during normal and drought years, and evaluated alternative management policies.
  - Tools/Frameworks: Python/Matlab (optimization modeling), Reservoir Simulation, Data Analysis.
- **IoT-Based Monitoring of Evapotranspiration Using Load Cell**
  Course Project: CE738A Hydrometry | *Mentor:* Dr. Shivam Tripathi (CE Dept., IITK) ***(Nov 2024)***
  - System Specification: Lysimeter setup with Tulsi plant in silty loam soil for evapotranspiration estimation.
  - Designed and Implemented: A real-time monitoring system using a calibrated load cell integrated with IoT infrastructure.
  - Methodology: Developed hardware with Arduino Mega 2560, ESP8266, and SD card logging, enabling MQTT-based wireless data transfer to a PostgreSQL server.
  - Performance and Analysis: Achieved reliable ET estimation with uncertainty and sensitivity analysis, including load cell hysteresis effects.
  - Additional Contributions: Sensor calibration, PCB design (EAGLE), and integration of environmental sensors (DHT22) for temperature and humidity monitoring.
  - Tools/Frameworks: Arduino, Python, PostgreSQL, MQTT, EAGLE PCB, Data Analysis.
- **Design of Irrigation Schedule System – Analysis of Resistive and Capacitive Soil Moisture Sensors**
  Course Project: CE738A Hydrometry | *Mentor:* Dr. Shivam Tripathi (CE Dept., IITK) ***(Oct 2024)***
  - System Specification: Soil moisture monitoring setup using resistive and capacitive sensors for irrigation scheduling.
  - Designed and Implemented: Calibration of sensors and testing under controlled soil conditions to evaluate sensitivity and response.
  - Methodology: Conducted sensitivity and hysteresis analysis to compare sensor performance for decision-making in irrigation control.
  - Performance: Identified the capacitive sensor as the most reliable, forming the basis of the irrigation scheduling system.
  - Tools/Frameworks: Arduino, Eagle PCB, Circuit Design, Hydrometry, Sensor Data Analysis.
- **Decentralised Waste Water Treatment**
  Degree Project (2023): B.E., JSS Science and Technology University, Mysuru
  - Decentralized Wastewater Treatment Systems (DEWATS) provide a sustainable, low-cost solution by treating wastewater on-site through natural processes such as sedimentation, anaerobic and aerobic treatment, and polishing ponds—without chemicals and with minimal maintenance. This project assesses DEWATS performance and process combinations to improve sewage treatment, safeguard public health, and protect vital water resources.

INTERNSHIP

- **Mysore Urban Development Authority (MUDA), Mysuru** – Internship *Aug 2022*
  - Guided by Mr. N. Sunil (Executive Engineer).
  - Exposure to: **Technical Section** (Roads, Bridges, Buildings), **Town Planning**, **Land Acquisition**, and **Revenue & Accounts**.

TECHNICAL SKILLS

- **HWRE Tools:** HEC-RAS — EPANET — HEC-HMS — MODFLOW — HYDRUS — QGIS
- **Civil Engg Tools:** ETABS — Lumion — AutoCAD — SketchUp — STAAD.Pro
- **Programming:** Python — MS SQL — AI-ML — Data Science — Aurdino
- **Libraries / Frameworks:** Pandas — NumPy — Matplotlib — Seaborn — Scikit-learn
- **Visualization:** MS Excel
- **Utilities:** Jupyter Notebook — Google Colab — Spyder

CERTIFIED COURSES

- **Artificial Intelligence (AI) and Machine Learning (ML)** — *Udemy* *(Ongoing)*
  - Learned fundamentals of AI and ML algorithms, including supervised & unsupervised learning, model training, and predictive analytics.
  - Hands-on with algorithms such as Linear Regression, Logistic Regression, Decision Trees, Random Forests, SVMs, and Neural Networks.
  - Exposure to real-world projects such as predictive modeling (house prices, student scores), classification tasks (spam detection, fraud detection), and clustering problems (customer segmentation).
  - Applied tools: Python, Scikit-learn, TensorFlow, Pandas, and Matplotlib.
- **QGIS** — *Udemy* *(Ongoing)*
  - Trained in spatial data analysis, mapping, and geoprocessing techniques using open-source GIS software for environmental & civil engineering applications.
  - Learned raster and vector data handling, spatial joins, buffer analysis, and land-use classification.
  - Developed thematic maps for hydrology and civil projects such as watershed delineation, rainfall-runoff analysis, and urban planning layouts.
  - Mini-projects: Flood risk mapping, groundwater potential zoning, and transportation network analysis.
- **Machine Learning and Data Science** — *Udemy* *(2025)*
  - Focused on data preprocessing, visualization, and building ML models to solve real-world problems using Python libraries.
  - Learned Exploratory Data Analysis (EDA), feature engineering, dimensionality reduction (PCA), and model evaluation.
  - Built regression and classification projects such as predicting rainfall, crop yield forecasting, and water demand estimation.
  - Tools used: Python, Pandas, NumPy, Matplotlib, Seaborn, Scikit-learn.
- **HEC-RAS, HEC-HMS** — *Udemy* *(2025)*
  - Learned hydrological & hydraulic modeling for river analysis, watershed management, and flood simulation using HEC software tools.
  - Applied HEC-RAS for steady/unsteady flow simulations, floodplain mapping, and hydraulic structure analysis.
  - Applied HEC-HMS for rainfall-runoff modeling, hydrograph generation, and basin water balance.
  - Mini-projects: Flood risk analysis for a river stretch, stormwater drainage modeling, and reservoir inflow prediction.
- **MYSQL, Python** — *IT Desk* *(2023)*
  - Gained hands-on skills in database management with MySQL and programming for data analysis & automation using Python.
  - Learned database design, normalization, joins, indexing, and writing optimized SQL queries.
  - Integrated Python with MySQL for automated data entry, extraction, and visualization.
  - Mini-projects: Water quality database management system, rainfall records query system, and groundwater monitoring dashboard.
- **Diploma in Civil CAD** — *CAD Desk* *(2022)*
  - **AutoCAD**
    - Learned 2D drafting, detailing, and preparation of civil engineering drawings (plans, sections, and elevations).
    - Mini-projects: Created building floor plans, site layouts, and structural drawings.
  - **ETABS**
    - Gained skills in structural analysis and design of multi-storey buildings, including load calculations.
    - Mini-projects: Designed and analyzed residential/commercial buildings under seismic and wind loads.
  - **SketchUp**
    - Developed 3D architectural models for visualization and conceptual design.
    - Mini-projects: Modeled residential houses, landscaping layouts, and urban design prototypes.
  - **Lumion**
    - Learned realistic rendering, animation, and architectural visualization with materials and lighting.
    - Mini-projects: Produced architectural walkthroughs, landscaping visuals, and interior renderings.

Sustainable Engineering Concepts and Life Cycle Analysis — *NPTEL* *(2022)*

- Gained knowledge of sustainable design principles, environmental impact assessment, and life cycle analysis for engineering projects.

POSITIONS OF RESPONSIBILITY

- **Secretary, COMMUNITY WELFARE CELL | IIT Kanpur** (*June 2025 – Present*)
  - Strengthened campus well-being and student engagement by organizing welfare drives, health and hygiene campaigns, and inclusive community events.
  - Coordinated with institute authorities to address welfare needs, managed event logistics and budgets, and fostered a vibrant, supportive campus environment for all.
- **Student Guide, Institute Counselling Service (ICS) | IIT Kanpur** (*June 2025 – Present*)
  - Guided first-year students (including one international student) on **course registration, orientation, and campus acclimatization**.
  - Assisted in organizing and invigilating the English Diagnostic Test (EDT), campus walk, and interactive orientation events.
  - Supported students in academic and personal challenges, acting as a mentor and motivator to ensure smooth transition to campus life.
- **Cultural Secretary, GENDER CELL Students' Gymkhana | IIT Kanpur** (*June 2025 – Present*)
  - Led initiatives to promote gender equality, inclusivity, and awareness across campus. Organized sensitization workshops, policy discussions, and outreach programs.

  - Acted as a point of contact for addressing gender-related concerns, liaising between students and administration to create a safe and supportive campus environment.
- **Teaching Assistant (DPGC, Civil Engineering) | IIT Kanpur** (*July 2025 – Present*)
  - Assisting in conduction of labs for B.Tech batch under the supervision of faculty.
  - Teaching Assistant for **CE261** Fluid Mechanics for Civil Engineers, involving lab tutorials, invigilation, evaluation, and student guidance.

ACADEMIC COURSEWORK

ADVANCED HYDROLOGY	ADVANCED HYDRAULICS	DATA SCIENCE
HYDROMETRY	NUMERICAL METHODS FOR CIVIL ENGINEERING	PROBABILITY AND STATISTICS FOR CIVIL ENGINEERING
FLUID MECHANICS LABORATORY	COMPUTER METHODS IN HYDRAULICS AND HYDROLOGY	MACHINE LEARNING (Ongoing)
WATER RESOURCES SYSTEM ANALYSIS	STOCHASTIC HYDROLOGY (Ongoing)	Microsoft SQL

SOFT SKILLS

- Time Management – Prioritizing tasks and meeting deadlines.
- Adaptability – Flexibility to adjust to new environments and challenges.
- Teamwork & Collaboration – Working effectively in diverse teams.
- Problem-Solving – Analytical approach to practical challenges.
- Communication Skills – Strong written and verbal communication.
- Continuous Learning – Commitment to upgrading knowledge.

EXTRA-CURRICULAR

- Silver Medal – Basketball (Inferno 2024, IIT Kanpur).
- Silver Medal – Arm Wrestling (Inferno 2024, IIT Kanpur).

HOBBIES AND INTERESTS

- Classical Bharathanatyam dance
- Playing Basketball, Fitness, Sports and Yoga
- Reading Non-Fiction and Research Articles
- Music (Guitar) and Photography
- Traveling and Exploring Cultures