

Manush Gopal

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EDUCATION

University of Michigan, College of Engineering

Ann Arbor, MI

M.S.E in Environmental Engineering: Environmental Data Systems

December 2026

- B.S.E. in Computer Science and B.S.E in Environmental Engineering, GPA: 3.5/4.0 August 2022–December 2025
- **Courses:** Machine Learning, Web Systems, Data Analysis, Database Management, Data Structures & Algorithms
- **Awards:** Frank J. Lemper Scholar, Graham Sustainability Scholar, Dean's Honor List, Pelham Scholar

EXPERIENCE

Ecolab/Siemens

Crawfordsville, IN

Digital Twin Engineering Intern

May 2025 – Present

- Led first Metals Climate Intelligence initiative; built process digital twin for Nucor steel plant decarbonization using Siemens gPROMS, extracting and validating 6+ months of operational data from plant databases; projected 7,500 ton/yr CO₂ reduction and \$3M savings.

BLUElab, University of Michigan

Ann Arbor, MI

Project Manager & Technical Lead, Smart Irrigation

January 2025 – Present

- Lead team building IoT precision irrigation system for ClayHill Farm; architected FastAPI backend with LightGBM soil moisture forecasting, Penman-Monteith ET₀ calculations, LoRa sensor network, and Particle Cloud valve control; deployed dashboard here: [🔗 Link](#)

University of Michigan

Ann Arbor, MI

Teaching Assistant, CEE 373: Statistics for Data Analysis and Uncertainty Modeling

August 2025 – January 2026

- Taught regression, hypothesis testing, and uncertainty quantification coding sessions in Python for 85 students.

One Energy

Findlay, OH

Field Engineer Intern

May 2024 – August 2024

- Automated geospatial GeoTIFF processing pipeline in wind modeling software using Python and C#; planned 100+ future wind turbine sites with ArcGIS and QGIS.

Digital Water Lab, University of Michigan

Ann Arbor, MI

Machine Learning Research Assistant

December 2023 – May 2024

- Developed regression models to optimize water resource recovery plant efficiency; built frontend for open-source ML toolkit published for U.S. DOE, DC Water, and partner universities. | [🔗 Toolkit Link](#)

PROJECTS

Groundwater Contamination PINN | *Python, PyTorch, Neural Networks, Streamlit* | [🔗 Demo](#)

- Built physics-informed neural network to model Gelman dioxane plume migration using 40 years of data from 888 wells; added leakage decay term achieving R²=0.955 and deployed Streamlit prediction dashboard.

SteelAdvisory | *Python, FastAPI, Next.js, React, ARIMAX, Monte Carlo Simulation* | [🔗 Demo](#)

- Engineered full-stack forecasting platform with decoupled React frontend (Vercel, CI/CD via GitHub integration) and FastAPI REST backend serving modular API endpoints for ARIMAX predictions (8.06% MAPE), Monte Carlo simulation, and procurement optimization at MIT Energy and Climate Hackathon.

Soil Moisture Forecasting Model | *Python, scikit-learn, NASA SMAP Satellite Data, ETL Pipeline* | [🔗 Repo](#)

- Engineered scalable ETL pipeline processing 2,900+ NASA SMAP satellite rasters with automated data validation and weather API integration; trained Random Forest model (R²=0.84) for geospatial soil moisture forecasting.

TECHNICAL SKILLS

Languages: Python, C++, Java, SQL, JavaScript, C#, MATLAB, HTML/CSS, LaTeX

ML/AI: PyTorch, TensorFlow, scikit-learn, LightGBM, LLMs, neural networks, regression, random forest, predictive modeling, feature engineering, model validation, hyperparameter tuning

Data & Backend: Pandas, NumPy, Matplotlib, Streamlit, REST APIs, ETL pipelines, time-series analysis, spatiotemporal analysis, statistical modeling, system monitoring

Tools: Git/Github, Agile, CI/CD, Azure, MongoDB, PostgreSQL, Flask, FastAPI, GIS (ArcGIS and QGIS)