

## ***Problem Statement and Team Details***

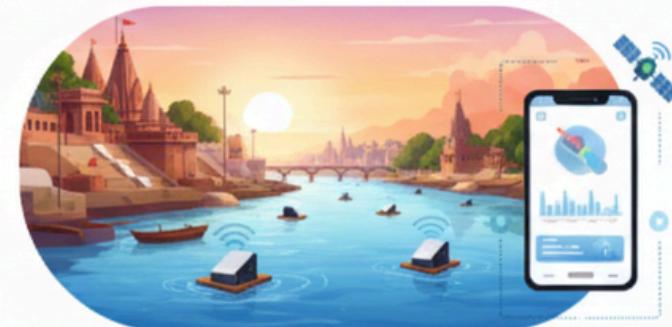
**Problem Statement: Real-time Ganga River Water Quality Monitoring and Forecasting**

**Team Name: TechnoSTAR**

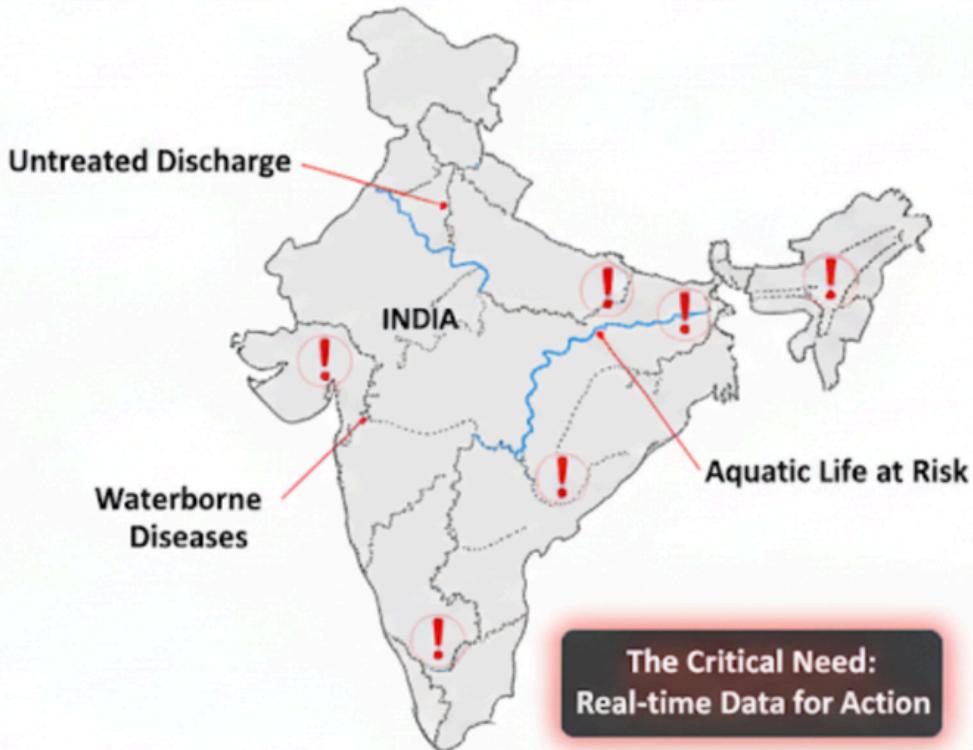
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## REAL-TIME GANGA RIVER WATER QUALITY MONITORING & FORECASTING



### Challenges:

- Industrial & Sewage Pollution
- Health Crisis & Ecosystem Damage
- Lack of Real-time Data & Predictive Insights

# SOLUTIONS

## HEALTH IMPACT ALERTS



Safe/Unsafe for Drinking,  
Bathing, Aquatic Life

## POLLUTION SOURCE INDICATOR



BOD rise expected due  
industrial discharge

## GAMIFIED PUBLIC AWARENESS



'Did You Know?  
Fact Cards

## DOWNLOADABLE MINI-REPORTS



PDF/CSV with 10-day avg,  
forecast, alerts  
summary

## COMPARISON FEATURE



HARIDWAR → KANPUR  
Compare 2 Locations  
Side-Side

## COLOR-CODED RIVER HEATLINE



River path: Green → Yellow / Red

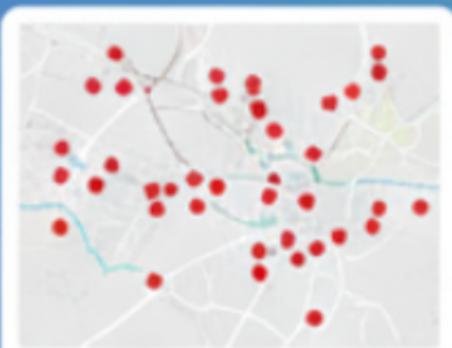


## AI Chatbot "Ask Ganga"

User: How is water in Patna?



## Basic Alerts



Map + Locations



Time Series Chart  
(10-day history + day forecast)



## 1 Data Collection

Simulated data represents DO, BOD, nitrate, fecal coliform, rainfall, flow; optionally real-time IoT sensors or in future.



## 2 Data Storage

Database: MongoDB stores historical records, 10-day data, 3-day forecast, and alerts.



## 3 Backend API

Processing: Node.js + Express APIs fetch data from MongoDB and calculate alerts based on thresholds.



## 4 Frontend Display

React.js fetches API data and displays maps, charts; comparisons, alerts, and chatbot.



## 5 High Alert Identification

Logic: Backend compares each parameter with threshold → flag high alert locations → data sent.



## 6 Updates to Website

When new mock or real data inserted into MongoDB APIs automatically serve latest data.

# Technology Used

The core technology is the MERN stack —

MongoDB, Express.js, React.js, Node.js — enriched with map/chart libraries, Web Speech API for voice-enabled chatbot, socket.io for real-time alerts, and PDF/CSV tools for reporting.



Layer	Technology	Purpose
Frontend	React.js,html,css	Interactive dashboard (map, charts, alerts, chatbot UI)
Backend	Node.js + Express.js	REST APIs, alert engine, forecast logic
Database	MongoDB	Store stations, water-quality readings, forecasts, alerts



map-chart libraries

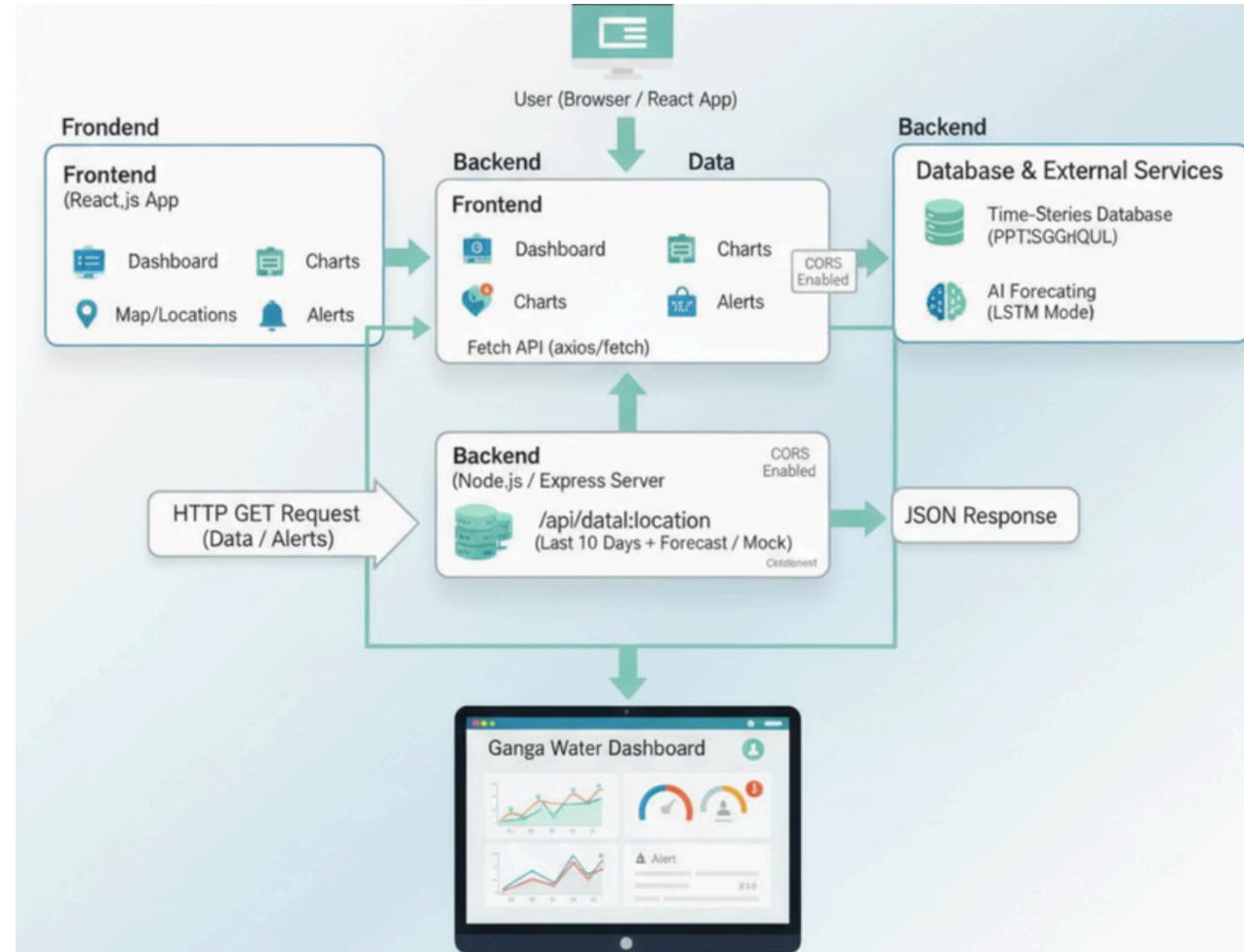
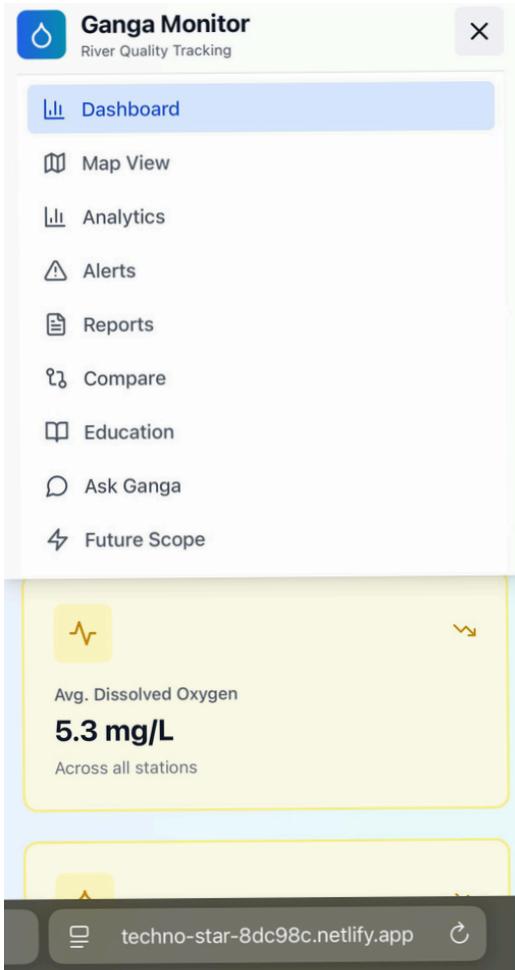


Web Speech API  
or voice-enabled chatbot



socket.io  
PDF/CSV tools for reporting

# Flowchart & Supporting Images





# Feasibility



## Technical Feasibility

MERN Stack, Time Series Charts,  
Heatline, AI Chatbot



## Operational Feasibility

Scalable APIs, Alerts,  
Easy public integration



## Financial Feasibility

Open-source tech, low-cost  
mock data, potential govt/NGO support



# Market Value



## Social Impact

Millions depend on Ganga;  
prevents waterborne diseases



## Govt & Institutional Adoption

NMCG, State Water Boards,  
Smart City projects



## Commercial Potential

Expansion to other rivers,  
AI analytics monetization



## Unique Selling Points

Heatline, AI chatbot, comparison,  
gamified awareness,  
downloadable reports

## Wow Factor



Ask Ganga



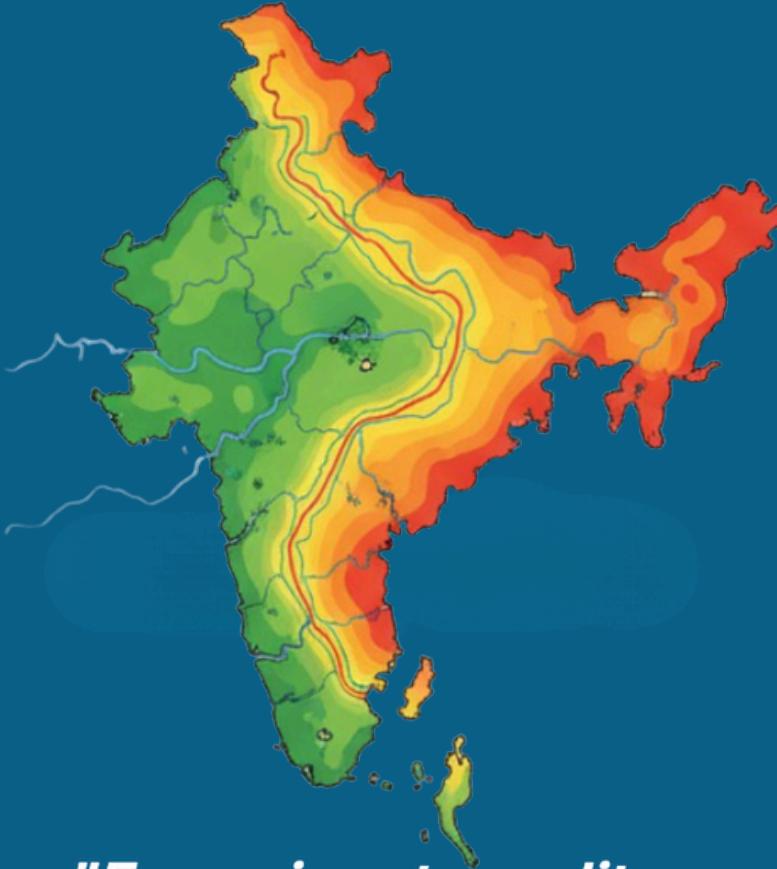
Heatline



Report

# Conclusion & Future Vision

- ✓ Developed a **real-time Ganga Water Quality Monitoring & Forecasting** system using the MERN stack.
- ⓘ Provides **10 days of historical data and a 3-day forecast** for key parameters like DO, BOD, Nitrate, and Fecal Coliform.
- 💻 Features an **interactive dashboard** with maps, charts, health alerts, and public engagement tools.
- ⌚ **Future-ready design** for integrating IoT sensors, advanced ML forecasting, and CPCB data.
- 👤 **Empowers the public and decision-makers** with actionable insights for a healthier Ganga.



***"From river to reality:  
Predicting and protecting  
the Ganga's future."***