



BHARATIYA ANTARIKSH HACKATHON 2025

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Team Name : Hack O' Giants

Team Leader Name : Gurjas Singh Gandhi

Problem Statement : Developing an Algorithm for Air Quality Visualizer and Forecast App to generate granular, real-time, and predictive air quality information, especially in smaller cities or rural areas.

Team Members

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Brief about the Idea:

Our idea is to build a **hyperlocal, AI-powered Air Quality Visualizer and Forecasting App** named **'Vayu Drishti'** that goes beyond major cities to cover **small towns and rural areas**, providing **granular, real-time, and predictive air quality insights**. Most existing AQI apps ignore underserved regions, but our tool will bridge that data gap using a combination of **satellite data, meteorological inputs and machine learning models**.



1. How different is it from any of the other existing ideas?

- We will use our system to integrate CPCB and satellite data for hyperlocal AQI, including in rural areas.
- Using AI models, our system will effectively forecast the AQI 72 hours in advance (Hugging Face).
- We will offer individualized, real-time health advisories via our system.
- A tree-planting estimator based on the local AQI will be part of our system.
- We will enable location-based and photo-based pollution reporting to authorities via our system.

2. How will it be able to solve the problem?

- We will expand AQI coverage outside of major cities with our system.
- To assist sensitive groups in making plans, our system forecasts pollution.
- Depending on the user profile, our system will provide practical health advice.
- When pollution levels rise, our system will promptly notify users.
- Our system will use community-driven reporting to close the enforcement gap.
- Our system will use a tree count calculator to recommend environmental restoration.

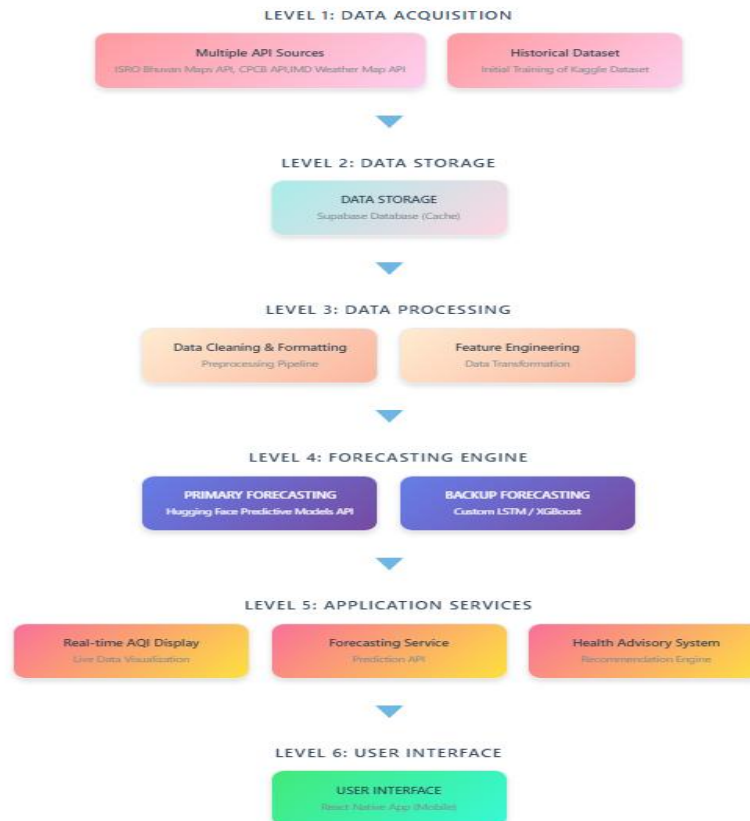
Unique Selling Points (USP)

- AI-powered AQI predictions and alerts in real time.
- Using satellite data to cover AQI in rural and semi-urban areas.
- Health-first approach with personalized advice.
- Tools for action built in: report people who break the rules and plant trees.
- Mapping pollution sources to raise awareness ahead of time.
- Linking emergency alerts for schools, hospitals, and other public places.
- Developers can get AQI data, forecasts, and alerts through a public API.

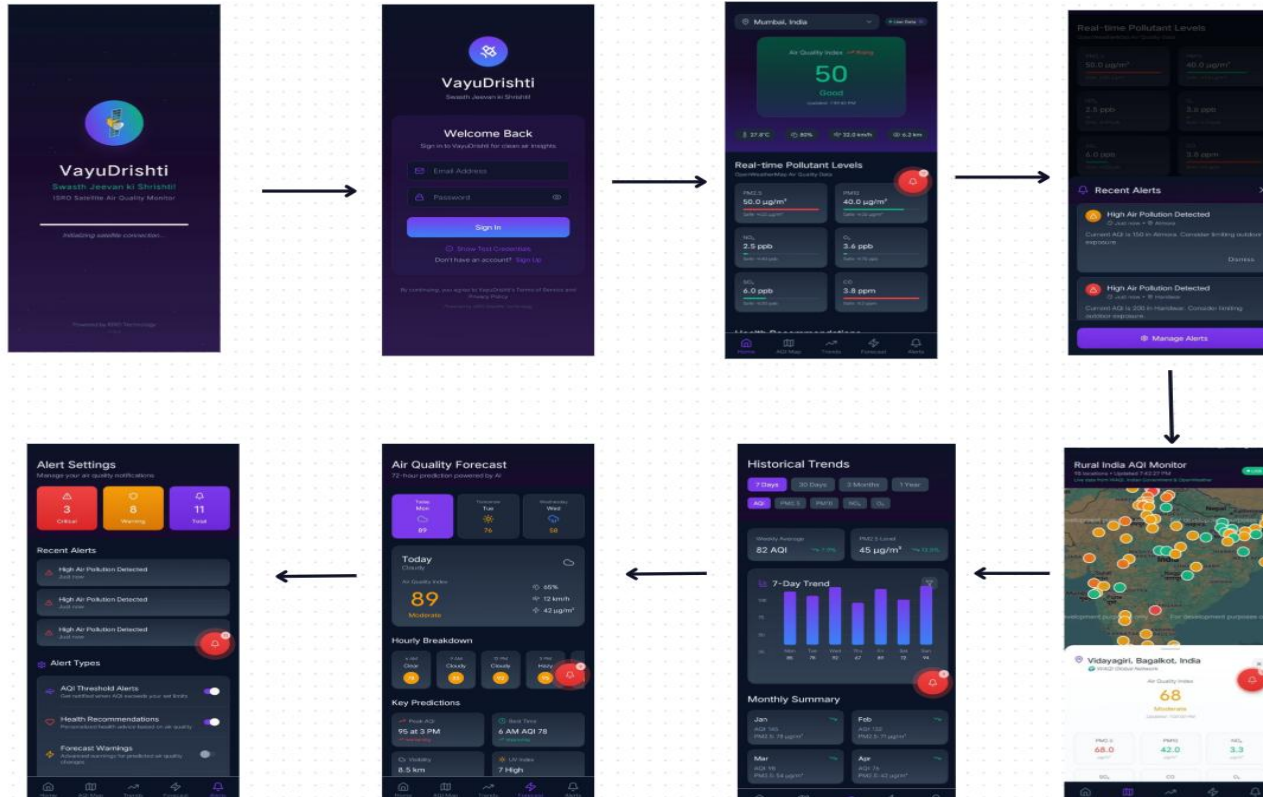
List of features offered by the solution

Feature	Description
Hyperlocal AQI Coverage	Fusion of satellite + ground-level data to ensure coverage of every region, not just major cities.
AI-Based Forecasting	Predicting AQI trends 3 days in advance using machine learning and meteorological data.
Personalized Health Advisory	Health alerts are location-aware and condition-specific (e.g., for asthmatics, elderly).
Pollution Source Mapping	Heatmaps showing traffic zones, factory emissions, crop-burning areas help with awareness and regulation.
Tree Compensation Calculator	For suggesting how many trees to plant in an area to improve AQI—first-of-its-kind actionable feature.
Pollution Violation Reporting	Photo + GPS-based reporting tool to let users notify civic bodies of unregulated pollution sources.
Smart Push Notifications	Customizable alerts for pollution spikes, daily AQI digests, and emergency warnings for schools, hospitals, and public spaces.
Historical AQI Trends	Graphs for PM2.5, PM10, NO ₂ , filterable by location, date, and pollutant type, including an optional satellite image timeline.
Public AQI Developer API	Offering a public API for developers, researchers, and civic apps to integrate AQI forecasts, trends, and alerts into their systems.
Emergency Response Integration	Linking AQI alert thresholds with emergency systems in schools/hospitals (e.g., auto-sending alerts to admin staff when AQI > danger level).

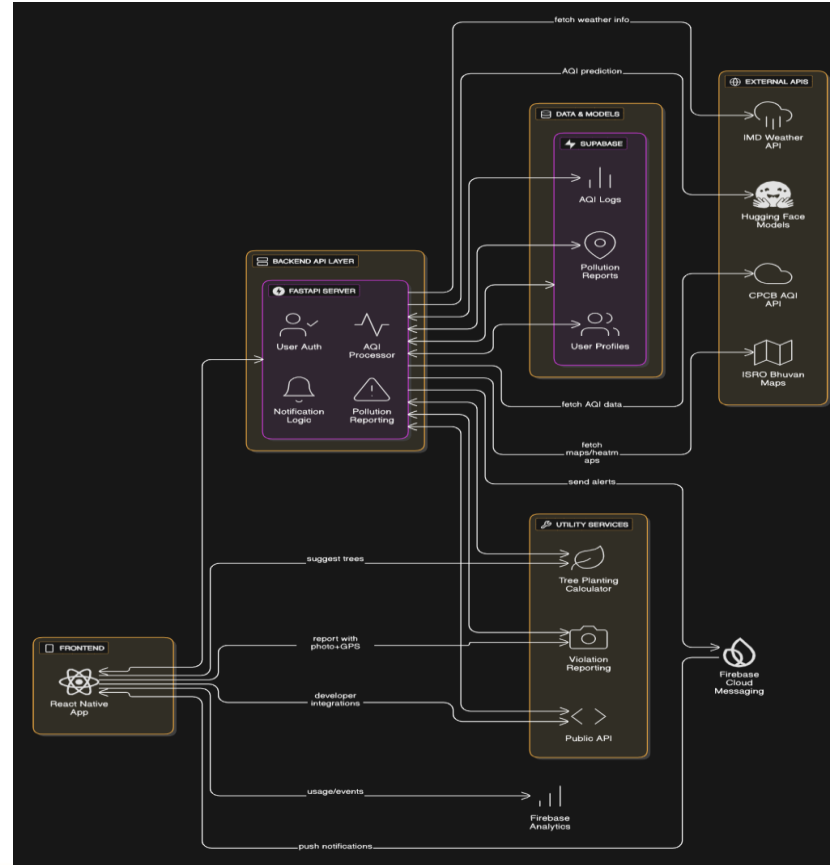
Process flow diagram



Wireframes of our proposed solution



Architecture diagram of our proposed solution



Technologies to be used in the solution:

Category	Technology/Tool	Purpose
Frontend Development	React Native	Mobile app UI
Maps & Visualization	ISRO Bhuvan Maps API	AQI heatmap visualization and pollution overlays
Backend Development	Python (Fast API)	API handling, business logic, ML model serving
Database	Supabase DB	Storage for AQI, weather, and user data
AQI Data Sources	CPCB API	Real-time and historical AQI values
Satellite Data	ISRO Bhuvan	Rural pollution & crop burning data
Weather Data	IMD API	Meteorological input for forecasting
Forecasting Models	Hugging Face Predictive Models API	AI-based AQI prediction (24–72 hrs)
Notification Service	Firebase Cloud Messaging (FCM)	For pushing alerts for high AQI, daily summaries
Analytics	Firebase Analytics	For tracking user behavior and performance

Estimated implementation cost

Component	Tool/Service	Cost Estimate (per month)
Frontend Hosting	Firebase Hosting	₹ 0 – 20
Backend Server	Fast API	₹ 5 – 25
Database	Supabase DB	₹ 0 – 25
Maps API	Bhuvan Maps	₹ 0 up to quota, then ~7/1000 requests
Weather API	IMD API	₹ 0 – 40
Notification Service	Firebase Cloud Messaging	₹ 0
ML Model Hosting	Hugging Face Predictive Models API	₹ 0 – 30
CI/CD & Repo	GitHub Actions	₹ 0 (with limits)
Total Estimated Cost	=	₹ 1,600 – ₹ 12,000 per month

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THANK YOU

