1. Please provide a suitable title for your invention (maximum 15 words).

Ans: EcoAlert.in: Real-Time Community Platform for Environmental Pollution Reporting and Monitoring

2. What is the field of your invention? (Max 100 words).

Ans: This invention falls under the fields of Environmental Technology, Geospatial Information Systems, and Web/Mobile Application Development. It focuses on real-time pollution reporting, crowdsourced environmental monitoring, and data-driven environmental governance. By integrating software development, community engagement, and geolocation technologies, the system empowers citizens to report environmental hazards, enabling timely responses from NGOs, municipal bodies, and policymakers. This platform promotes participatory environmental action and enhances transparency in pollution tracking.

3. Please elaborate the problem being solved by your invention. Please specify the actual problem in the existing product or process. You may talk about existing solutions in the market/industry, and why in spite of the presence of those other solutions your invention is needed. (almost 200 words).

Ans: Urban and semi-urban areas are experiencing rising environmental degradation due to industrial waste, vehicular emissions, and poor waste management. While NGOs actively work on these issues, their efforts are often fragmented and not well communicated. Citizens lack accessible platforms to report problems or engage with ongoing initiatives.

Existing systems like government-run pollution monitors are limited by high costs, sparse coverage, and delayed data updates. Satellite and sensor-based tools offer only broad regional data, lacking the detail needed for local intervention. Additionally, most platforms do not enable direct citizen participation or real-time issue reporting, leading to missed opportunities for timely action.

EcoAlert.in addresses these gaps by offering a real-time, crowdsourced environmental reporting platform. It allows users to submit pollution reports with geotags and images, view local NGO projects, and contribute directly to initiatives. This creates an interactive bridge between the public, NGOs, and policymakers.

By enhancing transparency, responsiveness, and community engagement, EcoAlert.in solves the core shortcomings of existing environmental monitoring and civic engagement systems.

4. Please elaborate the solution being provided by the invention to overcome the problem. a) How is your invention made? b) How does your invention work (i.e. functionality of your invention)? Please provide schematics diagram and its description if required. (200-700 words)

Ans: The problem of environmental degradation—whether in the form of air pollution, public waste, or poor civic amenities—is compounded by delayed reporting, poor public engagement, and lack of coordination between communities and NGOs. **EcoAlert.in** provides a scalable, real-time, community-driven platform to address these challenges through a web-based application that empowers users to report environmental issues and helps NGOs and authorities act promptly.

a) How is the Invention Made?

EcoAlert is built using a robust, full-stack architecture that ensures responsiveness, scalability, and real-time synchronization across users.

- **Frontend**
    - **Web Interface:** Developed using **React.js** for a responsive and intuitive user experience
- **Backend**
    - Powered by **SupaBase**, which handles user authentication, API endpoints, and server-side functions
- **Database**
    - **SupaBase PostgreSQL** is used for real-time data storage, syncing user reports, location metadata, and image uploads
- **Mapping & Location Services**
    - **MapBox API** allows users to tag and visualize locations on an interactive map interface
- **Visualization**
    - A **heatmap engine** dynamically color-codes regions based on the frequency and severity of user reports, providing an intuitive visual representation of pollution

hotspots

- **AI Integration** (Planned/Future Feature)
    - AI models classify user-submitted descriptions into categories (e.g., air pollution, waste, traffic emissions), helping route reports to the right stakeholders

b) How the Invention Works (Functionality)

Step 1: User Engagement and Reporting
Any user visiting the **EcoAlert in** website can:

- Click a photo of an environmental concern (e.g., smog, garbage, deforestation, water stagnation)
- Add a short description
- Mark the exact location using GPS or manually on the map
- Categorize severity: *Low, Moderate, or High*

The app records the **latitude and longitude**, attaches the image and description, and submits the report to the cloud backend.

Step 2: Backend Processing

- Reports are validated and stored.
- AI models (or keyword-based logic) classify the reports into categories (e.g., Air Pollution, Sanitation, Infrastructure).
- The system aggregates multiple reports from the same region to determine **urgency** using frequency thresholds.
- Each report is timestamped and geotagged, forming the basis for further visualization and analysis.

Step 3: NGO and Authority Dashboard

- Partnered NGOs and local municipal authorities access a real-time dashboard.
- They can:
    - View reports by type and severity
    - Filter based on location or time
    - Get **"pinged"** when reports fall under their area of expertise
- This ensures targeted, decentralized response mechanisms, reducing time lag between complaint and action.

Step 4: Heatmap Visualization

- Areas with no reports remain **grey**
- Low-frequency reports → **Yellow**
- Moderate-frequency reports → **Orange**
- High-frequency reports → **Red (Hotspot)**
- Resolved reports or those accepted by NGOs are marked in **shades of green**, scaled by the number of NGOs actively involved

Step 5: Impact Tracking

- Users can:
    - See the number of NGOs working on a specific issue
    - Track resolved vs unresolved complaints
    - View trends in a region over time (weekly/monthly)

This increases public trust, transparency, and accountability, as progress becomes visible.

Step 6: Community Features & Gamification (Planned)

- Community groups can form around localities, enabling collaborative discussions on local issues (e.g., unclean parks, poor roads, lack of healthcare access)
- Users receive:
    - Eco-friendly habit reminders
    - Progress badges for consistent reporting
    - Rewards or leaderboard status based on community impact

5. Please provide how your solution is unique/novel and different as compared with other available/known solutions to the same/similar problems?

Ans: Table 1: Comparison of EcoAlert.in vs Traditional Environmental Monitoring Systems→

Feature	**Existing/Traditional Solutions**	**EcoAlert.in (Our Invention)**
Infrastructure Dependency	Relies on centralized government infrastructure like air quality monitoring stations	Fully decentralized and community-powered; anyone with internet access can

	and satellites; expensive and limited in reach.	report issues from any location.
Citizen Participation	Largely passive systems; citizens receive alerts or data but cannot actively engage.	Enables two-way participation: users can report, track issues, and engage with NGOs (volunteer, donate, spread awareness).
Data Visualization	Static reports or delayed updates; minimal visual representation of data.	Real-time, color-coded heatmaps visualize issue frequency and severity for easy hotspot identification
Geographic Reach	Limited to urban centers or sensor-equipped zones; rural and semi-urban areas are often excluded.	The crowdsourced model ensures broad coverage, including under-monitored and remote areas.
Issue Categorization	Predefined categories or sensor outputs; lacks flexibility or user perspective.	User-driven reports include images, severity levels, and descriptions; future AI tagging adds intelligent categorization.
Transparency & Tracking	No or limited public visibility into complaint progress or resolution.	Public dashboards allow users to track report status, view NGO involvement, and monitor overall impact.
Community Impact Features	Absent or minimal; focus is on technical data rather than engagement.	Includes planned gamification, habit reminders, badges, and community features to encourage sustained public action.

6. Please intimate if you can think of any alternative way/solution of achieving the same result as your invention? Please note that the alternative way/solution may or may not have same advantages as offered by the invention.

Ans: While several alternative solutions exist to bridge the communication and data gap between citizens, NGOs, and local authorities in environmental problem-solving, each comes with notable limitations that our invention overcomes. Below are some key alternatives:

1. Manual Communication via WhatsApp or Google Forms
How it works:
NGOs create WhatsApp groups or circulate Google Forms within communities to collect environmental complaints or seek participation.
Limitations:

- Labor-intensive and non-scalable; requires continuous manual effort by NGOs
- Lacks real-time updates or geolocation tagging
- Minimal data aggregation or visual analytics
- Dependent on NGO-driven outreach, reducing spontaneity and reach

2. Installation of Pollution Monitoring Sensors
How it works:
Government or private institutions deploy fixed-location air quality sensors to gather scientific environmental data.
Pros:

- Provides precise measurements of air quality and pollution levels

Cons:

- High setup and maintenance costs
- Limited geographical coverage—many rural and semi-urban areas remain unmonitored
- No community involvement or real-time citizen feedback
- No platform for direct public action or issue tracking

3. Government Complaint Platforms (e.g., Swachhata App, Green Delhi App)
How it works:
Citizens submit civic or environmental complaints via centralized government apps.
Limitations:

- Response time is often slow or unclear
- Citizens have limited visibility into what happens after reporting

- No collaboration or integration with NGOs and civil society actors
- Lacks transparency and citizen empowerment features

4. Social Media Tagging (e.g., Twitter, Facebook)
How it works:
Users post photos or text highlighting environmental issues and tag NGOs or authorities.
Limitations:

- Informal and unstructured—difficult to follow up or track systematically
- Posts are often lost in unrelated content
- No structured categorization, geolocation, or historical record
- No visual mapping, report status, or accountability mechanism

Why EcoAlert.in Is Different:

EcoAlert.in addresses all the above limitations by offering:

- A **real-time, web-based platform** accessible to any user with internet access
- **Geolocation-enabled reporting**, allowing accurate spatial mapping of issues
- **Visual heatmaps and urgency zones**, helping prioritize hotspots
- A **transparent dashboard** that connects citizens with NGOs, tracks issue resolution, and encourages community participation
- **Decentralized and scalable**, with no dependence on expensive infrastructure or manual coordination

7. Enlist the novel aspects of your invention that need protection? Describe technical differences between conventional product/processes and your solution (should not include the application/ benefits). Please prioritize the features to come to the most important part of your invention.

Ans: A) Implemented Novel Aspects:

1. Geo-Tagged Heatmap Generation from User Reports
What's Novel:

- User-submitted reports are tagged with GPS coordinates and visualized in real-time as color-coded heatmaps to show severity and frequency.

Technical Difference:

- Conventional systems use fixed sensors or offer static location data.

- EcoAlert uses distributed crowd input to generate dynamic, map-based spatial analytics.

2. Real-Time Crowdsourced Reporting Interface
What's Novel:
- A lightweight, accessible web platform that enables instant submission of environmental concerns with location, description, severity, and images.

Technical Difference:
- Traditional systems rely on centralized reporting or sensor networks, with delayed response loops.
- This interface allows spontaneous, distributed data collection at street-level granularity.

3. Photo-Based and Severity-Indexed Reports
What's Novel:
- Submissions include images as proof and allow the user to categorize severity (High, Moderate, Low).

Technical Difference:
- Existing platforms rarely incorporate user-generated visual documentation or subjective severity input.
- EcoAlert enables qualitative insights to augment quantitative data.

4. Community Impact Tracker
What's Novel:
- Tracks whether an issue has been addressed and how many NGOs are working on it; differentiates resolved vs. unresolved reports.

Technical Difference:
- Most systems offer no historical report status tracking or resolution mapping across stakeholders.
- This feature adds a time-aware, status-based reporting dimension.

5. Real-Time Regional Alert System
What's Novel:
- Users and stakeholders can be notified when a new incident is reported within a defined geographic radius.

Technical Difference:
- Few platforms offer automated, geo-fenced alerts for public environmental updates.
- This increases response speed and situational awareness.

B) Planned/Upcoming Novel Aspects:

6. Dual-Dashboard System for NGOs and Authorities *(Planned)*
What's Novel:
- A role-specific dashboard system offering filtered views based on organization type (NGO vs. authority) and specialization.

Technical Difference:
- Conventional systems often rely on unified dashboards or non-configurable interfaces.
- This approach modularizes access, aligning data visibility with stakeholder responsibilities.

7. Integration of Educational and Gamification Modules *(Planned)*
What's Novel:

- Eco-friendly habit reminders, user engagement badges, and behavioral tracking features to incentivize environmental participation.

Technical Difference:

- Standard platforms are transactional; this module adds longitudinal engagement and behavior reinforcement components.

8. Has any biological material been used in developing or implementing the invention?

Ans: No biological material has been used in the invention.

9. Has the invention been published or disclosed/discussed to anyone outside of your organization or any third party in India or abroad (such as marketing meetings, conferences, tradeshows, trade fairs, websites, social media, newspapers etc.)?

Ans: Yes, the invention and its core features were publicly disclosed during an intercollege competition called **Science Engineering Connect** through a college-level presentation. However, it has not been published in any journal, conference proceeding, or third-party media outlet. Given this public disclosure, it is advisable to proceed with IP filing at the earliest to preserve potential intellectual property rights.

10. Potential Customers/Industries who may be interested in this work. (Provide 10 names or more)

Ans: The following organizations and sectors may be highly interested in adopting or partnering with **EcoAlert.in**:

1. **Central Pollution Control Board (India)**
2. **Ministry of Environment, Forest and Climate Change (MoEFCC)**
3. **Municipal Corporations and Local Urban Bodies**

4. **Swachh Bharat Abhiyan**
5. **Smart Cities Mission**
6. **Environmental NGOs and Advocacy Groups**
    - e.g., *Greenpeace India, Chintan, Goonj*
7. **Environmental Consulting Firms**
    - e.g., *ERM India, AECOM, RMSI*
8. **Urban Planning and Sustainability Departments**
9. **Disaster Management Agencies**
    - e.g., *National Disaster Management Authority (NDMA)*
10. **Research Institutions and Universities Promoting Sustainability**
    - e.g., *TERI, IITs, IISc, environmental science departments*
11. **CSR Wings of Corporates with ESG Commitments**
    - e.g., *Infosys Foundation, Wipro Foundation, Tata Trusts*
12. **Environmental Journalism and Media Platforms**
    - e.g., *Down To Earth, Mongabay India, The Wire Science*

These entities represent both potential customers and collaborators for deploying or scaling the EcoAlert platform at local, regional, or national levels.

11. Inventor details (Please add more rows if required)

Sl No.	Name of Inventors	Nationality	Department /School	Email id & Contact No.	Signature
1.	Kapil Singh Negi	Indian	School of	kapil.negi12300	

			Computer Science	@gmail.com +91 97566 48995	
2.	Shreya Jalota	Indian	School of Computer Science	shreyajalota2006@gmail.com +91 89689 28472	
3.	Yash Gusain	Indian	School of Computer Science	yashgusain6002@gmail.com +91 7037155173	