**Executive Summary**

**Event:** KakushIN\_9 – Beach Warriors: Tech for CSR  
**Team Name:** Tech-Savvy  
**Team Members:** Saparya Dey, Aishwarya Sreejith

**About Us:**

We are Team Tech-Savvy, a duo of dedicated developers passionate about solving real-world problems through technology.

Saparya Dey and Aishwarya Sreejith both specialize in MERN Stack development (MongoDB, Express.js, React.js, Node.js) and have extensive experience in AI/ML integration, full-stack application development, and intelligent automation.  
Our shared vision is to create sustainable tech-driven solutions that not only enhance operational efficiency but also empower communities to take meaningful action toward environmental preservation.

**Understanding of the Problem Statement:**

With Mumbai's beaches increasingly burdened by waste and pollution, dedicated environmentalists like Anjali work tirelessly to organize beach clean-up drives. However, they struggle with inefficient communication, volunteer no-shows, poor tracking of impact metrics, and lack of automation in outreach and reporting. Volunteers like Rohan, on the other hand, face confusion regarding event legitimacy, preparation requirements, and a lack of visible personal impact.

The current tools fragmented WhatsApp groups, spreadsheets, and manual tracking are inadequate for managing the scale and depth of operations required to make beach cleanups sustainable and impactful. What’s missing is a unified, intelligent platform that can connect, guide, and motivate all stakeholders while leveraging data, automation, and AI.

**Proposed Solution: BeachHero – Your Personal Eco-Engagement Companion:**

BeachHero is an AI and GenAI powered, cross-platform application that streamlines beach clean-up efforts by empowering organizers, volunteers, and communities through intelligent automation, real-time insights, and gamified engagement.

**Core Functionalities:**

1. **Volunteer Participation & Engagement**

* Smart volunteer registration and geo-tagged QR code check-in
* Personalized event suggestions based on interest and proximity
* Push notifications and event reminders
* Volunteer profile dashboard with badges, ranks, and certificates

1. **AI-Enabled Waste Tracking**

* Image-based waste classification using AI (plastic, metal, organic, hazardous)
* Manual data entry option for weight/type/volume
* Historical tracking and visualization of waste reduction trends

1. **GenAI-Driven Content Generator**

* Automated creation of social media content, flyers, and impact reports
* Real-time event summaries with environmental storytelling
* Certificate generation with volunteer contribution data

1. **Admin/NGO Dashboard**

* Role-based access for admins and event coordinators
* Live attendance and resource tracking
* Insights on volunteer performance, event impact, and beach-specific analytics

1. **Educational & Awareness Module**

* Interactive quizzes and eco-tips for volunteers
* AI chatbot to answer FAQs on waste segregation, safety, and protocols
* Knowledge leaderboard and awareness score

1. **Gamification & Motivation Layer**

* Points for actions (attendance, waste collected, quiz participation)
* Achievement badges and seasonal challenge rewards
* Volunteer-of-the-month recognitions with AI-generated personalized certificates

1. **Corporate & CSR Integration**

* Corporate partner dashboard to sponsor drives
* CSR tracking for employee volunteers
* Branded co-certification and impact reports

1. **Offline Accessibility & Multi-language Support**

* Offline check-in/log capability with later sync
* Hindi, Marathi, and English interface toggle for inclusivity

**Development Tools, Software, and Libraries with Exact Versions:**

**Our development will use the following environment setup:**

* Frontend Web Framework: React.js (v18.2.0)
* Mobile App Framework: React Native (v0.74.1)
* Styling & UI: Tailwind CSS (v3.4.1)
* Backend Runtime & Server: Node.js (v20.12.2) with Express.js (v4.18.2)
* Database System: MongoDB (v7.0.8)
* Authentication Service: Firebase Authentication (JS SDK v10.12.0)
* Maps & Geo-Location: Google Maps JavaScript API (v3.57)
* File Upload & Media Storage: Firebase Storage / Cloudinary (JS SDK v10.12.0)
* Waste Image Classification (AI): TensorFlow.js with MobileNet model (v4.14.0)
* GenAI Integration: OpenAI GPT-4 API using Node.js SDK (v1.26.0)
* Analytics and Charting: Recharts (v2.7.4) and Chart.js (v4.4.0)
* Push Notifications: Firebase Cloud Messaging (JS SDK v10.12.0)
* Chatbot Service: Dialogflow Node Client (v4.5.1)
* PDF Document Generation: jsPDF (v2.5.1)
* HTML to Canvas Utility: html2canvas (v1.4.1)
* Version Control: Git (v2.45.0)
* Operating System Environment: Ubuntu Linux (v22.04 LTS)
* Web Browser Used: Google Chrome (v126.0.6478.56)
* Optional CI/CD Integration: GitHub Actions (latest)

All required packages and dependencies will be pre-installed and locally available to eliminate the need for any downloads during the event.

**Conclusion:**

BeachHero is more than a clean-up coordination app—it is a catalyst for social and environmental transformation. By integrating AI, GenAI, real-time data, gamification, and multilingual support, our solution turns fragmented efforts into a well-organized, impact-driven movement.

With a focus on community, education, and measurable outcomes, BeachHero not only improves the efficiency of current beach cleanup drives in Mumbai but also lays the foundation for replicable coastal conservation across India and beyond.