THADOMAL SHAHANI ENGINEERING COLLEGE

THADOMAL SHAHANI TSEC ENGINEERING COLLEGE | CodeTantra

PRESENTS

NEED FOR CODE 4.0

Dominate the race track of innovation

PROBLEM STATEMENTS

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GENERAL INSTRUCTIONS

- Read the problem statements carefully
- All the teams should make a Github repository and name it as follows : NFC4_<TEAMNAME>
- We Recommend you to update Repositories every 2 hours
- It is Forbidden to plagiarize or reuse previously published content. If found upon inspection that the project has reused code that was not revealed with the submission, the project will be disqualified
- You are free to use any data sets you find appropriate for the respective Problem statements

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WEB/APP DEV

1. Residential Society Issue Tracker

Problem Statement:
Residential societies frequently face civic maintenance issues like overflowing garbage bins, broken elevators, water leakage, streetlight outages, and noise disturbances. These issues are currently reported informally via WhatsApp, SMS, or verbal complaints, leading to disorganization, slow resolution, lack of transparency, and recurring problems. Residents are left frustrated as there is no structured system to track issue status, follow up, or analyze root causes. The absence of data also limits management's ability to make evidence-based decisions or track vendor performance. Develop a centralized digital platform accessible via web and mobile to help residents report and track issues, enable committee members to assign and resolve them, and provide real-time insights for better community management. The expected outcome is a seamless and accountable workflow that improves service efficiency, ensures resident satisfaction, and provides actionable analytics to society managers.

Key Functionalities:

- User Roles: Resident, Committee Member/Admin, Technician/Maintenance Staff.
- Issue Reporting Form: With image/video upload, geotagging, priority levels, and categories (e.g., sanitation, security, water).
- Status Dashboard: Track complaint status (New, Assigned, In Progress, Resolved).
- Automated Alerts: Email/SMS/push notifications for updates and resolution.
- Admin Panel: Assign tasks to staff, monitor performance, generate monthly reports.
- Analytics: Heatmaps of common issues, recurring problem alerts, maintenance cost insights.
- User Feedback & Rating: Allow residents to rate the resolution.
- Multilingual Support & Accessibility: Hindi, Marathi, etc., with simple UI for elderly users.
- **Compulsory Functionality: Incorporate a multi-agent system where AI agents autonomously coordinate issue reporting, task assignment, and follow-up.**

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WEB/APP DEV

2. Smart Study Group Finder

Problem Statement:

Students often struggle to find peers with compatible learning styles, academic subjects, or schedules to form study groups. This disconnect results in missed collaboration opportunities, poor peer-to-peer learning, and reduced exam preparedness. Educational institutions lack digital systems to facilitate efficient group formation beyond social circles. As hybrid learning expands, the need for intelligent, automated study group formation tools has become more pressing. Design a web platform that uses intelligent matchmaking to help students discover or form productive study groups based on shared academic goals, interests, and learning preferences. The expected outcome is a smarter, more inclusive, and data-driven study experience where students thrive in collaborative environments.

Key Functionalities:

- Student Registration: With fields for institute, courses/subjects, preferred languages, availability schedule, and learning style (visual, auditory, kinesthetic).
- Group Matching Algorithm: Based on subject compatibility, availability, and learning preferences.
- Integrated Scheduler: Sync with Google Calendar or in-app weekly planner.
- Group Chat & Notifications: For discussions, file sharing, and reminders.
- Virtual Study Rooms: Real-time collaboration using whiteboard, screen sharing, and timers.
- Progress Tracker: Shared to-do list, study hours tracker, milestone badges.
- Privacy Controls: Approve/decline group invitations, report misuse.
- Gamification Elements: XP points, peer ratings, leaderboard for study consistency.
- **Compulsory Functionality: Empower the platform with agentic AI to enable autonomous matchmaking and group formation based on student preferences and learning behavior**

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WEB/APP DEV

3. CodeCollab –Real-Time Coding for Interviews and Teams

Problem Statement:
Live coding interviews, collaborative programming sessions, and remote team coding require robust, real-time platforms. However, most existing solutions are complex, over-engineered, or not tailored for interviewers or bootcamps. They lack features like multi-language support, code versioning, and candidate-friendly environments, and often require separate tools for communication. Develop a lightweight, browser-based real-time collaborative coding platform with integrated chat and video features, tailored for interviews and learning. The expected outcome is an intuitive, interview-ready code collaboration tool for universities, startups, and training programs.

Key Functionalities:

- Real-Time Code Sharing: With syntax highlighting for popular languages (Python, JavaScript, C++, Java, etc.).
- Live Execution Environment: Support for compiling and executing code with input/output console.
- Built-in Chat & Video Integration: Text or video chat for real-time communication.
- Prompt Window: For interviewers to share problems and test cases.
- Code Playback & History: Replay code sessions to review logic and edits.
- Role-Based Access: Interviewer/interviewee modes, admin controls.
- Multi-file Support: For modular projects and larger exercises.
- Mobile Compatibility: Lite interface for tablets/phones.
- **Compulsory Functionality: Integrate agentic AI assistants to provide intelligent coding suggestions and feedback during collaborative sessions**

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WEB/APP DEV

4. Maternal Health Tracker for Rural Areas

Problem Statement:
In rural India, pregnant women face life-threatening risks due to inadequate prenatal care, poor health monitoring, and limited connectivity with healthcare providers. Many are illiterate and unaware of nutrition, check-up schedules, or signs of complications. Family members and ASHA workers lack tools to guide or monitor their health journey effectively. Develop an AI-assisted maternal health tracking application tailored for low-literate and semi-literate users. It should guide expectant mothers using local languages, voice prompts, and emergency support, while enabling ASHA workers to track and assist them. The expected outcome is a life-saving tool that improves maternal outcomes and ensures safe pregnancies in rural regions.

Key Functionalities:

- Voice-Based Daily Log: Capture symptoms, fetal movement, nutrition via guided audio prompts.
- Automated Reminders: IVR/SMS for medication, check-ups, vaccinations, and nutrition.
- Emergency Labor Button: One-tap call with GPS location sent to nearest hospital/PHC/ASHA worker.
- ASHA Worker Integration: Dashboard to track assigned beneficiaries and their risk factors.
- Offline Support: Store logs and sync when online.
- Family Member View: Allow husbands/family to receive reminders on their phones.
- Language Localization: Marathi, Hindi, Gujarati, etc.
- Data Privacy & Security: With OTP-based logins and encryption.
- **Compulsory Functionality: Assign agentic AI health assistants to pregnant users for personalized guidance, symptom monitoring, and emergency escalation**

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WEB/APP DEV

5. Smart Navigation & Accessibility App for Railway Stations

Problem Statement:
Railway stations in India, especially metro stations and large junctions, are difficult to navigate—particularly for first-time travelers, elderly people, and persons with disabilities. Lack of clear signage, real-time updates, and accessibility mapping leads to stress, missed trains, and unsafe conditions. Design a real-time digital navigation assistant that helps users orient themselves within railway stations, locate facilities, get voice guidance, and access real-time updates. The expected outcome is an inclusive and intelligent mobility solution that enhances travel confidence and accessibility in Indian railways.

Key Functionalities:

- Interactive 3D Map: With live positioning and turn-by-turn directions.
- Facility Locator: Platforms, restrooms, elevators, ticket counters, food stalls, etc.
- Voice-Guided Navigation: For visually impaired or elderly passengers.
- Live Train Position & Alerts: Platform changes, delays, announcements.
- Accessibility Support: Show wheelchair-accessible routes and elevators.
- Offline Station Maps: Download in advance for use without internet.
- Emergency Help Button: Connect with RPF or railway help desk instantly.
- Language Selector: Hindi, English, Bengali, Tamil, etc.
- **Compulsory Functionality: Use agentic AI to deliver personalized navigation and accessibility support for elderly and differently-abled users.**

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WEB/APP DEV

6. Personal Health Dashboard for Families

Problem Statement:
Families today juggle medical information across multiple people—parents, children, elders—with prescriptions, vaccination dates, test results, and doctor appointments often scattered across apps, papers, and SMS. This fragmentation causes missed medications, poor chronic care management, and confusion in emergencies. Build an intuitive personal health dashboard where families can track, store, and share health information for all members in one secure space. The expected outcome is a reliable health management app that empowers preventive care, reduces errors, and enables informed decisions at home and at hospitals.

Key Functionalities:

- Family Member Profiles: With individual health records, history, and allergies.
- Medication Reminders: With dosage, timing, and stock alerts.
- Appointment Calendar: Book and track doctor visits, vaccinations.
- Vitals Tracker: Log blood pressure, sugar, weight, etc., manually or via device sync.
- Prescription Upload and OCR: Convert prescriptions into medication schedules.
- Doctor Communication Portal: Secure chat or upload reports for consultation.
- Health Data Visualization: Trends of vitals, missed doses, progress tracking.
- Emergency Contact Integration: Share key data with paramedics or relatives.
- Integration with Wearables: Fitbit, Apple Health, etc.
- Secure Cloud Sync: Accessible across devices with password protection.
- **Compulsory Functionality: Each family member is paired with an AI health agents that tracks vitals, medications, and raises alerts proactively**