Dhirubhai Ambani University
Formerly known as DA-IICT

HackOut'25-Problem Statements & Guidelines

Dhirubhai Ambani University Gandhinagar

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HackOut'25 – General Guidelines

1. **Only one problem statement must be chosen per team.**
   Each team is required to select a single problem statement from the provided list and work exclusively on it throughout the hackathon.

2. **Extra points for the first problem statement.**
   Teams choosing the **first problem statement (Blockchain-Based Green Hydrogen Credit System)** will be eligible for additional evaluation points.

3. **Technology suggestions are advisory, not mandatory.**
   The "Tech that can be used" section under each problem statement is provided for guidance only.
   Teams are free to use **any other technologies, frameworks, or tools** as long as they effectively address the problem statement.

4. **Alignment with Impact and User Requirements.**
   Submissions will be evaluated on how well the solution meets the **user needs** and achieves the **impact goals** outlined in the problem statement.

Blockchain-Based Green Hydrogen Credit System

Description:

In the transition to low-carbon economies, it's vital to accurately account for and incentivize the production of truly “green” hydrogen—hydrogen generated from renewable resources. This problem asks participants to design a system utilizing blockchain technology to issue, track, and certify credits for every unit of certified green hydrogen produced. Transactions, transfers, and retirements of credits between producers, certifying authorities, and industrial consumers must be transparent and immutable. The system should also support integration with external auditors or government verifiers and allow for monitoring (and preventing) double counting or fraud.

User:

Green hydrogen producers, regulatory authorities, industry buyers (steel, ammonia, transport companies), certification bodies.

Impact:

- Increases trust in claims of renewable hydrogen usage, boosting market confidence.
- Enables industries to prove compliance with green mandates and meet carbon-neutral goals.
- Encourages more producers to invest in certified green hydrogen due to clear value and traceability.

Tech that can be used:

- Blockchain/DLT
- Smart Contracts
- RESTful APIs
- Digital Identity Solutions
- Secure Cloud Storage
- Data Encryption

Green Hydrogen Subsidy Disbursement via Smart Contracts

Description:

Subsidies are essential to catalyse the early growth of the green hydrogen sector, but manual and opaque disbursement processes are susceptible to delays and misuse.
This challenge requires development of a system that uses programmable smart contracts to automate the release of government subsidies or incentives. These contracts should automatically verify milestone achievements—such as volume of green hydrogen produced or project completion stages—using real-time data from trusted sources, and trigger payments/rewards when conditions are met. The system must incorporate audit trails and mechanisms to integrate with legacy banking or government payment platforms.

User:

Government bodies, green hydrogen startups and producers, auditors, subsidy disbursement banks.

Impact:

- Faster, more transparent distribution of public funds.
- Reduces risk of fraud and misappropriation.
- Increases uptake of green hydrogen projects due to predictable, reliable support.

Tech that can be used:

- Smart contracts (Solidity on Ethereum, chain code on Hyperledger)
- Secure backend development (Node.js, Python)
- Secure API design
- Database integration (SQL/NoSQL)
- Secure payment gateways

Coastal Threat Alert System

Description:

Coastal areas are vital for blue carbon storage but face threats like storm surges, coastal erosion, pollution, and illegal activities. This problem is to build a comprehensive early warning and alerting platform that collects data from physical sensors (e.g., tide gauges, weather stations), satellite feeds, and historical records. Using AI/ML, it should analyse trends and detect anomalies or patterns that indicate looming threats—such as rising sea levels, algal blooms, illegal dumping, or cyclonic activity. The system must disseminate actionable alerts via SMS, app notifications, and web dashboards to the appropriate authorities and potentially exposed communities.

User:

Disaster management departments, coastal city governments, environmental NGOs, fisherfolk, civil defence teams.

Impact:

- Protects human lives and reduces economic losses by enabling timely interventions.
- Preserves essential blue carbon habitats from avoidable degradation.
- Supports sustainable coastal management and community resilience.

Tech that can be used:

- Data ingestion pipelines
- AI/ML models (Python: TensorFlow, PyTorch)
- Real-time web dashboards (React, D3.js)
- Mobile/web notification systems (push/SMS A

Green Hydrogen Infrastructure Mapping and Optimization

Description:

Identifying where to grow the hydrogen ecosystem requires a map-based tool that visualizes all existing/planned assets (plants, storage, pipelines, distribution hubs) and uses data-driven models to guide new investments. This problem involves creating an interactive map layered with infrastructure data, renewable energy sources, demand centres, and transport logistics. The tool should offer site selection recommendations for new projects based on criteria such as proximity to renewable generation, market demand, regulatory zones, or cost optimization.

User:

Urban and regional planners, energy companies, project developers, policy analysts.

Impact:

- Directs capital to high-impact, high-yield infrastructure projects.
- Avoids redundant investment, minimizing costs and land use.
- Facilitates coordinated growth of hydrogen networks supporting net zero ambitions.

Tech that can be used:

- Full-stack web GIS (Leaflet.js, Mapbox, postGIS)
- Data visualization libraries (D3.js)
- Backend computation for optimization (Python, R)

Community Mangrove Watch

Description:

Mangrove forests act as natural barriers against storms and are vital for biodiversity and carbon storage, yet they are increasingly threatened by illegal cutting, land reclamation, and pollution. This problem is to design a participatory monitoring system where coastal communities, fishermen, and citizen scientists can report incidents (e.g., mangrove cutting, dumping) via mobile apps or SMS. The system should use geotagged photos, satellite data, and AI-assisted validation to ensure accuracy, while also gamifying participation through points, leaderboards, and rewards.

User:

Coastal communities, conservation NGOs, government forestry departments, researchers.

Impact:

- Improves surveillance and protection of mangroves.
- Empowers local communities to take active roles in conservation.
- Provides reliable, real-time data to authorities for enforcement and policy action.

Tech that can be used:

- Mobile apps / SMS reporting tools
- Geotagging & satellite data APIs
- AI/ML for anomaly detection & report validation
- Gamification engines (leaderboards, badges)
- Cloud-based dashboards for authorities