PRAGYAN HACKATHON

1. BLOCKCHAIN   **INR 75,000/-**

Objective:

To develop a secure, transparent, and efficient voting system using blockchain technology. This system should ensure voter anonymity. prevent electoral fraud and enable real-time vote tallying.

Key Challenges to Address:

01 Secure Voting Mechanism: Implementing a blockchain framework that records each vote as a transaction, ensuring it is tamper-proof and permanent once cast.

02 Voter Anonymity and Verification: Developing a mechanism to verify voter eligibility without compromising their anonymity. This is crucial to maintain the integrity of the voting process.

03 Prevention of Electoral Fraud: The system must be robust against common forms of electoral malpractices, such as double voting.

04 Real-time Vote Tallying: Enabling instant and transparent counting of votes as they are cast, ensuring the immediacy and credibility of election results.

Technical Specifications:

01 Blockchain Platform: Utilize the CosVM blockchain platform to create a decentralized application (dApp) for voting.

02 Smart Contracts: Employ smart contracts to automate the voting process, including vote casting, counting, and rules enforcement (e.g., one person, one vote).

03 Cryptography: Implement cryptographic methods to secure voting, ensuring data integrity and voter privacy.

04 User Interface (UI): Design a straightforward and accessible UI for voters to cast their votes and for officials to monitor the voting process.

Expected Deliverables

01 Prototype Development: A basic prototype of the blockchain-based voting system demonstrating the core functionalities.

02 Documentation: Comprehensive documentation detailing the system architecture, smart contract logic, and user interface design.

03 Security Analysis: An analysis report identifying potential security vulnerabilities and mitigation strategies.

04 User Guide: A simple guide or walkthrough for users to understand how to interact with the voting system.

Evaluation Criteria

01 Security and Privacy: The system's robustness in ensuring vote security and voter privacy.

02 Functionality and User Experience: The effectiveness and efficiency of the voting process, including ease of use.

03 Innovation: Creativity and originality in solving the challenges of blockchain-based voting.

04 Technical Implementation: The technical soundness and scalability of the blockchain solution.

2. SMART CITIES   INR 75,000/-

RAG-Enhanced Smart Urban Mobility with Multilingual Support

Domain: Smart Urban Mobility in Indian or Global Cities

Focus Area: Integrating Real-time Analytics and Generative (RAG) Systems for Multilingual Urban Transportation Solutions with support for Indic languages (for example, Tamil or Hindi)

Challenge: Urban public transportation applications, especially in diverse linguistic regions like India, often struggle with delivering accessible and efficient mobility solutions. The challenge is magnified by the need for real-time responsiveness and language inclusivity in fast-growing urban areas.

Objective: Develop solutions using RAG systems and real-time data to enhance urban public mobility. These solutions should not only address traffic and public transport efficiency but also provide multilingual support, making use of Indic local models or efficient prompting within existing foundational models for language translation. **Potential Areas of Focus:**

- Multilingual Traffic Management Systems: Utilize RAG for real-time traffic updates and advisories in multiple languages.
- Dynamic and Inclusive Public Transport Scheduling: Enhance public transport systems with real-time, multilingual information dissemination.
- Cross-Lingual Environmental Impact Awareness: Solutions to inform diverse populations about urban transport's environmental impacts in their local languages.

Beneficiaries:

- Local Governments and Urban Planners
- Public Transport Authorities
- Diverse Urban Communities
- Language and Accessibility Advocates

Recommended Submission Structure:

- Project Concept and Relevance to Real Time ML-led

- Technical Implementation (highlighting the use of RAG with real-time data and language translation capabilities)
- Demonstrations or Simulations in one language apart from English
- GitHub Repository Link with a clear README (strongly recommended)

Sample Resources for both the problem statements

- [Understanding RAG and LLM Architecture](#)
- [Hands-on implementation within RAG course](#)
- [Pathway's Open Source Stream Data Processing Framework](#)
- [Pathway's Open Source LLM Framework](#)
- [Potential use-case popularly adopted by multiple leading companies in Europe](#) ([Additional link for ideation](#))
- [How to use Pathway with LlamaIndex](#) ([Alternate Link](#))
- A few repositories to look at:
    - https://github.com/leabuende/mike-llm-slack-plugin/
    - https://github.com/Paulescu/virtual-assistant-llm ([Video](#))
    - https://github.com/Arjun-G-04/github-ai
    - https://github.com/atiabjobayer/transfinitte-team404
    - https://github.com/purrate/trail
    - https://github.com/atulkrishna-4100/AdsGPT_Pathway_project
    - https://github.com/AnimeshN/nutriGPT-database-python
- List of Real Time Data Sources and a few ideas suggesting a potential framework for ideation: [Google Sheet](#)

3. ENVIRONMENTAL SUSTAINABILITY   INR 75,000/-

Problem Statement 2: Real-Time ML-Driven Environmental Impact Solutions

Domain: Environmental Sustainability in Urban Areas

Focus Area: Leveraging Real-Time Machine Learning for Pollution Reduction and Maximizing Environmental Impact

Challenge: Cities around the world are grappling with rising pollution levels and seeking ways to mitigate environmental impact. A key challenge is the integration of smart, real-time machine learning predictions to enhance the effectiveness of existing environmental solutions.

Objective: Create innovative machine learning solutions that utilize real-time data to reduce urban pollution and maximize the effectiveness of current environmental initiatives. Emphasize the use of smart, real-time ML predictions to tackle environmental challenges.

Potential Areas of Focus:

- Predictive Air Quality Management: Using real-time ML predictions to preemptively address air pollution spikes.
- Dynamic Resource Allocation for Environmental Initiatives: Optimizing the use of resources in ongoing environmental projects through real-time ML insights.
- Enhanced Public Awareness and Engagement: Developing real-time, data-driven tools for public education and involvement in urban environmental sustainability.

Beneficiaries:

- Environmental Monitoring Agencies
- Urban Planners and Policy Makers
- Public Health Officials
- The General Public, particularly in densely populated areas **Recommended Submission**

   Structure:

- Project Concept and Relevance to Multilingual Urban Mobility

- Technical Implementation (highlighting the use of RAG with real-time data and language translation capabilities)
- Demonstrations or Simulations in one language apart from English
- GitHub Repository Link with a clear README (strongly recommended)

Sample Resources for both the problem statements

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