InnVedX Code Hackathon

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Problem statements : *Offline Rural AI Ecosystem with Smart Assistant, Credit Assessment, and Disaster Warning*

Track : *AI, Data & Smart Systems*

Grambharat AI

PROBLEM & SOLUTION

PROBLEM

- *Lack of reliable internet connectivity prevents rural communities from utilizing modern AI tools.*
- *Rural farmers and workers often lack formal financial histories, leading to credit rejection.*
- *Remote villages suffer from delayed warnings during natural disasters like earthquakes or floods.*
- *Traditional software interfaces are too complex for non-technical or low-literacy rural users.*
- *Cloud-dependent systems incur ongoing server, API, and cellular data costs that are unsustainable for rural deployment.*

SOLUTION

- *Deploy an offline Large Language Model (LLM) on local edge gateways, requiring zero active bandwidth after initial setup.*
- *Implement an embedded machine learning model that evaluates creditworthiness offline using alternative metrics like land size, crop yield, and local transaction history.*
- *Integrate low-cost IoT edge sensors (e.g., MPU6050) with LoRa network to broadcast instant, localized emergency Notification alert.*
- *Utilize a localized, multi-language conversational Smart Assistant interface that processes natural language queries instantly on-device.*
- *Utilize a decentralized hardware architecture to handle all computation and communication with no recurring network fees.*

An offline-first edge AI ecosystem for rural communities without reliable internet, combining a smart assistant, alternative credit scoring, and LoRa based disaster alerts in one local gateway. All processing runs fully on-device, ensuring secure, zero-bandwidth, cost-effective financial inclusion and public safety.

TECH STACK AND METHODOLOGY

Software Stack

React : Frontend framework for the localized, offline-capable Smart Assistant UI.

Express JS : Backend API routing requests between the frontend UI, database, and hardware serial ports.

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IOT and Hardware

ESP 32 : Edge microcontroller responsible for polling sensor data and managing wireless network transmission.

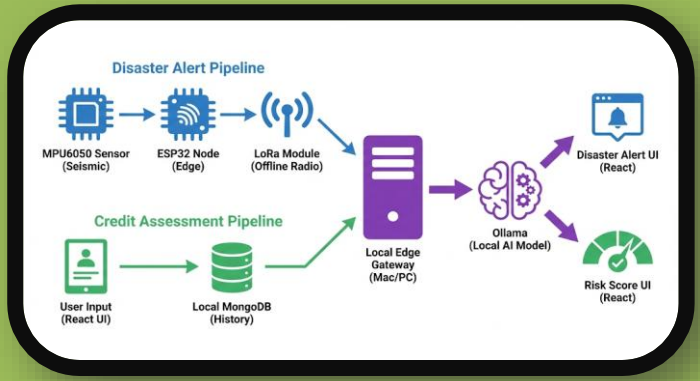
MPU 6050 : 6-axis accelerometer and gyroscope sensor used to detect minute seismic vibrations for earthquake early warnings.

A.I. and Edge Computing

Ollama : Local inference engine used to host and run heavy AI models entirely offline on the edge machine.

GPT-OSS : Core intelligence generating multi-language model conversational responses and evaluating credit risk logic from transaction data.

Methodology



USP and Key Features

100% Offline Ecosystem (Zero Cloud Dependency) : Entirely eliminates recurring cloud hosting, API, and cellular data costs. Functions flawlessly in zero-connectivity rural zones.

3-in-1 Synergistic Architecture : Unifies three critical problem statements (Financial Inclusion, Smart Assistant, Disaster Management) into a single, low-cost edge gateway.

Privacy-First Local AI : Sensitive financial data and transaction histories never leave the device, ensuring absolute data privacy using localized on-device LLMs via Ollama.

Grid-Resilient LoRa Mesh : Disaster warnings operate on independent radio frequencies (LoRa + ESP32), ensuring life-saving alerts are broadcast even during total telecom blackouts.

High Scalability & Low Cost : Built entirely on open-source software and budget-friendly microcontrollers, making rapid deployment across thousands of villages financially viable.

***Conclusion : Grambharat AI** can redefine edge computing as a self-sustaining digital lifeline for rural India. By enabling intelligent credit assessment and real-time disaster alerts without internet dependence, it delivers a scalable, privacy-first, life-saving ecosystem built for Bharat at its core.*