Capital One Launchpad Hackathon
[Synopsis Submission]

Team Details

Team Name: NPnotP

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Theme Details

Theme Name: Exploring and Building Agentic AI Solutions for Agriculture

Theme Benefits: Drives food security and sustainable farming through precision, prediction, and resource optimization.
Empowers farmers with real-time, data-driven insights for better yields and profits.
Builds climate-resilient agriculture to safeguard livelihoods and ecosystems.

Synopsis

Solution Overview: KhetAI(my AI agent) leverages AI-powered data analysis and predictive modeling to enhance agricultural productivity. The system processes real-time farm data, satellite imagery, and environmental parameters to provide actionable recommendations for crop selection, irrigation scheduling, and pest management. Future plans include integrating IoT sensor networks for continuous monitoring, advanced yield forecasting, and multilingual farmer-friendly interfaces for broader adoption.

Technical Stack: Python

Decision Rationale: KhetAI uses Streamlit for a lightweight, interactive UI and Together AI (Meta-Llama 3.1) for accurate agricultural query classification. Open-Meteo is integrated for free, location-based weather forecasts, while village data is stored locally in a cached CSV for fast access. A category-first design enables tailored responses and easy future feature expansion. The choices prioritize low cost, quick deployment, and high usability for farmers.

Innovation Highlights: Category-aware AI assistant that first understands the farmer's intent before providing targeted, context-specific advice.

- Seamless integration of AI-driven classification with live weather data for hyper-local, actionable insights.

- Offline-ready location database enabling instant region selection without relying on constant remote lookups.

- Scalable modular design allowing easy addition of new agricultural services like pest alerts, crop health tips, or market analytics.

- Farmer-friendly interface with clear visuals, regional focus, and minimal technical complexity for end-users.

Feasibility and User-Friendliness: KhetAI is highly feasible due to its low-cost, lightweight architecture using Streamlit and free APIs, making deployment and scaling practical even in rural settings. The simple, intuitive interface allows farmers to select their region and ask questions without technical knowledge. Cached local village data ensures fast, reliable performance, while AI-powered classification and real-time weather integration deliver accurate, relevant insights. Its modular design enables gradual feature expansion, ensuring the solution remains adaptable and sustainable for long-term agricultural support.

Success Metrics: User Satisfaction – Measured via feedback ratings and repeat usage rates from farmers.

- Classification Accuracy – Percentage of queries correctly categorized into the right agricultural topic.

- System Performance – Average response time from query submission to answer display.

- Adoption Rate – Number of unique users and locations actively using the platform over time.

- Feature Scalability – Ease and speed of integrating new agricultural modules or APIs without major code changes.

- Reliability – Percentage uptime and successful API call rates for weather and classification services.

Methodology/Architecture Diagram

1. End-to-End User Query Flow

- User (Farmer) → UI (Web/Mobile, Chat/Voice)
  ↓
- Backend/API Gateway
  ↓
- AI LLM Q&A Engine
  ↓
- External Knowledge/API Calls (Weather, Insurance, Govt Schemes...)
  ↓
- Synthesized Answer
  ↓
- Response to UI (with possible notifications)

2. AI LLM Central Hub Diagram

- User Interface (UI)
  ↓

- AI LLM Q&A
  ↙ ↓ ↘
  [Knowledge Sources] [Backend Storage] [External APIs]
  ↓ ↓ ↓
  [Weather/Climate] [Seed Varities, Soil Types] [Insurance, Loans, Govt Schemes]
  ↓

- Notification/Follow-up System

3. Security & Data Flow

- Users → UI (secured login/auth)
  ↓

- Data Collection (input, sensors, history, profiles)
  ↓

- Secure Backend → AI LLM Engine
  ↓

- External Integration (Weather, Finance, Govt APIs)
  ↓

- Answer generation → Notification service
  ↓

- Response sent (with ongoing privacy/data logging)

Important: Please insert or attach the links to your architecture diagrams in this document for your submission.

ArchitectureFlow Diagram