

AI for Bharat Hackathon

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Team Name : GrootForce

Team Leader Name : Rajasi Barapatre

Problem Statement: Farmers know when something is going wrong in the field, but not when intervention actually pays off. Acting too late or too much increases costs and quietly erodes yield.



The Silent Erosion in Indian Farming

Meet Reshma, a wheat farmer.

She sees yellow spots on leaves.

She spends ₹4000 on pesticide... but yield was already lost.

She didn't just need disease detection.

She needed to know:

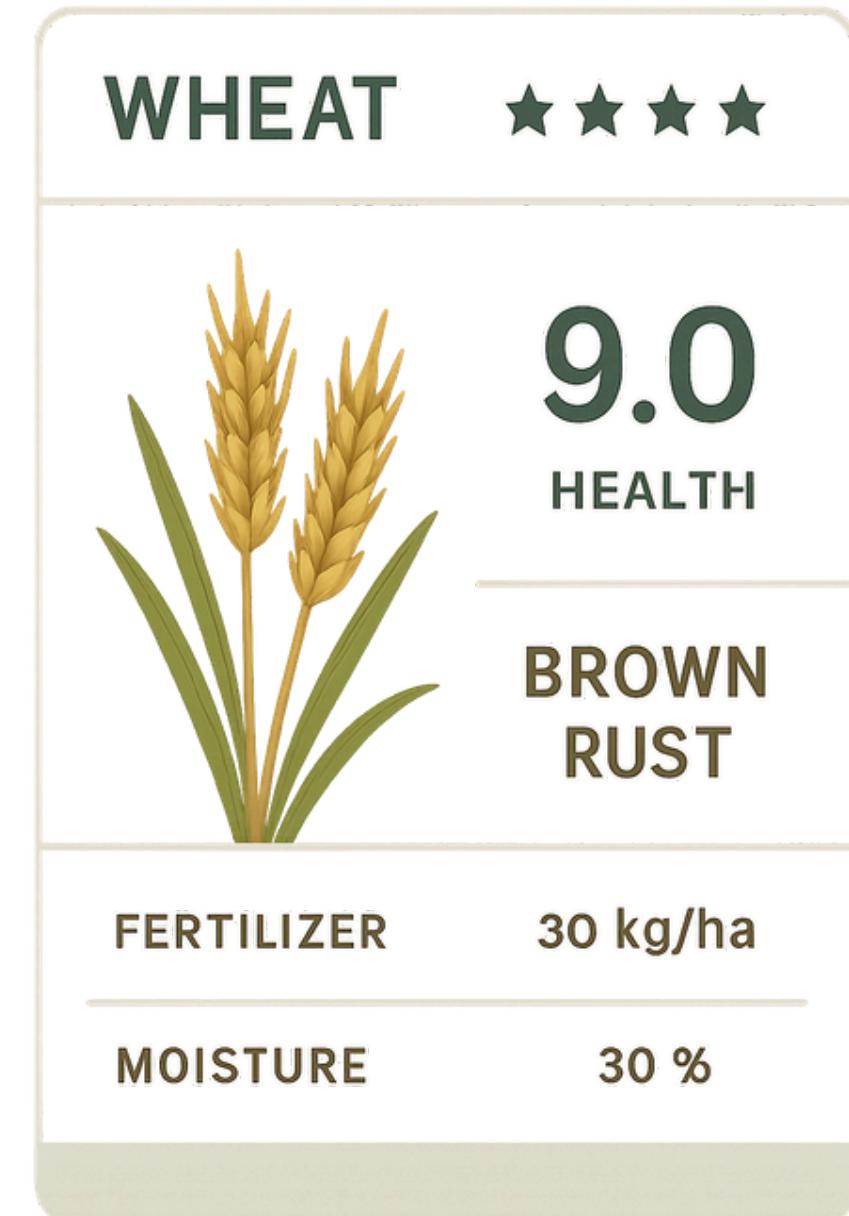
"Is this treatment economically worth it, given all the environmental parameters?"



BRIEF OF THE IDEA

Fasal: An AI-powered **Digital Twin** for smarter farming decisions

- Instead of only detecting disease, the system simulates **future outcomes** of multiple **treatment actions** and recommends the most **profitable** and **sustainable** choice.
- Each farm field is represented as a **Digital Twin Card** that models crop condition, disease severity, soil health, crop stage, and weather.
- The AI twin predicts how the crop might **evolve under different actions**, such as no treatment, chemical spraying, or low-cost alternatives and **compares their yield impact, cost, and ROI**.
- The farmer receives a clear, **prescriptive** recommendation, not generic advice, in her **regional language**.



HOW IS OUR SOLUTION DIFFERENT FROM OTHER IDEAS ?

Existing Solutions	Our Solution
Disease detection only	Prescriptive decision-making
Generic treatment advice	Action-specific outcome simulation
No cost awareness	ROI-based recommendations
Reactive response	Predictive + preventive approach
High chemical usage	Optimized , minimal intervention

Fasal uses a learned neural **digital twin** to simulate future crop outcomes under different actions, **not static rules or fixed expert advice**.
Not just “What disease?” but “What action maximizes farmer profit?”

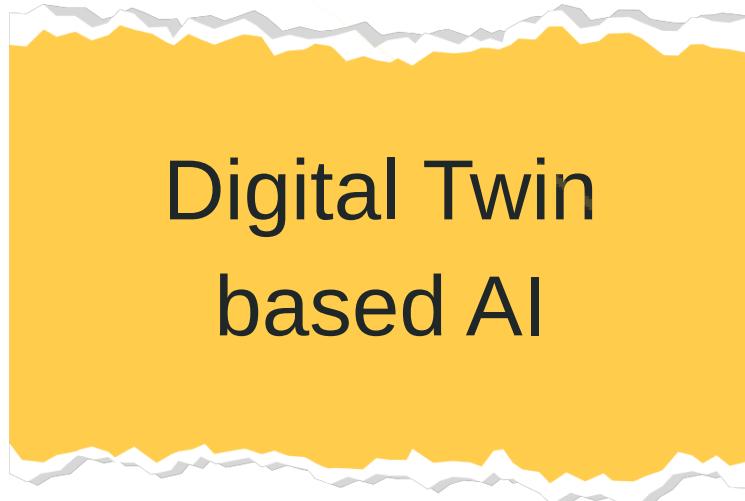
HOW WILL IT SOLVE THE PROBLEM ?

- Detects **disease severity** from crop images
- Builds a **neural digital twin** of the crop field
- Simulates future **crop states** for each action and **treatment actions** over future days
- Compares **yield impact vs cost vs profit**
- Recommends the **best ROI-positive intervention**, at the right time, with **reasoning**

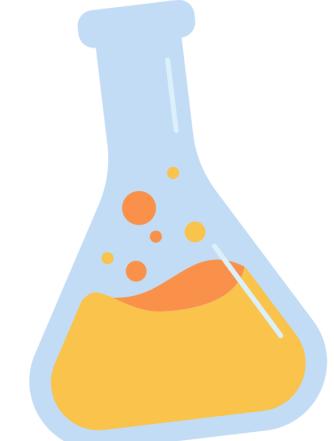
Result:

Farmers **intervene** only when the intervention is economically justified.

Core Innovation: Neural Digital Twin + ROI Engine



USP OF THE PROPOSED SOLUTION



FEATURES OFFERED BY THE SOLUTION



Crop disease detection via images and regional voice input.



Explainable AI reasoning for every recommendation



Disease severity scoring (0–100%)



What-if analysis for multiple actions



Digital Twin Card per field



Yield vs time visualization



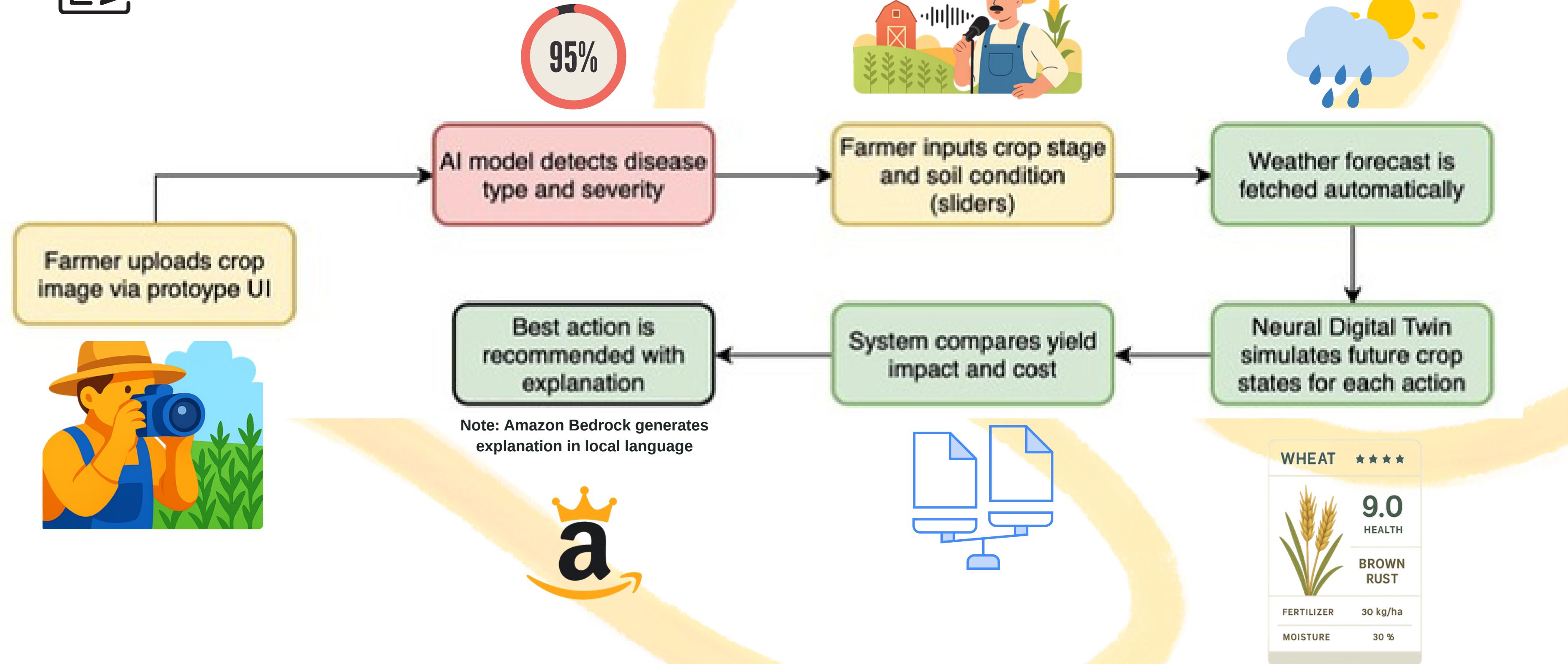
Weather-aware crop simulation



Cost vs profit comparison table



PROCESS FLOW DIAGRAM



PROTOTYPE OF THE PROPOSED SOLUTION

Farmer Profile

Select Farmer Persona
Reshma's Field

Voice Assistant

Ask Digital Twin

Field Parameters

Crop Age (Days) 45

Soil Moisture (%) 65

Economic Parameters

Treatment Cost (₹) 3500

Market Price/kg (₹) 23

Fasal: AI Neural Digital Twin

Empowering Indian Farmers with AI-Driven Crop Decisions

Upload Crop Image

Choose a crop image (JPG/PNG)

Drag and drop file here
Limit 200MB per file - JPG, JPEG, PNG

Browse files

wheat-wheat-field-cereals-field-158603.jpeg 0.6MB


Uploaded Crop Image

PROTOTYPE OF THE PROPOSED SOLUTION

Field Parameters

Crop Age (Days)

Soil Moisture (%)

Economic Parameters

Treatment Cost (₹) - +

Market Price/kg (₹) - +

Language

Select Language

System Status Bitmask: (01101101)

Analyze Field

WHEAT ★★★★☆

 **6.0** HEALTH
BROWN RUST

TYPE	LEGENDARY / PROFITABLE
WEATHER	 Clear Skies
DISEASE SEVERITY	40%
FIELD HEALTH	60%
CONFIDENCE	87%

PROTOTYPE OF THE PROPOSED SOLUTION

Treatment Scenario Comparison

The Digital Twin simulates multiple treatment options to find the most profitable choice:

Scenario Analysis:

Premium Treatment RECOMMENDED

Advanced treatment with fertilizer

₹13650.00

Net Profit

Cost: ₹4550

Yield Gain: 800.0 kg

ROI: 300.0%

Chemical Spray

Standard chemical pesticide treatment

₹13186.21

Net Profit

Cost: ₹3500

Yield Gain: 733.5 kg

ROI: 376.7%

Low-Cost Alternative

Organic/bio-pesticide option

₹10168.72

Net Profit

Cost: ₹1750

Yield Gain: 523.9 kg

ROI: 581.1%

Manual Weeding

Labor-based weeding (Low-cost option)

₹3267.49

Net Profit

PROTOTYPE OF THE PROPOSED SOLUTION

No Treatment
Baseline - No action taken

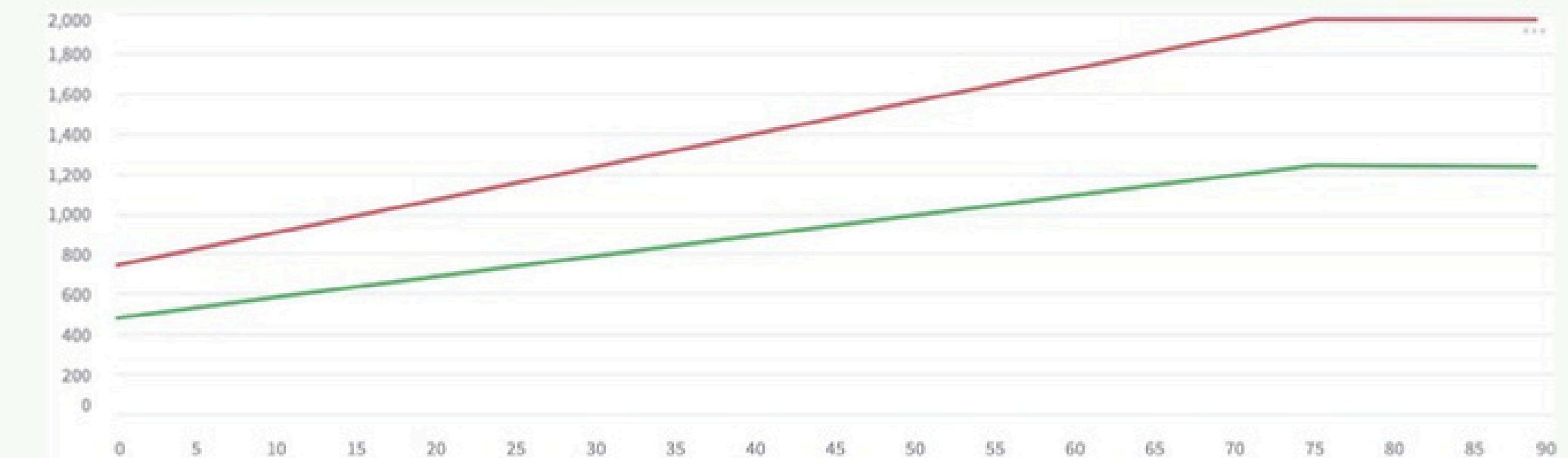
Cost: ₹0 Yield Gain: 0.0 kg ROI: 0.0%

₹0.00
Net Profit

Recommendation: Premium Treatment will give you ₹13650.00 profit with 300.0% ROI

Neural Twin Rollout

Simulating 90-Day Crop Trajectory...



Day	Fasal Recommended Action (Yield)	No Action (Baseline) (Yield)
0	750	450
10	950	650
20	1150	750
30	1350	850
40	1550	950
50	1750	1050
60	1950	1150
70	2150	1250
80	2250	1250
90	2300	1250

— Fasal Recommended Action... — No Action (Baseline)

PROTOTYPE OF THE PROPOSED SOLUTION

Field Parameters

Crop Age (Days): **45**

Soil Moisture (%): **65**

Economic Parameters

Treatment Cost (₹): **3500**

Market Price/kg (₹): **23**

Language

Select Language: **मराठी (Marathi)**

System Status Bitmask: **(01101101)**

Deploy :

AI Advisor Explanation

English मराठी

Reshma, treatment is recommended! You will gain ₹13650.00 profit.

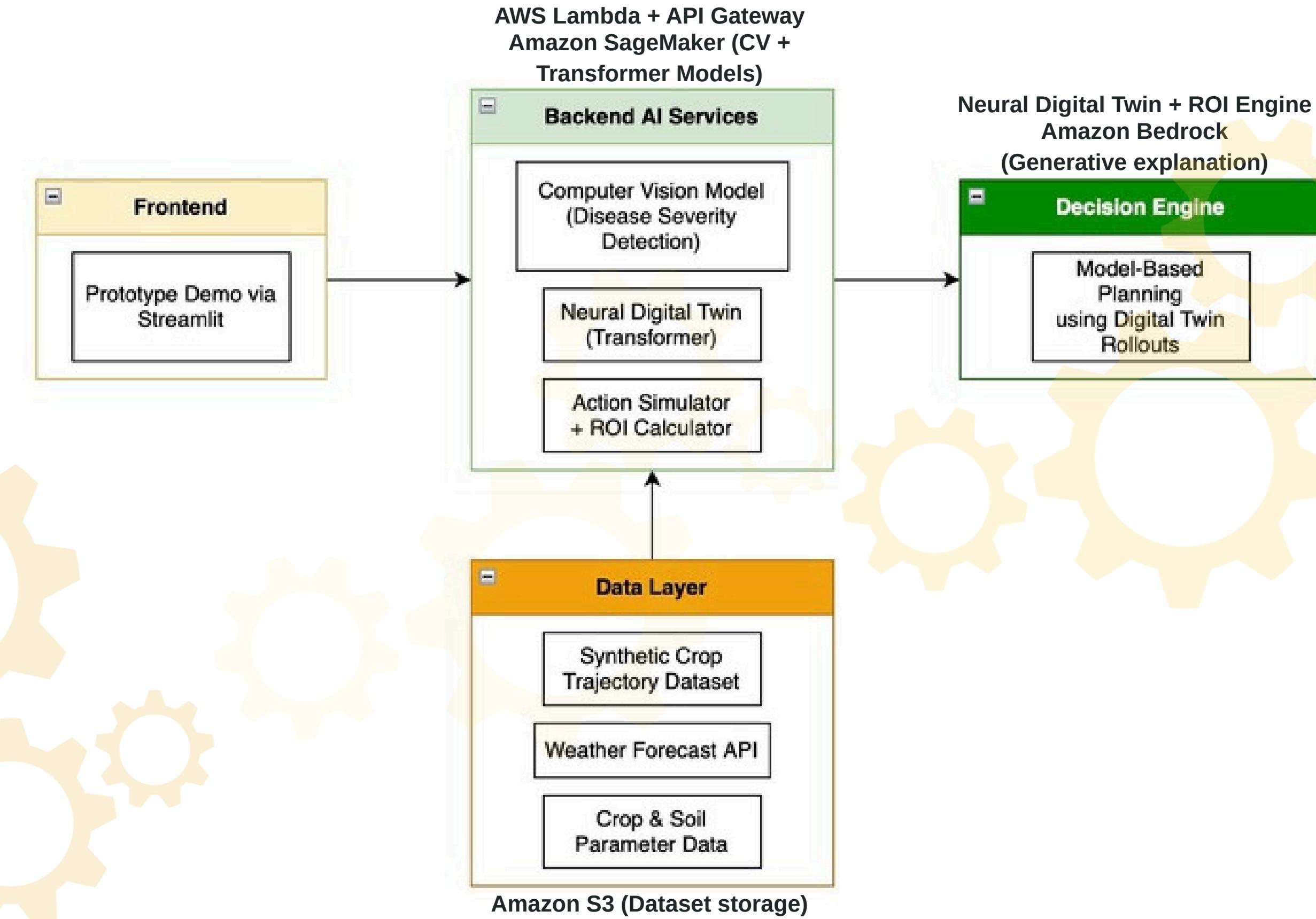
Reshma, जप्याराती शिफारसा तुम्हारा ₹13650.00 नफा पिंडेला।

Detailed Financial Analysis

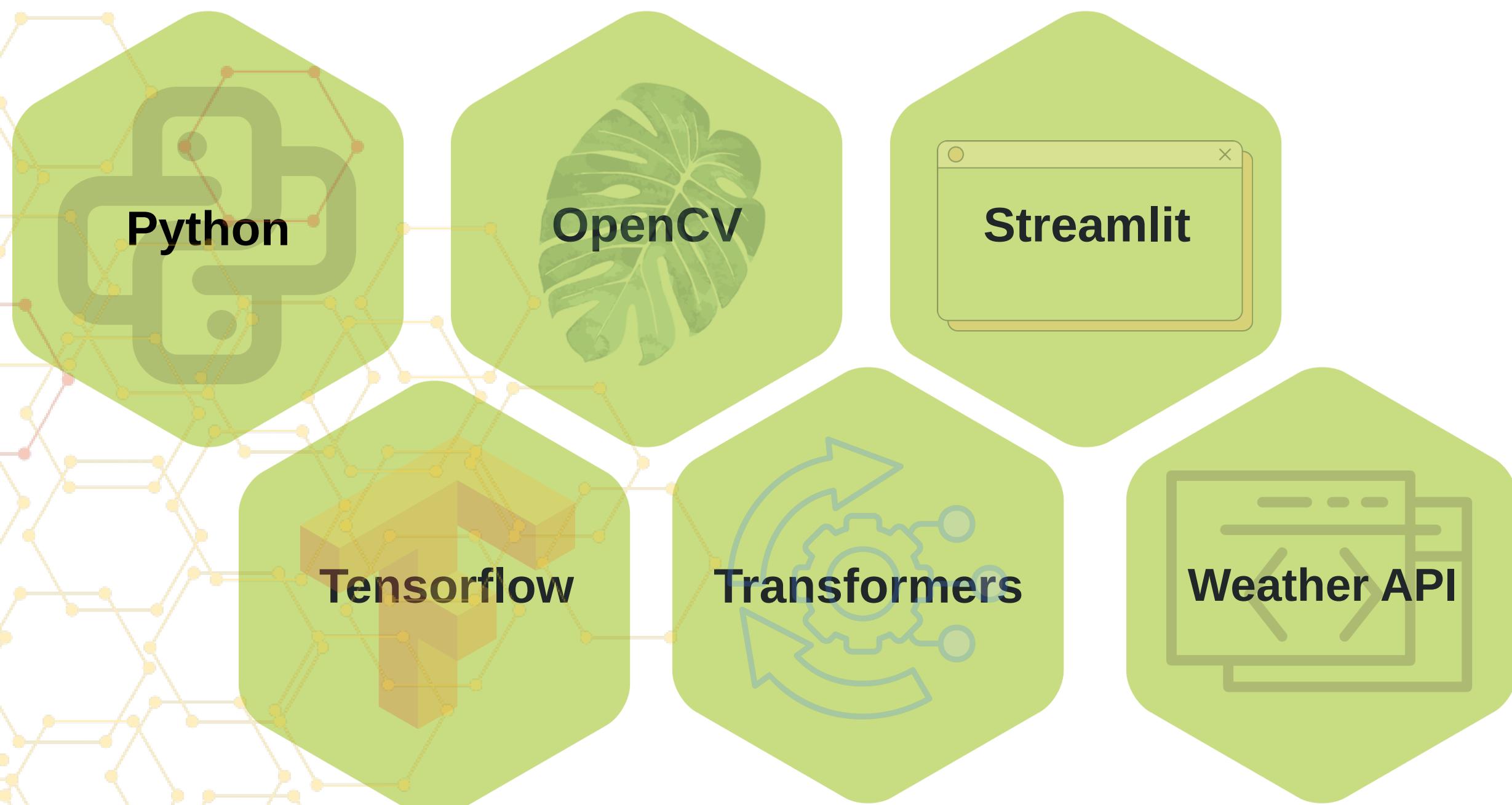
Yield Increase	Revenue Increase	Treatment Cost	Net Profit
800.0 kg	₹18200.00	₹4550	₹13650.00

Fasal Neural Digital Twin - Powered by AWS AI/ML Services
Amazon SageMaker • Amazon Bedrock • AWS Lambda

OVERVIEW OF THE ARCHITECTURE



TECHNOLOGIES USED IN THE SOLUTION



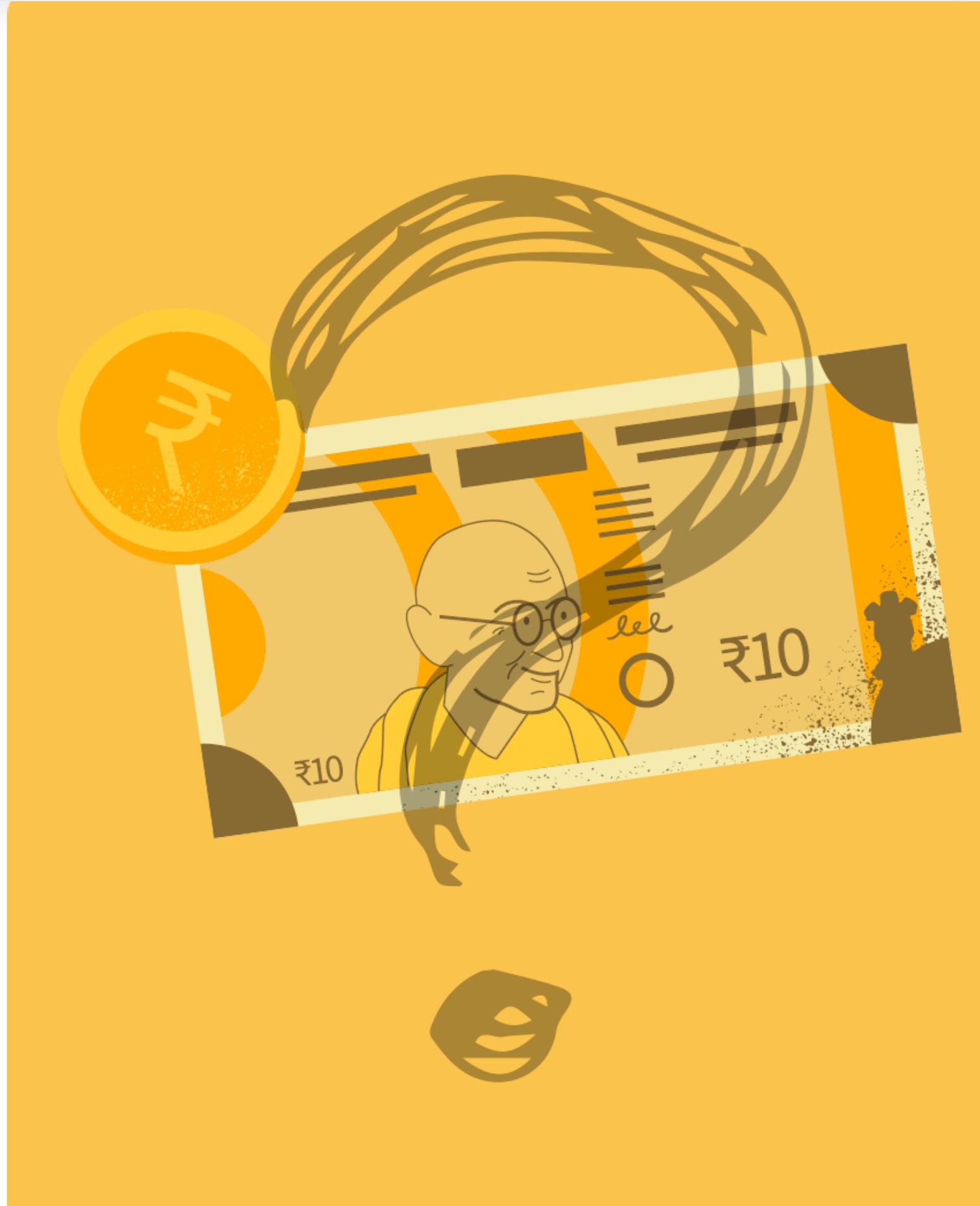
AWS Tech

- Amazon SageMaker
- Amazon Bedrock
- AWS Lambda
- Amazon S3

ESTIMATED IMPLEMENTATION COST

- Prototype: ₹0 – ₹5,000 (using open-source models and free tiers)
- Scaled deployment: Pay-as-you-go cloud infrastructure
- Designed to remain affordable for small farmers

Serverless AWS deployment keeps costs
affordable for small farmers



WHY THIS FITS AI FOR BHARAT (AI for Rural Areas)

BUILT FOR FARMERS

- Small & marginal farmers
- ROI-based decision support, low risk



RURAL-READY AI

- Smartphone-first, low connectivity
- Multilingual, Language-agnostic, inclusive



SUSTAINABLE IMPACT

- Reduces chemical overuse
- AI decides when action is worth the cost



Innovation partner



Media partner



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Thank You

