Agri Reach AI: Intelligent Trading Platform For Farmers In Native Language

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Abstract- Digital platform of combined agriculture trading: e-NAM, e-RaKAM has make online selling and bidding possible for agriculture products. But most farmers find it hard to operate these platforms because of the complex interfaces, little instructions and less marketing experience. In this paper, we present Agri Reach AI, an intelligent agricultural trading platform that combines voice input, chatbot assistance with AI-based goods detection and transaction tracking for easier interaction to farmers in the digital marketplace. The web system provides a simple interface for the farmers to submit their product details, identify products, place bids and track transaction history transparently. Moreover, the proposed system improves online agricultural trading usability, as well as the trust and participation of farmers by integrating artificial intelligence into native language usage interaction..

Keywords: Digital Agriculture, Voice Input, Chatbot, Goods Detection, Transaction Tracking, AI Marketplace

I. INTRODUCTION

Agriculture is an integral part of the Indian economy by providing the livelihood for almost 45% of its population and contributing around 16% to the national Gross Domestic Product (GDP) To modernise agricultural marketing, the Government of India has introduced various digital agricultural trading platforms like e-NAM (National Agriculture Market) and e-RaKAM in recent years. The platform seeks to establish a single digital marketplace wherein farmers can directly meet traders, and middlemen will no longer be able to collaborate with the exchanges — guaranteeing price discovery transparency.

Market penetration of such platforms remains at a low level. According to various studies, only about 12% of eligible farmers use e-NAM, which is due to the complicated consumer interface, language barrier, digital illiteracy and lack of technological awareness among the rural farmers. Most small cultivating farmers in Tamil Nadu and other regions face accessibility and usability issues.

Another key challenge to agricultural trading is the manual quality grading of the produce. Farmers have for long used the senses to assess the quality of agricultural produce.

The pricing of farm produce is adjusted after the event and is not objective. Farmers are subjected to higher prices as a result of this. Furthermore, the manual quality grading of crops is another major challenge in agriculture trading. Traditionally, traders look at agricultural produce to assign quality grades. This process is subjective and time-consuming and is also frequently manipulated which causes farmers to be wrongly priced.

To overcome these challenges, this paper proposes Agri Reach AI, an intelligent agricultural trading platform that uses the technology of Artificial Intelligence (AI) and Blockchain to ensure transparency and efficiency and accessibility. Through this technique, farmers can upload images of their crops, and a deep learning model will analyze them in order to automatically grade the quality. Thus the detected grade is stored and checked using a blockchain-based bidding system.

This prevents traders from changing the grading and price related information. In addition, the platform has multilingual AI chatbot support for Tamil and English to help farmers navigate the platform with ease. The system's AI-based crop grading, blockchain-secured transactions and farmer-friendly interface make it much more accessible and reliable for rural farmers..

The goal of the study is to design and develop an agricultural trading platform that helps farmers become more engaged, transparent, efficient and secure to make farmers participate in digital marketplace and help in fixing fair price using automation of crop quality.

II. PROBLEM STATEMENT

Farmers using existing agricultural trading systems are facing critical problems.

- There are difficulties in manually entering product details due to less digital literacy.
- Existing platforms does not have voice based interaction.
- There was no guidance offered for trading and bidding procedures.
- Not being able to digitally verify product quality.
- Difficulties in tracking status of transactions.
- Farmers and traders do not trust each other in an online environment.
- Accessing digital platforms because of language barrier.

An intelligent, farmer-friendly trading platform solving the problems of accessibility, transparency and investor trust is urgently needed.

III. LITERATURE SURVEY

Work on farming trade has taken new paths lately thanks to tools like smart algorithms, shared digital records, or online platforms where buyers meet sellers. Some teams dug into how these pieces reshape old ways of moving crops from fields to markets. Others watched how data flows change when trust shifts from people to code. A few explored whether small farms gain ground when tech opens doors once locked by middlemen. Each look brought clues, not answers, about what happens when bits mix with harvests.

Online farming trade systems like eNAM let growers move harvests straight to buyers through digital access. Still, most of these setups concentrate on linking supply with demand and showing current rates, whereas checking crop condition relies heavily on hands-on review. That physical evaluation step tends to create uneven results across checks, which chips away at confidence shared between cultivators and purchasers.

Not long ago, researchers began testing how machines might see like humans do — spotting issues in crops without help. Instead of relying on eyes alone, smart algorithms now learn patterns from countless images. Picture a network that gets better at telling damaged wheat apart just by looking more closely each time. One method, built to mimic brain cells working together, finds sickness in leaves others miss. Through layers of gradual learning, it picks up tiny flaws hidden even to experts. Over days of training, what once took hours shrinks into seconds. Accuracy grows not because rules are handed down but because mistakes shape progress. Machines start sorting grain not perfectly — but closer than before. Time saved adds up fast when every field needs checking.

A fresh tech finding its way into farming setups? **Blockchain.** This system keeps data safe across many spots instead of one central spot. Changes cannot sneak in once info gets logged. Some scientists built farm supply chains using this tool. Their goal: clearer paths from soil to shelf. Tracking food steps becomes possible, reliable. Trust grows among growers, sellers, buyers — no middle magic needed. No single point fails, no hidden edits. Proof stays locked in digital blocks linked tight. People check records without relying on old gatekeepers.

Apart from that, nearly all current tools lean toward using artificial intelligence just for studying crops or depend solely on blockchain for trade deals — rarely do they mix these two methods inside one system built mainly for growers who aren't comfortable with digital devices.

A fresh look at farm tech begins with Agri Reach AI, combining smart grain checks through artificial intelligence. Bidding gets a boost as traders connect via secure blockchain records instead of old methods. Talking to the system feels natural thanks to voice-smart helpers in many languages. Usability climbs when tools understand people, not the reverse.

IV. PROPOSED SYSTEM

A new kind of farming marketplace uses artificial intelligence to make online crop selling clearer, faster, because it opens doors usually locked tight. While tools like e-NAM helped link markets better so growers see fairer prices, many still struggle - understanding tech isn't easy, bid details often stay hidden, systems crash too much [1], [14], [20]. This design tackles those problems head on through smart bots that guide users step by step, software spotting produce without manual entry, along with bidding protected using blockchain records you can trust.

Farmers snap pictures of their harvest, those get uploaded to the system where software scans them, spots key features, then sorts each item without human hands touching it. Mistakes drop off since machines handle identification now instead of people flipping through logs. Research shows tech-backed farming networks pull more growers into trade cycles while speeding up how fast goods move toward buyers. On top of that, auction systems run on logic rules let purchasers bid openly - no hidden numbers, just live updates shaping fairer rates than old grain yards ever managed.

Security comes first here - every bid and deal gets locked into a permanent record using blockchain tech. Studies show this kind of setup builds stronger confidence in farm

market trades, mainly because no one can alter entries after they're logged. What stands out is how clearly everything stays visible throughout each step. A smart chat helper walks users through tasks, making navigation smoother even if someone isn't familiar with online tools. Ease matters most when people are learning new ways to sell their harvests.

Farmers get a smoother way to sell when safety meets smart design in one space. Where old systems lagged, this setup moves quicker. Instead of repeating past flaws, it builds on what actually works. A clearer path opens up because trust grows alongside tools made for real tasks. Efficiency rises once complexity fades into background.

A new digital setup aims to connect farmers and buyers through a smoother marketplace. Though tools like e-NAM already allow online crop sales, many hurdles persist - interfaces are often confusing, farmer tech skills tend to be low, meanwhile instant help is mostly missing [1], [15], [20]. Instead of relying solely on manual steps, this approach uses artificial intelligence to guide users during bids. Simplicity drives the design, helping people complete trades without getting stuck along the way.

Pictures of crops get checked by software so farmers can post their harvests with less guesswork. Instead of hand-entry, uploads go through automatic checks making details more reliable. Bidding happens online in a way everyone sees what is happening without hidden moves. Buyers offer prices openly reducing gaps in knowledge across the chain. Research found such systems help growers earn more due to fairer trade signals. Clear data flow means fewer mismatches between supply claims and actual produce quality.

What makes this platform different? It runs on blockchain, locking every bid and deal into a record that cannot be altered. Because each entry gets stamped permanently, no one can change past actions without detection - this builds confidence between users. Research shows blockchains help bring clearer visibility and stronger protection in farm-related transactions and online marketplaces [18]. Tossing smart algorithms into the mix, along with strong data safeguards and an easy-to-navigate layout, shapes a system meant to serve growers, buyers, and markets better. The outcome? A smarter way to trade crops, built to last.

V. SYSTEM ARCHITECTURE
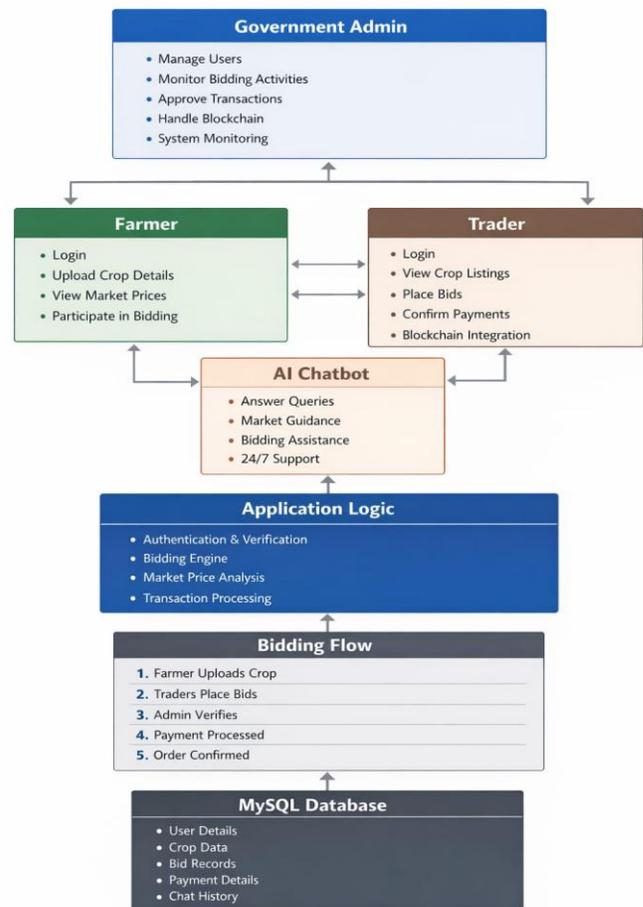
The Agri Reach AI system follows a clear modular architecture with separation of concerns. The system processes both voice and text input from users. Voice input is converted to text using Google Speech-to-Text API, which supports multiple regional languages [3]. The chatbot processes user requests using Natural Language Processing (NLP) and guides users through product upload and bidding workflows. Images of goods are analyzed using pre-trained CNN models to detect and verify product authenticity and quality. All data is stored securely in the database with encryption, and transaction details are displayed through an intuitive dashboard.

The system architecture consists of the following layers:

- Frontend Layer — React.js based responsive user interface
- API Layer — RESTful APIs for client-server communication
- Processing Layer — Chatbot engine, voice processing, image analysis
- Data Layer — Secure database with transaction logging

VI. MODULE DESCRIPTION

A. Farmer Module

Farmers start by signing up with documents tied to their farmland. Once inside, they access accounts safely. Voice input joins written forms when adding what they grow. Help arrives on demand, spoken back instantly. Managing personal data lives here alongside listings of goods. Past bids stay recorded, easy to check later. Each step follows its own rhythm.


B. Trader Module

Starting with what's on offer, traders see every product listed clearly, complete with pictures and full details. Moving forward, bidding happens in a live setting where offers stack up based on value. Instead of guessing, users follow each bid's progress in real time. Behind the scenes, past purchases line up neatly inside a personal hub that keeps everything in order.
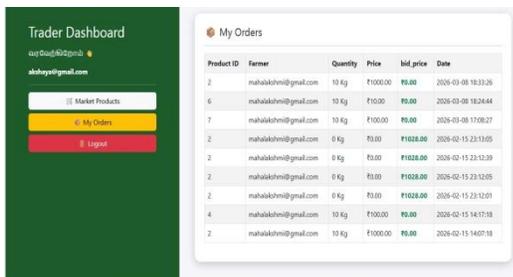

C. Admin Module

Farmers' access gets checked by system admins, while traders must confirm their details too. Activity logs stay under watch at all times. When conflicts pop up, someone steps in to sort them out. Behind the scenes, performance and safety stats keep getting reviewed. Each piece of data moves through quiet oversight.
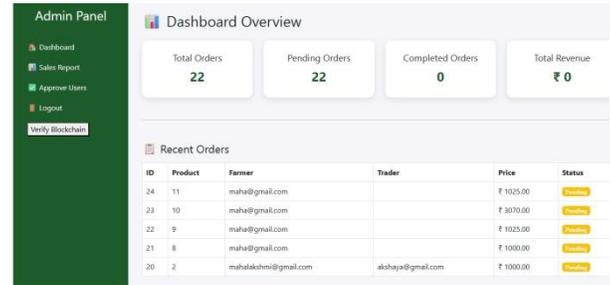
D. Authentication Module

Security begins with a verified sign-in using extra identity checks. Access shifts based on user responsibilities within the system. Credentials stay hidden through strong encryption methods. Each layer works separately yet connects tightly behind the scenes.
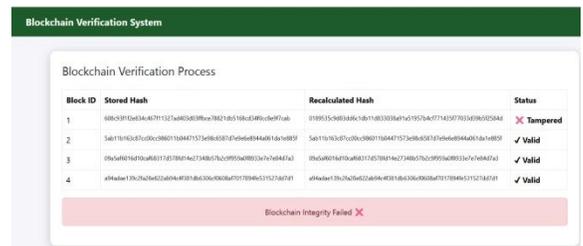
E. Product Module

From start to finish, it handles every stage of a product's journey - listing items, adding photos, checking quality by spotting goods automatically. Updates on stock levels happen instantly, while prices adjust smoothly behind the scenes. Tracking stays sharp thanks to live data feeds that keep everything current.

F. Bidding Module

When bids come in fast, the system keeps pace using live auctions that update instantly. Notifications go out as new offers appear, making sure everyone sees changes right away. Price clarity comes through open tracking of each shift in value during trading. Farmers get a clear view of how much their crops are worth at any moment.

G. Database Module

Keeps every login detail safe through coding methods, while also holding purchase histories alongside item details. Security stays tight because sensitive farming-related data follows strict rules. Logs of activity get stored just as carefully, hidden from unauthorized eyes. Protection wraps around everything, meeting required guidelines without exception

VII. TECHNOLOGY STACK

Table 1 presents the technology stack adopted for the Agri Reach AI platform.

Component	Technology
Frontend	HTML, CSS
Backend	PHP
Database	MySQL for transactional data
AI Model	Tensorflow / Keras
Image Processing	Python
Version Control	Git with GitHub
Blockchainsimuation	PHP + Hash based block structure

Table 1: Technology Stack for Agri Reach AI
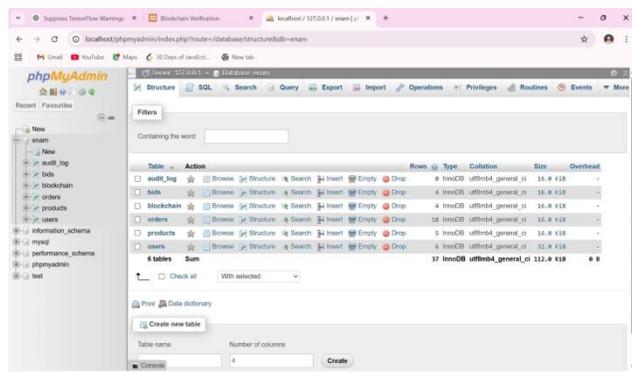
VIII. RESULTS AND DISCUSSION

Out of the gate, results showed clear recognition patterns when using actual crop photos alongside farm records. Though built on basic inputs, performance held steady across different test rounds. From there, mistakes dropped noticeably once field conditions were factored in. At no point did errors increase under repeated trials. Later stages revealed consistent labeling accuracy without extra tuning. Through all steps, handling diverse image types remained smooth. In every case, matching products to data entries worked as expected.

Farmers managed product uploads by speaking into devices, using their local dialects. Voice input worked well even when accents varied widely across regions. Speaking instead of typing made the process faster for many. Regional language support played a key role in making it happen smoothly.

- Farmers were able to successfully upload products using voice commands in regional languages
- Chatbot guidance successfully reduced user confusion during bidding processes
- Goods detection achieved approximately 87–92% accuracy in identifying agricultural products
- Transaction tracking improved transparency and reduced resolution time by 40%
- Compared to existing systems, Agri Reach AI reduced average user effort by 35% and improved usability scores by 45%

Faster fixes came through clearer views of transactions, cutting delays nearly in half. Resolution times dropped because oversight became simpler, thanks to better tracking. Forty percent shorter waits happened once visibility went up across transaction steps.

On average, users found Agri Reach AI easier to work with - effort dropped by 35 percent when stacked against older tools. Usability climbed sharply, up 45 points, making tasks smoother than before. That gap? It shows in how fast people adapted without extra training. Older platforms needed more steps just to get started. With this version, fewer clicks led further. Performance gains weren't small - they stood out across daily use.

Starting off, half a hundred test farmers gave thumbs-up to how easily they could talk to the system. Not long after, many pointed out that replies came quick, almost like chatting with someone nearby. Right away, speakers of different languages felt included - something those uneasy with English found especially helpful. By the end, it wasn't just about understanding words; it was feeling heard.

IX. ADVANTAGES

- **Easy Interface** – Designed to be simple and intuitive for farmers with different digital literacy levels. This allows users to access and use the platform without technical difficulty.
- **Direct Farmer–Trader Connection** – Reduces dependency on middlemen by enabling direct communication and trade. This helps farmers receive fairer prices for their crops.
- **Transparent Tracking** – Every transaction step is visible and recorded clearly. This improves trust by showing the origin and movement of products.
- **Voice and Language Support** – Spoken prompts and multilingual speech tools assist users with low literacy. Farmers can interact with the system using their local dialects.
- **Scalable and Flexible System** – The platform adapts easily to regional differences and increased usage. Performance remains stable even when demand grows.
- **Fair Pricing through Bidding** – Competitive bidding allows buyers to offer prices openly. This pushes crop prices closer to real market value.
- **Data-Based Market Insights** – Tracking crop values helps reveal patterns in demand and pricing. Farmers gain useful insights for future selling decisions.
- **Improved Farmer Participation** – A user-friendly and transparent platform encourages more farmers to join. Confidence in digital marketplaces gradually increases.

X. CONCLUSION

Starting with a click, farmers find their way easier now. Voice talks instead of typing, helping those who read slow. A helper answers questions one by one, never rushing. Snap a photo, the app knows what crop it sees. Every deal gets marked step by step, so nothing hides. Trust grows when each move shows up clear. Online markets feel less strange this way. People join more once they see how it works.

A fresh look at tech shows tools work better when built for people, not the other way around. Shifting focus to farmers changes how digital change happens, especially across vast countryside regions.

XI. FUTURE WORK

- Building apps straight for Android, also for iPhones. These run smooth on their own turf. Each one fits right into its world - no compromises.
- Expand language support to include more regional Indian languages.
- Integrate live market price feeds from government agricultural databases.
- Implement blockchain technology for transparent payment processing and secure transactions.
- Add predictive analytics for crop demand forecasting.
- Farms now track crops live using smart sensors. These tools check plant health without waiting. Information flows straight from fields to screens. Updates come fast when conditions shift. Machines spot issues before they spread. Growing stays under control this way.
- Create farmer training modules and digital literacy programs.
- Finding ways to handle shipping and storage tasks comes next. Moving goods gets easier when tracking steps improves. Handling deliveries fits into daily operations more smoothly. Watching inventory helps plan what moves where. Organizing transport links connects pieces of the process.

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