AGROCHATBOT
Chatbot for farmers

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***Abstract* – Now a days, this is an age where everything is getting better with the help of the technology. So, it is very much important for the government to interact with people in the timely and prompt way. This research paper presents a chatbot based Helpdesk system for farmers and other people in agricultural community. The main aim of this project is to provide prompt and useful information to the farmers to avail different services and schemes of the government along with market rates, weather report and farming tips all through this user friendly chatbot helpdesk.**
This chatbot will be the perfect combination of natural language processing and will give the answer to the question of the farmers in the easy to understand language wherever they are and irrespective of the language they speak and whatever may be the nature of their question (like crop insurance, subsidy, soil test, natural calamity help, etc.). A 24/7 available chatbot helpdesk even in the farthest areas where the farmers won't have to stand in the long lines at the helpdesk offices of the government.
The study focuses on the possibility of implementation of chatbots in the agricultural sector how it will lessen the work of human helpdesk staff and how this friendly nature of the technology will make the government more closer to farmers by making the process simpler and convenient for farmers. Definitely the farmers will feel the satisfaction being a part of the society and will lessen the workload of human helpdesk staff.

Keywords: **AI Chatbot, AgroChatBot, Smart Farming Assistance, Agricultural Helpdesk, Natural_Language Processing (NLP), Voice-Based Systems, Multilingual Chatbot, Image-Based Crop Diagnosis, Real-Time Market Prices, Weather Forecast Integration, Pest and Disease Detection, Farm Advisory Services, Data-Driven Farming Solutions**

I. INTRODUCTION

In rural India, where green is hill meets green, and to farm is to survive, millions of farmers make the same difficult decision every morning.
How much water should they use? Is this insect harmful?

Should they brave out and purchase fertilizer today, or should they wait for the rains?
For many of these farmers — the farmers in the small villages and with the least amount of education — getting an answer isn't so easy. Government help centers are far away, farmers have to stand in long lines and help centers are only open during office hours. Farmers are faced with instructions written in formal language, none of which they're accustomed to. These farmers feel alone, unsure, and sometimes forced to take a big leap based on a guess or piece of gossip.

We see a new kind of support for these farmers — an AI- powered Farmer Helpdesk, available 24/7, year-round. An helpdesk available in every season, using smart technology to answer farmers in an easy way — an easy way for farmers to get answers, advice, and next-best actions — from a device they already have, on basic feature phones or smartphones. To get an answer from this helpdesk, it all starts with a translation engine trained special in agricultural language and local language. Whether a farmer speaks in Marathi, Bengali, Telugu or Kannada, the helpdesk understands the question, and replies in a simple language — in the same local dialect.

If a farmer wants to ask about how to set up a drip irrigation system for their crops, or use a natural pesticide, they do so in their local language. The farmer doesn't need to worry about difficult translations or misunderstandings — the farmer can speak in their mother tongue.

For farmers who prefer to speak rather than type, voice features make the helpdesk even more natural — the helpful helpdesk listens to the farmer's question, and replies in a friendly, familiar voice.

The farmer hears questions and answers that sound as local and familiar as the crop itself.

But the helpdesk goes beyond conversation. If a farmer notices unusual spots on a leaf or damaged crops, they can simply snap a photo. Using advanced image recognition, the system can detect signs of diseases, pests, or soil problems — just like an expert looking at the plant. It marks the areas of concern, rates the severity, and matches the image with government- recommended guidelines and remedies. This means farmers can act quickly, using the right treatment, avoiding unnecessary chemicals, and saving both money and crops.

Adding even more value, the system is designed to consider everything around the farmer — from the weather forecast and current market prices to soil conditions and the type of crop in the field. It gathers this information and creates simple, personalized advice. If heavy rain is coming, it might suggest delaying fertilizer use. If there's a fungal threat in nearby areas, it might recommend a locally available, affordable treatment. The goal is to give farmers practical, timely actions based on real data, not guesswork.

What makes this system special is its sense of partnership. It isn't just a one-way information broadcast, like a radio announcement. It's a conversation, a relationship. Farmers ask, the system listens, learns, and replies. It remembers their preferences, understands their farms, and over time, becomes a trusted companion in their daily work. By handling routine questions and providing early alerts, it frees up human experts to focus on complex, critical problems — making the entire system of agricultural support faster, fairer, and more responsive.

This report will take you through how this helpdesk is built, the technology behind its voice, vision, and translation features, the real-world trials we conducted, and how it has begun changing lives in farming communities. It marks a step toward a future where every farmer — no matter where they live or what language they speak — can feel supported, confident, and connected.

II. LITERATURE REVIEW

Surely many researchers have done studies on advantages of artificial intelligence (AI) and chatbots in different areas and have benefited from these studies for implementation of similar AI system in the agriculture. These studies are the basis of this work.

T. Bocklischetal [1] talks about Rasa which is an open source code for AI conversation. It can be two part: Rasa NLU; the part of system knows what the user wants and Rasa Core; the part of system decides how to continue the conversation. The authors explain how the Rasa works in stock financing chatbot.

The authors said that Rasa good at context; but when conversation include more than one topic or one information, the system can't do it [1].

S. Johnson et al. [2] introduces intelligent chatbot used in wealth management. Wealth management becomes complex very quickly. This chatbot uses ML and NLP to talk to the client about wealth, investment, taxes, and risk. The aim is provide personalized, low-cost wealth management which is not provided by traditional wealth management. This chatbot tries to understand the client in the conversation.

Frommert et al. [3] explains how to use enterprise social networks (ESNs) more efficiently for knowledge sharing and communication in a company. Although the ESNs are connected, there is not an easy-to-use method to share and use the data in the connected social networks. The authors said that chatbots can use in particular this problem can be solved in a corporate environment. The authors also present a prototype and show how chatbots can be used to improve the communication by using the data in these social networks.

Jiao et al. [4] talks about how to train the conversation understanding with Rasa NLU. Especially for taking information such as name, date and place from the user's question. The authors explain how to add neural networks to the system to make chatbots better cope with confusing and ambiguous situations that are important in more complex conversations with the user.

Fathima et al. [6] explains how chatbots can automate banking customer service questions and answers so that the banker need not be involved in

every transaction. Chatbots can answer questions related to accounts and transaction, it is possible to understand what the customer is asking without the intervention of banker. The authors said that this technology is important in services where the need for a quick response is high such as in banking.
Young et al. [9] explains how deep learning models such as CNNs, LSTMs, and RNNs are transforming the landscape of NLP in different areas including banking. These models allow chatbots and virtual assistant to understand what the user is saying and enables them to do more kinds of work and talk to the clients, from answering questions to automated transactions.

A. Singh et al. [10]. Comparison of chatbots development platforms: Google Dialogflow, Rasa and Microsoft Bot Framework. In: Procedia Computer Science, 178, (2020), pp. 324-331.

A. Singh et al. [10] Compares three chatbots development platforms i.e., Google Dialogflow, Rasa and Microsoft Bot Framework and evaluate these platforms on the basis of ease of use, flexibility and future integration capabilities. This work will be helpful for the people who are decided to develop a chatbots for business.

III. PROPOSED METHODOLOGY

To build a system that knows the problems and the reality of farmers we understood that the solution will not come from technology, but from farmers, by experiencing the problems and knowing what they need help with.

So, we didn't start building our chatbot helpdesk from a computer screen, but instead heard from farmers, saw their problems, and knew what they need help with. And then, step- by-step, we designed, built, and tested a helpdesk chatbot that speaks farmers' language, knows what their problems are, and uses the latest technology to provide relevant help.

Understanding Farmer Needs

Our journey began with conversations. We spoke to farmers, agricultural officers, and community leaders to understand what kind of help farmers were looking for. The most common issues revolved around getting quick advice on crop health, identifying diseases, checking market prices, predicting the weather, and receiving timely tips for better yield. Many farmers shared that government offices and helplines often involved long waits and complex paperwork, while their questions couldn't wait — crops don't pause for office hours. These discussions helped us clearly define what the chatbot needed to do and what kind of information it should be able to access.

Gathering the Right Information

For this system to be truly helpful, it needed to be well- informed. So, we carefully planned how and where the chatbot would gather its data. Farmers would directly interact with the chatbot — typing their queries, speaking into it, or even sending pictures of their crops. These inputs would give us firsthand information about what's happening in the fields. In addition, we connected the system to official databases from government bodies and NGOs to access verified information on pest outbreaks, weather advisories, and farming guidelines. Live market prices and weather forecasts were brought in through reliable APIs, and we also designed the chatbot to learn from its own usage history, constantly improving the advice it gives.

Designing a Friendly, Powerful System

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Making Conversations Natural and Helpful

The magic happens in how the chatbot responds to farmers. If a farmer sends a message - a text query, a voice note, or a picture of a sick plant - the backend goes to work figuring out what they're looking for. If it's a typical query, the chatbot sends back a nicely formatted, jargon-free, local language voice using the language model. If farmers are asking for responses based on prices or weather

information, the backend pulls the data, does the math, and returns an easy-to-swallow answer - or a graph or map with the answer.

When farmers upload images, the system uses AI to spot problems — like leaf diseases or soil nutrient deficiencies — and immediately offers advice based on government-approved farming practices. It doesn't just say what's wrong; it suggests the next steps, which treatments are safest, and even checks local availability where possible.

This way, a farmer could easily spot a price drop, a coming storm, or a pest outbreak at a glance. Everything was designed to work in multiple languages and be as simple as possible, focusing on what matters most to farmers.

IV. OBJECTIVES

Farming is the lifeline of rural India, and for the people who grow our food, getting the right advice at the right time can make all the difference. But in reality, many farmers face a tough time reaching out for expert help. Long queues at government offices, language barriers, limited literacy, and patchy internet connections often keep them from getting the support they need. This project was born out of a simple but powerful idea: to bring reliable, easy-to-use, and farmer- friendly help right into the hands of those who need it the most.

Our project goal was to build a project for a smart Farmer helpdesk — a helpdesk that farmers can talk to anytime — in their own language — whether they live in a city in North America or in a remote village in India — via text, voice, or even pictures (if needed).

We wanted to build a system where farmers can talk about anything — from when to sow the seeds to how to treat insect attacks to what are the market prices today — and get a simple answer for it. The chatbot speaks their language and listens to their questions. It can even look at pictures of their crops and tell them what's wrong and what they should do next. The helpdesk will be available 24×7, so farmers don't have to wait for office hours or stand in lines for hours. Even if they live in a village with poor internet connectivity, they will be able to use it with basic voice calling capability or simple phones.

Finally, by looking at the questions farmers ask and problems they face, this helpdesk can see the bigger picture — from increasing pest attacks to changing market prices — and tell early warnings or useful information not just to one farmer but to whole communities of farmers. In short, this project isn't just about building a chatbot. It's about building a smart, caring, and friendly digital helpdesk for farmers — one that listens to them, speaks in their language, helps them make better decisions, and ultimately makes farming a little bit easier, safer, and more successful.

System Design and Implementation.

In order to really help farmers in rural India, especially farmers who live in remote areas, we designed our AgriChatBot system to be simple, practical, and accessible. This smart farmer helpdesk isn't just another digital assistant — it's a digital helpdesk that gives advice and answers questions and provides information whenever and wherever farmers need it, in a language and format that's comfortable for them.

How is The System Built?

In order to help farmers, AgriChatBot is built of two main parts — the frontend (the part where farmers see and interact with) and the backend (the part behind the scenes that does all the thinking and processing). On the farmer's end, we built a simple and easy-to-use frontend using React.js. Whether a farmer wants to ask a question, upload a picture of a diseased plant, or listen to an audio answer, this is what it is. It works on smartphones as well as simple feature phones that support basic internet connectivity or basic voice calling.

Behind the scenes, our Node.js and Express.js backend receives all the requests, talks to smart AI models, gets current market rates and weather reports, and more. It also talks to a separate Python service that does all the parts that require basic data science — from analyzing pest patterns using tools like Pandas to making yield predictions using Scikit-learn and other smart tools.

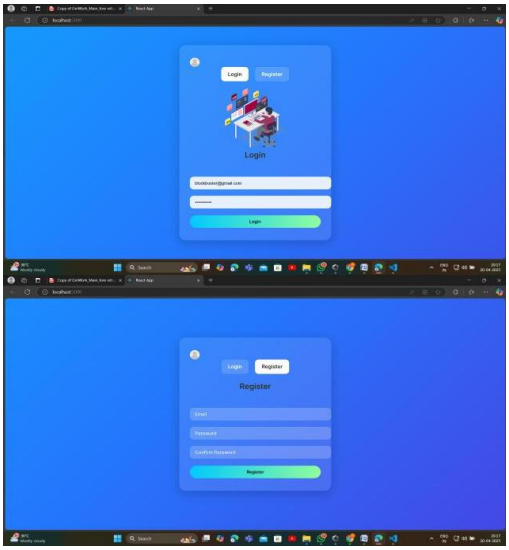
How is it Helping Farmers in Real Life?

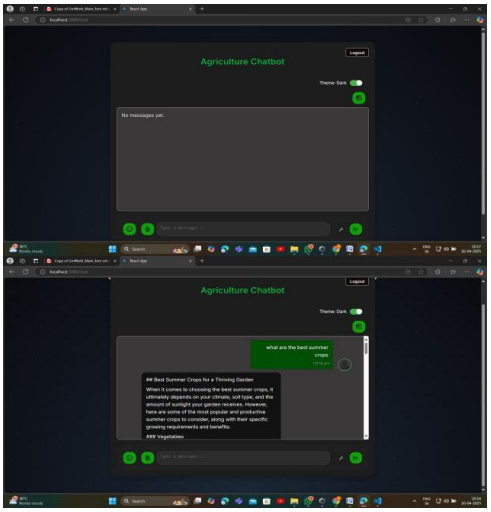
When a farmer asks a question or sends a picture through the chatbot — it could be about diseases of crops, prices of the market, the time of fertilizers, or anything — the fun starts. It's a text question, it translates it into a language of the system, understands the question, and answers in a language of a farmer.

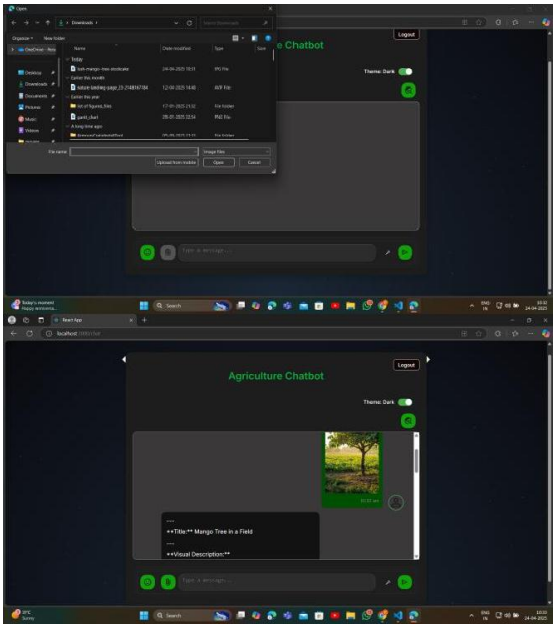
It's a voice question, the system converts a voice message into a text, understands the question, and answers in a text or in a spoken form (depending on what the farmer prefers). The farmer sends a picture of a sick plant, our image recognition model looks for disease signs, nutrient deficiency, or damage from pests — and it doesn't stop there. It gives farmers practical solutions on the basis of ICAR guidelines, local agricultural rules, and best practices.

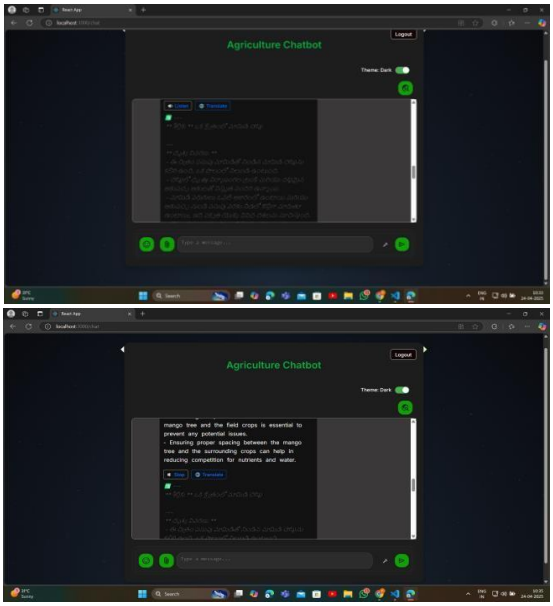
The chatbot uses live data (weather forecasts, rates of the market, pictures of weather, rainfall, and others) to answer questions. If there's going to be a heavy rain in the next couple of hours, it may ask to delay the spreading of fertilizers. If other areas nearby registered an outbreak of a pest, it can warn farmers and provide them with safe, local treatments that they can use.

V. OUTCOMES









VI. CONCLUSION

In a country like India, where tens of millions of farmers around the world rely on their harvest to feed their families and communities, being able to get fast, reliable information in a timely manner can be the difference between a successful crop and a poor one.

Today, traditional support systems are lacking — bound by their own resource constraints, physical limitations, and slow turn-around times. As a result, millions of farmers are left without direction when they need it most. We were born out of the need to solve that gap. By combining artificial intelligence with intuitive features like voice interaction, real-

time language translation, image-based crop disease detection, and predictive data-based recommendations — AgroChatBot provides farmers with a smarter, more convenient solution — one they can carry in their pocket. And it doesn't stop there. It's a trustworthy companion that provides direction, one that listens, learns, and understands.

Whether it's answering day-to-day questions, sending early alerts, or providing seasonal tips, our chatbot provides help in the farmer's own language, with a human touch — and as it learns in-real-time from users, the chatbot has the potential to change the way agricultural services are delivered across India. It's a step towards creating smarter, more connected, and more resilient farming communities. And it's an example of how technology, shaped by empathy and bound by real needs, can bridge the gap for even the most remote villages, ensuring the hands that feed our nation are never left behind.

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