Chatbot based helpdesk for govt employees and departments AgricultureChatBot

Sanda Naveen Reddy[1], A.V. Divakara Reddy[2], Podamekala Sudheer[3], M Obulsubba Reddy[4]

[1,2,3,4] *Students, Computer Science Engineering Block Chain, Presidency University, Bengaluru Arshiya Lubna Associate Professor, Computer Science Engineering, Presidency University, Bengaluru.*

Abstract—In today's rapidly changing world, technology is becoming an aspect of every and any corner of our lives — and farming is not an exception.For farmers, easy and quick access to the information.can mean the difference between a harvest overflowing and a harvest gone.crop. But the majority of farmers, especially rural farmers, still face challenges in gaining timely information and advice from government bureaucracies. because of prolonged waiting times, bureaucratic paperwork, and miscommunication.This research introduces a friendly, easy, and intelligent chatbot Farmers only helpdesk driven by AI. AI powered.

Intelligence, this chatbot is essentially a farm assistant.informing farmers with helpful information regarding government schemes, market rates, weather forecast, and farm advice — all in their own tongue, and day and night on call.The chatbot answers farmers' questions in their own language processing and responds in a clear, conversational, practical means — whether it's crop insurance, soil health, subsidies, or how to deal with pests. It works around the clock,subject to the proviso that even rural village farmers remote from the city can access prompt responses without needing to leave their homes or farms.

This research focuses on the use of this chatbot in the agriculture sector, how it can reduce the burden on government helpdesks, and how it can make government services seem nearer, quicker, and more farmer-friendly. The results indicate that AI chatbots can play a significant role in assisting farmers, allowing them to make more informed decisions, and a smarter, more connected agriculture society.society.

I. INTRODUCTION

Among rural India's social circles, where agriculture dictates the rhythm of everyday life and generations have subsisted on the land, agriculture is not only a career — it's tradition, culture, and the very pillar of the nation. Every day, farmers come out to their harvests in hopes of a fruitful crop, but also with have plenty of questions to ask themselves. Whether to irrigate the cropstoday? Can we spray a pesticide today? Why are the leaves turning yellow? When do you harvest? And what is market price of their fruits? These seemingly straightforward questions have serious repercussions for their health, and prompt, correct answers comprise the difference between profit and loss, or even survival and struggle.Sadly, however, for the

majority of farmers, it is not easy to answer these questions.Most of the government farm centers are located outside villages, typically a few kilometers away. If farmers can in order to make the journey, they are greeted with long lines, few office hours, technical reports loaded with jargon and official-sounding jargon that is difficult to read. For farmers with little education behind them, these obstacles appear impossible. Even when assistance finally arrives, however, it comes too late — by the time when there is an issue at hand or a proposal made, the damage to the crops has already been done.It is a reality for millions of marginal and small farmers throughout India. And this is where technology has the ability to really change lives. The concept of this project is straightforward but strong: provide expert, reliable, and customized agriculture guidance to the farmer — not in the form of lengthy forms tightly packed office space, but on their line, in their own voice, in in their own words, and now they need it. was conceived in this vision — an intelligent, AI-powered chatbot farmers' helpdesk which has been customized specifically for use by farmers.

It serves as an internet farm friend, waiting for response to farmers'24×7 requests, either by text, voice, or even pictures. The chatbot uses sophisticated natural language processing (NLP) so

that they will understand what farmers are demanding, whether the dialect orphrasing, and provides correct, real-life solutions in the first language of the farmer — either Hindi, Telugu, Marathi, Bengali, Kannada, or an indigenous language.What sets AgroChatBot apart is that it can continue beyond simple question-and-answer. If a farmer observes something unusual patch on a plant, but they can simply snap a picture and forward it to the chatbot. With sophisticated AI image recognition, the system can immediately identify signs of disease, pest infection, or soil disorders, and recommend the next step to be taken according to government-approved locally accessible interventions and farm technologies. It promotes farmers act fast, do not incur expenses, and maintain their crops before it is too late.But AgroChatBot does not stop at that. It also refers to up-to-date data sources — for example, weather forecasts, market prices,

reports of pest outbreaks, and official warnings — so that advice it offers will be timely and locally relevant. For example, if rains are predicted to be heavy, it might suggest against fertilizer use. If adjoining areas are suffering from pest invasions, it will provide advance warnings and counsel preventive measures farmers can take. Market price alerts can help farmers to decide when and where to sell their produce for optimal return.

What is of added worth with AgroChatBot is that it becomes smarter over time. It keeps a record of the farmer's crop, the soil conditions, and the kind of questions they tend to ask. This allows it to give better, more tailored advice every time. It turns a simple chatbot into a valued partner — one that hears, learns, and helps farmers navigate the challenges they face in their fields every day.In a country where over half the population is directly or indirectly dependent on agriculture, this kind of technology is more than a nicety — it's a requirement. By eliminating barriers of distance, time, language, and literacy, AgroChatBot is helping farmers to gain greater mastery over their land, their money, and their lives. This project is not only meant to make farming easier, but to empower farmers to feel empowered, enabled, and activated in a world that is rapidly changing and rapidly digitizing.

Here in this report, we will take you through how this

system was conceptualized, how it was carefully built around real farmers needs, the technology underpinning, and how AgroChatBot is already contributing to farm communities — helping them to grow wiser, work safer, and construct stronger, more resilient livelihoods.

II. LITERATURE REVIEW

T. Bocklisch et al. [1] created Rasa, an open-source platform that is perfect for conversational AI software development. Two basic building blocks of Rasa are Rasa NLU, responsible for making the system capable of discerning user intent and extracting information, and Rasa Core, responsible for handling conversation flow. With the ability of the developers to fine-tune the system based on feedback, Rasa was fantastic, especially in financial applications such as funding chatbots in the stock market. The study also encountered difficulties, such as handling complicated, multi-entity conversations. In another research study, S. Johnson et al. [2] created an intelligent wealth management chatbot. Using advanced machine learning (ML) and natural language processing (NLP) methods, the chatbot engages clients on investment, tax, and financial planning issues. The software can identify user intent, handle client data, and offer customized advice. Their research

emphasized how AI can make financial services closer, affordable, and more accessible—reshaping a people-centric business. Frommert et al.

[3] had earlier suggested the use of enterprise social networks (ESNs) in order to trigger knowledge exchanges and communications among firms. While such networks are underutilized, research had indicated that chatbots could do so by summarizing excellent insights from knowledge they possess intelligently and, as a byproduct, enhancing corporate decision-making. This innovative manner would enhance noticeably collaboration between organizations. Jiao et al.

[4] ensured the enhancement of the chatbot's ability to read input from users, i.e., via entity extraction—salient information such as names, dates, locations, and details. Neural networks, the system was better able to understand things like that in

context of various circumstances. Their work was based on highlighting the necessity in a bid to enable efficient entity extraction towards successful conversational systems, particularly in indefinite or ambiguous contexts.Finally, A. Singh et al.

[10] contrasted the three most widely used chatbot platforms used—Google Dialogflow, Rasa, and S. F. Suhel and others

[5] had already made contributions to AI application in banking, i.e., automation of customer service activities through chatbots. They had explained how chatbots deployed through AI can be used to automate basic banking tasks like inquiry of transaction history and inquiry of balance and how this can make banks efficient and decrease the cost of operation. Our paper puts us in a position where we know how AI can be used to automate customer-focused businesses interactions, offering information of value to industries like agriculture. Young et al.

[9] described the impact of deep learning on NLP applications such as chatbots. They explained that methods such as Convolutional Neural Networks (CNNs),Long Short-Term Memory (LSTM) networks, Recurrent Neural Networks (RNNs) are making chatbots learn and reply to translate to human language. These advances improve the ability of chatbots for cope with different types of user interaction, so it is extremely robust in banking-like domains.Lastly, A. Singh et al.

[10] compared the three highest-rated chatbot development platforms—Google Dialogflow, Rasa, and Microsoft Bot Framework. They had compared these platforms on matters
such as usability, flexibility, and integration abilities, providing very good advice on choosing the best.
business-focused chatbot development platforms. This review is especially useful when choosing platforms for enterprises like ours, and we need reliability and flexibility.

III. PROPOSED METHODOLOGY

Building a system that actually understands and assists the ordinary farmers' struggle wasn't all about technology — it had to be built on the real experience and needs of the people who would use it. That is why we did not begin our project by jumping directly into coding or higher-level algorithms. Rather, we began by listening. We took time to speak with farmers, agricultural officers, and community leaders in order to know what was actually going on in the fields. We wanted to know their struggles, what they required most, and how we could assist to resolve those issues. From these talks, we realized that farmers were not just looking for general guidance; they needed immediate, reliable solutions for extremely specific problems. The most frequent problems they faced involved things like diagnosing crop diseases,

tracking market prices, getting weather reports, and learning how to increase their crops' yields. We also learned that most farmers found it irritating to depend on government helplines or local offices, where they'd have to wait for hours fill out intricate forms, and yet fail to get the information they required in time. The truth is, crops don't wait for office hours, and farmers can ill afford delays when problems occur. This insight guided the actual core of our chatbot architecture: it must be fast, easy to use, and ubiquitous.Listening to Farmers' GrievancesbTo make sure we were heading in the right direction, we focused on to understand precisely what the farmers were requesting. We had spoken with as many farmers as possible to listen to their grievances and needed firsthand experience. From these conversations, it was apparent that they required more than a mere tool — they required a system which would provide immediate guidance when something went awry. wrong, and that might provide practical solutions in the short term.

We did not wish to produce anything that merely informed them of what incorrect, but something that gave them action steps they could take right away. Collecting Useful Information To render the chatbot operational, we were aware that it needed to be wellinformed. Therefore, we strategized very meticulously where it would get data from. The farmers would directly communicate with the chatbot, allowing them to call and leave voice mails or even upload photos of them harvest. The live feeds would offer us a detailed understanding of what was going on in the fields. But we didn't stop

there. We connected the system to stable sources like government databases and agriculture organizations, which provided authenticated information on from insect infestations to weather forecasts. We even utilized real-time market prices through APIs, so that farmers would never be short of the latest news at their fingertips. And the chatbot wasn't just relying on pre-programmed knowledge — it was meant to learn in the long run. As farmers used it, the system would tune its responses and provide improved advice, becoming increasingly intelligent with each conversation. Building a Simple, yet Efficient System One of the biggest challenges we had was ensuring that the system would be easy for farmers to use. They are not mosttech-savvy, and we knew that a complex interface wouldn't be useful. We wanted the chatbot to be as easy and intuitive as much as possible, whether they were using smartphones or otherwise feature phones. We implemented the interface in React maintain the clean and minimalist look. It needed to something with which farmers can work easily, though they had minimal or no exposure to technology. Behind the bonnet, however, the setup was robust. We used Node.js to handle all the conversations and connected it to a Data Analysis Module which assisted the chatbot in making predictions, detect trends in crop health, and alert for like pest infestation or adverse climatic conditions. Whenever there is urgent arose, the system would immediately alert farmers, alerting them to the situation so that they could move quickly. We also added a Python microservice to handle more complex tasks, including market trend analysis, plant disease diagnosis, or running weather predictions. Through outsourcing these computationally demanding operations, we ensured that the chatbot would remain capable of responding promptly, even when dealing with complex queries. Getting the Conversations to Sound Natural The real magic of the chatbot is how it talks with farmers. We wanted it to be like a helpful, friendly dialogue, not a mechanical one. Therefore, whenever a farmer it conveys a message — a written-out question, a voice message Designing a Simple, Yet Powerful System

One of the biggest challenges we faced was ensuring that the system would be easy for farmers to use. Many of them aren't tech-savvy, and we knew that a complicated interface wouldn't be helpful. We wanted the chatbot to be as simple and intuitive as possible, whether farmers were using smartphones or more basic feature phones. We built the interface using React, keeping the design clean and user-friendly. It had to be something farmers could interact with comfortably, even if they had little to no experience with technology.

Under the hood, though, the system was powerful. We used Node.js to handle all the conversations and connected it to a Data Analysis Module, which helped the chatbot make predictions, spot trends in crop health, and send out alerts for things like pest attacks or bad weather. Whenever something urgent came up, the system could instantly notify farmers, giving them the heads-up they needed to act quickly.

We also added a Python microservice to handle more complex tasks, like analyzing market trends, diagnosing crop diseases, or running weather predictions. By offloading these heavy tasks, we made sure the chatbot could still respond quickly, even when dealing with complex queries.

Making the Conversations Feel Natural

The real magic of the chatbot comes in the way it communicates with farmers. We wanted it to feel like a helpful, friendly conversation, not just a robotic exchange. So, whenever a farmer sends a message — whether it's a typed query, a voice note

IV. OBJECTIVES

Agriculture: The Pulse of Rural India
• Agriculture is not employment; it is the countryside economycIndia, helping families and communities.
• But under normal circumstances, farmers also have gigantic problems, i.e., not receiving the right advice at the right moment, which can affect theirccrops and livelihood.

The Problems Facing Farmers:
• Long queues at government offices, tedious paperwork, and waiting for help are some issues faced by agriculturists.
• Language differences, low literacy, and unequal internet making it even harder for farmers to get hold of support they need.

The Idea Behind the Project:
• We wished to bring a positive change by being a Farmer Helpdesk – an immediate and sure virtual aide who farmers can call us at any time.

• The goal is to present recommendations, ideas, and solutions that are easy to read, beneficial to farmers at the appropriate time all.

What the Helpdesk Does

• Always Available: Farmers will never have to wait for office hours. 24/7 chatbot will be there to help whenever they require.

• Speaks Their Language:It's written to speak to farmers in their respective languages, so that the information seem more familiar and closer.

• Flexible Communication: Whether you are typing a message, recording a voice message, or leaving a sick plant image, bot is prepared to respond in the most appropriate way best for the farmer. What Can Farmers Request?

• Farmers would also like to inquire, for example, "When do I plant my seeds?" or "How do I deal with this pest problem?"

• The chatbot will give short, direct answers, with step-by-step practical procedures and steps to resolve theissue.

Simple Access for All Farmers:

• Whether they are using feature phones or smartphones phones, the chatbot will be available to everyone.

• They cannot have a proper internet but they can still contact through direct voice calls or messages.

A Proactive Strategy:

• The chatbot does not reply – it actually learns from the issues confronted by farmers and detects trends.

• Where there is an increase in pest infestation or unexpected weather patterns, and the chatbot could provide early warnings to farmers, always one step ahead of problems.

The Bigger Picture:

• Anything other than a chatbot – it's a clever, compassionate companion to farmers.

• Hears them out, provides them with technical advice, and helps them to make better decisions to improve their performance.farming methods, making their lives a little easier and their work more successful.

V. OUTCOMES
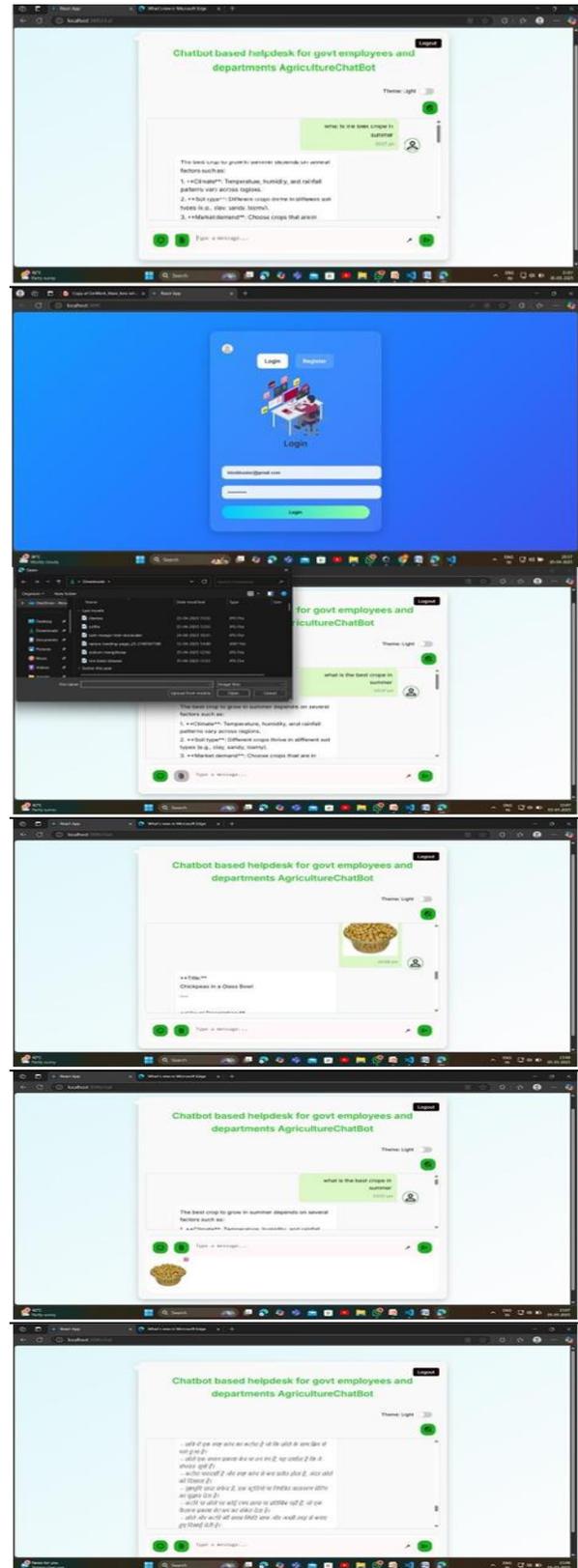
VI. CONCLUSION

In a nation such as India, where millions of farmers rely on farming that will sustain their communities and their families, earning the right guidance at the right moment would be beneficial. But the majority of farmers are limited by factors such as long queues in politics, language problems, illiteracy, and slow network connections that deprive them of the benefit of acquiring the support they requirement when it is needed most. This is where Agriculture ChatBot steps in. We have come re-configure farmers' access to information and services. Through combining the potential of artificial intelligence with simple, day-to-day applications such as voice commands, image inspection, live translation, and data-driven suggestions, AgricultureChatBot provides another option to rely on. It's not another gadget — it's a friend to be utilized by the farmers, whenever required, on the the palm of his/her hand.Anything one is speaking to a voice assistant, posting a picture of a sickly plant, or receiving immediate replies to on its own terms, AgricultureChatBot is programmed to understand farmers and provide the proper direction, though they may be in remote areas where the internet is poor. It supports crop problem diagnosis.

From pictures, crosses linguistic frontiers and dialects, and also suggests to consumers based on available data. However, the disparity that AgricultureChatBot holds with other bots is that it can to get better and better each year. Whenever it becomes more conscious, better understanding farmers' requirements and offering more practical counsel. It can also include more patterns, such as an unexpected outbreak of insect infestation or a shift in the market trends, and warn farmers before the problem gets out of hand. In brief, AgricultureChatBot is a matter of empowering more close-knit, interdependent farm community. It's about sharing farmers the tools they require to decide and farm risks — an open and transparent system. Whether it's expanding market prices, weather, or offerings pest control advice, it is there to make their lives a little easier and farming a little more predictable.

The challenge isn't to import some fresh gadget — it's to guarantee so that any farmer anywhere can obtain access to the service they need. They need to plan with empathy and a sense farmers' requirements, AgricultureChatBot is empowering people who feeding our nation and taking care of them in the process step of their journey. In short, AgricultureChatBot is not a regular chatbot. It's a listening partner who comprehends and helps farmers to plant difference in human lives. Enhanced. For when technology is designed with compassion and empathy, it can transform lives and make a real disparity — particularly for those who require it most.

VII. ACKNOWLEDGMENT

REFERENCES

[1] T. Bocklisch, J. Faulkner, N. Pawlowski, and A. Nichol, "Rasa: Open-Source Language Understanding and Dialogue Management," NIPS Workshop on Conversational AI, Dec. 2017

[2] S. Johnson, S. Sri Jayanthi, T. V. N. L. Harika Jhansi, K. Pavithra, S. Sowmya and M. u. Mahathi Devi, "Chat Finance: Tracking Wealth with a Conversational Bot," 2024 International Conference on Expert Clouds and Applications (ICOECA), Bengaluru, India, 2024, pp. 253-257, Doi: 10.1109/ICOECA62351.2024.00054.

[3] Frommert, Christian &Häfner, Anna & Friedrich, Julia & Zinke-Wehlmann, Christian. (2018). Using Chatbots to Assist Communication in Collaborative Networks: 19th IFIP WG 5.5 Working Conference on Virtual Enterprises, PRO-VE 2018, Cardiff, UK, September 17 19, 2018, Proceedings. 10.1007/978-3-319-99127-6_22.

[4] Jiao, Anran. (2020). An Intelligent Chatbot System Based on Entity Extraction Using RASA NLU and Neural Network. Journal of Physics: Conference Series. 1487. 012014. 10.1088/1742-6596/1487/1/012014.

[5] S. F. Suhel, V. K. Shukla, S. Vyas and V. P. Mishra, "Conversation to Automation in Banking

Through Chatbot Using Artificial Machine Intelligence Language," 2020 8th International Conference on Reliability, Infocom Technologies and Optimization (Trends and Future Directions) (ICRITO), 10.1109/ICRITO48877.2020.9197825.

[6] Fathima, Sasha & Student, Suhel & Shukla, Vinod & Vyas, Dr Sonali & Mishra, Ved P, "Conversation to Automation in Banking Through Chatbot Using Artificial Machine Intelligence Language". 2020 International Conference on Recent Innovations in Technology and Engineering (ICRITO), Delhi, India, 2020, Doi: 10.1109/ICRITO48877.2020.9197825.

[7] The Rasa documentation. [Online]. Available: https://rasa.com/docs/rasa/2.x

[8] Trends in Deep Learning-Based Natural Language Processing". 2017 arXiv:1708.02709, Computation and Language.

[9] A. Singh, K. Ramasubramanian, and S. Shivam, "Introduction to Microsoft Bot, Rasa, and Google Dialog Flow", In Building an Enterprise Chatbot (pp. 1-22), (2019) Springer Nature, Cham, Switzerland.

[10] R. S. Bird, J. Klein, and E. Loper, Natural Language Processing with Python, O'Reilly Media, 2009.

[11] J. Xu, Y. Wang, and L. Wang, "Enhancing RNN-based dialogue systems with pretrained contextual representations," Proc 2021 Conf. Empirical Methods Natural Language Process.

[12] Singh, Netra & Singh, Devender. "Chatbots and Virtual Assistant in Indian Banks". Industrija 2019 Institute of Economic Sciences (IES), Belgrade, Serbia, Journal of Physics: 47. 75-101. 10.5937/industrija47-24578.

[13] Young T, Hazarika D, Poria S and Cambria E, "Recent