**SYNOPSIS**

**on**

**AI Chatbot for Agriculture: Enhancing Farm Management**

Bachelor of Technology in

# Computer Science and Engineering

*by*

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***Project Guide***

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# DECLARATION

We, hereby declare that the mini project report titled “AI Chatbot for Agriculture: Enhancing Farm Management” submitted here in has been carried out by us towards partial fulfillment of the requirement for the award of Degree of Bachelor of Technology in Artificial Intelligence. The work is original and has not been submitted earlier as a whole or in part for the award of any degree/diploma at this or any other Institution / University.

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**ABSTRACT**

Artificial Intelligence (AI) has been extensively applied in farming recently. To cultivate healthier crops, manage pests, monitor soil and growing conditions, analyse data for farmers, and enhance other management activities of the food supply chain, the agriculture sector is turning to AI technology. It makes it challenging for farmers to choose the ideal time to plant seeds. AI helps farmers choose the optimum seed for a particular weather scenario. It also offers data on weather forecasts. To obtain the maximum yield from the crops, it is required that farmers should be provided with the best technologies and methodologies. Artificial intelligence enabled technologies support industry competition, and the agricultural sector will steadily incorporate artificial intelligence in the future. In order to achieve larger yields and higher quality with fewer resources, agricultural artificial intelligence can not only assist farmers in automating their operations but also help them move to precise harvesting techniques. Farmers can interact with the system comfortably and receive customized advice through the AI chatbot interface. This project aims to boost agricultural productivity, reduce environmental impacts, and promote sustainable farming methods, linking AI technology with farming to create a sustainable and food-secure future.

**Keywords**: AI chatbot, agriculture , AI-Powered Decision Support System, Machine, Data Analytics, Large Language Model, crop management, technologies and methodology, yield of farm, pest control, resource optimization, natural language processing, machine learning, harvesting, sustainable farming, IoT, blockchain .

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# INTRODUCTION

Agriculture, a cornerstone of human civilization, is undergoing a significant transformation driven by technological advancements. The integration of artificial intelligence (AI) into agricultural practices has emerged as a pivotal development, promising to enhance productivity, sustainability, and efficiency in the sector. Among the diverse AI applications, chatbots have shown remarkable potential in addressing various challenges faced by farmers and agricultural stakeholders AI chatbots, equipped with natural language processing (NLP) and machine learning capabilities, offer a novel approach to bridging the information gap in agriculture.

Farmers are somehow less burdened with labor thanks to the development of AI chatbots in agriculture. The bots are convenient and can provide information on crop maintenance, pest infestations, and rainfall all at a go, which helps in fast decision making. The power of AI to process big data means that these chats offer smart solutions that maximize productivity and minimize risk.

Moreover, as all other ruptures, these chatbots eliminate mundane activities by some level of automation. For instance, they can handle irrigation scheduling, pest and crop monitoring, soil management and so on that may otherwise have been tedious. Moreover, they promote efficient arrangements of the waste resources, in this case, the water resources.

Last but not least, there is the issue of AI chatbots in agriculture acting as intermediaries between farmers and specialists. Farmers can simply employ a chatbot to get information or solutions to their problems whenever needed as the chatbot works around the clock. There is a free flow of information that helps to raise the living standards of poor farmers, high yield production, adopting better agricultural technologies, and utilizing the global market.

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# OBJECTIVES

* The objective of the AI chatbot for agriculture is to provide assistance to farmers by giving a valuable guidance for modern day farming.
* By giving them new parameters on which farmer would understand new approach of farming by solving some problems related to farm and the agribusinesses with real-time, personalized assistance in crop management, pest control, weather forecasting, and market trends.

* The chatbot aims to improve decision-making by delivering accurate and timely information, improving productivity, and thereby supporting sustainable farming practices and empowering farmers with technology-driven solutions reducing operational costs.
* Enhance the output by providing localized recommendations which are likely to be appreciated by the end-user.
* Provide tools for constant observation for the prevention of disease and pests in plants.
* Minimize manual efforts and operational costs by automating agricultural processes.
* Encourage farmers to use precision guided agriculture for i A better production.
* Make services available at all hours, considering the need of providing information to farmers.

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# LITERATURE SURVEY

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Sr no. | Year | | Author’s Name | | | Descriptive | | Methodology | | | Parameters |
| 1. | 2024 | | | Emmanuel  ASOLO,  Ifechukwu GIL-OZOUDEH, Chibundom EJIMUDA | | | The research paper is based on how a farmers can interact with the system comfortably and receive customized advice through the AI chatbot interface. This project aims to boost agricultural productivity, reduce environmental impacts, and promote sustainable farming methods, linking AI technology. | | Creating a sophisticated AI-driven chatbot to assist farmers in agricultural decision-making involves multiple methodologies across different stages of development. The key methodologies involved are outlined below. | The process began with collecting agricultural data, specifically focused on sustainable practices. A set of 20 carefully curated agricultural questions was developed sustainable farming techniques | |
| 2. | 2023 | | | Mohd Javaid  Rajiv Suman | | | Artificial Intelligence (Ai) has been extensively applied in farming recently to know about the true potential of Ai in Agriculture to be used. | | By knowing the process of Ai in a agriculture and how to use its advantages in farming or yield | As many as 828 million people were affected by hunger in 2021-46 million people more from a year earlier and 150 million more from 2019 | |
| 3. | | 2022 | | | Harikumar Pallathadka ,Malik Jawarneh ,F.Sammy,Vipul Garchar,Dominic T.Sanchez, Mohd Naved | Food needs are rising as the world's population grows. Similarly, the food processing industry is growing at an accelerated pace. Reduced food waste, better supply chain management, and increased delivery and storage of food are urgently required. | | | We will focus on the state of art on machine learning and its application in agriculture. Also, we study the use of machine learning in wheat crop production. | | The farmer have to be largely focused on the output and the yield crop  every year for a better year on year growth of the overall farm production . We mainly focus on the crop production but it does not satisfy . |
| 4. | | 2022 | | | A V Rozhkova,  S E Rozhkov | The article provides an analysis of the prospects for the use of artificial intelligence in the agro-industrial complex. As the main measures to overcome these obstacles, we can single out an increase in state support and professional development of staff. | | | In recent years, digital technologies have emerged, such as the use of big data, the Internet of things, artificial intelligence (AI), additive technologies and production robots. | | Using extreme machine learning, artificial neural networks (ANN) and model trees (M5 Tree) to determine the temperature of various soil layers (from 5 to 100 cm). |
| 5. | | 2021 | | | Indrajeet Kumar, Jyoti Rawat , Noor Mohd , and Shahnawaz Husain | Human workforce plays an essential role in the smooth execution of the production and packaging of food products. Due to the involvement of humans, the food industries are failing to maintain the demand-supply chain and also lacking in food safety. | | | In the food industry, AI also has some important applica-tions such as soil monitoring, robo-croping, and predictive analysis. | | Conventional systems are only able to characterize good and bad products according to their appearance. By using TOMRA , it has been observed that the detaching and ordering problem can be improved by 5–10% in the case of potatoes only |
| 6. | | 2021 | | | Gyan Singh Sujawat,  Dr. Jitendra Singh  Chouhan | To obtain the maximum yield from the crops ,it is required that farmers should be provided with the best technologies and methodologies | | | By collecting the Data of crop and yield to analyze the defects and to tell solutions on the basis of AI Supervision . | | Diseases of crop by analyses it and today there are various types of crop which resists these types of diseases are being developed |
| 7. | | 2021 | | | Sneha  Shelake, Swarupa Sutar, Aishwarya Salunkher, Snehal Patil, Rutuja Patil ,Tanjila Tamboli | The AI and Robotics Technologies have the potential to solve these problems competently. As agriculture is a dynamic sector, the problems in agriculture are not mid-core by AI and robotics, and a specific solution is provided to an expressly daedal problem. | | | On the input side we using three types of sensors which a Pi Camera, Humidity sensor, IR sensor. On the output side pesticide motor driver and pesticide pump for pumping pesticide. For control, a Humidity water motor driver and water pump will be installed. | | Data is getting collected and operated then ANN and ML . |
| 8. | | 2021 | | | Mochammad Haldi Widianto, Mochamad Iqbal Ardimansyah, Husni Iskandar Pohan, Davy Ronald Hermanus | Artificial Intelligence (AI) applied to Smart Farming. AI can give special capabilities to be programmed as needed. In cooperation with agricultural systems, AI is part of improving the quality of agriculture. This technology is no stranger to being applied in basic fields such as agriculture. | | | Many authors must analyze from different perspectives to determine what models are suitable . Smart Farming focus show the fundamental openings and challenges of utilizing this innovation. This work aims to analyze Smart Farming using PRISMA by Smart Farming. | | It is no longer strange if the world population can reach 9.1 billion. It is conceivable that the need for food must have increased by 70 percent . |
| 9. | | 2020 | | | Li Zhang,  Shanshan Wang | The purpose of this paper is to provide better Suggestions and technical means for the rational planning of agricultural industry economy by analyzing the input and output of agricultural industry economic benefits based on big data and artificial intelligence. | | | By using methods of 1.Agricultural big data  2.Experimental Analysis | | Data collected from the experiments done and then analysis with big data. |
| 10. | | 2020 | | | Bhawana Sharma, Jaykant Pratap, Singh Yadav, Sunita Yadav | The main aim of machine learning is to instruct computers to use data or experience to solve a real-life problem. It can apply as association analysis through supervised learning, unsupervised learning, and Reinforcement Learning | | | We will focus on the state of art on machine learning and its application in agriculture. Also, we study the use of machine learning in wheat crop production. | | Approximately 60% of world terrain is used for farming and feeding over 125 crore of people and crores of livestock |
| 11. | | 2020 | | | Sukanta Ghosh Amar Singh | Several AI-assisted application domains are emerging in a continuous manner. Similar benefits are provided to health care management. Lot of data generated by medical equipment helps in taking better decisions | | | By providing test papers the data are shown in research and then the advantageous functions of Ai is told in research paper | | Almost 30 percent of world population is depended on agriculture for their living. |
| 12. | | 2020 | | | Chun Hyunjin | Recent agriculture uses latest technologies such as artificial intelligence to create smart farms. In particular, Korea, which has a rapidly decreasing farming population, is investing a lot of research money to create smart farms. | | | The research method of this study was literature survey on smart farm using new technology such as artificial intelligence. | | Tomato production has increased by 30% and fuel costs have decreased by 40% compared to previous data |

**PROPOSED METHODOLOGY/SYSTEM ARCHITECTURE**

1. **Data Collection:** Collect information from a variety of agricultural sources, such as weather forecasts, soil sensors, crop health metrics, pest data, and feedback from farmers.

**2. AI Model Development:** Use historical data to train machine learning models that can predict crop yields, pest outbreaks, and weather trends, enabling the chatbot to offer well-informed advice.

**3. Natural Language Processing (NLP):** Apply NLP techniques to help the chatbot comprehend and respond to farmers' questions in everyday language, accommodating local dialects and languages.

**4. Integration with IoT Devices:** Link the chatbot to IoT sensors (like those for soil moisture) to deliver real-time, location-specific guidance on crop health, irrigation needs, and pest control.

**5. Recommendation Engine:** Create a system that evaluates data and farmer feedback to produce customized, actionable advice on crop management, resource allocation, and market insights.

**6. User Interface Design:** Design an intuitive and user-friendly interface that can be accessed on mobile devices, ensuring that farmers, even those with limited tech skills, can easily use it.

**7. Continuous Learning:** Establish feedback mechanisms for ongoing enhancement of the chatbot, allowing it to adapt based on farmer interactions and refine its recommendations as new data is gathered.

**8. Multilingual and Contextual Adaptation:** Tailor the chatbot to accommodate various languages, local farming methods, and diverse crop cycles to ensure it remains relevant to specific regions.

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**SOFTWARE REQUIREMENTS**

1. **Programming Languages:**
   * Python (primary language for machine learning and data processing).
   * JavaScript, HTML, CSS (for web development, if applicable).

# Libraries and Frameworks:

* + Data Processing : Pandas, NumPy (for data manipulation and analysis).
  + Web Development (if applicable) : Flask or Django (for backend development). React, Angular, or Vue.js (for frontend development).
    - RESTful API frameworks (for API development).
  + Other Useful Libraries:

# Database:

* + SQL databases (e.g., MySQL, PostgreSQL) or NoSQL databases (e.g., MongoDB) for storing data.

# Cloud Services (optional but recommended):

* + AWS, Google Cloud, or Microsoft Azure (for model deployment and hosting), Cloud storage services (for storing large datasets).

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# CONCLUSION

# AI chatbots are revolutionizing modern agriculture by tackling significant challenges and enhancing overall efficiency. Utilizing advanced machine learning and natural language processing, these chatbots provide farmers with real-time, data-driven insights on crop management, pest control, irrigation, and weather forecasting. This ongoing support helps farmers make informed decisions, resulting in increased yields, improved resource management, and cost savings.

# Additionally, AI chatbots make expert knowledge more accessible by providing essential agricultural advice to farmers in remote areas, empowering small-scale farmers and reducing their dependence on expensive consultations. As technology progresses, chatbots are expected to integrate with other innovations like IoT devices, blockchain for supply chain transparency, and precision farming tools, further boosting their effectiveness. Their capacity to adapt to local languages, dialects, and specific farming conditions will broaden their reach, making them invaluable to farmers in various regions and climates.

# The future of AI chatbots in agriculture looks bright, with potential developments in predictive analytics, sustainability monitoring, and market insights. As these tools continue to advance, they will play a crucial role in the global agricultural landscape, not only supporting individual farm success but also contributing to food security, sustainability, and climate resilience on a larger scale.

# Ultimately, AI chatbots will become essential partners for farmers, aiding in the modernization of agriculture while balancing innovation with tradition.

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**REFERENCES**

1. Ekanayake, Jayalath, and Luckshitha Saputhanthri. "E-AGRO: Intelligent chat-bot. IoT and artificial intelligence to enhance farming industry." *Agris on-line Papers in Economics and Informatics* 12.1 (2020): 15-21.
2. 4.Asolo, Emmanuel, Ifechukwu Gil-Ozoudeh, and Chibundom Ejimuda. "AI-Powered Decision Support Systems for Sustainable Agriculture Using AI-Chatbot Solution." *Journal of Digital Food, Energy & Water Systems* 5.1 (2024).
3. Javaid, Mohd, et al. "Sustainability 4.0 and its applications in the field of manufacturing." *Internet of Things and Cyber-Physical Systems* 2 (2022): 82-90.
4. Widianto, Mochammad Haldi, et al. "A systematic review of current trends in artificial intelligence for smart farming to enhance crop yield." *Journal of Robotics and Control (JRC)* 3.3 (2022): 269-278.
5. Singh, Kaushik Kunal. "An artificial intelligence and cloud based collaborative platform for plant disease identification, tracking and forecasting for farmers." *2018 IEEE international conference on cloud computing in emerging markets (CCEM)*. IEEE, 2018.
6. Hyunjin, Chun, and Kim Tongjin. "A Study on the Development of Robot Education in the Fourth Industrial Revolution." *Journal of Physics: Conference Series*. Vol. 1642. No. 1. IOP Publishing, 2020.
7. Ghosh, Sukanta, and Amar Singh. "The scope of Artificial Intelligence in mankind: A detailed review." *Journal of Physics: Conference Series*. Vol. 1531. No. 1. IOP Publishing, 2020.
8. P. Deotale and P. Lokulwar, "IoT Based Smart E-Agriculture Monitoring with Android Application," *2022 International Conference on Emerging Trends in Engineering and Medical Sciences (ICETEMS)*, Nagpur, India, 2022, pp. 153-157, doi: 10.1109/ICETEMS56252.2022.10093381.
9. D. Tandekar and S. Dongre, "A Review on Various Plant Disease Detection Using Image Processing," *2023 3rd International Conference on Pervasive Computing and Social Networking (ICPCSN)*, Salem, India, 2023, pp.

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