

KRISHI AI an AI and IoT-Enabled Smart Agricultural Decision Support and Equipment Management System

Meghana A.¹; Ruthu S.²; Pragathi P. G.³; Pallavi T. G.⁴; Sangeetha M. R.⁵

^{1,2,3,4}Department of Computer Science and Engineering, East West Institute of Technology, Bengaluru,

⁵Faculty of Computer Science and Engineering, East West Institute of Technology, Bengaluru.

Publication Date: 2026/10/06

Abstract: Agriculture is one of the most important sectors, which supports the economy and the livelihood of a large population. However, there are various challenges that farmers have to deal with such as choosing the right crop to grow, plant disease, varying weather conditions and agricultural equipment affordability. Small-scale farmers might have little or no capacity to buy expensive farm equipment due to its high purchasing costs and subsequent maintenance costs. The problem to be solved by the proposed paper is to develop KRISHI AI (Agri Tech system) that offers smart equipment rental through an AI and IoT enabled platform. The proposed solution will integrate artificial intelligence, machine learning, web technologies, and Internet of Things to offer a smart farming solution. The system will offer crop recommendation based on agricultural parameters, plant disease identification from images, agricultural weather-related information and rental service for farm equipment. The IoT component will be used to track equipment-related information and help manage the equipment. The web portal will offer a farmer-friendly interface where farmers can get the required services. The proposed solution will solve the problem of agricultural equipment by reducing the cost of ownership, enhance decision-making, ensure timely agricultural activities and promote the use of technology in farming.

Keywords: Artificial Intelligence, Internet of Things, Smart Agriculture, Crop Recommendation, Plant Disease Detection, Weather Advisory, Agricultural Equipment Rental, Machine Learning, Precision Agriculture.

How to Cite: Meghana A.; Ruthu S.; Pragathi P. G.; Pallavi T. G.; Sangeetha M. R. (2026) KRISHI AI an AI and IoT-Enabled Smart Agricultural Decision Support and Equipment Management System. *International Journal of Innovative Science and Research Technology*, 11(9), 2955-2968. <https://doi.org/10.38124/ijisrt/26sep1353>

I. INTRODUCTION

Agriculture is the backbone of the Indian economy and provides jobs to a large proportion of the population. The yield of farming is dependent on various factors like the soil condition, type of crop, irrigation, climate, plant health, method of cultivation and availability of proper machinery for cultivation. Traditionally, farmers have relied on experience for decision making related to cultivation. However, changing climate, rising cost of production, problem with soil, crop disease and lack of proper machinery has posed as a major challenge to them. Thus, there is a dire need of technological advancements that could help these farmers take better decisions related to agriculture.

The decision of selecting the crop that should be planted in a particular region is a crucial one. Nutrient availability in the soil, temperature, humidity, rainfall and other environmental factors affect the overall growth as well as determine the yield of the plant. The cultivation of an inappropriate crop might result in not only financial loss but also a wastage of resources. Artificial intelligence (AI) and Machine Learning (ML) offer a viable solution to this

problem. By analyzing the agricultural and environmental data, ML algorithms could find relations between these environmental factors and the type of crop cultivated thus leading to suggestions for appropriate crop cultivation. KRISHI AI presents a crop recommendation module that would take into consideration agricultural parameters to recommend the most suitable crop according to the data provided by the farmer thus leading to optimal yield.

Crop disease, in turn, affects the overall quality and yield of the cultivated plant. Various diseases could weaken the plant thus lowering its yield, thus affecting the quality of the harvest. Early diagnosis of these diseases play a major role in counteracting ill-effects. Traditional diagnosis mostly consists of manual testing or visiting agricultural experts, which is not always convenient for the farmers cultivating in remote areas. Image processing and AI based techniques could present a viable solution to this problem. KRISHI AI offers a plant disease detection module that would analyse the image of the plant captured by the user to help detect potential diseases. Moreover, change in weather often has tremendous impact on the agriculture practices that should be followed. Thus, timely information of weather forecasts plays an

important role in planning irrigation, spraying, harvesting, etc. KRISHI AI offers a weather forecasting module that could provide the necessary information to the farmers thus helping them make appropriate decisions related to farming.

Modern agricultural machinery like tractors, harvesters, seeders, tillers, and sprayers provide convenience and reduce the time required for farming practices. Nevertheless, the high cost of these machineries could be a disheartening factor for farmers cultivating on a small scale. A possible solution to this problem could be a rental service for agricultural equipment that allows the farmers to rent the appropriate machinery on demand thus eliminating the need for full ownership of expensive machineries. KRISHI AI presents an equipment rental module that allows the users to browse the available agricultural equipment. Farmers could choose the appropriate equipment according to their resources and requirements. Internet of Things (IoT) technologies could serve as an added advantage to monitor and track the equipment. Various smart sensors could gather data and help monitor equipment. Overall, IoT technologies could help manage and optimize equipment rental.

While AI, ML, image processing, weather, equipment rental and IoT technologies individually address agricultural problems separately, having separate applications for each of them proves cumbersome. KRISHI AI, on the other hand, serves as an integrated web application that brings together all of them under a single umbrella. In the proposed system, crop recommendation, plant disease detection, weather forecasting and equipment rental modules have been included besides equipment monitoring and tracking. Python has been employed as the main coding language for the development of the system while ML techniques have been used to implement agricultural features. Weather information has been fetched using an Application Programming Interface (API) while IoT technologies could be used for equipment monitoring and tracking. Overall, the proposed system KRISHI AI aims at providing farmers with a digital platform to adopt smart and precision agriculture.

KRISHI AI aims at providing smart and precision agriculture by providing a digital platform that provides easy accessibility to various agricultural needs. By providing a unified platform, it aims at reducing the hassle of using different applications for similar tasks. Farmers could use it to seek crop recommendations, detect plant diseases, obtain weather forecasts, rent agricultural equipment, etc. Moreover, the equipment tracking component could help monitor the tracked equipment. By using technologies like AI, ML, IoT, image-processing, web based technologies and weather based API, KRISHI AI aims at helping farmers make optimal decisions related to farming and reduce the burden of tedious manual tasks.

II. LITERATURE REVIEW

Agricultural activities are based predominantly on manual experience and visual observation. Machine Learning has been utilized in the development of crop recommendation systems. A variety of parameters, including temperature,

humidity, rainfall, nutrients in the soil, and other parameters, would have to be considered when recommending appropriate crops for agricultural activities. ML systems would be trained to recommend crops based on the data set utilized. The utilization of ML in the crop recommendation systems could reduce the complexity of considering a variety of agricultural parameters.

Plant disease detection has been considered using image processing and AI tools. Plant disease detection involves identifying symptoms of illness present in leaves, stems, and fruits to identify the causative agents of the illness. The use of image processing techniques in plant disease detection is to process images of plants to detect symptoms of illness and provide preliminary information regarding the status of the plants. Deep learning and image classification techniques could be used to automate the process of plant disease detection. Hence, image-based disease detection should be considered a supplementary tool to support farmers in the detection process.

In addition to the utilization of image processing and AI in the development of disease detection and crop recommendation systems, weather data is also considered an important aspect of agricultural activities. However, the relevance and usefulness of weather data is dependent on the additional features provided by the system, including additional decision support tools.

Various digital systems and research activities have considered agricultural equipment sharing and renting to support farmers in acquiring machinery without purchasing the equipment. This method allows farmers to request specific agricultural machinery according to their needs at a lower cost than purchasing the machinery.

IoT could be utilized in agricultural equipment monitoring and smart farming applications and services. However, the utilization of IoT in agricultural equipment monitoring has been limited to stand-alone systems with no additional features to support farmers in acquiring or renting agricultural machinery. The discussion above demonstrates that crop recommendation, disease detection, weather data, and agricultural equipment rental and sharing offer multiple benefits to farmers. KRISHI AI considers an integrated approach in the design and development of AI-based agricultural systems. By offering an integrated system, KRISHI AI supports farmers and agricultural workers in accessing a comprehensive agricultural support system through a shared database and backend servers.

KRISHI AI's crop recommendation tool, which utilizes AI and ML making recommendations and an image-based disease detection system, along with access to weather data, equipment for sale and rent, and IoT-based monitoring systems, would support farmers in making decisions at various stages of agricultural activities. Farmers would be able to request specific tools and equipment at different stages of farming activities. In addition, farmers would have access to tools to help monitor and manage plant diseases and obtain weather data to support various aspects of agricultural

activities. The next step would be considering the effectiveness of an integrated system and an agricultural platform to support farmers and agricultural workers.

Subsequent studies in the field of smart agriculture and digital tools for farming activities demonstrate that farmers could benefit from an agricultural platform that consists of integrated tools and services rather than different standalone systems. Crop recommendation systems could support farmers in preparing for planting activities, while imagebased disease detection tools would support farmers after planting. Thus, various digital tools and systems could be utilized at different stages of agricultural activities. However, the need for standalone systems would increase the need for farmers to compare data from different sources. Thus, an integrated system would offer convenience and provide access to multiple services and information from one source.

In addition, data is a critical component of most AI-based systems, including smart agriculture systems. Most AI-based systems, including crop recommendation systems, require data to train the system and develop a mechanism for making decisions based on the existing data. Therefore, farmers should be aware of the relevance of agricultural data and its impact on the accuracy of AI-based systems designed to support agricultural practices such as crop recommendation systems. In KRISHI AI, the machine learning component acts as a decision support system based on the data available in the system to advise on the best crop to grow.

In addition, agricultural activities have evolved over time from manual disease detection to image processing to identify signs of plant disease. Image processing entails processing the image of a leaf to identify patterns and provide preliminary information regarding the status of the plant and possible diseases affecting it. Such systems would be useful to farmers in providing information regarding plant health, especially in cases where plant pathologists are not easily accessible. Thus, image recognition systems could be utilized to supplement the manual identification of plant diseases.

Temperature, rainfall, and humidity data influence most aspects of agricultural activities and should be considered by farmers when making decisions. Thus, weather-based data and tools are essential for agricultural activities. However, weather-based data and tools should be used as decision support systems to supplement other agricultural data rather than being utilized as a stand-alone system. KRISHI AI provides weather data as an additional service that farmers could utilize to support agricultural activities.

Agricultural machinery plays a significant role in modern agricultural activities. Agricultural equipment supports increasing efficiency and profits while minimizing the amount of labor required for farming activities. However, agricultural equipment requires a significant amount of investment and could be expensive to maintain. Thus, agricultural equipment rentals and sharing have become essential in allowing farmers to utilize or share machinery for specific purposes. Thus, farmers need to be able to access information regarding agricultural equipment, including

where to purchase or rent the machinery. A digital platform that provides farmers with access to agricultural equipment, whether for sale or for rent, would be beneficial to farmers.

KRISHI AI recognizes the relevance of agricultural equipment and provides access to equipment for sale and rent in the selected region. In addition, IoT-based monitoring systems would ensure farmers can easily monitor the status of their agricultural machinery. The application of IoT in agricultural machinery includes tracking the equipment and collecting data about the temperature of the machinery. Thus, IoT-based agricultural machinery monitoring systems would be essential for farmers and agricultural equipment owners.

Although AI-based crop recommendation, image processing for plant disease detection, weather data, equipment sharing, and IoT-based agricultural equipment offer multiple benefits to farmers, the review above demonstrates that these solutions are mostly applied as stand-alone systems. The limitation of the current research demonstrated in the review above is the availability of multiple options, some of which are limited to specific features and farmers have to navigate through different systems to obtain the required information. Thus, the next step is to develop an integrated system that combines all the features provided by different systems and offer a comprehensive agricultural support platform. The proposed system, KRISHI AI, offers an integrated system that allows farmers to access crop recommendation, weather data, and agricultural equipment for sale or rent. Thus, the proposed system would support farmers and agricultural workers in accessing the required agricultural advice and tools in one platform.

III. METHODOLOGY

The proposed KRISHI AI system is designed as an advanced smart farming solution, which includes crop recommendation based on machine learning, image diagnosis of plant diseases, provision of weather information, equipment rental, and monitoring of agricultural machinery using IoT. The process starts with engaging farmers through a user interface, where personal data and general information about the area are collected. It is further split into several stages, including the collection of required information, its processing, and the use of machine learning methods to train a crop recommendation model. The next stage includes processing of plant images, extraction of weather data, equipment rental management, and IoT-based monitoring. Information is stored in a database during the data storage stage. The main steps of the proposed system are described in more details below.

➤ *System Design and Data Flow*

KRISHI AI is primarily organized on a web-based architecture, where farmers access the application through a user interface. In this diagram, the user provides the necessary agricultural parameters for crop recommendation, uploads an image of the plant for analysis, accesses weather information, and views relevant agricultural equipment for rental. The processing component is responsible for executing the

corresponding machine learning, image processing, weather, rental, and IoT modules in the application backend.

The processed information is stored in the system's database, where it is used to generate a recommendation for crop selection or present preliminary information about the

plant's condition. In addition, the system accesses weather information through the weather service and equipment rental details through the equipment rental module. Furthermore, IoT-related information can be found in the equipment monitoring component.

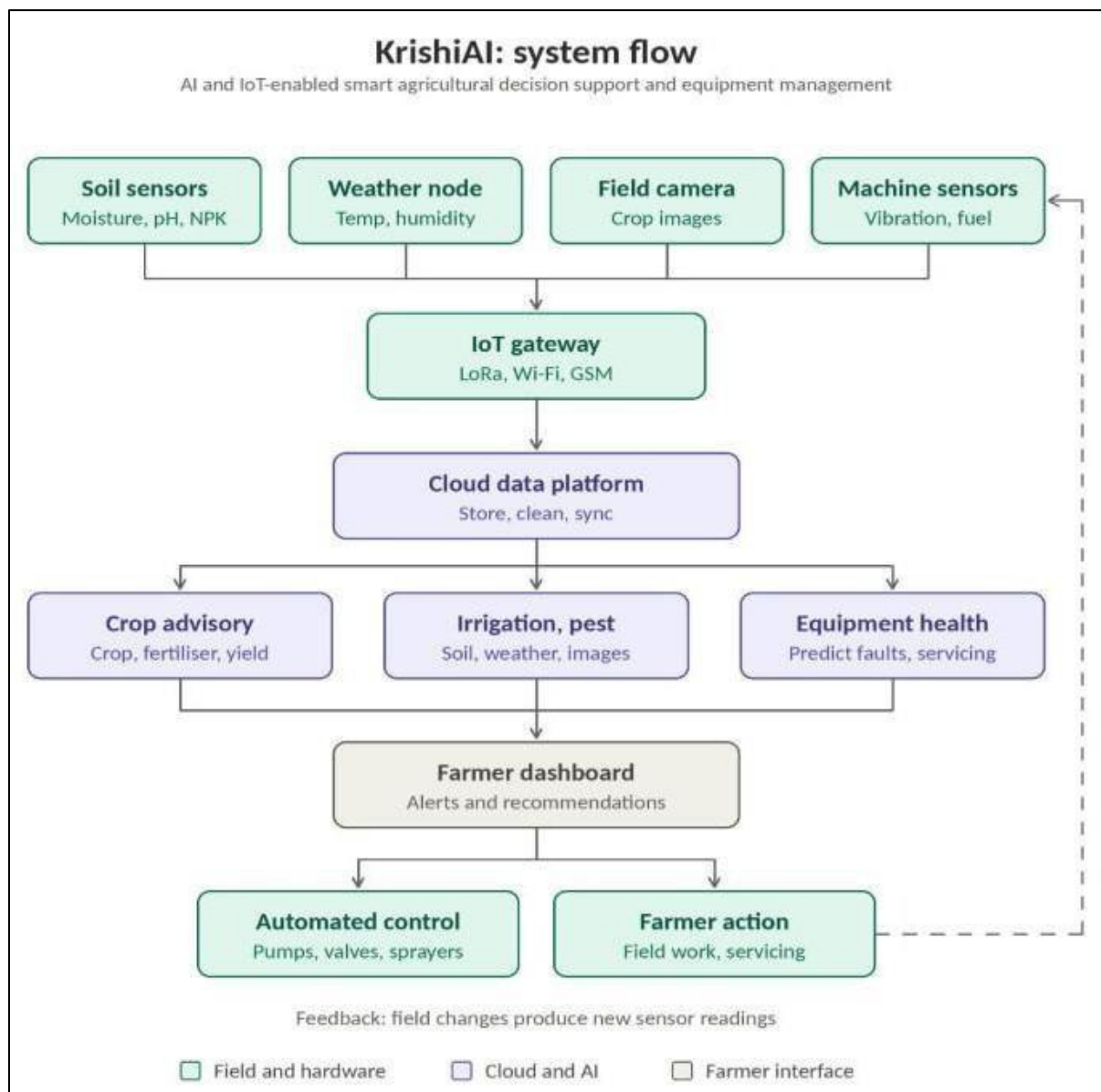


Fig 1 System Design and Data Flow of KRISHI AI

➤ Agricultural Data Collection and Preparation

Agricultural parameters are needed for the crop recommendation component of KRISHI AI. The system evaluates parameters such as temperature, humidity, rainfall, and soil-related nutrient values for determining crops. The collected data is arranged to suitable format prior to providing to the machine learning model.

The data preparation process includes arranging the input parameters according to the requirements of the trained model. Proper data preparation enables the system to process farmer-provided values consistently and produce recommendations based on the patterns learned by the model.

➤ Crop Recommendation Using Machine Learning

KRISHI AI utilizes a machine learning-based crop recommendation component to assist farmers in selecting suitable crops. A Random Forest classification model is applied for analyzing the agricultural parameters provided by the user.

The model learns the relationships between environmental and soil-related parameters and their corresponding crop categories. Once a farmer enters the required parameters, the trained model processes the input and predicts a suitable crop. The recommendation is presented through the web interface as decision-support information for

the farmer. Random Forest combines multiple decision trees to produce a classification result. The utilization of multiple trees enables the model to analyze different patterns in the agricultural data prior to producing the prediction.

➤ *Plant Disease Detection and Image Processing*

Plant disease detection is applied as an image-based component of KRISHI AI. The farmer can upload the image of a plant or leaf via the application. The submitted image is processed by the system for identifying visual characteristics associated with possible plant health conditions.

The implemented approach makes use of image processing and color-based analysis for examining the plant image. The system analyzes the visual information contained in the uploaded image and provides preliminary disease-related information. This functionality is intended for supporting early observation of plant health and not for substituting professional agricultural diagnosis.

➤ *Weather Information and Agricultural Advisory*

Weather conditions have an important influence on agricultural activities. KRISHI AI provides related information for supporting farmers in comprehending the environmental conditions prior to planning farming operations.

The weather module receives relevant information such as temperature, humidity, rainfall, and other available weather conditions through a weather service. The retrieved information is presented through the application interface so as for farmers to utilize it along with other agricultural information when making farming decisions.

➤ *Agricultural Equipment Rental*

The equipment rental module is designed for enhancing farmers' access to agricultural machinery. The system provides information about the available equipment and enables the users to select machinery as per their requirements.

Equipment information such as equipment type, availability, and rental-related details is maintained by the system. Upon a farmer selecting the required equipment, the rental or booking information is maintained in the database. This provides a digital mechanism for managing agricultural equipment access without compelling farmers to make a direct purchase of the equipment.

➤ *IoT-Based Equipment Monitoring*

IoT functionality is embedded to support the monitoring of agricultural equipment. The system can represent equipment-related parameters such as location, temperature, fuel level, and equipment status. These parameters provide information about the operating status and utilization of agricultural machinery.

The collected or simulated IoT information is processed by the system and stored as monitoring records. The information can be displayed through the application for providing better visibility over equipment conditions. IoT-

based monitoring also constitutes a basis for future equipment maintenance and operational analysis.

➤ *Database Management*

A database is utilized for storing and managing the information generated by the different modules of KRISHI AI. User information, equipment details, rental or booking records, and IoT monitoring information can be maintained in the database.

SQLite is utilized as the database component of the system. The database storage enables the information to be retained between the operations of the application and provides a structured mechanism for facilitating retrieval and updating of records. The database acts as the central storage layer connecting the different functionalities of the application.

➤ *Backend Processing and Module Integration*

The backend exists as the processing layer between the user interface and the different system components. It manages the user requests and connects the crop recommendation, plant disease detection, weather, equipment rental, database, and IoT modules.

Upon a user submitting information, the backend identifies the required operation and sends the input to the corresponding component. The generated result is then returned to the user interface. This integration allows the multiple agricultural services to be accessed through a common platform rather than through separate applications.

➤ *System Validation and Testing*

The KRISHI AI system is validated by testing the individual modules and the complete workflow. The crop recommendation module is tested by utilizing different values of the agricultural parameters and the plant disease component is tested by utilizing plant images. The weather module is verified for the retrieval and display of weather-related information.

The equipment rental module is tested through equipment selection and booking operations and the IoT component is tested by monitoring equipment-related parameters. Database operations are also verified for ensuring that user, equipment, rental and monitoring information can be stored and retrieved correctly.

The complete system is validated through the overall workflow, starting with the user interaction and input submission and proceeding to processing, prediction or information retrieval, database operations and display of results. This end-to-end testing ensures that the different components of KRISHI AI work collectively as an integrated smart agricultural platform.

IV. PROPOSED SYSTEM

The proposed system, KrishiAI, is an integrated smart agricultural platform, which aims to provide agricultural equipment rental and AI-based farming assistance through a

single system, simplifying the process and empowering farmers with relevant information.

The system comprises a number of modules including equipment rental, crop recommendation, plant health analysis, and weather advisory. Equipment rental provides an option for the user to search and filter equipment, view details, check availability and submit a rental request. This serves as a convenient option for the farmer to rent equipment and avoid the expensive purchase for occasional use. Crop recommendation is based on machine learning algorithms, enabling the model to suggest the most suitable crop option, taking into account the parameters provided by the user for the soil and climatic conditions. For plant health analysis, the user can upload an image of the plant leaf for analysis. The image undergoes processing to extract relevant features of the leaf and determine the plant health conditions. This, in turn, enables the user to take relevant decisions regarding the current plant conditions. The weather advisory comprises weather information to provide relevant advisory to the user for farming activities. The weather conditions can be taken into account, in addition to the crop and farming requirements, to enable relevant decisions related to agriculture.

In addition, an equipment monitoring module is incorporated to illustrate the concept of IoT integration with the described rental system. The equipment monitoring serves as an additional tool, based on IoT, to keep track of the status of equipment. Currently, the data is simulated, although in future versions actual sensors can be employed. Finally, the platform encompasses a number of modules which serve to provide a common platform for the user to take advantage of multiple services without the need to utilise different platforms.

➤ *System Workflow*

The major workflow of the proposed system is as follows:

- The User accesses the KrishiAI platform through the web interface
- The User can search and filter available agricultural equipment.
- The User selects suitable equipment and submits a rental request.
- For crop recommendation, the User provides relevant soil and environmental parameters.
- The machine learning model processes the input and generates a crop recommendation.
- For plant health analysis, the User uploads a leaf image.
- The image processing module analyses the uploaded image and provides a health indication.
- The weather module obtains weather information and generates relevant advisory information.
- Equipment status and rental information are maintained through the database.
- The final results are displayed to the User through the platform.

➤ *Major Components*

The proposed system encompasses a number of components including the following:

- **User Interface:** Provides a simple interface through which users can access equipment rental, crop recommendation, plant health analysis, and weather advisory services.
- **Equipment Rental Module:** Manages equipment search, filtering, availability, booking, and rental information.
- **Crop Recommendation Module:** Uses machine learning to analyse agricultural inputs and recommend suitable crops.
- **Plant Health Analysis Module:** Processes uploaded leaf images and provides an indication of plant health conditions.
- **Weather Advisory Module:** Uses weather information to provide farming-related advisory support.
- **Database Module:** Stores user information, equipment details, availability, rental records, and other system data.
- **IoT Monitoring Module:** Provides equipment monitoring functionality and establishes the foundation for future integration with real agricultural sensors. The proposed system therefore combines equipment accessibility and AI-assisted farming to empower farmers and provide relevant information in a single system.

V. SYSTEM ARCHITECTURE DIAGRAM

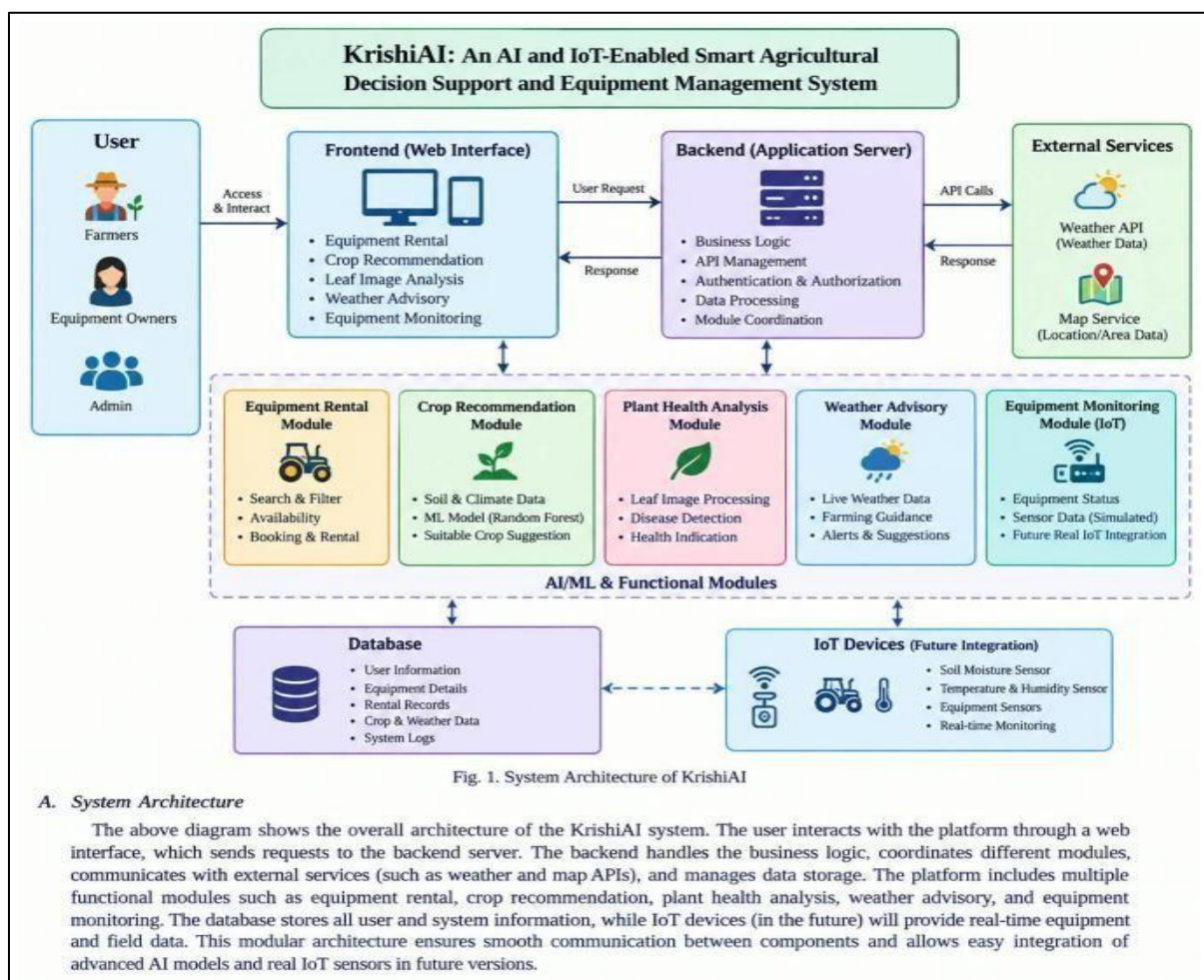


Fig 2 System Architecture

➤ Farmer/User Application

The KRISHI AI application allows the farmer to easily login/register, search and view available agricultural equipment, check availability, make a reservation for the required equipment based on their requirements. The User can view equipment details, rental details, booking progress, and give feedback on the equipment used.

➤ Python/Flask Backend

The Python/Flask backend serves as the core processing component in the application. It manages the application's user authentication, equipment information, rental requests, booking process, and general communication between the application and AI, IoT processing, and database components. The backend manages the general availability and booking information of the equipment.

➤ AI Recommendation Module

The AI component helps recommend the best agricultural equipment based on specific customer requirements. It can scan and read information such as crop details, activity, equipment requirements, availability, and previous use data to suggest the best equipment for any given need. Additionally, AI can be used to predict demand and optimize equipment rental usage.

➤ IoT and Equipment Monitoring

The IoT component allows for tracking and monitoring equipment sensors. The sensors can be used to gather information such as equipment usage, location, or status. This feature helps keep equipment owners and administrators informed of the status and general performance of the machinery rented.

➤ Database and Administrative Dashboard

The database stores information such as user details, equipment details, availability, rental information, and IoT data. The admin dashboard is used to manage equipment, approve rental requests, review user activities, and general analytics and reporting.

➤ Overall Architecture

User/Farmer App → Flask Core Processing → AI Recommendation/IoT Processing → Equipment Rental Database → Admin Dashboard → Equipment Rental → Farmer.

VI. RESULTS AND DISCUSSION

The developed KRISHI AI system has been evaluated based on its ability to help farmers find agricultural

equipment, check equipment availability, submit rental requests, receive suitable equipment recommendations, and monitor equipment-related information. This assessment considers the operation of AI-based recommendation component, equipment rental workflow, user management, and IoT-based monitoring features. The complete system was tested by following the workflow from farmer registration to equipment selection, rental request, equipment usage, and return.

➤ Farmer Registration and Login Results

The farmer registration and login feature were tested to ensure that users can register and login into the system.

Indeed, in the process of testing the feature, the registration details were successful and added to the system. The login procedure enabled accessing into the system only when the correct details were provided while the wrong information was denied. In this case, farmers' rental activity and equipment request will be tracked under their account. The authentication procedure facilitates the basic aspect of security and user account management to the proposed equipment rental system for farmers' needs. It also provides a solid foundation for further tracking of farmers' rental history and personalized service provision.

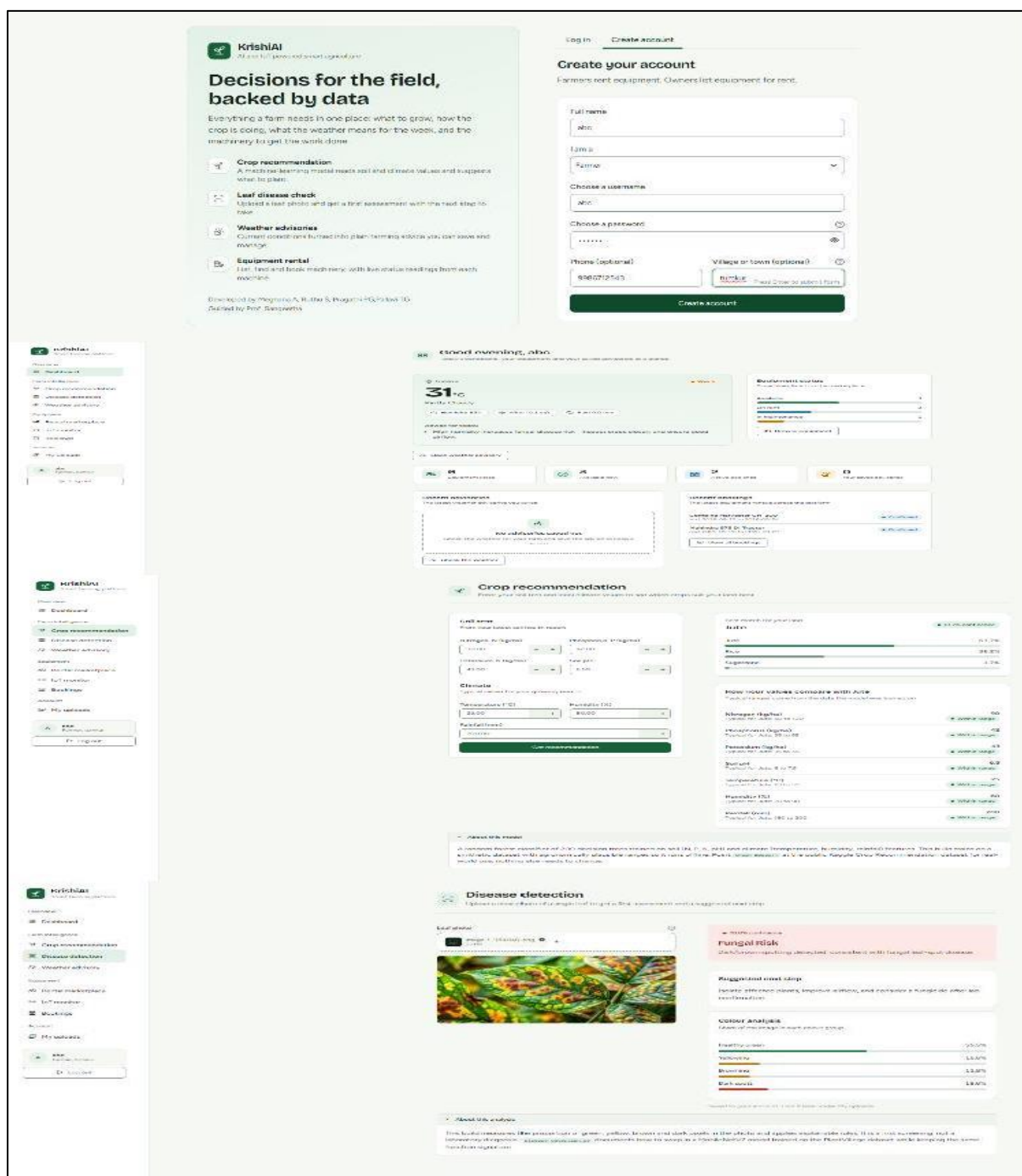


Fig 3 KrishiAI Login Page, Dashboard , Crop Recommendation and Disease Detection Modules

➤ *Agricultural Equipment Management Results*

The agricultural equipment management component was assessed based on its effectiveness in providing and sustaining information about available farming machinery. Equipment-related details such as equipment name, category, description, availability, rental information, and status are managed. The system was successful in providing farmers with the available agricultural equipment. Equipment available for rental was able to be selected by the farmer and equipment that was already rented or unavailable was indicated via its status. This provides the farmer with more information prior to submitting a rental request. The centralized equipment management mechanism further facilitates the elimination of the need to maintain manual records. Equipment owners or administrators can update the equipment status based on its status and rental activity.

➤ *AI-Based Equipment Recommendation Results*

The AI-based recommendation component was assessed based on the ability to provide suitable agricultural equipment according to the requirements presented by the farmer. The recommendation mechanism considers information such as the type of crop, farming activity, and equipment requirement. During testing, the system generated equipment recommendations based on the inputs presented by the farmer. The recommendation mechanism facilitates reducing the time spent searching through multiple equipment options and enables farmers to identify machinery that is relevant to their farming activity. For example, when a farmer provides information about a particular agricultural operation, the system can identify equipment that is commonly associated with that operation. This illustrates the potential of AI-based recommendation to facilitate simplification of agricultural machinery selection. However, the quality of AI recommendations depends on the information available in the system. A larger and more diverse agricultural dataset that contains crop types, farming activities, machinery specifications, and previous rental information would facilitate improving the recommendation capability in future.

➤ *Equipment Rental Request Results*

The equipment rental component was tested by following the entire process from selecting an available machine to submitting a rental request. Farmers can view available equipment, select the required machinery, and submit a rental request through the platform. The system was successful in recording rental requests and associated them with the corresponding farmer and equipment. The request status can be monitored throughout the rental process. Once the request is accepted, the equipment availability can be updated in order to eliminate conflicting rental requests.

This digital rental process facilitates eliminating the need for farmers to physically contact multiple equipment providers to determine machinery availability. It facilitates the creation of a Centralized method for submitting and managing agricultural equipment rental requests.

➤ *Equipment Availability and Status Results*

The equipment availability mechanism was assessed during different stages of the rental workflow. When an equipment item is available, it is displayed as a possible rental option. After a rental request is accepted, its status can be changed to indicate that the equipment is currently rented or in use.

After the equipment is returned, its status can be updated, once again, so that it becomes available for future rental. This process facilitates maintaining an updated view of machinery availability. The results indicate that centralized equipment status management can facilitate increasing equipment utilization and eliminating the possibility of multiple farmers requesting the same equipment during the same period.

The figure displays three screenshots of the KrishAi web application interface, which is designed for farmers to manage weather advisories and rent agricultural equipment.

Top Screenshot: Weather advisory
This screen shows the 'Weather advisory' section. It includes a sidebar with navigation options like Overview, Dashboard, Farm intelligence, Crop recommendation, Disease detection, Weather advisory, Equipment, Rental marketplace, IoT monitor, Bookings, Account, and My uploads. The main content area has tabs for 'Current conditions', 'Advisory records', and 'REST API'. Under 'Current conditions', it displays real-time weather data for Tumkur: 31.1°C Temperature, 85% Humidity, Partly Cloudy Condition, 0.0 mm Rainfall, and 10.2 m/s Wind. It also provides farming advice based on these conditions, such as 'High humidity increases fungal disease risk'. A 'Keep this advisory' section allows users to save the advisory with optional crop and note details.

Middle Screenshot: Weather advisory
This screen shows the 'Weather advisory' section with filters for 'Search by city', 'Severity', and 'Status'. Below the filters is a table listing advisory records:

ID	City	Crop	Condition	Temp (C)	Severity	Status	Updated	
☐	5	Tumkur	Advisory	Partly Cloudy	31.1	Watch	Active	24 Sep 2026, 20:09:10T
☐	4	Tumkur	Advisory	Partly Cloudy	31.1	Watch	Active	24 Sep 2026, 20:09:10T
☐	3	Tumkur	Advisory	Partly Cloudy	31.1	Watch	Active	24 Sep 2026, 20:09:10T

Bottom Screenshot: Rental marketplace
This screen shows the 'Rental marketplace' section. It includes a sidebar with navigation options like Overview, Dashboard, Farm intelligence, Crop recommendation, Disease detection, Weather advisory, Equipment, Rental marketplace, IoT monitor, Bookings, Account, and My uploads. The main content area has tabs for 'Browse and book' and 'List equipment'. Under 'Browse and book', it displays a list of available equipment for rent, including a Mahindra 575 DI Tractor, Combine Harvester CH-200, Seed Drill Sower, Drip Irrigation Kit, Rotavator RU-G, and Power Sprayer PS-400. Each item shows its category, availability, price per day, and a 'Book' button.

Fig 4 KrishAi-Weather Advisory Management, Equipment Rental Space

➤ *IoT-Based Equipment Monitoring Results*

IoT technology component of KRISHI AI was evaluated through its ability to monitor agricultural equipment. IoT sensors can be attached to agricultural machinery to capture relevant equipment-related data (i.e., status, usage details, location, etc.). This data can be transmitted to the main system to provide equipment owners or administrators with remote access to information about the machinery. Equipment status can be indicated by tags (e.g., available, rented, in use, returned, maintenance).

KRISHI AI system, with the IoT component, provides expanded functionality beyond a regular equipment rental website. It presents a concept of connected agricultural machinery that offers enhanced equipment usage and monitoring. The IoT-related equipment monitoring functionality relies on the hardware and communication technologies attached to agricultural machinery. Additional sensors can be added to the system for further functionality (i.e., GPS location tracking, working hours counter, fuel level sensor).

➤ *Rental History and Record Management Results*

KRISHI AI rental history functionality was evaluated to confirm the possibility of recording all equipment rental requests and ensuring their availability for future data reviews. Rental-related requests and information can be associated with specific farmers and agricultural machinery allowing the user and the administrators to retrospectively access all details of the equipment rental request. Equipment rental history provides enhanced information recording and management possibilities. It also assists equipment owners in identifying the most popular machinery types and analyzing equipment demand trends. The rental history data can also be utilized for future AI training and enhanced equipment recommendation functionality.

➤ *Admin and Equipment Owner Management Results*

KRISHI AI administrative functionality was assessed to confirm that administrative and equipment owner roles can manage farmers and equipment effectively within a unified interface. Administrative panel functionality helps manage the equipment data and rental requests while providing an overview of general trends and patterns within the system. Administrative and equipment owner roles can update equipment details and rental request data to ensure the accuracy of information within the system. This reduces the potential for errors associated with manual data entry and provides unified access to equipment details, rental requests, and general trends analysis. The administrative panel also assists in understanding what types of machinery are in demand and what equipment should be prioritized for future utilization.

➤ *System Usability and Performance Results*

KRISHI AI general usability was assessed by interacting with the system in accordance with its documented user workflow. The system involves a complex set of procedures and operations ranging from user (farmer) registration and login to equipment rental and monitoring. The discussed procedures and operations are supported within a web-based interface providing farmers with remote access to agricultural equipment information and rental functionality. The system's digital nature ensures reduced paperwork and enhanced coordination between farmers and equipment owners. The system is modular and can be expanded to support additional equipment categories, users, sensors, and AI functionality. Its current structure allows enhanced flexibility and scalability which are critical for long-term project sustainability.

➤ *End-to-End System Validation*

KRISHI AI system was validated through a use case involving the entire system lifecycle:

Farmer Registration → Login → Farming Requirements Entry → AI Equipment Recommendation → Equipment

Catalog Browsing and Status Checking → Rental Request → Rental Approval → Equipment Usage → IoT Monitoring → Equipment Return.

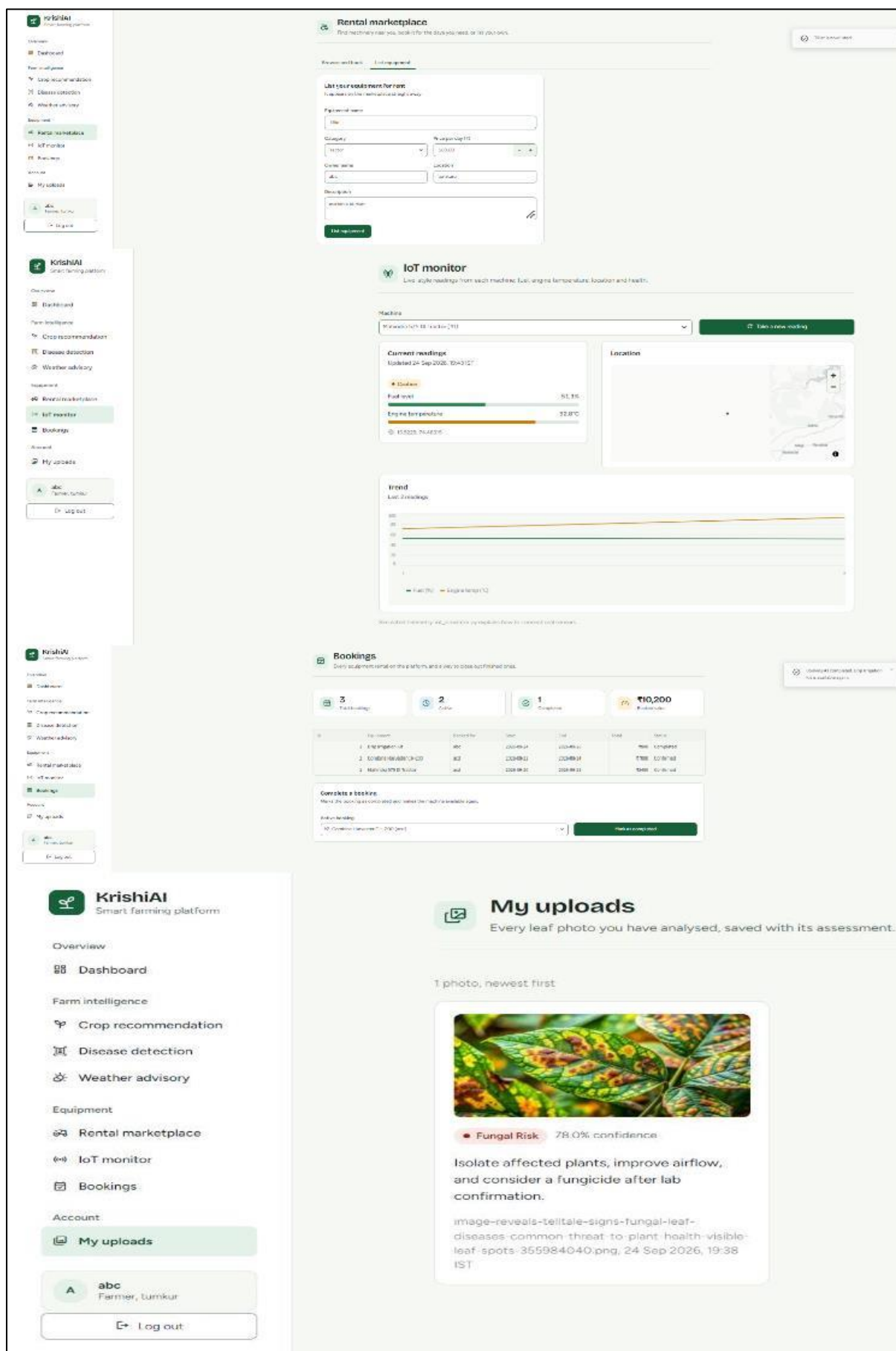


Fig 5 KrishiAI-Rental Marketplace, Simulated IOT

➤ *Telemetry Monitoring , Bookings Management , Disease Detection Data Management*

The end-to-end validation proves that the major elements of the proposed system could work together as an integrated agricultural equipment rental platform. The system demonstrated the interaction between farmers, agricultural equipment, administrators, AI-based recommendation functionality, and the IoT monitoring framework, proving the feasibility of using the AI and IoT technologies combined with digital agricultural equipment rental services.

➤ *Discussion*

The results prove that KRISHI AI offers an integrated approach to agricultural equipment rental by combining Artificial Intelligence, Internet of Things, database management, and web technologies. The system offers farmers a centralized platform where they can search for agricultural machinery, identify the most suitable equipment, check its availability, and submit rental requests.

The AI-based recommendation component can reduce the effort spent on selecting suitable agricultural machinery by offering recommendations according to the farmer requirements. The IoT component offers a framework for monitoring equipment status and usage that can increase the level of awareness about the agricultural machinery.

Among the most important benefits of the proposed system are increased access to expensive agricultural machinery and optimized equipment usage. The farmers who cannot afford to buy equipment individually can rent machinery according to their farming requirements. Equipment owners can also benefit from the system by making better use of the machinery that may otherwise stay unused for a long time. The proposed system also reduces farmers' dependence on manual equipment rental processes. Traditional equipment rental may require farmers to contact different equipment owners or physically visit the rental centers to check the availability. KRISHI AI offers a centralized digital platform that can make this process more convenient and increase the level of communication between farmers and equipment providers. However, some limitations should also be noted. The performance of the AI recommendation component depends on the quality and quantity of agricultural data that the system can use. Similarly, IoT monitoring depends on the availability of appropriate sensors, network connectivity, and compatible hardware. These aspects should also be taken into account when implementing the system in the real-world agricultural environment. Future improvements can include GPS tracking in real-time, predictive maintenance, weather recommendations, crop recommendations, online payments, multilingualism, advanced machine learning, and other IoT sensors. A larger agricultural dataset can also be used to increase the personalization and accuracy of equipment recommendations.

Overall, the developed KRISHI AI system proves that it is possible to combine AI and IoT technologies with agricultural equipment rental management. The proposed approach offers a structured digital platform to increase

equipment accessibility, optimize rental management, monitor equipment, and utilize smart technologies to offer higher levels of agricultural services.

VII. CONCLUSION

The proposed KRISHI AI: An AI and IoT Powered Smart Agricultural Equipment Rental System is a digital and intelligent approach towards the enhancement of farmers in accessing agricultural machinery. The system utilizes Artificial Intelligence and Internet of Things in combination with web technology and database management system for the purpose of farmers registration, display of available agricultural equipment, recommendation of suitable equipment, availability of agricultural equipment and request submission of farmers for the rental of agricultural equipment.

The application of AI will empower farmers to find suitable agricultural equipment according to their farming needs thus saving the time and effort required to search for the appropriate machinery manually. The use of IoT will provide a framework for the monitoring of agricultural equipment status and other related information. In addition, the creation of a centralized rental management system will enhance the proper recording of equipment details and management of rental activities by the owners of the equipment. The proposed rental system can be beneficial to many farmers especially those that cannot afford to buy equipment due to high costs. KRISHI AI will ensure effective utilization of equipment by enhancing accessibility of agricultural machinery through an alternative to purchasing agricultural machinery. The system will also promote the adoption of technology in farms by providing information regarding the agricultural machinery thus enabling informed decision making. Furthermore, the system will reduce manual rental procedures and create a formal platform for interaction between the farmers and equipment owners.

Despite the benefits associated with the use of AI and IoT in agricultural equipment rental, there are several opportunities for the enhancement of the proposed system. The accuracy of AI recommendations can be improved by using a large amount of agricultural data. The system can be enhanced to provide GPS location tracking of the equipment, predictive maintenance, weather-based recommendation, multilanguage command recognition, online payment processing, and advanced sensors enabled by IoT. Additionally, future research can focus on improving the accuracy of AI-based recommendations on agricultural equipment rental by using actual rental data and agricultural data. Overall, the proposed KRISHI AI will enable the combination of AI and IoT with agricultural equipment rental services and enhance accessibility and utilization of agricultural machinery by farmers.

REFERENCES

- [1]. M. Neela K., Benikka R., Vishalakshi R. M., and Hemalatha M., "Harnessing Android application for agricultural equipment rental system," in 2025 International Conference on Computing,

- Communication and Technology (ICCCT), 2025, doi: 10.1109/ICCCT63501.2025.11020135.
- [2]. J. Pathmanaban, S. Sangeetha, T. Prabakar Godwin James, S. Sibisurya, S. Sakthi Arunachalam, R. Abiram, "Agritool-A farm log rental service platform with crop management", 2024 International Conference on Sustainable Technology and Sustainable Development Goals (ICSTSDG) , 2024, doi:10.1109/ICSTSDG61998.2024.11026212.
- [3]. A. Nagar, H. Kumar, and R. Devi, "A decentralized peer-to-peer protocol for collaborative equipment sharing in sparse agricultural networks," in 5 th International Conference on Image Processing and Machine Technology (ICIPTM), 2026, doi: 10.1109/ICIPTM69057.2026.11465874.
- [4]. V. Kumar M. N., M. Raj J., Gokul S., Lokesh K., and Jayandar B. S., "Design and development of tapioca harvesting machine," in 2024 International Conference on Innovative Engineering and Technology for Digital World (ICIETDW), 2024, doi:10.1109/ICIETDW61607.2024.10941241.
- [5]. F. S. Prity, M. M. Hasan, S. H. Saif, M. M. Hossain, S. H. Bhuiyan, M. A. Islam, and M. T. H. Lavlu, "Enhancing agricultural productivity: A machine learning approach to crop recommendations," Human-Centric Intelligent Systems, vol. 4, pp. 497–510, 2024, doi: 10.1007/s44230-024-00081-3.
- [6]. Y. Mahale, N. Khan, K. Kulkarni, et al., "Crop recommendation and forecasting system for Maharashtra using machine learning with LSTM: A novel expectation maximization technique," Discover Sustainability, vol. 5, art. no. 134, 2024, doi: 10.1007/s43621-024-00292-5.
- [7]. R. K. Kasera, S. Gour, and T. Acharjee, "A comprehensive survey on IoT and AI based applications in different pre-harvest, during-harvest and post-harvest activities of smart agriculture," Computers and Electronics in Agriculture, vol. 216, art. no. 108522, 2024, doi: 10.1016/j.compag.2023.108522.
- [8]. "A comprehensive review on smart and sustainable agriculture using IoT technologies," Smart Agricultural Technology, vol. 8, art. no. 100487, 2024, doi: 10.1016/j.atech.2024.100487.
- [9]. "Internet of Things and agricultural unmanned aerial vehicles in smart farming: A comprehensive review," Internet of Things, vol. 18, art. no. 100187, 2022, doi: 10.1016/j.iot.2020.100187.
- [10]. "Recent advancements and challenges of Internet of Things in smart agriculture: A survey," Future Generation Computer Systems, vol. 126, pp. 169–184, 2022, doi: 10.1016/j.future.2021.08.006.
- [11]. "Recent trends of smart agricultural systems based on Internet of Things technology: A survey," Computers and Electrical Engineering, vol. 104, art. no. 108453, 2022, doi: 10.1016/j.compeleceng.2022.108453.
- [12]. N. R. Sawant, A. Kumar, S. Pant, et al., "An IoT-driven machine learning system for real-time smart crop recommendation and optimization in precision agriculture," Discover Artificial Intelligence, vol. 6, art. no. 194, 2026, doi: 10.1007/s44163-026-00896-y.