Advancement in Agriculture Using AWS

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***Abstract*: Farmers may access all the knowledge they need about farming and learning about agriculture on this website. Various technologies, including HTML, CSS, JavaScript, Bootstrap, AWS Polly, AWS Lex, AWS Lambda etc., will be used in this. As a result, the farmers will find our website to be of great use. On this website, we will also include a chat bot so that the farmer can contact us through it. In this we will also include the information page, inside which we provided information of different types, such as fertilizers, water management, and climate change rates. And buttons were also provided inside the information columns so that farmer gain more information. In third part we design an organic farming page in which we provide information about how organic farming is done and its benefits. The results of the experiment contain information regarding the climate and temperature, soil moisture, water usage, and humidity on the farms, as well as a decision-making analysis with farmer input. The main characteristics of the information system include the ability for users to retrieve information from anywhere in the form of statistical data on fertiliser, research facilities, and research, as well as data on diseases, appropriate soil concentrations for appropriate crops, export statistics, and so on. It also provides information on crops that are intercropped with the main crops.**

***Keywords*: HTML, CSS, JavaScript, chat bot, crops, seeds, fertilizers, AWS Lex, AWS Lambda, diseases.**

1. Introduction

Agriculture is an art form in which farmers nurture crops only with their hands in order to provide high-quality, protein-rich fruits and vegetables to consumers. This technique feeds the plants proteins and vitamins, helping them to grow and turn green. As a result, farming is extremely important to us. Farmers are supposed to feed us, just as troops are required to defend lives at the border.

What do you mean by farming?

Animals and farmers both contribute to the farming process. Farmers work very hard in the field to produce high quality crops. Agriculture knowledge is a critical component that influences other production elements. The knowledge offered by agricultural organisations for extension, research, teaching, and farming can help farmers make wiser and more accurate decisions. The aim of this is to highlight the importance of agricultural information systems for agricultural growth. It will also highlight the strengths and limitations of the existing systems and provide ideas for enhancing their functionality. In the beginning, this review paper provides concepts and models pertinent to agricultural information systems. It organizes data

in one location and controls farmer operations using a single system. It aids in the improvement of knowledgeable farmers. It motivates farmers to produce and consumers to buy fresh commodities. The agriculture system will improve relationships between farmers and buyers to guarantee high-quality food.

A. Problem Statement

Despite putting in a lot of effort, our farmers still don't receive a fair wage for their excellent harvests. Sometimes they can't get good seeds to grow their crops well, which results in the spoilage of the entire harvest. Because they are unaware of climate change, they cannot safeguard their crops from unexpectedly poor weather. Farmers often experience losses because they have trouble selling their products online due to their lack of education. Due to the manual data processing methods used by the agriculture department, data from farms is inconsistent and inaccurate. Farmers' production is impacted by the department's extension officers' frequent communication gaps with the farmers.

B. Objective of Study

This traditional approach places a lot of emphasis on breeding, testing, and dispersing activities. In the generation and transfer of technology, a top-down approach is used. Researchers are expected to create superior varieties and give them to extension agents for use in demonstrations and dissemination to farmers. Each function creates its own programme in this configuration autonomously, which results in programme duplication. This is not only a waste of resources, but it also leaves manufacturers unsure about which group to contact. The hierarchy in this type of research and extension system extends from the national level to the field level. While internal communications within a business between higher and lower levels may be simple, communication across organizations frequently involves detours and is therefore unproductive.

- To increase farm output productivity.
- This will contain a chat bot that will instruct the farmer on how to utilise the website.
- To give extension officers the tools they need to effectively support farmers.

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2. Literature Survey

In this situation the most important question we have: Why we have all these problems in this ongoing system? When a management and end-users starts researching the software utilising the existing system, analysis has begun. During the study, information was captured in different files, decision-making processes and transactions are managed by the current approach. The system's generally used techniques are DFD [1] and others. The suggested system should then be carefully investigated considering the requirements.

- System planning and preliminary research.
- Information gathering
- Use of analytical techniques for structured analysis
- Feasibility study
- Cost-benefit analysis

It is now widely acknowledged that agricultural R&D, with a limited focus on a few main grains, is insufficient, despite its historical achievements.

Kamal Vatta contends that the fusion of ecological, economic, environmental, and social variables is necessary to achieve sustainable agriculture. While synergies are feasible at smaller scales, they become more difficult to maintain as size increases; scale is therefore important. He emphasized the necessity of giving farmers financial incentives to use sustainable technologies.

According to Dr. Suresh Pal, the agriculture industry has performed much better over the past few years. He stressed the need to quadruple the export of our agricultural products by 2025, given that we have had growth of between 3.5 and 4% over the past several years. He also concentrated on growing products we import, including crops for oil seeds. According to him, doing so will help us pay less for imports.

A. Existing System

The manual recording of user information in our current system makes it more time-consuming to search for user information. Another significant drawback is the added time required to prepare the list of users who accessed any user's information. So, after doing a feasibility analysis, I made the decision to computerize the agroforestry system.

B. Proposed System

An agricultural website with a live chat bot or a WhatsApp connection is the suggested system. To replace the unreliable and imprecise manual technique of processing farm data, a web-based application has been created and developed. This programme can be viewed on a computer or a mobile device and will be hosted on an internet server. The system will collect and handle information about farm products, farmers, purchasers, or suppliers, including names, locations, phone numbers, and email addresses.

C. Problem Analysis

It has to do with accessing a user's or candidate's specific information. Therefore, I started this project with straightforward user and candidate information needs. The following is a discussion of some of the issues that this project's design and development faced:

- Farmers facing problem of language.
- To discover the issue throughout development.
- To display a link between entities.
- A compact database table inaccuracy

3. Proposed Methodology

A. General Architecture

The database design for the project was done with HTML and CSS, and both the back end and front end employed simple HTML, CSS and JavaScript. Several software evolution methodologies have emerged. We can use a structured approach to solve similar problems in the future. It is a standard set of theory, methods, and criteria for dealing with a specific category of error. A framework's objective is to provide a familiar approach so that programmers may recycle the given data rather than beginning from scratch.

Initially, we created a website, which we called Farming Website Design. Next, we added alternatives to it, such as Home, About Us, Blogs, Information, and Contact. Next, we developed the main page for our website, giving it the name Friends of Farmers.

We kept this name so that we could provide farmers with all the information they needed as if we were their friends. The second step includes a button that says "Visit Us to Learn More," allowing farmers to learn more about us. Following that, we gave details regarding fruits, vegetables, and seeds, including which ones are best to eat during specific seasons and, most importantly, which seeds would produce the best results.

When we accessed this website on a laptop, all of those options appeared to be in working order, but as soon as we opened it on a phone, the main page became corrupted. To address this, we utilized JavaScript, which allows us to open the menu bar, shut it, and all of the options will appear in the wish menu.

B. Creating a Website Using HTML, CSS, JavaScript

- First of all, we designed the main page of the website using HTML, in which we provided home, information and so on elements in the menu.
- Then we designed the information page, inside which we provided information of different types, such as fertilizers, water management, and climate change rates. And buttons were also provided inside the information columns so that farmers gain more information.
- In the third part we design an organic farming page in which we provide information about how organic farming is done and its benefits.
- In the fourth part, we talked about our website, and how it will help the farmers.
- We used the CSS code to design all this, which made our website more attractive.
- We have provided a button inside the main page, with the help of which we can go from Hindi website to English website and can also come back.

- In the last we made a contact page in which we have provided google map and by using this page farmers can contact us.
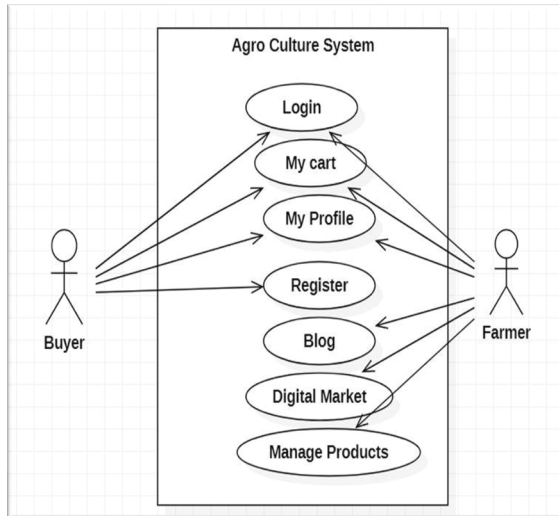- And finally, we provided a Chatbot using AWS, whose functioning is on the next page.

Fig. 1. Chart for website

C. Modules Description

1) Visual Studio
Visual studio is an IDE (Integrated Development Environment) or a platform, which is used to debug, edit or create code and then publish an app. It is a lightweight code editor available for Windows, Linux and Mac OS. It is used to develop programs which include web apps, web pages and mobile apps etc.

2) Windows 10
Operating system or system software act as a platform for other software to run on computer. It used as an interface between the human and the computer.[2]

3) Microsoft Edge
All Windows 10 devices use the web browser Microsoft Edge as default browser. It is used to display content of web pages. You may use Enterprise Mode to force users to utilize Internet Explorer 11 for a restricted number of sites and some corporate web apps that were created to function with ActiveX and other antiquated technologies. The new Edge was publicly released in January 2020 [3] and on Xbox platforms in 2021. [4]

D. Creating a Chat Bot using AWS Services

A chat bot is software that employs text and voice to replicate individual dialogue. A chat bot is an AI component that can be connected to and employed on any convincing messaging platform [8].

1) Chat bot Design
We create intelligent chat bots specifically for your domain based on your requirements and specifications.

2) Chat bot Architecture
Our chat bot APIs can integrate with a variety of platforms and domains. Consequently, you may design customized experiences for your clients.

3) Natural Language Processing
Our chat bots can use NLP [9] to recognize emotions, intents, and sentiments, enabling them to make risk aware decisions and enhance customer interactions.

4) Chat bot Consultancy
For the design and development of chat bots, we provide no-cost consultation. Our experts can offer insightful analysis and recommendations on chat bots for your sector.

5) Methods
In this phase, I set up the infrastructure for Amazon Lex to take text and use Amazon Translate to process it before showing the user the translation. I chose the North Virginia region (us-east-1) in the AWS Console, and from the Amazon Lex menu, I selected Create a Custom Bot. I pick Create after filling out the bot's details as follows and accepting the IAM role settings. To create an Amazon Lex bot, we must decide which set of tasks—referred to as "intents"—we want our bot to perform. A bot may have different intentions. An utterance is a word or phrase used to express intent.[10] The Amazon Lex bot requires user input in order to carry out its purpose. Slots are used to record this information. For instance, we might designate the show name and time as "slots" for the purpose of making bookings. When creating the custom text input slot, Amazon Lex typically anticipates values that are identical to or extremely close to those entered as slot values. There is no analogous Amazon Lex slot option for more open text input, in contrast to Alexa's AMAZON, search query slot. Instead, I provide several slot values—much more than you may typically supply for a slot—to overload the slot values of Amazon Lex and make them open to any input. As a result, the chat bot's ability to respond to other slots is somewhat constrained. Effectively, after the source and target languages have been set, everything will match the custom slot, so I use custom logic in the Lambda function [11] instead.
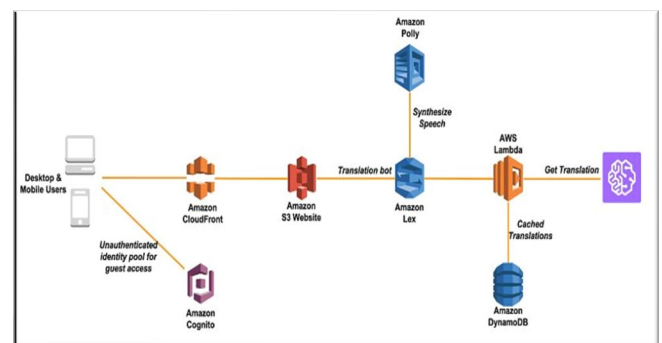

Fig. 2. AWS chat bot architecture

E. Technologies Used

1) AWS (Amazon Web Services)
The vast and ever-expanding Amazon Web Services (AWS) is the company's cloud computing backbone. It brings together packaged SaaS, IaaS, and PaaS offerings. Using AWS resources like processing power, database storage, and content delivery services may be advantageous for a business.

2) Amazon Lex

Developers can create text- and speech-based conversational user interfaces for their products using Amazon Lex[12], an AWS service. With Amazon Lex, any developer can now include sophisticated natural language chat bots in both new and current apps. It opens you access to the conversational engine behind Amazon Alexa. It gives designers complete access to NLU and ASR's versatility and capabilities, enabling them to create new product categories and incredibly engaging user interfaces with conversational-sounding interactions.

3) AWS Lambda

Lambda enables the execution of code without the need for any managed servers, computer resources, Code for almost any kind of backend service or application can be run using Lambda. Simply writing your code in one of the languages that Lambda supports is all that is required.

F. Testing

The practice of comparing the application to the user and system requirements is known as "testing." Significant flaws, defects, or vulnerabilities in the application code are discovered during testing and should be addressed. It also evaluates or praises the characteristics of a design. Verification determines the quality and accuracy of a product. The word "unit testing" indicates the verification of discrete data portions. This will help us ensure that all the functionalities work properly. System testing examines the overall behavior of the system in line with the development project's stated scope. It might include risk-based testing in addition to requirement descriptions, business processes, or, for a more remarkable explanation of system behavior, interfaces with the OS. It is typically the last test run to check that the design meets the benchmark and achieves its target. Each feature is subject to a system trial, which is in progress and contains attempts to improve the present system.

4. Results and Discussions

The farmers will be able to readily access all the information once our full website is complete, which may be used to alter the crops. In the future, the farmer can contact a chat bot for assistance if they have any issues. Once the website is fully complete, farms can access it and read different sections of it using the links we have provided in the blog area. They can learn about everything, including the best pesticides to use, the best seeds to use, and the best times of year to plant particular fruits and vegetables.

A. Output of Hindi Website on Laptop

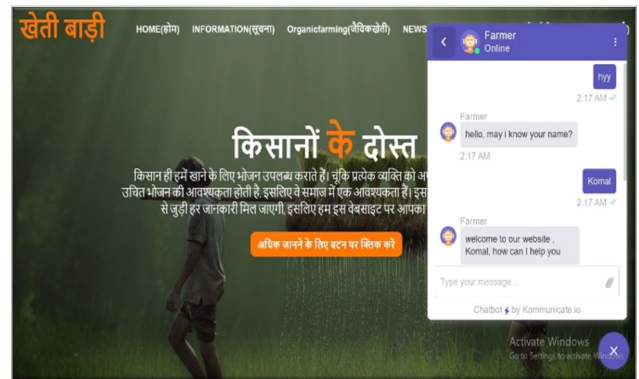Fig. 3. Main page of website (Hindi)
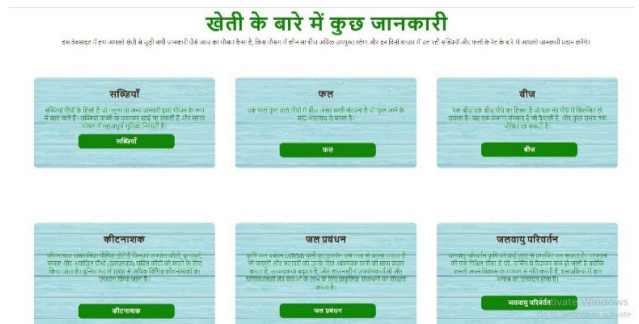

Fig. 4. Main page of website (Hindi) with chatbot

Fig. 5. Information page of website
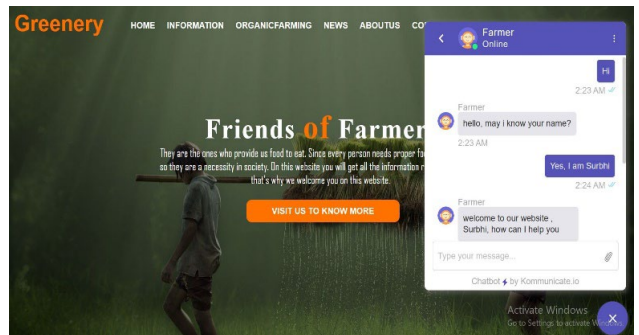
B. b) Output of English Website on Laptop

Fig. 6. Main page of website (English) with chatbot

C. Output of Different Information Pages

Season	Time		Examples of crops	Features	States
	Sown	Harvested			
Kharif	June – July	September-October	Rice, maize, jowar, bajra, tur, moong, urad, cotton, jute, groundnut, soybean, tea and coffee	They require a lot of water hence are also called monsoon crops.	Assam, West Bengal, coastal regions of Odisha, Andhra Pradesh, Telangana, Tamil Nadu, Kerala and Maharashtra
Rabi	October-December	April-June	Wheat, barley, gram, peas, mustard	Need cold weather for growth hence called winter crops.	Punjab, Haryana, Himachal Pradesh, Jammu and Kashmir, Uttarakhand and Uttar Pradesh
Zaid	March	July	Seasonal fruits, vegetables, fodder crops	Requires warm & dry weather for growth and a longer day-length for flowering	North and north-western states

Fig. 7. Crop information page of website

Name of the crop	Sowing time	Harvesting time	Seeds per hectare in kg	Average yield in quintals cm	Average total water depth in cm
KHARIF CROPS					
1. Transplanted rice	June–July	Oct.–Nov.	80 kg	15	125–150
2. High yielding rice	July	November	90 kg	40	125–150
3. Maize	June	Sept–Oct.	14 kg	15	45
4. Hybrid maize	June	Sept–Oct.	18 kg	28	45
5. Bajra or spiked millets	July–Aug.	October	2 kg	6	30
6. Great millets (Juar)	July	October	10 kg	20–30	30
7. Arhar	July–Aug.	March	20 kg	20	30
8. Urad or Moong	July	November	15 kg	8	30
9. Cotton	May–June	Nov.–Jan.	15	12	45
10. Til	Aug.	November	15	3.5	35
11. Groundnut	May	Nov.Dec.	30	20	45
RABI CROPS					
1. (a) Wheat	Oct–Nov.	April	70–80	15	37.5
(b) High yielding	Oct.	April	80–100	50	45
2. Gram	Sept–Oct.	March	40–50	20	30
3. Barley	October	March–April.	90–130	20	30
4. Mustard	October	Feb.–March	1.5 kg	12	45
5. Peas	Oct–.–Nov.	March	30–40	12	55
6. Potatoes	Sept.–Oct,	Feb.	400–900	200	80
7. Linseed	Oct.–Nov.	March	10	10	45
8. Tabacco	Oct,–Feb.	Feb.–March	—	20	60
9. Vegetables	Aug.–Nov.	Oct.–April		—	45
10. Sugarcane	Feb.–Mar.	Dec.–March	5t cut pieces	50 (Gur)	90

Fig. 8. Crop information page of website
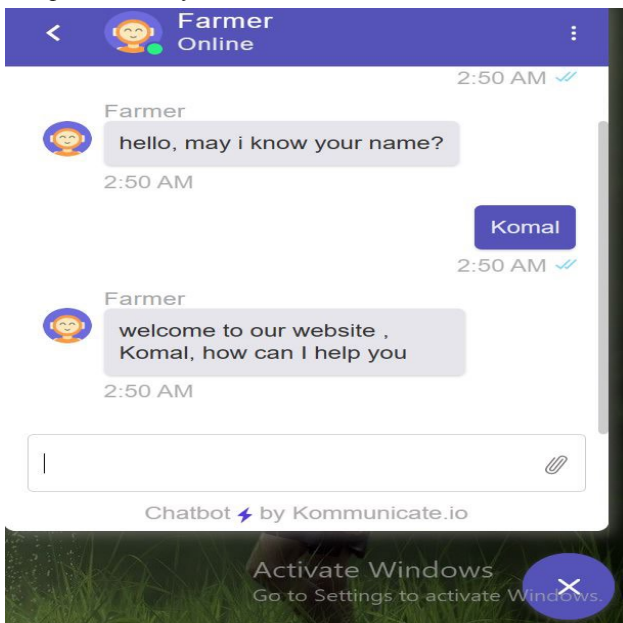
D. Output Screen of Chatbot

Fig. 9. Chatbot screen

5. Conclusion

This is the first attempt to show that this sort of information system is coercive. The true value of this type of information system for an agriculturally focused country like Sri Lanka will become clear once it is operational, since planters, importers, exporters, and researchers will have access to the most up-to-date data. In order to make this project a reality, internet access and the necessary human resources staff need to be made available throughout the entire main institute. Create inquiries to retrieve and change information. If an authorized individual at the Rubber Institute has to update their new research description in the database, they simply need to know their log-on name and password, as well as the research description. Authorized users may update databases using web browsers, but they do not need to understand how SQL queries work. Then, using the internet, he or she may update databases without prior knowledge of SQL by using the query used to update databases for research descriptions.

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