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AN AGRICULTURIST'S PARTNER-AGROBOT

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ABSTRACT

The Indian Primary Sector is mainly comprised of Agriculture. It was always deemed necessary to improve the agricultural industry for the development of India as a whole. With online services becoming an integral part of India, it is only natural that we take our agricultural services online. Agricultural services most usually extend to queries on information on crops, growing techniques, diseases, about fertilizers, pesticides, organic and inorganic techniques. Such queries are hard to handle person to person. With the implementation of AI to create chatbots, such problems can be faced easily. In our paper, we describe the chatbot we have created to implement agricultural services in an easier and more efficient way. This chatbot, also known as the “Agrobot” can have a one-on-one conversation with its user, acting as a virtual partner. The methodology to create and implement the chatbot has been described step by step, hence giving an insight to the overall capacity of the bot.

Keywords: Agriculture, Chemical Fertilizer, Pesticide information, Chatbot, Organic Farming,

I. INTRODUCTION

1.1 About the Project

The Agrobot is a conversational AI bot. The name Agrobot would translate to “Agricultural bot”, created for farmers as a developmental aid for better and improved farming techniques. Hence, it would ultimately be a farmer’s or an agriculturist’s partner. It answers simple agriculture-based questions posed by the user, most effectively queries involving tips and tricks of fertilizers and pesticides of various types of food and commercial crops grown in India.

Our aim is to give it a user-friendly interface which interacts with the user as a real person to help them answer such queries and give advice as to how they can improve their techniques. The way it works needs the user to ask questions in a conversation via textual method based on growth, fertilizers and pesticides of any certain crop and it would reply with the required answer. Thus, this chatbot would be useful to any farmer who would be looking to have the knowledge about modern organic and inorganic fertilizer and pesticides along with the techniques to grow crops. It considers the various ideas implemented in modern farming and the user’s preferences.

For example, Computer Vision leading to smart farming techniques which can detect weeds among healthy plants and offers them to use herbicides, where the Agrobot examines the info. This insight helps the peasants and reduces the use of less chemicals according to the situation and many such.

The history of agriculture in India dates back to the Rig-Veda time. According to the global ranking, India stands second in farm output. Nowadays, technology emerged with agriculture sector as the new platform. Our recent studies claim that people in India rely on agriculture and its allied sectors. Still agriculture is demographically the broadest economic sector which plays a significant role. India’s yields for various commodities are low. The present days agricultural practices are neither economically or environmentally sustainable. “Slow agricultural growth is a huge concern for policy-makers(farmers)”, as they are dependent on rural employment for a survival. This access to markets which are obstructed by poor roads and excess regulation. Considering technical capabilities of Chatbot AI, agricultural field cannot be ignored. Developments like expansion to other messaging platforms, the implementation of communication capacity, Image Classification, continuous Data Analysis, early detection of diseases in crops, energy and waste water reduction, and advanced management capabilities for the farmers. Efficiency and productivity will automatically be incremented as “precise agriculture” which will take over the near future by

smarter farmers and connectivity. Time ahead the farmers can achieve maximum potential, less workforce, and shape the agribusiness. Thus, the processing of Agrobot will be more convenient for peasants and monitor the fields. It is crucial to make an advancement in this sector to raise farm productivity and immense progress. Further the automated farming minimizes the manual labor. Using Agrobot the peasants can interact in a personalized way. Assisting them with answers to their queries, giving suggestions, decision making, and recommendations on specific farming problems involved. With this we can facilitate the farmers. So, that we can save better result than manual system. The project aims to contribute the development of agricultural lands and assist the farmers to overcome poor farming.

1.2 Software Specification
IBM Watson Platform

II. LITERATURE SURVEY

Artificial Intelligence:

As per the previous quest, there has been an advent of large amount of software that utilizes elements of artificial intelligence. The subsets of AI such as Machine Learning, Natural Language processing, Image Processing and Data mining have become an integral topic for today's tech giants. Machine Learning is actively being pre-owned in Google's predictive search bar, in the Gmail spam filer, in Netflix's show proposals. Natural Language Processing supports oneself in Apple's Siri and Google voice. Image Processing is required for Facebook facial recognition tagging subroutine and in Google's driveless cars. Data Mining has become a slang for software industry due to the mass amounts of data being collected day-to-day. Companies like Facebook and Google collect vast amounts of statistics from users every second and need a way to interpret the data they sustain.

Artificial Intelligence has already proven to be utility new tool in recent technology heavy culture. This paper provides the state of craft on artificial intelligence in an integrated, concise, and elegantly distilled manner to show the experiences in the study. In subsequently, this paper brings out a broad review of current developments within the Artificial Intelligence (AI) and its built applications. The work is targeted at new recruits to the artificial intelligence field. It also reminds the experienced researchers about some of the affair they have known. [1]

Chatbots:

A chatbot is a program which imitates human conversations. That are spoken and written, or both. Chatbots perform conversations with people, and developers typically hope that users will not realize they are actually talking to a robot. This word chatbot comes from the word "chatterbot", which is a name coined by Michael Mauldin in 1994. Today, these Artificial Intelligence chatbots are also known by many other names: talkbot, bot, IM bot, intelligent chatbot, conversation bot, AI conversation bot, talking bot, interactive agent, artificial conversation entity, or virtual talk chatbot. However, problems can arise, including instances in which chatbot limitations frustrate customers.

Many companies are using chatbots and virtual agents all around world. For example, Disney, created an Officer Judy bot on Facebook Messenger to promote the 2016 movie Zootopia. Users helped Officer Judy Hopps to solve cases, spending an average of 10 mins talking to the bot. An AI chatbot has two components. They are machine learning and natural-language processing (NLP). Machine learning is an ability of systems to learn from experience without human intervention and then they use what they have learnt. Natural-language processing (NLP) is another component of a chatbot's intelligence and it refers to the analysis and synthesis of human languages. NLP makes use of predictive analytics, a combination of statistical, data mining, and data modeling techniques aimed at generating information, without having to wait for a prompt from a user.

Agronomobot:

According to the recent decades, was full of of technology, none of the field can't be remain without use of the technology, Agriculture is one such field among them. More than 42% of the total population in the world has chosen agriculture as their primary occupation particularly India. The peasants are supposed to do many works, which may hinder their health. Some problems regarding to their crops as some insects can damage their crops. To

degrade or remove these damages different types of pesticides are available. But they are not safe for human health while spraying. Fungicides, Herbicides and pesticides are used for securing crops. Pesticides are used to control insects that can be harmful to crops. They are effective but have many side effects for the environment. So, this project is based on spraying the pesticide liquids on crops in the field with the help of robots which can reduce the manually work. In this project work an engineering solution to the current human health hazards involved in spraying potentially toxic chemicals. Here in this project we want to design a chatbot, which can be utilized for the usage of the pesticides in the field and many other purposes.

New technologies have emerged the creation of intelligence and it's systems, and among one of them is the emergence of Chatbots. The term "chatbot" or "chatterbot" indicates a robot that can talk and can be defined as a software that allows the ease of interactions between humans and machines. These interactions can occur via speech or writing in the natural processing language, motion sensors, interaction with devices, and in other ways. According to the survey, we humans can easily adapt their language to human-chatbot communication, however there are notable differences in the content and quality of these conversations. Results presented by the authors present that people interact with chatbots for longer periods, but with shorter messages when least compared to human conversation. Also, on the concerned human-chatbot communication has improved the dictionary used by humans and increased in the occurrence of profanity. Chatbots can be classified in two ways: Rules-based, operating by means of specific commands (or keywords), which generally obey well-defined navigation flows and produce targeted conversations. AI-based, making use of more advanced technologies such as machine learning, NLP, among other artifices to increase its capacity for dialogue and interaction.

AgriBot:

The central objective of AgriBot project is to reach out millions of farmers there in India using social media and machine learning.

The engine is the most integral feature of every chatbot. It is responsible for the transmission of natural language into machine-understandable language. Chatbots engines were made using several Natural Language Processing and Machine Learning models to provide the required levels of accuracy and precision. In this project, the IBM Watson Assistant engine is been utilized for the implementation of a chatbot. The Conversation feature enjoys a set of Machine Language and Natural Language Processing resources capable of extracting intentions and entities from a dialog and thus produce a more precise response. The present change is being driven by three factors: Cheaper smartphones, Cheaper and faster data with wider coverage, and Localization of internet i.e. development of audio/visual content in local languages

This Agrobot project is one of the elements of the tasks highlighted above. Presently we receive around 5 lakh calls on our call center every month. This shows that our farmers want relevant information today and are willing to ask for it. However, expanding call centers is very expensive and requires huge capacity building. That is why we must develop intelligent chatbots where farmer can ask in his local language any query and our bot will give a meaningful reply.

The farmer can simply message their bot in his natural language and would get an answer. Presently, that bot has been done for facebook but not whatsapp because whatsapp hasn't opened its libraries yet. Once whatsapp opens its own libraries, this project can be taken into the direction of creating local farmer's groups.

III. PROPOSED CHATBOT

The Agrobot is created on the IBM Watson platform. The methodology includes numerous steps such as:

Step 1:

Log into your IBM account. Open catalog and select Watson Assistant. Under service name, name it as Agrobot and select the lite plan in pricing plans. Click on create . Then click on Launch Tool.

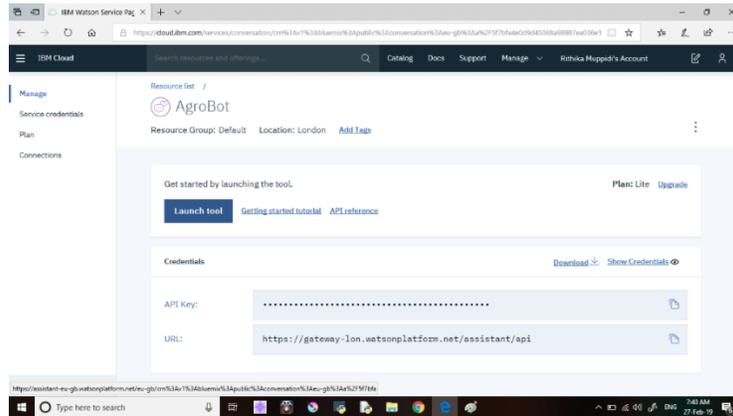


Fig 1: Launching the tool in Watson Assistant

Step 2:
Create a new skill and name it. An assistant can be equipped with multiple skills.

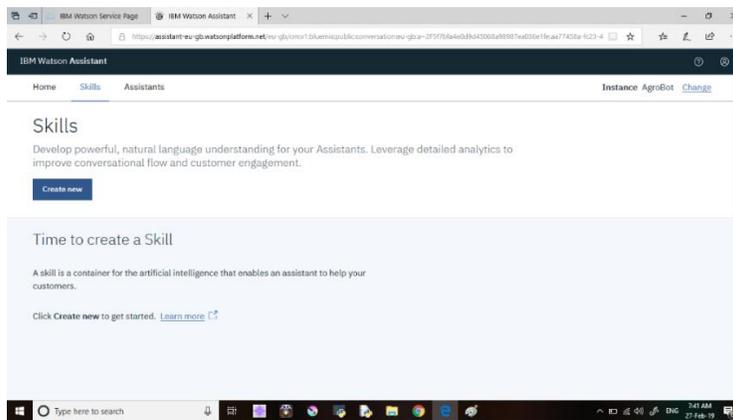


Fig 2: Creating a skill

Step 3:
After creating a skill, a page is opened which has intents, entities, dialog, version history and content catalog. In this the queries and responses are written.

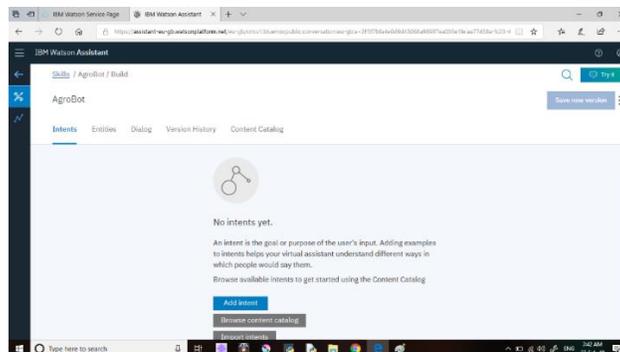


Fig 3: Home Page of the skill

Step 4:

Example Intent 1: Click on intents and name it as #greet. Then add user examples as hello, helo, hey, hi.

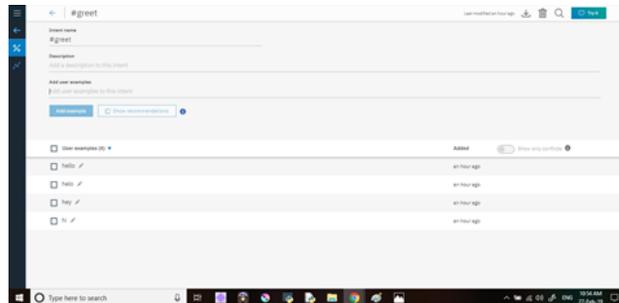


Fig 4: Creating an intent

Step 5:

Example Dialog 1: Click on the welcome node. It is a default node in Watson assistant. In this node under if assistant recognizes 'welcome' then respond with, type this message "Hello, Nice to meet you".

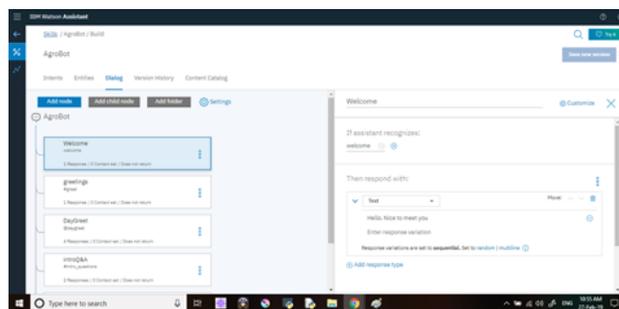


Fig 5: Creating welcome node in Dialog

Step 6:

Example to respond to Intents: Add a new node below welcome node and name it greetings. Open greetings node and under if assistant recognizes type "# greet" and give responses to it.

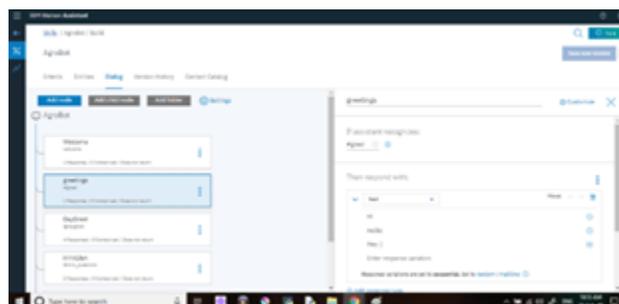


Fig 6: Creating greetings node in Dialog

Step 7:

Example Entity 1: Creating another intent #daygreet. In this create evening, evng, good evening, good morning, morning and mng as user examples.

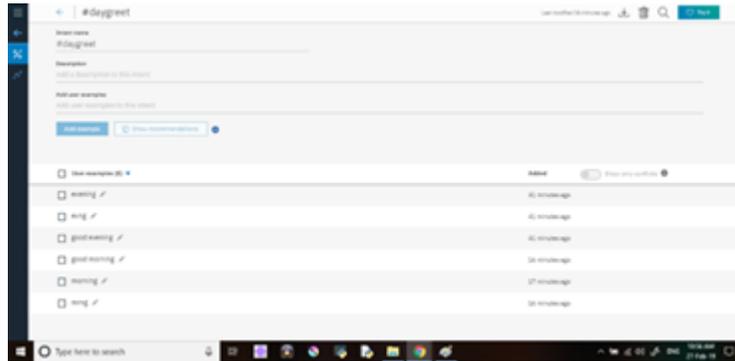


Fig 7: Creating day greet intent

Step 8:

Click on entities. Name it as @daygreet. Under value names add two values evening and morning with synonyms. Evening has two synonyms evng and good evening. Morning has two synonyms mrng and good morning.

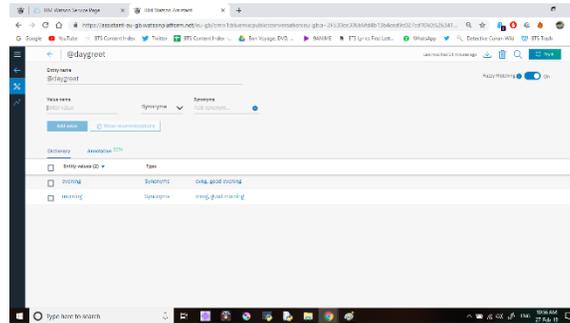


Fig 8: Creating an Entity

Step 9:

To create a dialog for the entity, go to dialogs and include @daygreet for the recognizing entity and for replies @daygreet:morning followed by the reply.

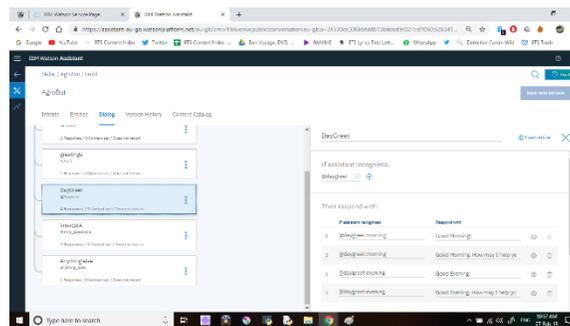


Fig 9: Creating a dialog for an entity

Step 10:

After completing all possible questionnaires through intents entities and dialogs and checking them beforehand, we can go for the implementation of the chatbot in NODE-RED.

Create an app in Node-red, name it AgroBot. After the app is awake and running, launch it.

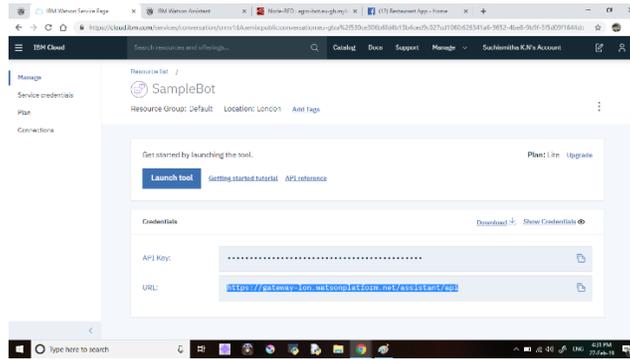


Fig 10: Launching Node-red App

Step 11:

After launching the node-red flow editor, insert nodes for input and output:

Input node: inject

Output node: debug

Processing node: Assistant

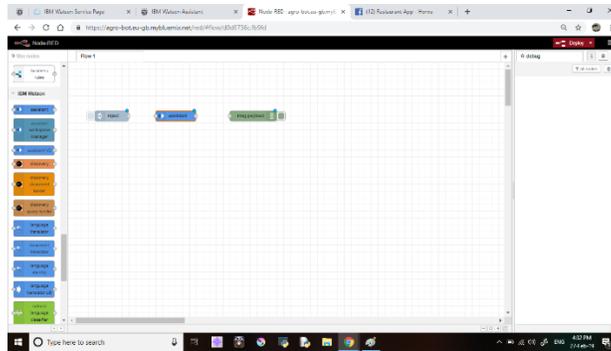


Fig 11: Inserting input and output nodes

Step 12:

Change input variables to string and give some initial value.

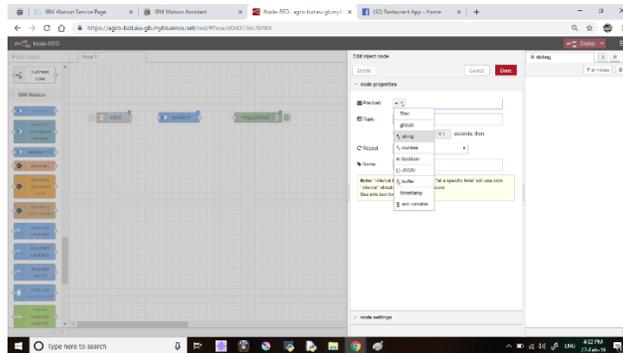


Fig 12: Editing the nodes

Step 13:

In assistant node, insert the credentials of the tool from step 10.

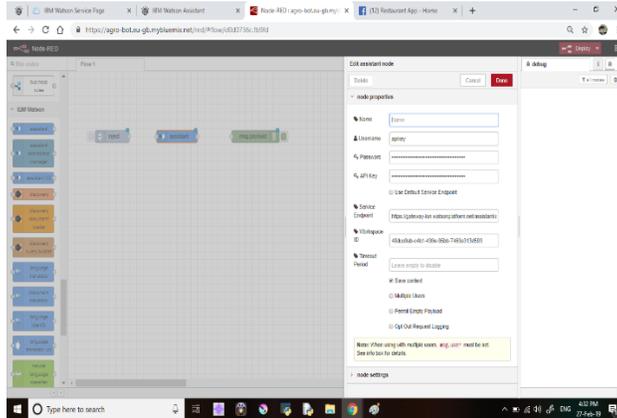


Fig 13: Inserting credentials of the Assistant

Step 14:

Insert a function node in the flow and edit the function in the JSON editor as follows:
`msg.payload=msg.payload.input.text[0];`
`return msg;`

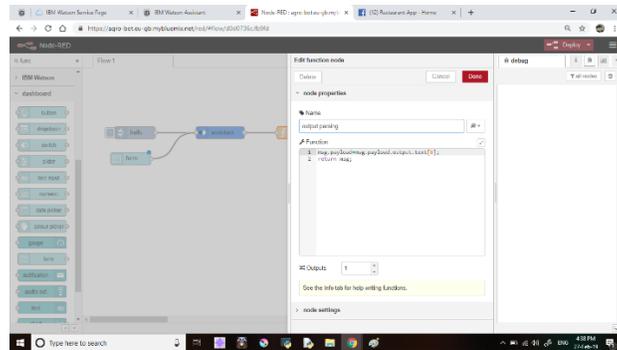


Fig 14: Editing the Function node

Step 15:

Go to options in the top-right corner. Select “manage palette”. In install tab, search for dashboard. Install node-red dashboard.

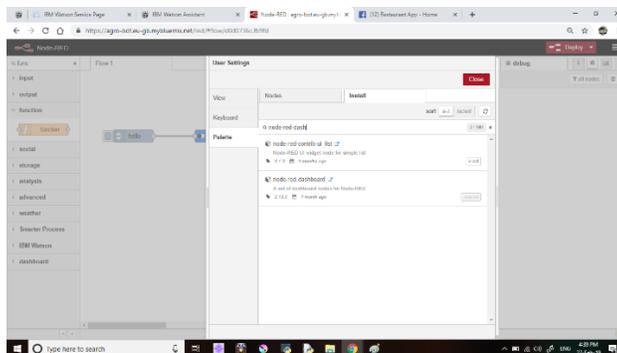


Fig15: Installing Dashboard

Step 16:
Drag the flow node from the dashboard nodes into the flow.

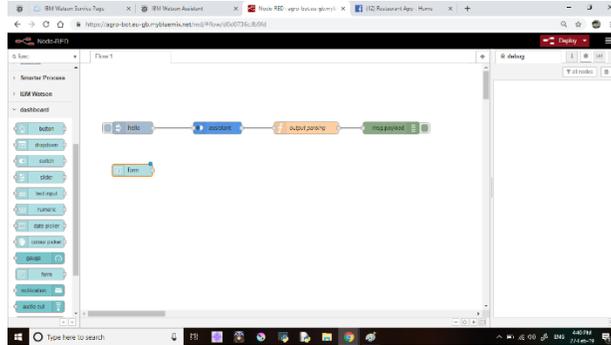


Fig 16: Inserting the flow node

Step 17:
Insert a new function into the flow. Write the same code in it as the previous function and name it input parsing.

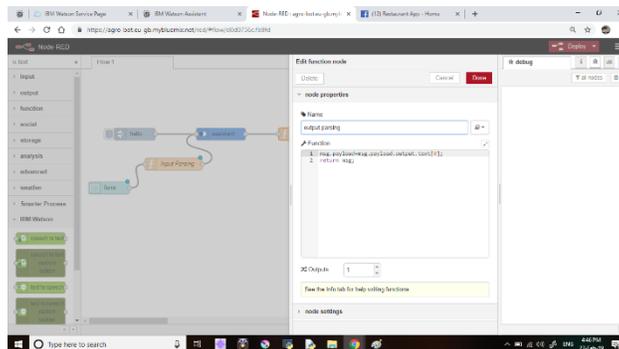


Fig 17: New Function node

Step 18:
Drag two more nodes into the flow named “text”. Label one and “you” and the other as “bot”. “You” node is connected to output of input parsing. “Bot” is connected to output of output parsing

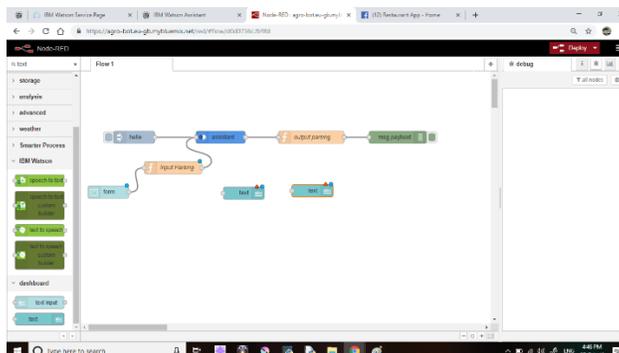


Fig 18: Adding in the text nodes

Step 19: Facebook integration

Go to tinyurl.com/nodered-fb. Copy the given code to insert Facebook nodes into the flow. Click on “manage pallette” in the options and select clipboard. Click on import to import facebook nodes into the flow.

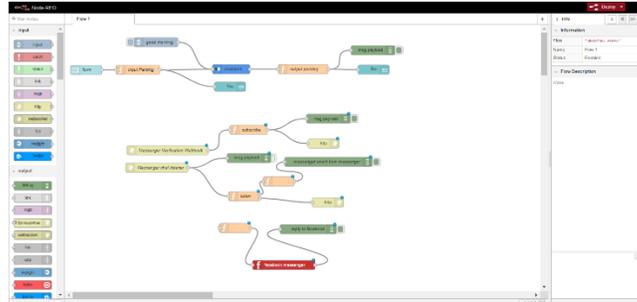


Fig 19: Inserting Facebook nodes into flow

Step 20:

Go to facebook.developers.com to create a new app.

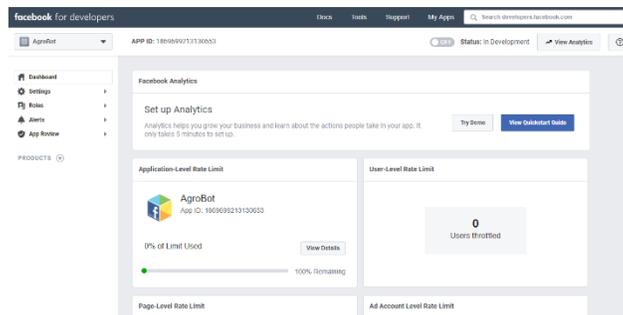


Fig 20: Creating an app on Facebook

Step 21:

Click on Messenger “setup” option

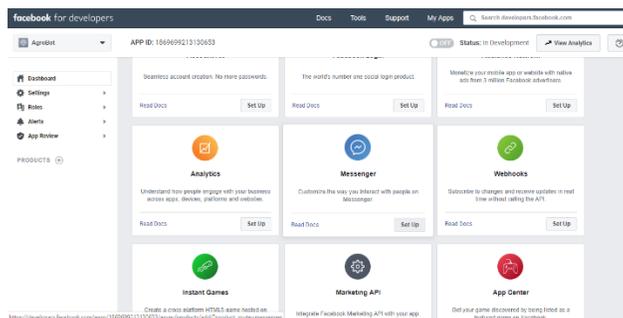


Fig 21: Setting Up Messenger Tool

Step 22:

Select a facebook page to integrate the chatbot into. Copy the page access token.

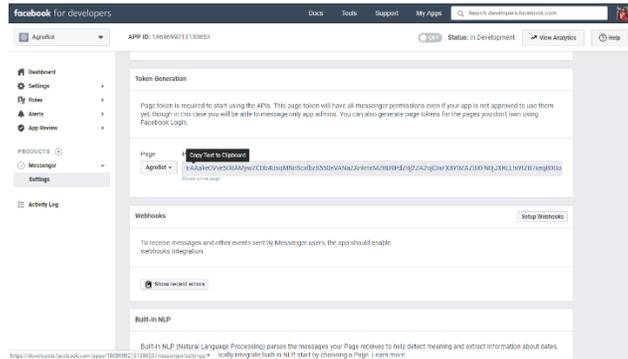


Fig 22: Copying the Page Access Token

Step 23:
In node-red, open the messenger node and paste the page access token.



Fig 23: Paste the Token in Messenger node

Step 24:
Click the subscribe node and change the “jai” in 14th line to any other name

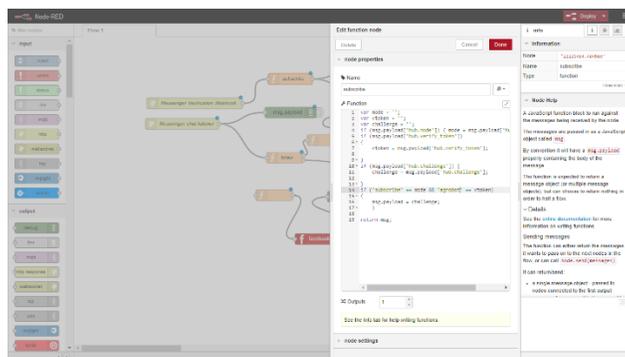


Fig 24: Edit the code in subscribe node

Step 25:
Connect the function output to the input of the assistant node.

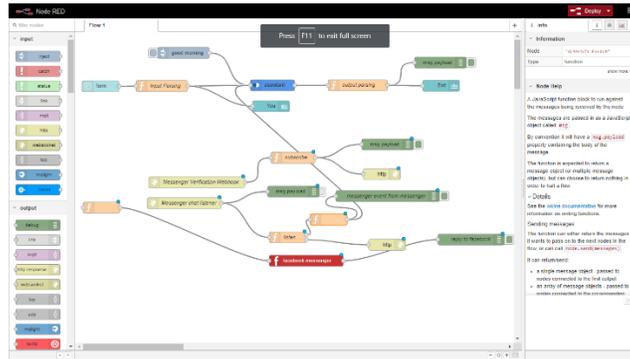


Fig 25: Connecting the nodes

Step 26:
Connect the input of the messenger function node to the output parsing node. After completion, deploy it.

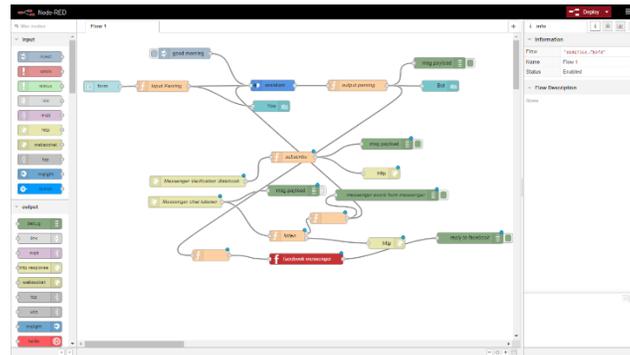


Fig 26: Connecting the nodes

Step 27:
Go to webhooks and setup the webhook. Give the token name which you have given in the previous function. For the callback URL, Open node-red and copy the link and add “mybot” to the end. Verify and Save. Subscribe and finish.

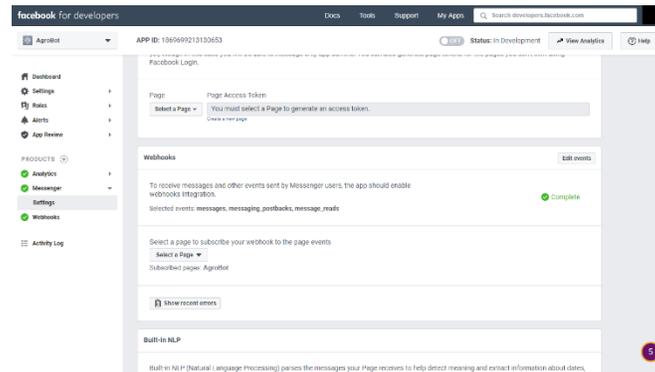


Fig 27: Setting Up Webhook

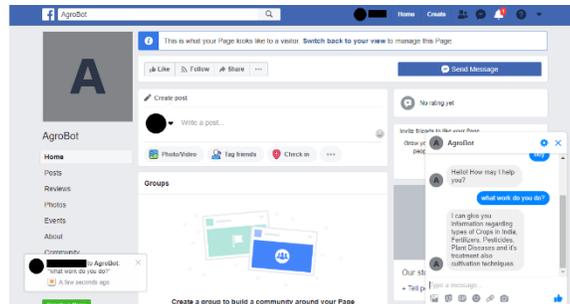
IV. RESULT & DISCUSSION

Output 1:

Open Agrobot page in Facebook and click on Send message. Then send a message

Example Question: “what work do you do?”

Answer: “I can give you information regarding types of Crops in India, Fertilizers, Pesticides, Plant diseases and it treatment also cultivation techniques.”

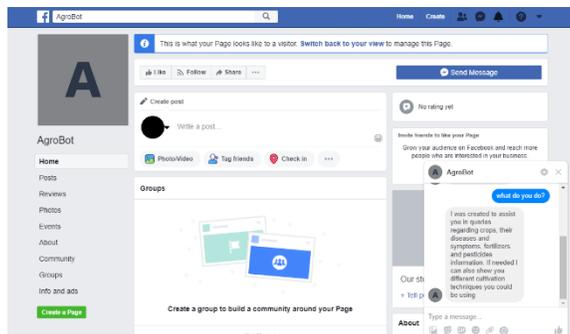


Output Screen 1

Output 2:

Example Question Repeat: “What do you do?”

Answer: I was created to assist you in queries regarding crops, their diseases and symptoms, fertilizers and pesticides information. If needed I can also show you different cultivation techniques you could be using.

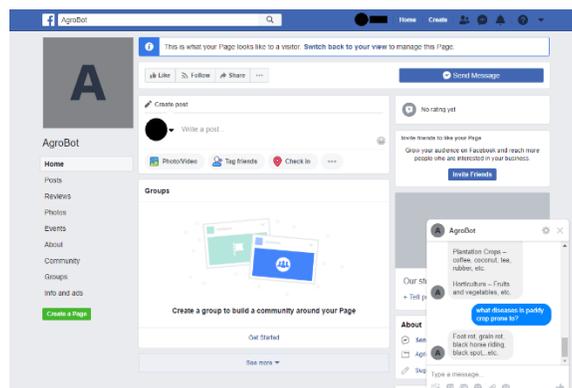


Output Screen 2

Output 3:

Example Question: “What diseases is paddy crop prone to?”

Answer: “Foot rot, grain rot, Black Horse riding, Black Spot, etc.”



Output Screen 3

V. CONCLUSION

The AgroBot of the existing agricultural sector serves as an integral importance for the survival. It is an undergoing process of transition to a market economy, with substantial changes in the social, legal, structural, productive and supply, as is the case with all other sectors of the economy.

We have scratched the surface of what is yet to be unleashed. There is more to build regarding chatbots and conversational UI than just plugging tools, services, and data together. It takes practice and a deeper understanding of concepts and subsequently to get the design and build bots that give users a great experience and response. The user must be able to get the job done by having a conversation with the bot without having to think too much. Great conversational experience, the experience that the user gets when interacting with or at the thought of doing so, is what we should always aim for. And, only with practice and mindful design can we achieve that and help the user. This technology is evolving at a rapid pace and so are the tools, services, and our collective understanding of underlying concepts. In conclusion, the biggest advantages of AgroBot include being able to reach a varied range audience, as well as the ability to automate personalized messages like a tool.

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