Software Developer Intern WIPRO LTD.

INDUSTRAIL TRAINING REPORT

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Abstract

This report provides a comprehensive overview of my 2-month internship at Wipro Ltd., where I served as a software developer intern. The primary objective of the internship was to contribute to the development of AI Assistant Voice Bot projects for ICICI Bank, leveraging cutting-edge technology such as Dialogflow CX. During this period, I had the opportunity to gain valuable insights into the tech industry, learn new skills, and implement various features within the voice bot projects.

The report commences with an introduction to the internship, Wipro Ltd., and the project's focus on AI Assistant Voice Bot development. It then delves into the technologies utilized throughout the internship, namely Dialogflow CX and Google Cloud Platform. Additionally, the report highlights my learning experience in Node.js, a crucial skill that I acquired during the internship.

Subsequently, the report covers the projects completed during the internship. It elaborates on the tasks undertaken during each project and the knowledge gained through practical application. The projects include the development of a dummy chatbot to grasp the fundamentals of Dialogflow CX, followed by the creation of a retail chatbot for merchandise ordering. The retail chatbot was enriched with features like custom payloads and conditional responses for a seamless conversational experience.

Further, the report delves into the individual project focused on building a transactional banking voice bot. This project involved integrating DTMF capabilities to enable users to interact with the bot using phone keypads. Rigorous testing and troubleshooting were undertaken to ensure the bot's smooth performance in various scenarios.

Finally, I undertook a research project to integrate ChatGPT with the chatbot, creating an FAQ bot for banks. Learning Node.js from scratch, I implemented webhooks for this integration, contributing to the team's success. Throughout the internship, I received invaluable guidance and support from my project head and team members, which played a pivotal role in the projects' successful completion. The practical experience gained has equipped me with essential skills and knowledge crucial for my future career as a software developer. In conclusion, this transformative internship allowed me to gain expertise in AI Assistant Voice Bot development, Dialogflow CX, Google Cloud Platform, and Node.js. The projects provided invaluable practical insights into the tech industry and prepared me for upcoming challenges and opportunities in software development.

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ACKNOWLEDGEMENT

ABOUT

Wipro Ltd. is a global IT, consulting, and business process services company founded in 1945 by Mohamed Hasham Premji. Headquartered in Bengaluru, India, it has become one of the world's largest IT service providers. Their vision is to be a world-class technology organization, continuously exploring new opportunities to serve clients better. The mission is to harness technology, innovation, and partnerships to help clients excel, enhance competitiveness, and achieve sustainable growth. Core values include integrity, customer centricity, respect for the individual, passion for excellence, and innovation. Wipro offers a wide range of services, including IT solutions, consulting, business process outsourcing, product engineering, and digital transformation, catering to clients across various industries. Operating in over 60 countries, Wipro maintains a global presence to meet diverse client needs. The company is committed to sustainability, engaging in environmental initiatives and promoting diversity and inclusion. It has earned numerous awards and recognitions for its excellence and customer-centric approach. As a software developer intern at Wipro, I experienced an environment fostering innovation, learning, and collaboration, contributing to the company's mission of delivering exceptional services worldwide.

INTRODUCTION

1.1 OVERVIEW

During my enriching two-month internship at Wipro Ltd., the central focus of the project was to conceptualize and develop an AI assistant voice bot for ICICI Bank, employing cutting-edge technology such as Dialogflow CX. The primary objective of this endeavor was to revolutionize the customer experience by creating an intelligent virtual agent capable of engaging in seamless voice interactions with users. The AI assistant was designed to cater to various banking needs, including providing account details, facilitating merchandise orders, and addressing transactional inquiries. A key aspect of the project involved incorporating Dual Tone Multi-Frequency (DTMF) integration to ensure the utmost security when dealing with sensitive information, such as credit and debit card details or loan inquiries. Throughout the internship, we engaged in a research project that explored the integration of ChatGPT to create an FAQ bot for banks. This addition aimed to provide customers with swift and precise responses to frequently asked questions related to banking services, policies, and general inquiries, enhancing their overall banking experience. The AI assistant voice bot brought significant benefits to ICICI Bank and its esteemed customers. By introducing a 24/7 virtual assistant, the bank could elevate its customer service and support capabilities, thereby reducing the burden on human agents for routine inquiries. For customers, the voice bot provided unparalleled convenience, allowing them to seamlessly perform banking operations and access essential information through natural voice interactions. During the project, we emphasized continuous improvement and scalability. Regular customer feedback and usage data allowed us to fine-tune the AI assistant, enhancing its accuracy, efficiency, and user experience. The bot's architecture was thoughtfully designed with scalability in mind, facilitating future expansions and integrations with various platforms and channels.

1.2 KEY RESPONSIBILITIES

- **AI Assistant Voice Bot Development**: My primary responsibility during the internship was to actively contribute to the development of the AI assistant voice bot for ICICI Bank using Dialogflow CX. This involved designing conversational flows, creating intents, implementing custom payloads, and ensuring a seamless user experience.
- **DTMF Integration**: As part of the transactional banking voice bot project, I was responsible for integrating Dual Tone Multi-Frequency (DTMF) capabilities. This involved enabling the voice bot to interact with users through phone keypads to handle sensitive information securely.
- **Research and Integration**: A significant part of my responsibilities included researching and integrating ChatGPT with the chatbot to create an FAQ bot for banks. This required learning Node.js from scratch and implementing webhooks to facilitate the integration.
- **Collaboration and Input**: Throughout the internship, I actively participated in team meetings and discussions, providing valuable input and insights to the ongoing projects. My contributions played a role in shaping the direction and progress of the projects. Challenges Faced:

1.3 CHALLENGES FACED

- **Learning New Technologies**: Learning and implementing multiple new technologies, such as Dialogflow CX, DTMF, and Node.js, within a short span of time posed a considerable challenge. However, I took on the challenge with determination and dedication. Mastering Node.js: As someone unfamiliar with Node.js, learning the server-side JavaScript runtime environment from scratch presented a significant learning curve. Nevertheless, I dedicated extra time and effort to grasp the concepts effectively.
- **Adapting to a New Environment**: Relocating to a new city and working in an unfamiliar office with colleagues I had never met before was initially challenging. However, I quickly adapted to the environment, fostering positive relationships with my teammates and establishing a productive work dynamic.

- **Meeting Project Deadlines**: With diverse projects and multiple technologies to work on, managing deadlines efficiently was crucial. I faced the challenge by prioritizing tasks, communicating effectively with the team, and staying organized. Despite the challenges, the internship experience was immensely rewarding. The opportunity to work on cutting-edge projects, acquire new skills, and collaborate with a talented team provided valuable insights into the tech industry and prepared me for future endeavors in software development. My ability to overcome these challenges and contribute effectively to the projects has left me with a sense of accomplishment and readiness to tackle future opportunities in the field..

TECHNOLOGIES USED

DIAGFLOW CX :

Dialogflow CX is a powerful Conversational AI Platform developed by Google that enables the creation of intelligent virtual agents, chatbots, and voice bots. It is an evolution of Dialogflow ES (Essentials) with advanced features, designed to handle complex conversations and provide more sophisticated natural language understanding. Dialogflow CX stands for "Conversational eXperience" and is part of Google Cloud's Contact Center AI Platform.

■ Basics of Dialogflow CX: Agent: In Dialogflow CX, an "Agent" is the core component that represents the virtual assistant. It is where the conversational design, intents, flows, and entities are defined. Intents: Intents in Dialogflow CX represent the intentions of the user's input. They are designed to capture what the user wants to achieve or convey during the conversation. Each intent can have various training phrases, representing the different ways users might express the same intent. Flows: Flows are an essential concept in Dialogflow CX. They represent the conversational structure of the agent. A flow can have multiple pages, and each page contains one or more related intents. Flows facilitate building complex, multi-turn conversations in a more organized manner.

■ Pages: Pages are the building blocks of flows. Each page contains a set of related intents and represents a single conversational turn. Pages allow you to design conversations with logical segmentation, making it easier to manage and maintain complex dialogues.

■ Routes in Dialogflow CX:

  ● Intent Routes: Intent routes define the path of the conversation based on the intent detected. Depending on the user's input (intent matched), the agent follows the corresponding intent route to guide the conversation flow. Event Routes: Event routes allow the agent to react to specific events other than user input. Events can be triggered from external systems or components to initiate certain actions or transitions within the conversation.

  ● Fulfillment Routes: Fulfillment routes are used to send data to, or retrieve data from, external systems, APIs, or webhooks. They enable seamless integration with external services to fulfill user requests or update information during the conversation. Entities and Parameters: Entities: Entities are used to identify and extract specific pieces of information from user inputs. They

represent important data types or concepts that the agent needs to understand. For example, a "location" entity can extract cities or countries mentioned by the user. Parameters: Parameters are variables created in intents that map extracted values from user inputs to specific entity types. They allow you to capture relevant information and use it to customize responses or trigger specific actions based on the extracted data.

- Conditional Routes: Conditional routes in Dialogflow CX allow for decision-making within the conversation flow. You can define conditions based on context, parameters, or system variables to guide the conversation in different directions. For example, you can use conditional routes to handle different cases based on the user's response or provide tailored responses based on specific conditions. In summary, Dialogflow CX is an advanced Conversational AI Platform that enables the creation of intelligent virtual agents and chatbots with complex conversational flows. It introduces flows and pages to structure conversations logically, while intents, entities, and parameters help understand user intentions and extract relevant information. The use of routes, including intent routes, event routes, and fulfillment routes, allows for smooth conversation management and external integrations. Additionally, conditional routes enable decision-making and personalized responses based on various factors. Overall, Dialogflow CX provides a robust and versatile platform for building sophisticated conversational experiences for users.

GOOGLE CLOUD PLATFORM (GCP):

Google Cloud Platform (GCP) is a suite of cloud computing services provided by Google, offering a wide range of cloud-based solutions for businesses and developers. GCP allows organizations to build, deploy, and scale applications, store and analyze data, and leverage various machine learning and artificial intelligence tools. It provides a highly reliable and secure infrastructure, allowing users to access computing resources on-demand and pay only for the resources they use.Some key components and services of Google Cloud Platform include:

- **Compute Engine**: GCP's virtual machine service, enabling users to run applications on Google's infrastructure. App Engine: A platform-as-a-service (PaaS) offering that allows developers to build, deploy, and manage applications easily without worrying about infrastructure management. Kubernetes Engine: A managed Kubernetes service for container orchestration and deployment. Cloud Storage: Scalable and durable object storage for unstructured data.

- **Cloud SQL**: Managed MySQL, PostgreSQL, and SQL Server databases in the cloud. BigQuery: A fully-managed and serverless data warehouse for real-time analytics. Cloud Pub/Sub: A messaging service for building event-driven systems and real-time data streaming.
- **Cloud AI Platform**: A set of services for building, training, and deploying machine learning models.
- **Cloud Functions**: Serverless compute service for running event-driven code without the need to manage servers.
- **Cloud Identity and Access Management (IAM):** Provides centralized control and security for GCP resources. GCP is known for its global network infrastructure, data security measures, and innovative services that cater to a wide range of industries and use cases, making it one of the leading cloud platforms in the industry.

DUAL TONE MULTI FREQUENCY (DTMF):

Dual Tone Multi-Frequency (DTMF) is a signaling method used in telecommunications and interactive voice response (IVR) systems. It allows users to interact with automated systems using their telephone's keypad by sending combinations of two distinct frequencies, each representing a specific digit or function. DTMF is commonly known as the "touch-tone" method and is widely used in various telephone services, including banking, customer support, and phone-based surveys. The DTMF keypad consists of 12 keys (0-9, *, and #), and each key corresponds to a unique pair of audio frequencies. When a user presses a key on their phone, the corresponding frequencies are generated, and the system detects these frequencies to interpret the user's input. In the context of the AI Assistant Voice Bot project for ICICI Bank, DTMF integration was employed to ensure the security of sensitive information. By using DTMF for tasks involving credit and debit card details or loan inquiries, users can interact with the voice bot without the risk of exposing their confidential data through voice interactions. DTMF provides an additional layer of security, making it suitable for handling financial transactions and other scenarios where data privacy is paramount. Overall, DTMF plays a vital role in creating secure and user-friendly voice-based interactions, particularly in applications where sensitive information needs to be protected during telephone interactions with automated systems.

NODE JS

Node.js is an open-source, server-side, JavaScript runtime environment that allows developers to execute JavaScript code outside of a web browser. It uses the V8 JavaScript engine developed by Google, the same engine that powers Google Chrome. Node.js provides a lightweight and efficient runtime, making it ideal for building scalable, real-time, and networked applications.

Key Features of Node.js:

- **Non-Blocking and Asynchronous:** Node.js is non-blocking and uses an event-driven, asynchronous I/O model. This means that it can handle multiple concurrent operations without blocking the execution of other tasks, resulting in highly efficient and responsive applications.
NPM (Node Package Manager): NPM is the package manager for Node.js that allows developers to easily install, manage, and share reusable JavaScript code modules (packages) known as "npm packages." This extensive package ecosystem provides a wealth of libraries and tools for developers to use in their applications.

- **Back-End Development:** Node.js is widely used for back-end development, enabling developers to create web servers, APIs, and other server-side applications using JavaScript, which was traditionally limited to front-end development in web browsers.

- **Real-Time Applications:** The asynchronous nature of Node.js makes it well-suited for building real-time applications, such as chat applications, gaming servers, and streaming platforms. Cross-Platform: Node.js is cross-platform, meaning it can be run on various operating systems, including Windows, macOS, and Linux.

- **Webhooks:** Webhooks are a mechanism used for enabling communication between different applications or services over the internet. They allow one application to send automated HTTP POST requests to another application when a specific event occurs. Webhooks serve as a way to receive real-time updates and notifications, allowing applications to react to changes or events in external systems without the need for constant polling. How Webhooks Work: Registration: An application that wants to receive notifications registers a webhook URL with the external service or platform.

- **Event Trigger:** When a specific event occurs in the external service, such as a new user sign-up or a data update, the service sends an HTTP POST request containing relevant data to the registered webhook URL. Processing the Event: The receiving application processes the incoming data and performs the necessary actions or updates based on the event payload. Use Cases of Webhooks:

Webhooks are commonly used in various scenarios, including: Sending real-time updates to chat applications or notification systems. Triggering actions in response to events in third-party applications (e.g., sending emails or SMS alerts). Keeping databases or caches in sync with changes in external systems. Automating tasks based on events in web applications or services.

PROJECTS UNDERTAKEN

PROJECT 1 (CCAI VOICE BOT FOR TRANSACTIONAL BANKING)

Week 1:

During the first week of my internship at Wipro Ltd., I was welcomed into the team responsible for AI Assistant Voice Bot projects for ICICI Bank, which utilized Dialogflow CX technology. Under the guidance of my project head, Giridhar Nimmagadda, and the team, I gained insights into the project's objectives and the technologies at play. My initial focus was on familiarizing myself with the fundamental aspects of Dialogflow CX, including flows, intents, and entities. I dedicated time to comprehending the voice bot's structure and its interactions with users, allowing me to explore the capabilities of Dialogflow CX for designing intuitive and effective conversational flows.

Week 2:

During the second week of my internship at Wipro Ltd., I immersed myself in the core concepts of Dialogflow CX, further expanding my knowledge. I delved into essential features like conditional routes, custom payloads, and managing transitions between flows and pages. My project head and team recognized my progress and entrusted me with a significant task - creating a dummy chatbot using Dialogflow CX basics. Designing the dummy chatbot required careful consideration of conversational flows, ensuring seamless interactions with users. I learned to implement conditional responses to handle diverse user inputs effectively. This was a valuable learning experience as I gained hands-on expertise in applying conditional logic to create dynamic and contextually relevant responses. Throughout the process, my team members provided invaluable guidance and support, assisting me in overcoming challenges and refining the chatbot's functionality. With their help, I successfully developed a fully functional dummy chatbot. This accomplishment laid a solid foundation for my subsequent involvement in more complex and challenging projects during the course of the internship. The second week marked a significant step in my journey towards becoming proficient in Dialogflow CX and honing my skills as a software developer in the field of AI Assistant Voice Bot development.
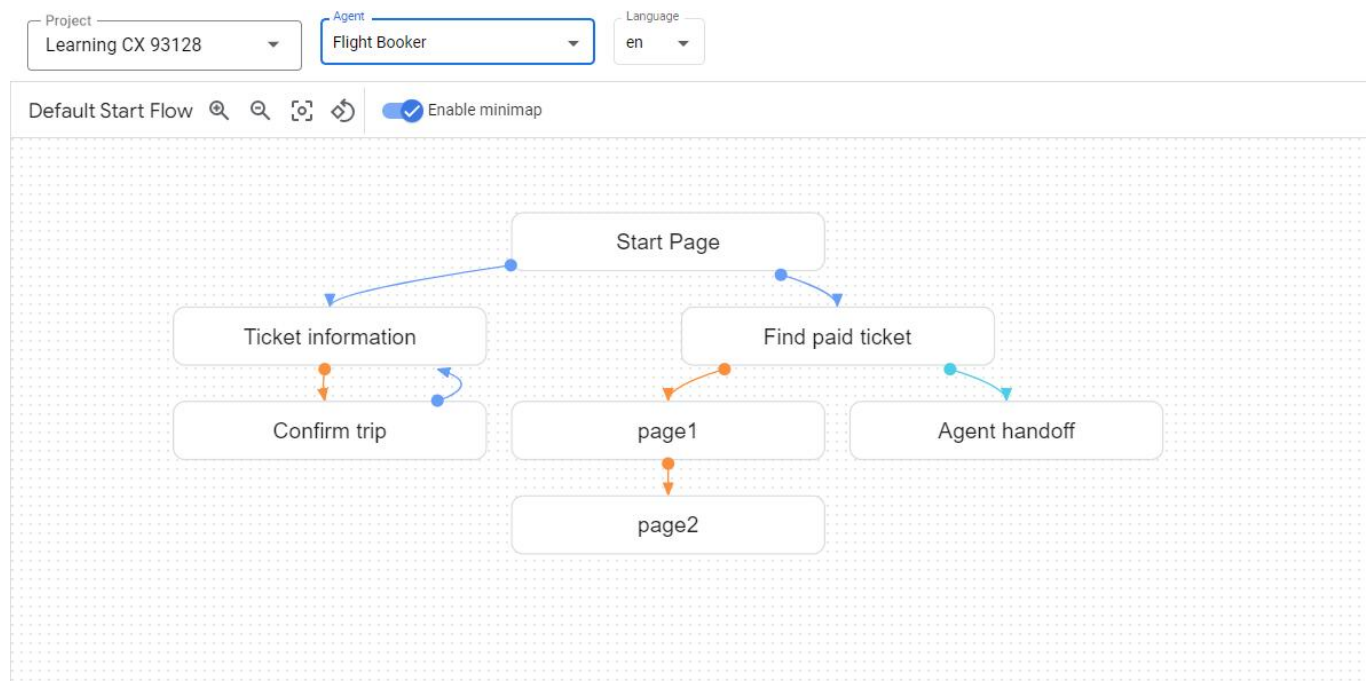
Week 3:

During the third week of my internship at Wipro Ltd., I undertook a significant project to independently develop a retail bot . The primary objective of the bot was to enable users to effortlessly place merchandise orders related to their favorite bands. To accomplish this, I had to utilize more advanced features of Dialogflow CX, including custom payloads and conditional responses. The development of the retail bot required meticulous planning and attention to detail. I learned how to manage user inputs step-by-step, allowing for smooth and intuitive interactions. Additionally, I implemented direct ordering functionality to eliminate repetitive questions and streamline the user experience. As the project progressed, I encountered complex challenges and opportunities to fine-tune the bot's interactions. My proficiency in Dialogflow CX was put to the test, and I successfully managed multiple routes, pages, and flows to ensure seamless functionality. Throughout the process, I sought guidance from my team members, who provided valuable feedback. Their input allowed me to further enhance the retail bot's capabilities, making it a testament to my growing expertise in Dialogflow CX and AI Assistant Voice Bot development. While the project was based on tutorials, the process of independently applying my knowledge and skills to create a fully functional retail bot was both rewarding and insightful. It

CCAI Voice Bot

strengthened my confidence as a software developer and demonstrated my ability to undertake complex projects in the field of conversational AI.
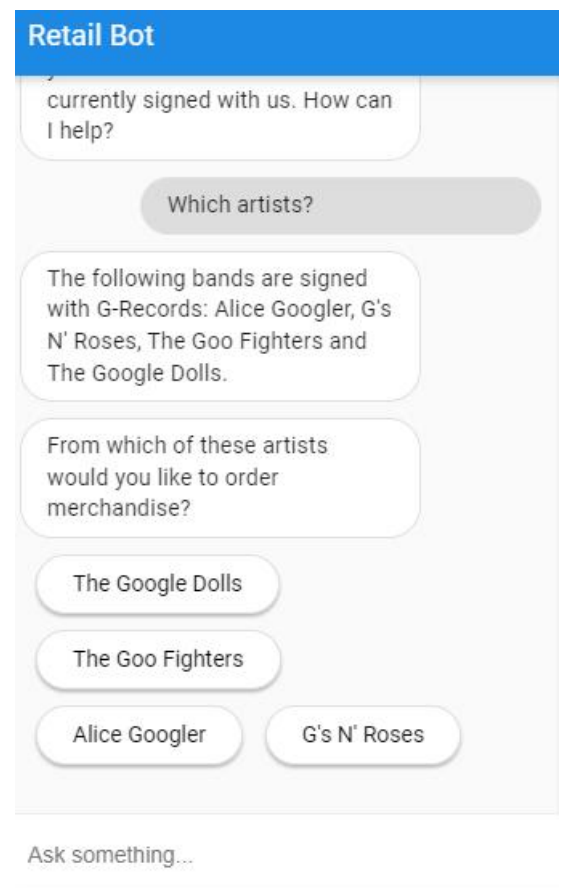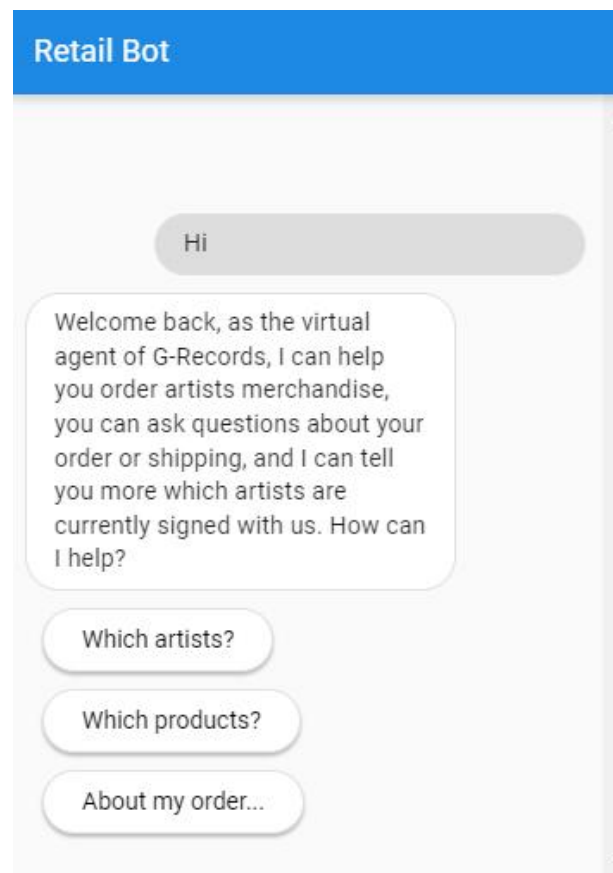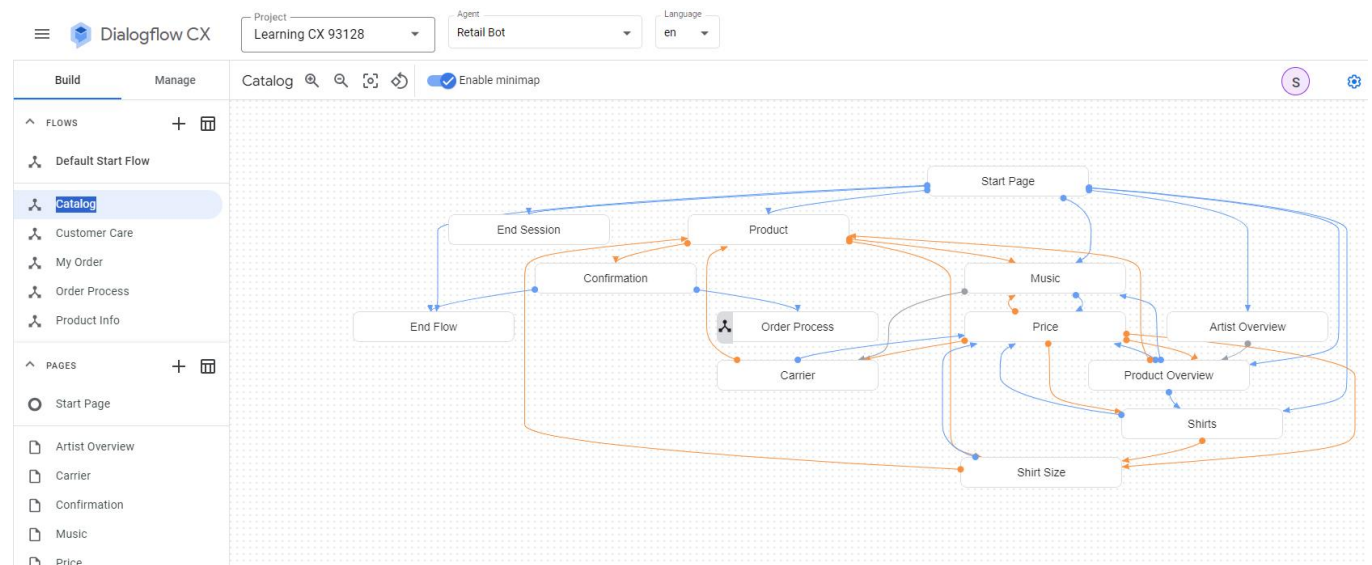
Week 4:

In week 4, I embarked on a solo project to develop a CCAI Voice Bot for transactional banking. This project involved using Dual Tone Multi-Frequency (DTMF) integration to enable users to interact with the voice bot by using their phone's keypad. I learned about DTMF and its applications in securing sensitive information during phone-based interactions. The project was integrated with Skype, and I conducted extensive testing to ensure smooth user experiences for various scenarios and edge cases.

CCAI Voice Bot
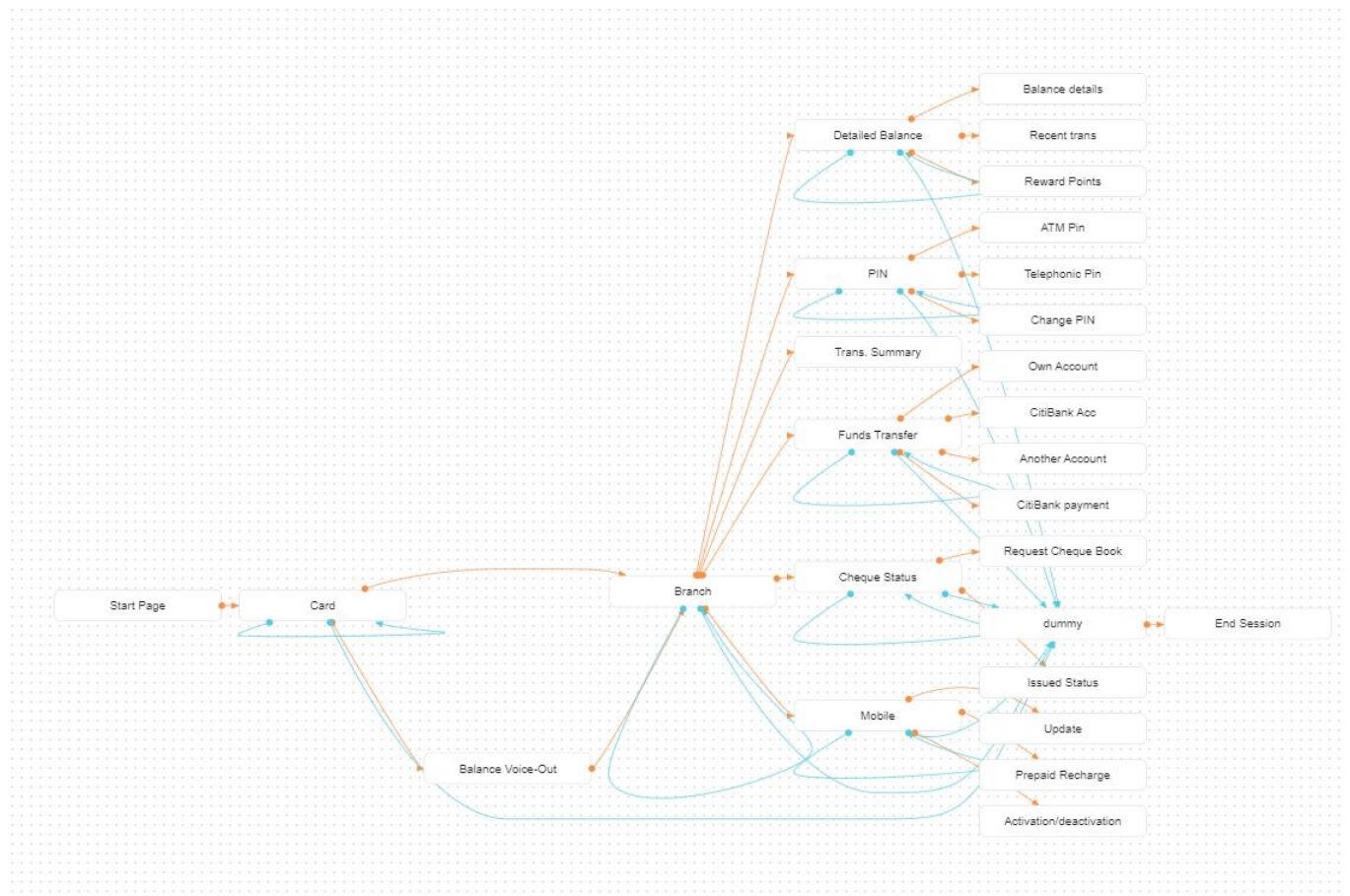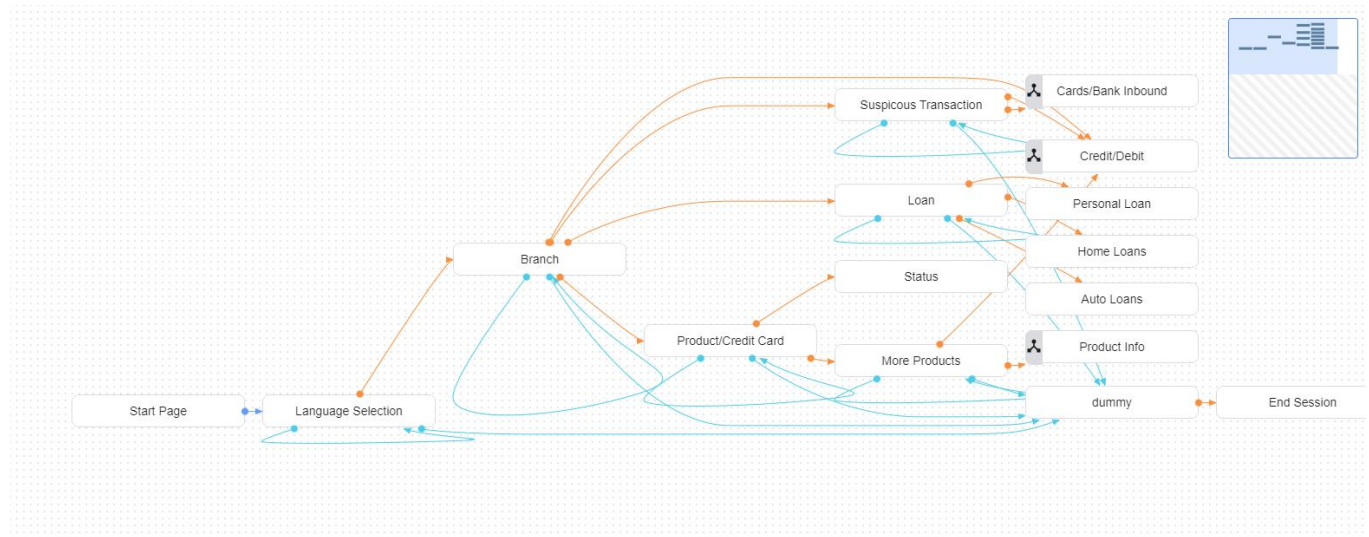
Bank Transaction Bot

hi

<speak>Welcome to City Bank</speak>

<speak> Please tell the language of your choice</speak>

<speak> Press 1 for English<break time = "1s"/> Press 2 for Hindi</speak>

1

You chose English

<speak> Press 1 For information on your Credit Card or Bank account,<break time = "1s"/> Press 2 To report loss of card or

Bank Transaction Bot

Enter your Credit or Debit Card Number

1234

The balance in your account is 10000 rupees

<speak> press 1 for Detailed Balance, Recent Transactions and Reward Points<break time = "0.5s"/> press 2 for pin services<break time = "0.5s"/> press 3 For transaction summary request<break time = "0.5s"/> press 4 For funds transfer and to make payment for your credit card<break time = "0.5s"/> press 5 For cheque status and cheque book request<break time = "0.5s"/> press 6 For For Mobile update or recharge and

Ask something...

PROJECT 2 (INTEGRATION OF CHATGPT WITH FAQ BOTS)

Week 5:

In the fifth week, I was presented with a research project aimed at integrating ChatGPT with the existing chatbot to create a comprehensive FAQ bot for banks. The integration required learning Node.js from scratch, as well as using webhooks to facilitate communication between the chatbot and the OpenAI API. I devoted time to studying Node.js, understanding webhooks, and gaining familiarity with API usage. I worked closely with my team members, exchanging ideas and suggestions to develop an efficient and robust FAQ bot.

```javascript
const config = new Configuration({
    apiKey: "API_KEY",
});

const openai = new OpenAIApi(config);

const runPrompt = async () => {
    const prompt = `
        write me a joke about a cat and a dog. Return response in the following parsable JSON format:

        {
            "Q": "question",
            "A": "answer"
        }

    `;

    const response = await openai.createCompletion({
        model: "text-davinci-003",
        prompt: prompt,
        max_tokens: 2048,
        temperature: 1,
    });

    const parsableJSONresponse = response.data.choices[0].text;
    const parsedResponse = JSON.parse(parsableJSONresponse);

    console.log("Question: ", parsedResponse.Q);
    console.log("Answer: ", parsedResponse.A);
};

runPrompt();
```

CCAI Voice Bot

```javascript
const { Configuration, OpenAIApi } = require("openai");
require('dotenv').config()

const configuration = new Configuration({
  apiKey: process.env.OPENAI_API_KEY,
});
const openai = new OpenAIApi(configuration);

async function runCompletion () {
    const completion = await openai.createCompletion({
    model: "text-davinci-003",
    prompt: "How are you today?",
    });
    console.log(completion.data.choices[0].text);
}

runCompletion();
```

Week 6:

The final week of my internship involved the implementation of ChatGPT integration with the chatbot. I used the OpenAI API to enhance the chatbot's responses and generate human-like interactions. The integration allowed the bot to handle more complex questions and provide personalized responses based on user inputs. I worked with my team to fine-tune the integration, addressing any issues that arose during testing. At the end of the week, I successfully demonstrated the enhanced FAQ bot, showcasing the practical application of AI-powered solutions in the banking industry.

```javascript
const express = require('express');
const axios = require('axios');

const app = express();
const port = 3000; // Change this to the port you want to run the server on
// Replace these variables with your OpenAI API key and endpoint
const openAiApiKey = 'API_KEY';
const openAiEndpoint = 'https://api.openai.com/v1/engines/text-davinci-003/completions';
app.use(express.json());
app.post('/webhook', async (req, res) => {
  try {
    const query = req.body.query; // Get the user's query from the webhook request
    const chatGptResponse = await getChatGptResponse(query);
    const fulfillmentResponse = {
      fulfillment_response: {
        messages: [
          {
            text: {
              // fulfillment text response to be sent to the agent
              text: [chatGptResponse],
            },
          },
        ],
      },
    };
    res.json(fulfillmentResponse); // Sending the JSON response back to Dialogflow CX
  } catch (error) {
    console.error('Error processing webhook:', error);
    res.status(500).json({ error: 'Something went wrong' });
  }
});
async function getChatGptResponse(query) {
  const headers = {
    'Authorization': `Bearer ${openAiApiKey}`,
    'Content-Type': 'application/json',
  };
  const data = {
    prompt: query,
    max_tokens: 150,
  };
  const response = await axios.post(openAiEndpoint, data, { headers });
  return response.data.choices[0].text.trim();
}
app.listen(port, () => {
  console.log(`Webhook server listening on port ${port}`);
});
```

CONCLUSION

In conclusion, my internship experience at Wipro Ltd. has been incredibly enriching and transformative. Over the course of two months, I had the opportunity to work on AI Assistant Voice Bot projects for ICICI Bank using Dialogflow CX technology, which allowed me to delve deep into the world of conversational AI and natural language processing. Under the guidance of my project head, Giridhar Nimmagadda, and the support of my mentor, Sampada Prabhu, I gained invaluable practical insights into the tech industry and honed my skills as a software developer. During the initial weeks, I familiarized myself with the fundamentals of Dialogflow CX, learning about flows, intents, and entities. As I progressed, I delved into more advanced features like conditional routes, custom payloads, and DTMF integration, which enabled secure and dynamic interactions with users. The projects undertaken during the internship showcased my proficiency in Dialogflow CX, as I successfully developed a functional dummy chatbot, a retail bot for merchandise orders, and a CCAI Voice Bot for transactional banking. These projects allowed me to apply my knowledge, creativity, and problem-solving skills, and receive valuable feedback from my team, which further fueled my learning and growth. The research project on integrating ChatGPT with the chatbot to create an FAQ bot for banks was a significant milestone in my internship. Learning Node.js from scratch and working with webhooks to interact with the OpenAI API expanded my skill set, allowing me to harness the power of AI language models and enhance the chatbot's capabilities in answering complex questions. The support and expertise of my project head, Giridhar Nimmagadda, and my mentor, Sampada Prabhu, were instrumental in the successful completion of the projects. Their guidance and encouragement motivated me to push my boundaries and strive for excellence. Additionally, I am grateful to my team members for their collaboration and the positive work environment they fostered. Working with them not only helped me overcome challenges but also allowed me to contribute my ideas and input to the projects. This internship at Wipro Ltd. has provided me with hands-on experience in cutting-edge technologies, including Dialogflow CX, Google Cloud Platform, Node.js, and OpenAI API integration. It has prepared me for future challenges and opportunities in the field of software development and AI. The practical exposure gained during this internship has been invaluable and has equipped me with essential skills and knowledge that will undoubtedly shape my future career as a software developer. I am deeply grateful to Wipro Ltd. for providing me with this valuable

opportunity and the chance to work on real-world projects that have enriched my learning and personal growth. The experience has been truly transformative and has set a strong foundation for my journey ahead in the tech industry.