

CoVoice Bot

About CoVoice Bot

This project is about the integration of telephony platforms with Google Dialogflow CX for conversational experience on a telephone call using natural language plus language of your choice(here Hindi). Though IVR(InteractiveVoiceResponse) is not used much because of many other channels, telephony remains the goto channel for immediate help when all other channels and works especially when you can't access the internet, from remote areas or villages. The latest channels including web or mobile apps are always inconvenient for senior citizens. I experienced this with my parents. They just can't get things done on web or mobile apps, whatever the UI/UX is and easier it is, all they want is to pick up a phone, talk to someone who can understand their natural language and get the work done. It could be downloading a pdf or updating address or correcting name etc.

I am calling this voice bot - **CoVoice Bot - a senior citizen buddy.**

Here I have taken the example of downloading the India COVID vaccine certificate on a telephony platform, and receiving the certificate pdf on their WhatsApp account in very simple steps without doing much of the manual self-service.

I assume this would be a time saver for many of the senior citizens in India who fail and are anxious to use mobile apps or web applications over the internet. I feel good that this voice bot can be helpful for the general public and useful especially for SENIOR CITIZENS.

I have used Google DialogFlow CX as a Natural Language Conversation backbone and integrated with Telephony platforms like Twilio. The idea here is integration of Twilio platform and Google DialogFlow CX using Java language.

There would be many use cases that we can drive once this integration is done. Here in this project i have considered recent issue with my parents to get vaccine certificate when ever they need and also answer few COWIN portal queries,

FAQ's or vaccine related questions. This bot can answer the queries in multi-lingual. I have considered English and Hindi as the languages here.

CoVoice Bot can understand intents related to COWIN portal, download certificate, FAQ's, issues, vaccine effect if any, pain related etc. For one of the conversational flow shown in the demo,

I have used COWIN API's to download certificates of users with their registered mobile number. This project being an integration example with complex platform s like telephony, am using only the free COWIN API's for which we need registered mobile number, OTP validation and Beneficiary ID etc.

This demo shows the capability of this integration which opens up a lot of other opportunities to integrate with apps like Whatsapp, telegram, SMS, Email, DeepLink etc.

Capabilities of CoVoice Bot

Following are the details of scenarios supported by CoVoice:

1 - Call Flow - Download vaccine certificate

Call Voice bot, select language, Intent identification, call DetectIntentStream api, respond with dialog flow cx bot response, enter 10 digit mobile number, 6 digit OTP sent by COWIN portal, enter 14 digit beneficiary ID (for security and also showing the capability of entering dtmf), get certificate on WhatsApp, get pdf, get Rich text message.

2 - Call Flow - Ask Questions in Hindi

Call voice bot, select language, intent identification, call DetectIntentStream api, respond with dialog flow cx bot response, enter 10 digit mobile number, receive PDF, images, more information, where the information to be played on call would not be good. The response here would be in Hindi.

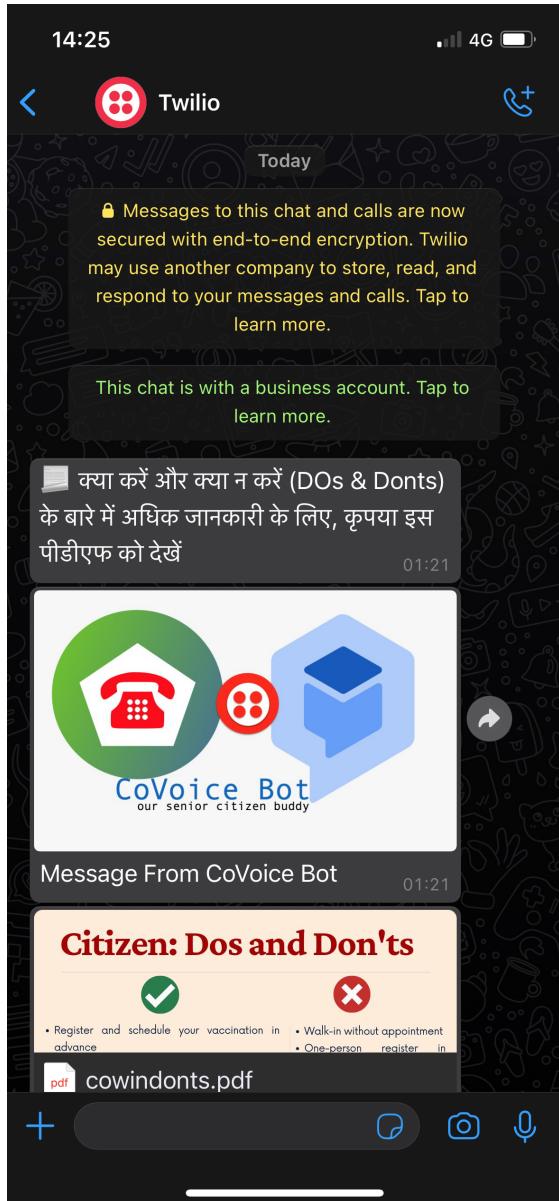
3 - Call flow - Ask Contact details or technical help on COWIN

Call voice bot, select language, intent identification, call DetectIntentStream api, respond with dialog flow cx bot response, enter 10 digit mobile number, receive PDF, images, more information, where the information to be played on call would not be good. The response here would be in English.

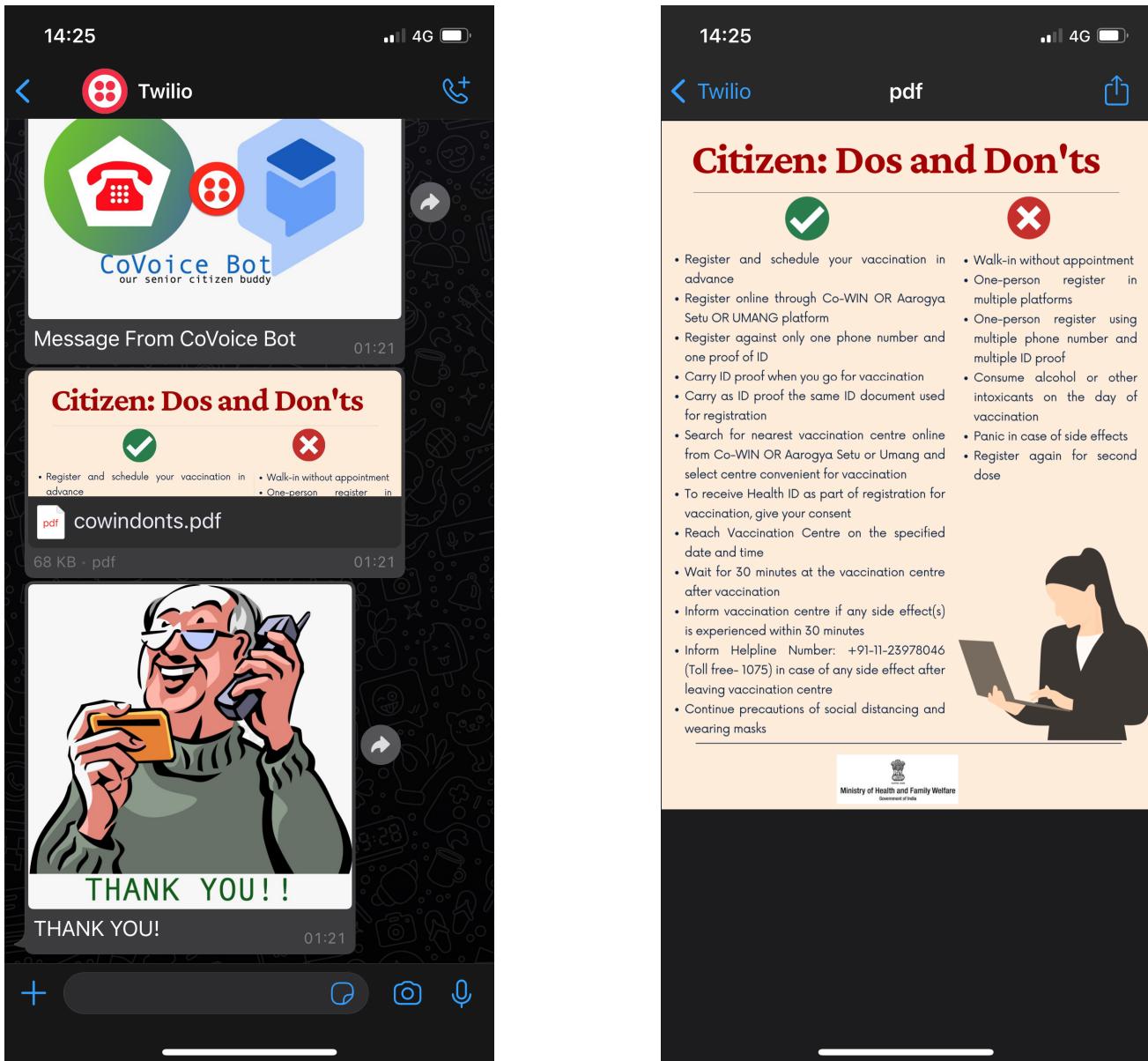
4 - Frequently Asked Questions.

Sample Conversation - In Pictures

Following are the snapshots of one of the use case where user asked help if user can be outside with friends in Hindi:



PDF sent by CovVoice in WhatsApp and PDF contents



Technical Architecture

Next we will talk about technical architecture of this Telephony Integration:

Github URL :

https://github.com/shivaprasadmohanrao/dfcx_telephony_integration

Technology Stack:

1. Java
2. Twilio

3. Google DialogFlow CX

4. WhatsApp

API's Used:

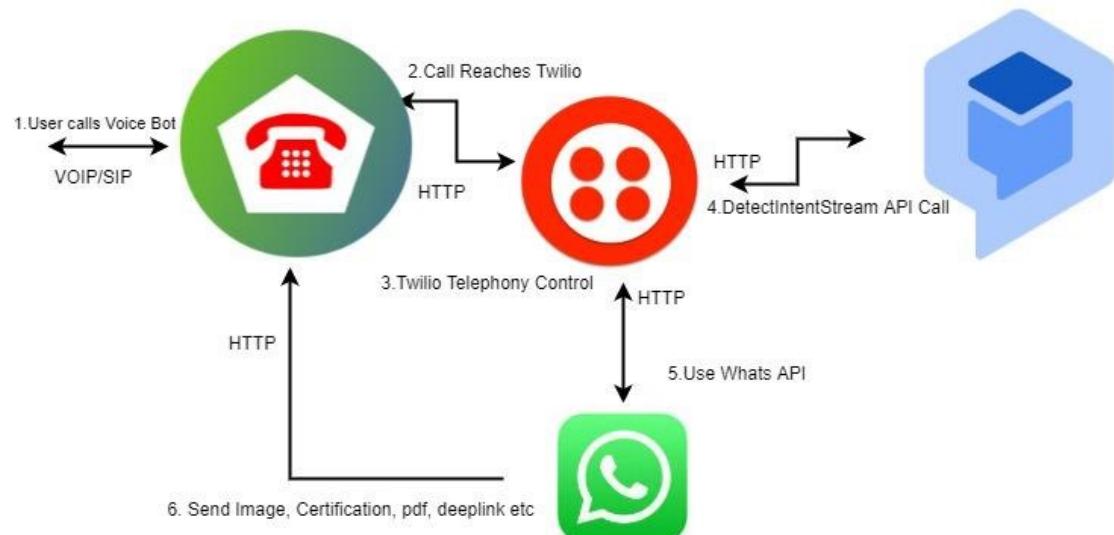
1. COWIN Portal - India Govt

2. Google DialogFlow CX - DetectIntentStream

3. WhatsApp API - Sending WhatsApp Messages

4. Twilio SDK - Voice Control

Primarily used Java-Spark to listen on port 4567 do call control. This application talks to Twilio for telephony control, talks to Google DialogFlow CX for intent recognition, talks to WhatsApp api through Twilio for sending the WhatsApp messages.



High Level Architecture Diagram of Integration

Execution Steps:

1. Clone the dialogflow-telephony-integration project in IDE.(https://github.com/shivaprasadmohanrao/dfcx_telephony_integration)
2. You will need to set an environment variable named GOOGLE_APPLICATION_CREDENTIALS in run configuration of the IDE. This will allow the java program running on your local to access the bot deployed in Google Dialogflow CX. Please see steps below:
 - a. If you are running in Eclipse, right click on TelephonyStart.java > Run As > Run Configurations... > Environment tab > New... > Set Name = GOOGLE_APPLICATION_CREDENTIALS > Set Value = Absolute path of dialogflow-cx-305201-7899257d6273.json file > Save > Apply > Close.
 - b. For IDEA, please check this.
3. Right click on TelephonyStart.java > Run As > Java Application. Application will start on port number 4567.

4. To reach the CoVoice bot, we need to map the application URL to a phone number in Twilio platform. For this webhook URL needs to be configured which should be a public URL.
5. We will publish `http://localhost:4567` as an external URL using ngrok. Download ngrok here. In `TelephonyStart.java` this variable must be changed "`static String ngrok_url`" to `ngrok url`, which is configured in the Twilio webhook.
6. In cmd or terminal run `./ngrok http 4567`. This will give you URL some thing like this `http://57b6-2401-4900-502b-523d-c845-c90d-b7a8-e87c.ngrok.io` or <https://57b6-2401-4900-502b-523d-c845-c90d-b7a8-e87c.ngrok.io>. This will allow your localhost web app running on port 4567 to be exposed to the outside internet world. Our Java web app continues to listen on port 4567, ngrok exposes the above url which will be mapped to `localhost:4567` url. This makes all the call control to be done on java web app (`TelephonyStart.java` to be very specific)
7. Login to Twilio console. Set the above URL for Voice webhook in Twilio for redirection so that when anyone calls the Twilio number, this URL will be hit.
8. To connect with CoVoice bot, dial `+1-443-960-7077` from your phone device. (under free version of Twilio i have got only US numbers, so this works only on US numbers)
9. Dial `+1-443-960-7077 -->` (Twilio Prompt for free version, skip by pressing any key) --> CoVoice Bot Welcome prompt --> Select language --> Ask question naturally from your preferred language --> Enter mobile number --> Enter OTP --> Enter beneficiary Id --> Receive vaccine certificate on whatsapp as pdf.
10. Sending Whatsapp message also need Twilio platform, so before testing this feature, have to enable Twilio Whatsapp sandbox and need to join by typing secret code from your whatsapp to Twilio whatsapp number(`+1-415-523-2018`) ex: join found-bradley. This will enable your whatsapp to receive messages from Twilio platform.

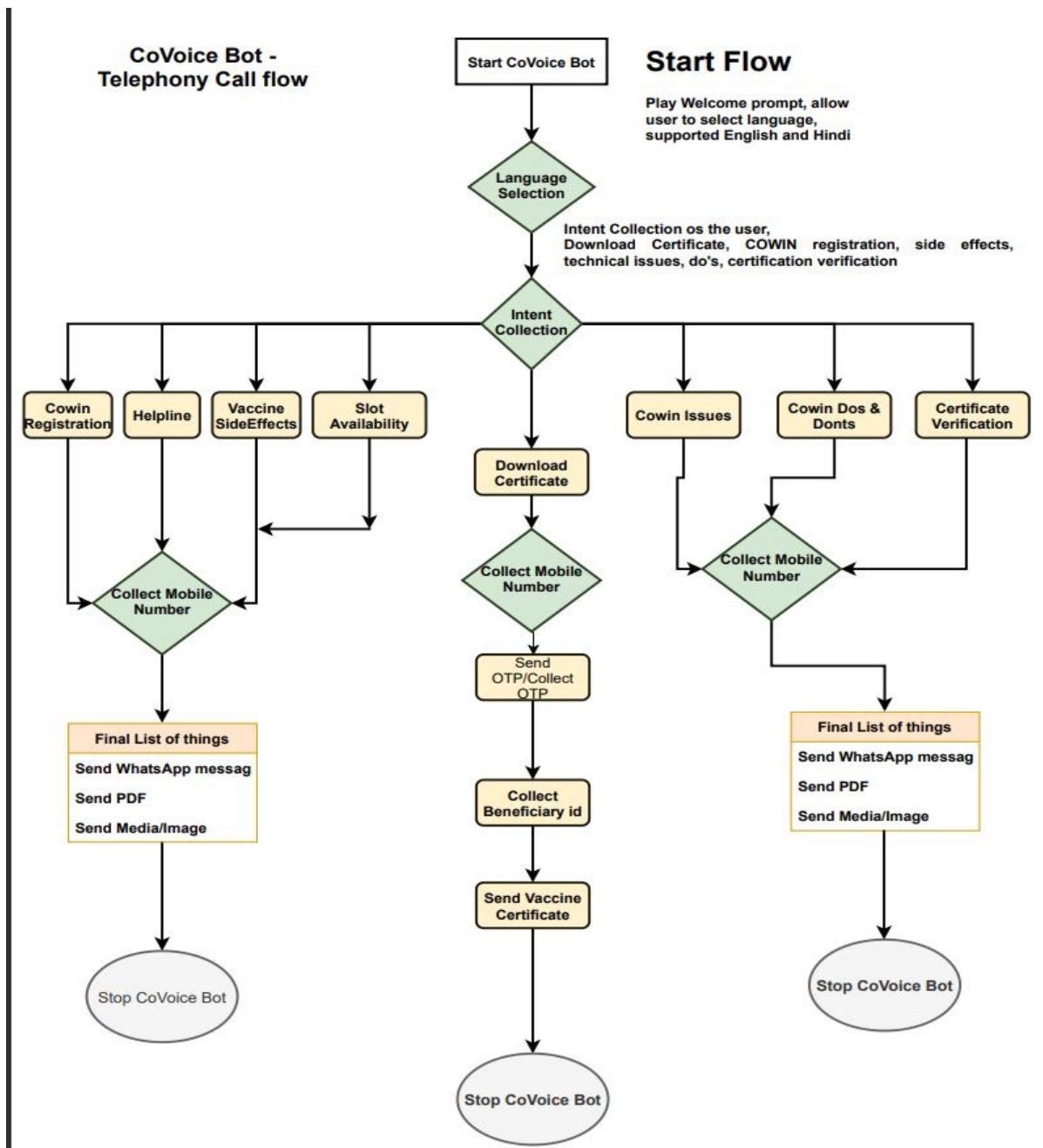
Capabilities Built as of Now

1. Receive call
2. Play Prompt
3. Gather user utterance - Voice input, DTMF input
4. Multi Channel - Telephony and Whatsapp(SMS)
5. Multi Lingual - English and Hindi Supported
6. Rich Media data exchange, PDF, JPEG, DeepLink etc

Future Possibilities

1. Many Other Languages - Simple to extend to other languages without much changes in the code(like Telugu, Tamil, French, Russian etc)
2. Call deflection - to other channel SMS, Whatsapp, Telegram etc
3. Deep Link with step by step help
4. Use cases like - Address Change, Name Change, Phone Number change, Aadhar update etc

Call Flow Diagram:



Demo Videos

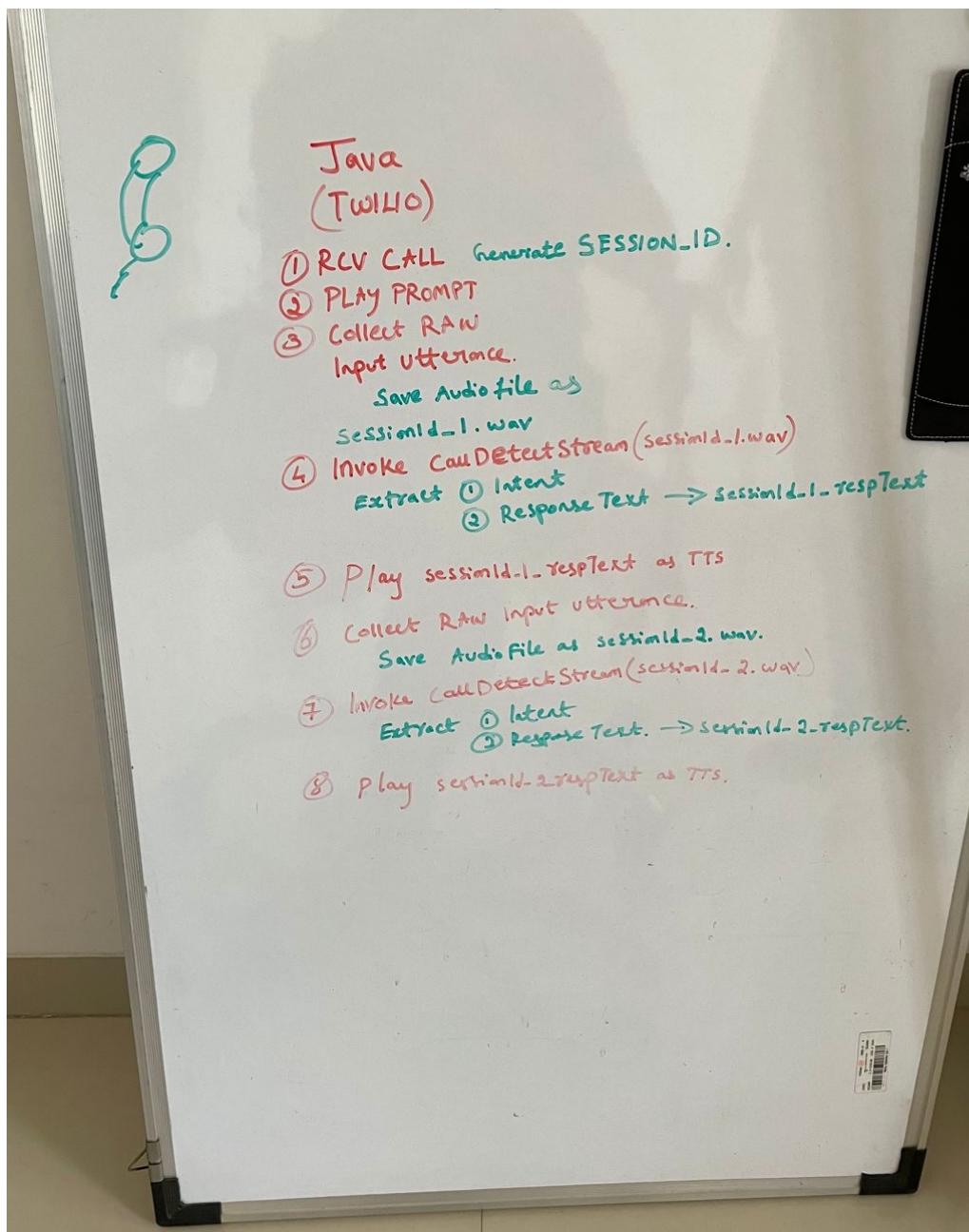
[DFCX TelephonyIntegration - Google Drive](#) for 4k/HD videos

(Please contact me at shivaprasad.mohanrao@gmail.com for access)

Or use the github link for low resolution videos:

https://github.com/shivaprasadmohanrao/dfcx_telephony_integration/tree/main/src/main/resources/CoVoiceBot-DemoVideos

Raw Telephony Integration Java - steps



For any other suggestions or issues please contact me on shivaprasad.mohanrao@gmail.com