Revolutionizing Customer Interactions: Developing an Augmented Reality Chatbot with Unity

[1]Mamuni Arya, [2]Sibabrata Mohanty, [3]Batalanki Srinavas Rao

[1]Professor & HoD, Department of Mechanical Engineering, GIET, Ghangapatana, Bhubaneswar
[2]Associate Professor, Department of Mechanical Engineering, GIET, Ghangapatana, Bhubaneswar
[3]Associate Professor, Department of Mechanical Engineering, GIET, Ghangapatana, Bhubaneswar
Email: mamuniarya@gietbbsr.edu.in, sibabratamohanty@gietbbsr.edu.in, bsrao@gietbbsr.edu.in

ABSTRACT: The Augmented Reality (AR) chatbot stands as a groundbreaking innovation engineered to initiate dialogues with humans through voice commands. In today's corporate realm, there's an overarching impetus to optimize operations and boost efficiency, ultimately driving profitability. The AR chatbot emerges as a pivotal advancement toward these goals by trimming down manpower requirements and curtailing human involvement.

Traditionally, websites functioned as conduits for directing users toward desired outcomes. Yet, contemporary client interactions demand more immersive and captivating experiences. Hence, our study endeavors to craft an Augmented Reality Chatbot utilizing Unity. Augmented Reality technology epitomizes a forefront breakthrough in the mobile domain, facilitating the superimposition of external data onto camera input and presenting results in an intuitive 3D format.

AR boasts diverse applications spanning education, navigation systems, tourism, gaming, and beyond. Our foremost objective is to devise a chatbot capable of engaging with humans in a manner akin to conversing with another individual, thus fostering heightened interactivity. By implementing this chatbot, organizations stand to efficiently accomplish their objectives with diminished dependence on human personnel.

1. INTRODUCTION

Augmented Reality, abbreviated as AR, defined as a real-time indirect or direct view of a physical existed real-world environment that has been amplified by addition of virtual computer-generated information. AR is both interactive in 3D and also it combines real and virtual objects. The main aim of Augmented Reality is to make the user life much better by bringing virtual information to his immediate surroundings, and also any indirect view of the real-world environment, such as live-football games and live video streams where different colour lines help the viewer having better understanding regarding important positions where players are located which results in change of perception. Augmented Reality improves the users view point and interaction with real world entities. Augmented Reality technology offers the user with both real and synthetic environment in which the virtual objects are added to the augmented reality user perception in real time in such way that it provides the user a better understanding of real world environment.

2. BACKGROUND AND RELATED WORK

One should probably need to get a reference to the Android app context if your plugin is going to do anything interesting. You can do this by adding the classes.jar file from your Unity install to your Android project as a library. So go to file project structure and then choose the dependencies tab for the app module. Here you can click the plus button to add the jar file. Go to your Unity build, playback engines, android player, variations, mono, development, classes, and finally classes.jar. Change the scope to compile only. Now, in a new java file you can do Unity Player. Current Activity. Get Application Context (); and use that reference where ever you need it.

Our project comprises of 3 fragments. First part describes the creation of pandabot in unity. Second part tells off how we added voice plugin in Android Studio. At last we are generating APK.

Our background related work is as follows:

1. Download Unity 2019.3.11f1.
2. Download java version 1.8.0_291 and add

path to environment variables.

3. Download Android Studio and updated GradleWrapper.
4. If there is no SDK manager in Android Studio, then we have to download the SDK manager packages in Android Studio by opening Android Studio->Settings->SDK.
5. Set SDK manager and JDK path in unity and it should match with Android Studio's SDK manager and JDK path.
6. If JDK path present in unity doesn't match with JDK path present in Android Studio,we have to change the following settings in Unity: Edit->Preferences->External tools->SDK path.
7. To build the project in Unity: open File-> build Settings->platform(Android)->build.
8. Store the generated APK in required location.

Natural Language Processing (NLP):

Natural Language Understanding: Natural languages are similar to human languages such as English. In this Section we make the computer to understand the English. Which allows non program mess to use them with little training.

Natural Language Generation: Natural Language Generation means making the computer to generate natural languages. It is much easier than previous process i.e. Natural Language Understanding.

Machine Translation: Computer generate a text written in one language into another language is called as machine translation. It is important for organization that operates in many countries.

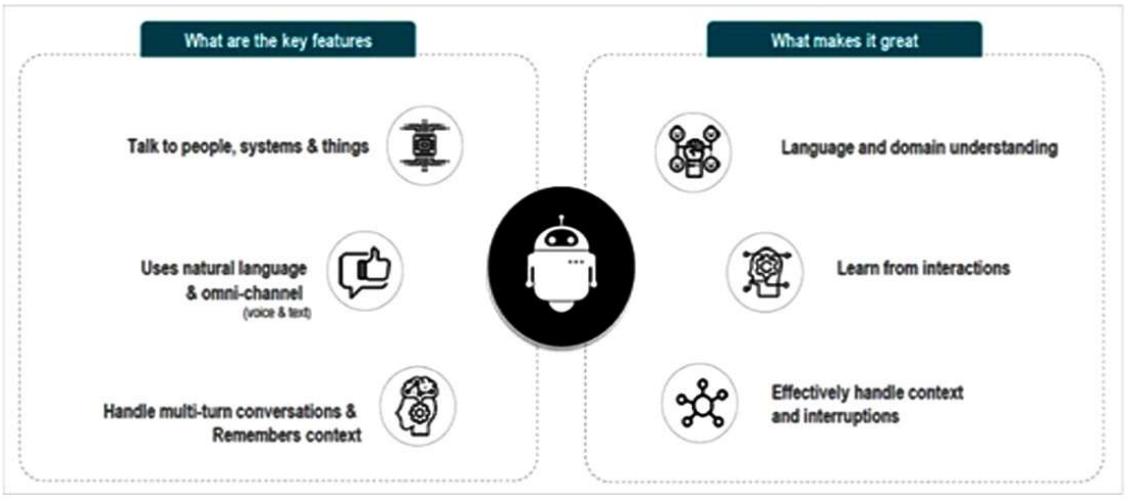

Figure-1: Features of Natural Language Processing

Workflow of system:

When user leaves an audio message, the message is forwarded for process and audio output to query is displayed on the screen

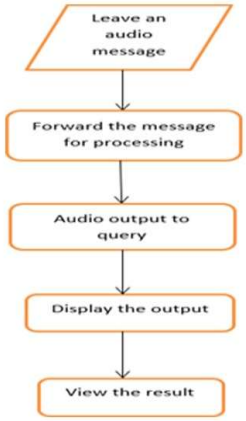

Figure-2: Workflow of system

3. PROPOSED MODEL

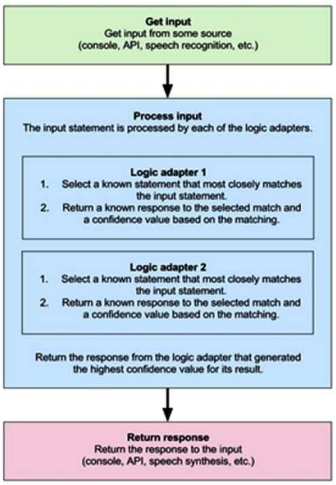

Figure-3: Flowchart of our proposed model

In our proposed model, we use technologies like AI natural language processing, Augmented reality and more robust network connectivity are opening up a new dimension for today's traditional robotic voice based chatbots. This proposed model can create a chatbot which interact with humans like there is another human talking to him and to increase interaction. The flow of our proposed model is as follows:

1. Our pandabot/chatbot takes the input as audio message from user.
2. Later the message is sent to voice messenger for processing and passed to API chatbot.
3. The message is processed in AI natural language processing.
4. The output is extracted entities and intents to chatbot.
5. The output comprises audio output to message and message sent to messenger.
6. Ultimately the result is displayed & viewed by the user.

Limitations:

1. Personalized answers
2. Standards regarding Augmented Reality App Design & Development is limited
3. The technological gap between AR devices and smartphones so we have to design full pledged AR gear.
4. In Augmented Reality we have to deal with Ethical and Legal Issues.
5. Considering that the majority of the users are not interested to purchase AR gear because it not practical and high prices.

4. EXISTING MODEL

Technology has developed day by day ensuring that every client gets nothing less of their expectations. Chatbots are developed day by day we have many versions of chatbots for a while now. But it is the only recent glows up technology to become the power house. With the help of chatbots we get more profits in the section of E-commerce and the main reason for this is they are always available i.e 24/7 and also due to influence of Machine Learning, the bot can understand more and can do more in return.

In Future chatbots was all cemented when social media giant Facebook ventured into the territories. With more than 2 billion users in a monthly span, there incorporation of service branded chatbots into their platform was huge game changer. With a proper application of Strategy, this business should leverage Facebooks numbers and turn them into conversations. So, we developed Voice based panda chatbot for more methodical experiences and refreshing conversations to make it as user friendly.

5. EXPERIMENTAL SETUP

In this section, we describe all the elements used in the experiment to explore our proposed model approach in Augmented Reality Chatbot Using Unity.

4.1 Unity: Unity3D is a powerful cross-platform 3D engine and a user friendly development environment. Easy enough for the beginner and powerful enough for the expert; Unity should interest anybody who wants to easily create 3D games and applications for mobile, desktop, the web, and consoles.

Using Unity version of 2019.3.11f1 we are creating pandabot. We can only view the movement of panda when we click on play button. Here we have created two button that is AR and Exit. When you open the mobile app, Panda speaks and displays text like this ‘Hi, I am AR Chatbot, Please speak something!’

Figure-4: Creating panda using Unity

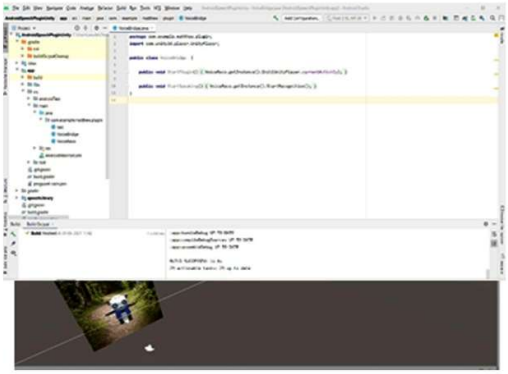

Figure-5: Scene View f Mobile

4.2 Android Studio: Android Studio is the official integrated development environment (IDE) for Android application development. It is based on the IntelliJ IDEA, a Java integrated development environment for software, and incorporates its code editing and developer tools. In Android Studio, We are adding Voice Recognition. Adding Jar file as dependency to the android studio. Voice Recognition is established.

Figure-6: Voice Plugin Build Successful in Android Studio

Generating APK: After Adding Jar file in Android Studio, we have to generate apk**.** Signed apk generates a key and this key can be used to release versions of the app, so it is important to save this key which will be used when the next version of the app is released. The android system needs all installed applications be digitally signed with a certificate whose private key is owned by application's developer. Android system applies the certificate as a means of recognizing a author of an application and establishing trust relations between applications. The essential points to understand about signing Android applications are:

- When developers are ready to publish the android application for end-users, they are required to sign it with suitable private key. They can't publish an application that is signed with the debug key generated by the SDK tools.
- Applications can only be installed when they are signed. Android does not allow unsigned applications to get installed.
- Developers can apply self-signed certificates to sign the application. No certificate authority is required.
- To test and debug the application, the build tools sign the application with a special debug key that is created by the Android SDK build tools.

Importance of Signed APK

- **Application Modularity:** The applications signed by same process are recognized as a single application and are allowed to run on the same process. This allows the developers to make the application in modules and so users can update each module independently.
- **Application Upgrade:** To update the application, the updates must be signed with the same certificates. When the system is installing update to application, it relates the certificate in the new version with those in the actual version. If the certificates match correctly, including both the certificate data and order, then the system releases the update. If we sign the new version without using matching certificates, we need to attach an different package name to the application and in this case, the user installs the new version as a completely new application.

6. EXPERIMENTAL RESULTS

This section specifies the results obtained by conducting the experiment. We depict the testing results on various conditions.

5.1 Test case 1: Surface Identification

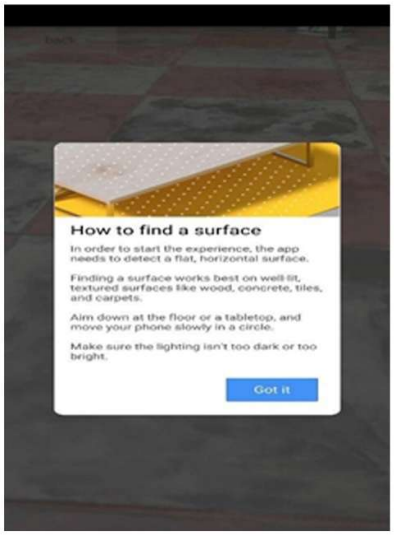

Figure-7: Surface Identification

From the above figures, when you open AR it asks for move your phone for surface identification. If still unable to find surface, then a popup is displayed to guide the user.

5.2 Test case 2: Identifying Surface

Figure-8: Identifying Surface

In the above figure, camera identifies surface and it creates a virtual base for panda to display it.

5.3 Test case 3: Virtual Image Created On Surface

Figure-9: Virtual Image

In the above figure, a virtual image is created on surface and introduce itself as “Hi Iam Pandabot. .How Can I Help You ?”.And it Listens to your command and respond according to your question.

5.4 Test case 4: Quick Responses and Displaying Text

Figure-10: Quick Responses and Displaying text Above picture tells how panda responds to user questions and displaying output.

5.5 Test case 5: Without Augmented Reality

Figure-11: Without Augmented Reality

When user is unable to open AR then Pandabot is displayed with a default background and responds according to user.

7. CONCLUSION

This thesis delves into the implementation and evaluation of an assistive application designed to aid users in conversational scenarios. The principal contributions of this study encompass the development of an Augmented Reality (AR) mobile application and the validation of its efficacy through user testing. Furthermore, the research elucidates the configuration of a remote and scalable speech recognition server, leveraging existing open-source software to alleviate the computational burden associated with modern automatic speech recognition—a challenge particularly pertinent to mobile devices.

User testing sessions were conducted following a similar protocol to previous studies, wherein simulated one-on-one conversations took place in a noisy and acoustically challenging environment, facilitated by background noise recordings. The primary objective of these tests was to ascertain user preferences between the AR approach proposed in this study and a text-only version akin to prior research endeavors.

The findings revealed a preference among most users for the AR version, primarily due to its facilitation of lip reading. However, a subset of participants expressed a preference for the text-only version, while others found it difficult to choose between the two approaches. Consequently, it was concluded that the optimal system would incorporate elements from both versions, thereby catering to the diverse preferences and needs of users.

Future Scope:

In the dynamic arena of e-commerce, the fusion of Augmented Reality (AR) capabilities with chatbot interfaces offers a captivating avenue for enriching customer interactions and tailoring shopping experiences. As online retail continues its exponential expansion, enterprises are compelled to transcend conventional engagement methods to provide unmatched purchasing journeys. A burgeoning movement in this domain involves integrating AR functionalities into customer-centric chatbots. Modern consumers have become accustomed to utilizing chatbots for inquiries and transactions, thus integrating AR represents a seamless progression in this sphere. By infusing Augmented Reality into the equation, businesses unveil a new dimension of immersive shopping encounters. Consumers can now envisage products within their own surroundings, engage with virtual demonstrations, and preview items before committing to a purchase. This convergence of AR and chatbot technologies not only heightens engagement levels but also empowers customers to curate their shopping voyage according to their preferences. In the race to maintain a competitive edge within the market, embracing this innovative trend ensures that enterprises harness the complete potential of AR Chatbots to deliver unparalleled customer experiences.

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