A Project Report

on

AI Based Virtual Interactive Host using Cloud

Submitted in partial fulfillment of the
requirement for the award of the degree of

Bachelor's of Technology in Computer Science

GALGOTIAS UNIVERSITY

(Established under Galgotias University Uttar Pradesh Act No. 14 of 2011)

Under The Supervision of
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CANDIDATE'S DECLARATION

We hereby certify that the work which is being presented in the thesis/project/dissertation, entitled **"AI based Virtual Interactive Host using cloud"** in partial fulfillment of the requirements for the award of the B.tech submitted in the School of Computing Science and Engineering of Galgotias University, Greater Noida, is an original work carried out during the period of month, Year to Month and Year, under the supervision of **Dr.Shrddha Sagar** Designation, Department of Computer Science and Engineering/Computer Application and Information and Science, of School of Computing Science and Engineering , Galgotias University, Greater Noida

   The matter presented in the thesis/project/dissertation has not been submitted by me/us for the award of any other degree of this or any other places.

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This is to certify that the above statement made by the candidates is correct to the best of my knowledge.

<div align="right">

Dr.Shrddha Sagar

</div>

CERTIFICATE

The Final Thesis/Project/ Dissertation Viva-Voce examination of

Mayank Kumar (18SCSE1050014), Madhav Pandey (18SCSE1010611) has been held on

_____ and his/her work is recommended for the award of B.tech

Signature of Examiner(s)   **Signature of Supervisor(s)**

Signature of Project Coordinator   **Signature of Dean**

Date: November 2021

Place: Greater Noida

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This Project could not be possible without the joint effort and assistance of many people and things that I would like to acknowledge and mention in this paper. One of the people that made difference in bringing the best out of what can be done in documenting the idea intended to be shared with this the help of this project, was our guide **Dr. Shrddha Sagar** ma'am. Her guidance throughout helped us shaping the project according to the intended need. Our peers also were one of the key factors that supported throughout while development of this research paper. Our University and its program also supported us while we were engaged in development of this paper. At last and certainly not the least of the list, I would like to thank almighty who have provided for the things that were needed and the collaboration of these things whose alignment was made possible for what was once was just a fragment of imagination into intended reality.

Abstract

Existing Problem

In today's modern world there are many languages. When we go outside the native place. We might get confused about finding a restaurant, cinema or any tourism place. The condition even gets worse in emergency situations. So we should find a solution that helps us in that situation. And that to should be reliable and easy to use.

Proposed Solution

we are introducing a 3D Augmented Reality(AR) Virtual Scout. This application is a mixture of real-life and Computer Generated surroundings. When you look around from your Camera then this application adds Virtual characters (AI Bot) in augmented reality. This character work as a guide.

Tools and Technology Used

In this, we using Amazon Sumerian and deploy it into any android mobile. We will take the help of Amazon Cognito, Amazon Polly, the AWS SDK for java, and ARCore SDK for Android. We'll build a foundation for creating an immersive 3D environment and application for end-use.

Results and output

AI based Virtual Interactive Host using Cloud will help in solving daily to daily life problems. And is very easy to use. If anyone wants to talk, translate in a foreign language. This will help in translating to their native language. This AI will help us in finding many good restaurants, hotels, tourist places with high ratings. It will call SOS while in panic mode

Conclusion and Future Scope

The Project at last can be concluded to be one of the revolutionary application in the field of tourism and navigation sphere making use of the advance technology of augmented reality and virtual vector space creation. The paper concludes the effectiveness of the advance technology of augmented reality and virtual reality in view of creation interactive scout for navigation etc. The paper is made in view of displaying the design of the application and its effectiveness in full stretch and how it can be modified according to usage and requirement of the proposed project. The application is in demo phase but all the factors regarding the future potential are tried to be included and provide information anyone interested in the scope and scalability of the concept used and application of the project practically.

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CHAPTER-1

Introduction

AI based Virtual Interactive Host using Cloud will help in solving daily to daily life problems. And is very easy to use. If anyone wants to talk, translate in a foreign language. This will help in translating to their native language. This AI will help us in finding many good restaurants, hotels, tourist places with high ratings. It will call SOS while in panic mode. In this, we using Amazon Sumerian and deploy it into any android mobile. We will take the help of Amazon Cognito, Amazon Polly, the AWS SDK for java, and ARCore SDK for Android. We'll build a foundation for creating an immersive 3D environment and application for end-user So, we are introducing a 3D Augmented Reality(AR) Virtual Scout. This application is a mixture of real-life and Computer Generated surroundings. When you look around from your Camera then this application adds Virtual characters (AI Bot) in augmented reality. This character work as a guide.

The basis of augmented reality is adding layers of information atop of an already existing physical environment. A retailer can showcase their goods in a more productive way which will involve showing the client how a particular product will fit and not just telling them. With augmented reality in the mix, clients can see items more clearly and realistically.When customers want to make a purchase, they want to do so while being as informed as possible. What augmented reality does is to bring this possibility to life. For example, in a store that specializes in makeup and beauty products, augmented reality infused into a chatbot would be incredibly useful in determining whether certain products are right for a client. By implementing such a feature into a chatbot, the client will make a more informed

decision. This means the possibility of return orders will drastically reduce, eventually increasing your profit margins.

In business, sentimentality is often equal to sales. The more sentimental a customer is towards something, the more likely they will purchase it. The same can be reiterated when it comes to combining augmented reality with chatbots. Since most chatbots run on artificial intelligence, they understand questions better. Coupling it with AR means that the customer will have a unique experience when shuffling through the various items as suggested by the bot. Since the experience is expected to be informative and smooth, it's highly likely that the customer will spread the word regarding their experience, hence more clients for the business.

When properly combined and implemented, augmented reality with chatbots could mean a lot for many businesses especially in the retail sector. Proper implementation will result in a great experience for the client on your online store, which translates to more revenues for the business.

Formulation of Problem

Travelling to a new place could possess various barrier that could hamper the travelling experience. Barriers that can possess discomfort namely a few could be language, geographical location and cultural difference. We have proposed interactive virtual tool to overcome and come through these barriers. Whenever one goes to a new place, everything to him is alien and when language of a place is also the part of the problem that even ads to discomfort. Navigating and being to new places becomes a nightmare if one is not well prepared. They face various problems and need to heavily depend guide and other system for tourist which are well known for fraudulent behavior. Hence it becomes imperative to use the help of technology to bridge the gap caused by language and geographical and cultural difference.When we go outside the native place. We might get confused about finding a restaurant, cinema or any tourism place. The condition even gets worse in emergency situations. So we should find a solution that helps us in that situation. And that to should be reliable and easy to use.

Tool and Technology Used

- **Amazon Cloud Service**

  AWS (Amazon Web Services) is a comprehensive, evolving <u>cloud computing</u> platform provided by Amazon that includes a mixture of infrastructure as a service (<u>IaaS</u>), platform as a service (<u>PaaS</u>) and packaged software as a service (<u>SaaS</u>) offerings. AWS services <u>can offer an organization tools</u> such as compute power, database storage and content delivery services.

- **Amazon Sumerican**

  Amazon Sumerian is a managed service and set of tools for creating augmented reality (AR) and virtual reality (VR).Creating interactive 3D, virtual reality (VR) and augmented reality (AR) experiences used to mean that you needed a team of programmers, special expertise and a lot of time.

- **Amazon Polly**

  Amazon Polly is a text-to-speech service within the Amazon Web Services cloud platform. It uses deep learning technology.Amazon Polly is a service that turns text into lifelike speech. With <u>dozens of voices</u> across a variety of languages, you can select the ideal voice and build engaging speech-enabled applications that work in many different countries.

- **Amazon Cognito**

  Amazon Cognito is an Amazon Web Services product that controls user authentication and access for mobile applications on internet-connected devices.

The service saves and synchronizes end-user data, which enables an application developer to focus on writing code instead of building and managing the back-end infrastructure. This can accelerate the mobile application development process. Access control via authentication and authorization requires confirming two things: the identity of the person trying to access the device or website, and if they are actually allowed to do so. Both aspects are critical in ensuring that organizations can keep their networks and protected resources secure from bad actors. Here is where Amazon Cognito comes in.

- **AWS SDK for java**

    The AWS SDK for Java simplifies use of AWS Services by providing a set of libraries that are consistent and familiar for Java developers. It provides support for API lifecycle consideration such as credential management, retries, data marshaling, and serialization. The AWS SDK for Java also supports higher level abstractions for simplified development. Visit GitHub to see AWS-focused open source Java libraries.

- **Android SDK**

    The Android SDK (software development kit) is a set of development tools used to develop applications for the Android platform that has become Apple's biggest rival in the smartphone space.

- **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.

To support application development within the Android operating system, Android Studio uses a Gradle-based build system, emulator, code templates, and Github integration. Every project in Android Studio has one or more modalities with source code and resource files. These modalities include Android app modules, Library modules, and Google App Engine modules.

Android Studio uses an Instant Push feature to push code and resource changes to a running application. A code editor assists the developer with writing code and offering code completion, refraction, and analysis. Applications built in Android Studio are then compiled into the APK format for submission to the Google Play Store.

CHAPTER-2

Literature Survey

Swan and Gabbard (2005) conducted the first complete study of AR user studies, building on the research provided i. They looked at 1,104 AR publications published between 1992 and 2004 in four major venues; just 21 of these papers conducted formal user studies. These user study studies were divided into three categories: (1) low-level perceptual and cognitive difficulties including depth perception, (2) interaction strategies like virtual object manipulation, and (3) collaborative activities. Dünser et al. (2008) conducted the next extensive survey, which uncovered 165 AR-related articles reporting user studies using a set of search terms across multiple common bibliographic databases. They grouped the studies based on user study methodologies such as objective, subjective, qualitative, and informal, in addition to the classifications Swan and Gabbard (2005) assigned to them. Bai and Blackwell (2012) analysed 71 articles in another literature review. They only looked at AR papers that reported on user studies that were published in the International Symposium on Mixed and Augmented Reality (ISMAR) between 2001 and 2010. They followed Swan and Gabbard's (2005) classification, but they also identified a new category of studies that looked into user experience (UX) difficulties. The evaluation goals, performance measurements, UX elements evaluated, and measuring equipment utilised were all detailed in their report. They also looked at the demographics of the participants in the research. However, no thorough analysis has been published since 2010, and none of the previous studies employed an impact measure to assess the significance of the publications examined.

A . Survey on AR Research

Some academics have also written review articles about certain types of user studies. Kruijff et al. (2010), for example, looked at AR publications that focused on the perceptual pipeline and found issues related to the environment, capture, augmentation, display technology, and the user. In the AR X-ray vision domain, Livingston et al. (2013) provided a review of user studies. As a result, their analysis focused on perceptual studies in a specific AR application area. Finally, Rankohi and Waugh (2013) analysed AR studies in the construction industry, including articles that did not include user studies. Many additional AR articles, such as Wang et al. (2013), Carmigniani et al. (2011), and Papagiannakis et al. (2012), have incorporated literature reviews that may include a few related user studies (2008).

B.Contribution and Creativity

The number of times these reviews have been cited by the scientific community (for example, Dünser et al., 2008 has 166 Google Scholar citations). However, a more recent evaluation is required due to a number of circumstances. To begin with, while early AR research focused mostly on head-mounted displays (HMDs), the use of handheld AR devices has exploded in recent years, and more complex hardware and sensors have become accessible. These new wearable and mobile technologies have spawned new research avenues, which have most likely influenced the categories and methodologies utilised in AR user research. In addition, the AR field has grown in recent years, resulting in a significant increase in the number of published AR articles, as well as papers containing user studies.

As a result, a new category of current AR user research is required, as well as the chance to examine new classification metrics such as paper impact, as assessing all published articles has become less feasible. Finally, because AR articles are now appearing in a larger number of academic settings, a survey that covers a wide range of journals and conferences is essential.

A. New Contribution

There are several significant variations between the current survey and previous reviews, including:

• We looked at a greater number of papers from a variety of sources.

• Compared to previous surveys, our analysis covers more recent years.

• We used paper impact to assist us sort through the papers we looked at.

• We take into account a broader range of classification categories.

• We also look at difficulties that users have had.

Project Design
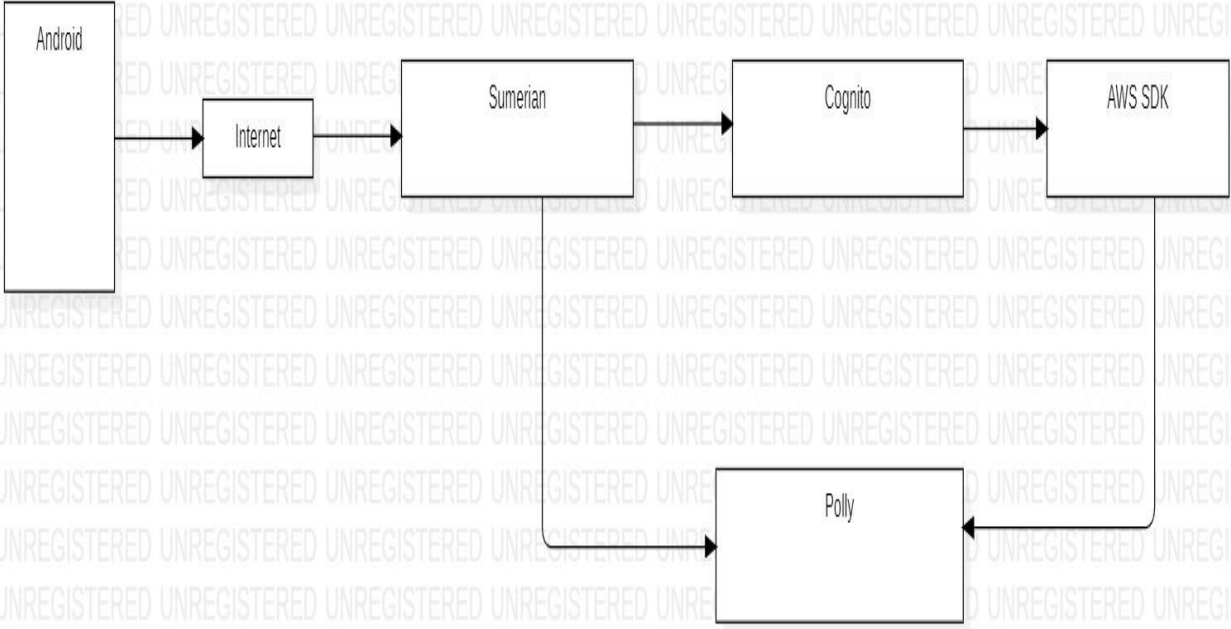
Fig No-1 Project Data Flow Diagram

CHAPTER-3

Functionality/Working of Project

AWS has the most extensive global cloud infrastructure. No other cloud provider offers as many Regions with multiple Availability Zones connected by low latency, high throughput, and highly redundant networking. AWS has 81 Availability Zones within 25 geographic regions around the world, and has announced plans for 27 more Availability Zones and 9 more AWS Regions in Australia, Canada, India, Indonesia, Israel, New Zealand, Spain, Switzerland, and United Arab Emirates (UAE). The AWS Region and Availability Zone model has been recognized by Gartner as the recommended approach for running enterprise applications that require high availability.

• AWS is a secure cloud platform that offers a broad set of global cloud-based products.

•AWS provides you with on-demand access to compute, storage, network, database, and other IT resources and management tools.

• AWS offers flexibility.

•You pay only for the individual services you need, for as long as you use them.

• AWS services work together like building blocks.

First Create an AWS Account.
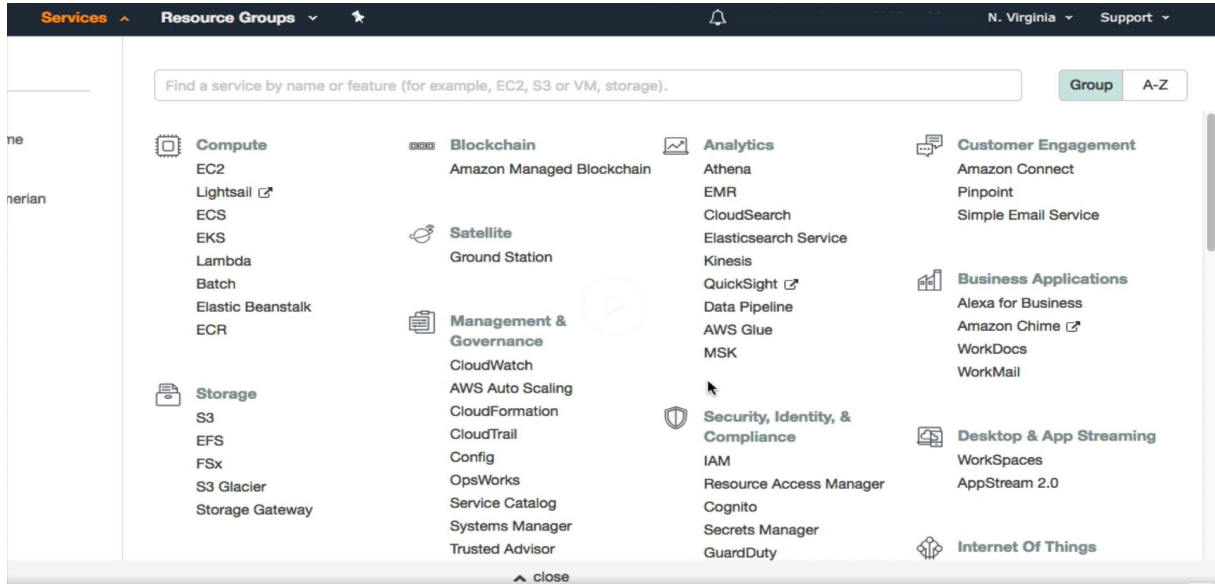
Fig No-2 Main Dashboard of AWS

And you can see the console of AWS in the image.first select any region like N.Virginia for cognito and sumerian.
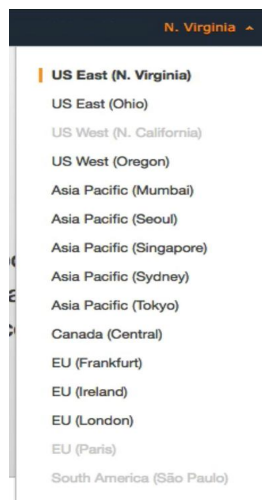
Fig No-3 Select the Region

After that go to search option and then search cognito in search box. This will take you to the Cognito Dashboard and click on Manage identity Pools
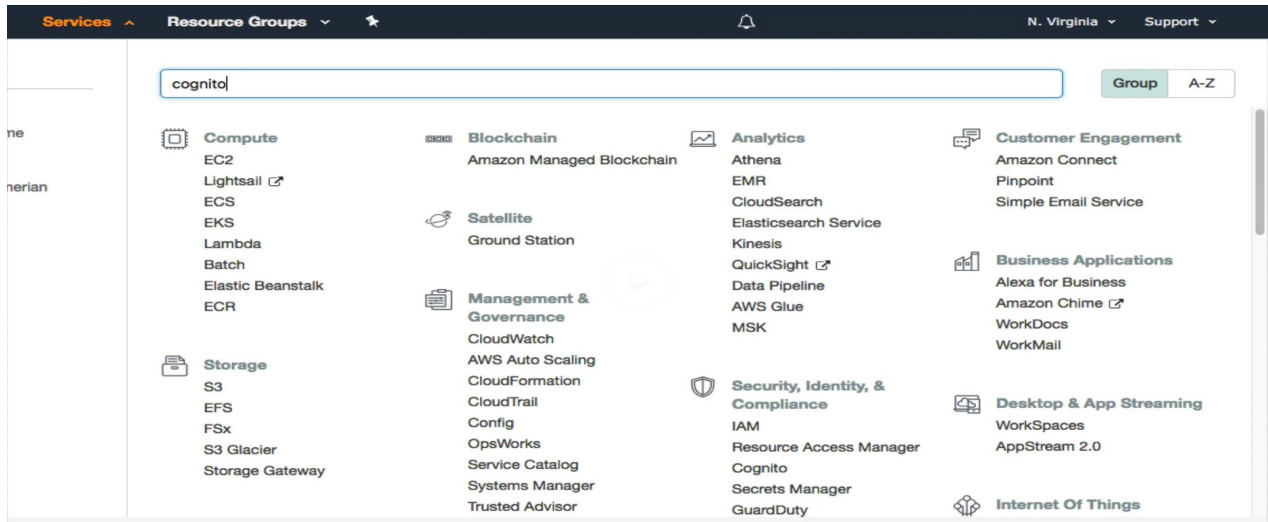

Fig No-4 Open Amazon Cognito

Amazon Cognito

Amazon Cognito provides authentication, authorization, and user management for your web and mobile apps. Your users can sign in directly with a user name and password, or through a third party such as Facebook, Amazon, Google or Apple.The two main components of Amazon Cognito are user pools and identity pools. User pools are user directories that provide sign-up and sign-in options for your app users. Identity pools enable you to grant your users access to other AWS services. You can use identity pools and user pools separately or together.

Click on Manage identity Pools
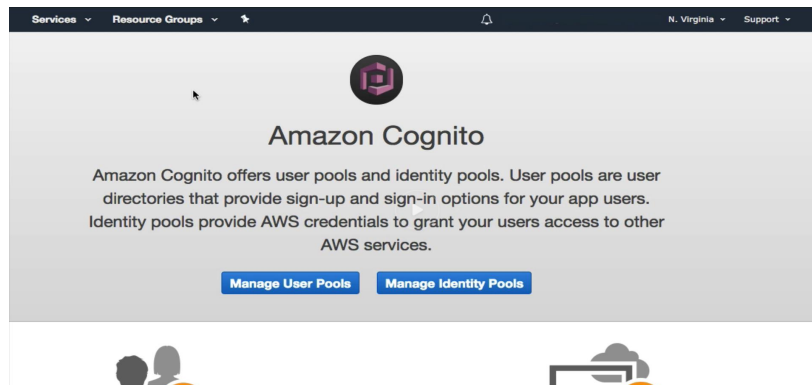
Fig No-5 Main Console of Cognito
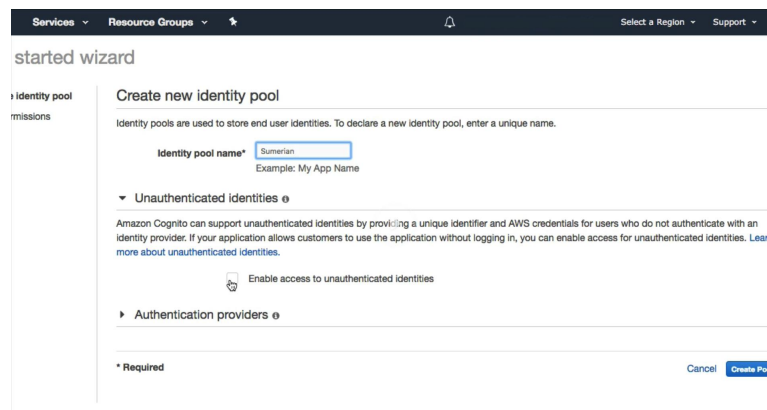
Fig No-6 Create your identity pool name

Name the Identity pool like we named it Sumerian.Enable access to unauthenticated identities and Create a Pool.Your Cognito Identities require access to your resources Assigning a role to your application end users helps you restrict access to your AWS resources. Amazon Cognito integrates with Identity and Access Management (AM) and lets you select specific roles for both your authenticated and unauthenticated identities. Learn more about IAM.

By default, Amazon Cognito creates a new role with limited permissions - end users only have access to Cognito Sync and Mobile Analytics. You can modify the roles if your application needs access to other AWS resources, such as $3 or DynamoDB.

● After this you will reach to the Final page as you can see in the image cognito Identity pool
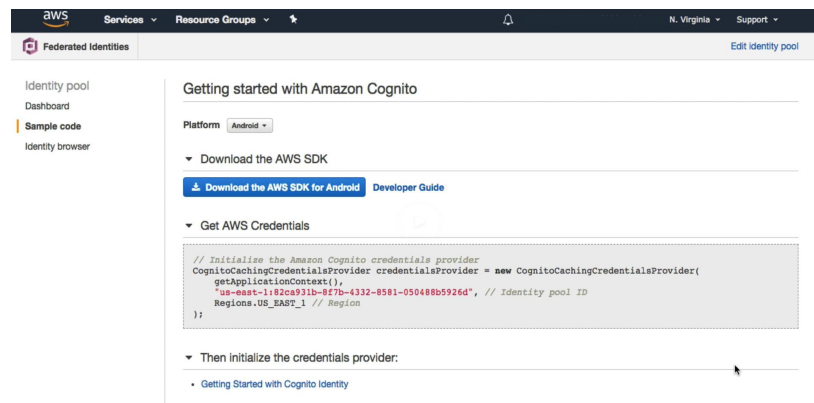
Fig no-7 Reach to the final Page

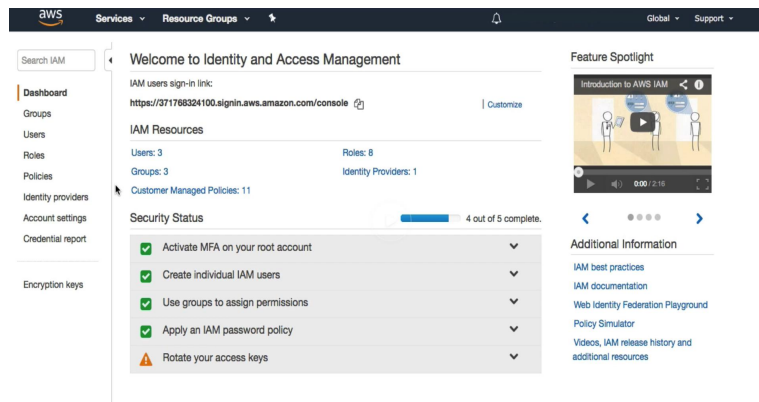● Next go to search option and then search IAM in search box. This will take you to the IAM Dashboard

Fig no-8 open Iam console

- Click on the Roles on the left corner.

- And type Sumerian in the search
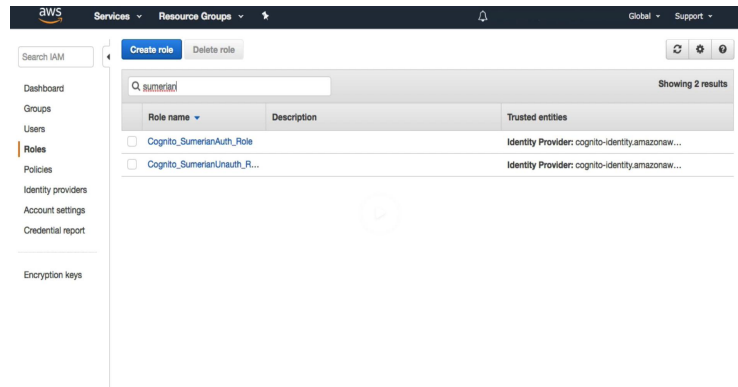
Fig no-9 Search sumerian

- And click on the Cognito_sumerianunauth_role and click on it
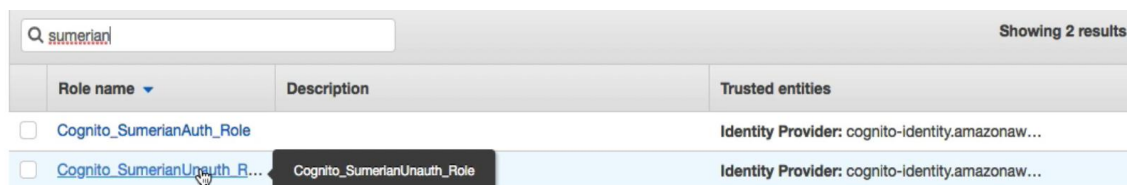

Fig no-10 Select Sumerianunauth
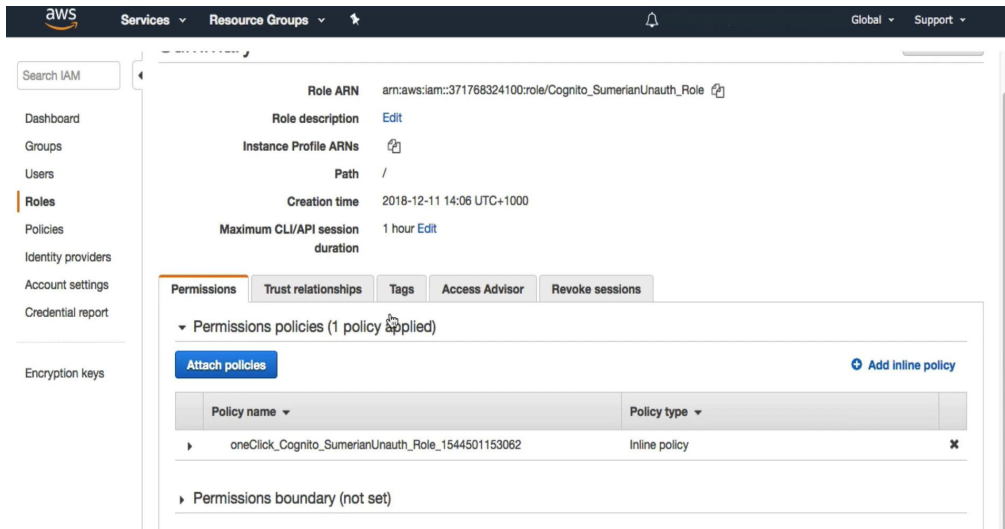
- Click Attach Policies

Fig no-11 Attach Polly

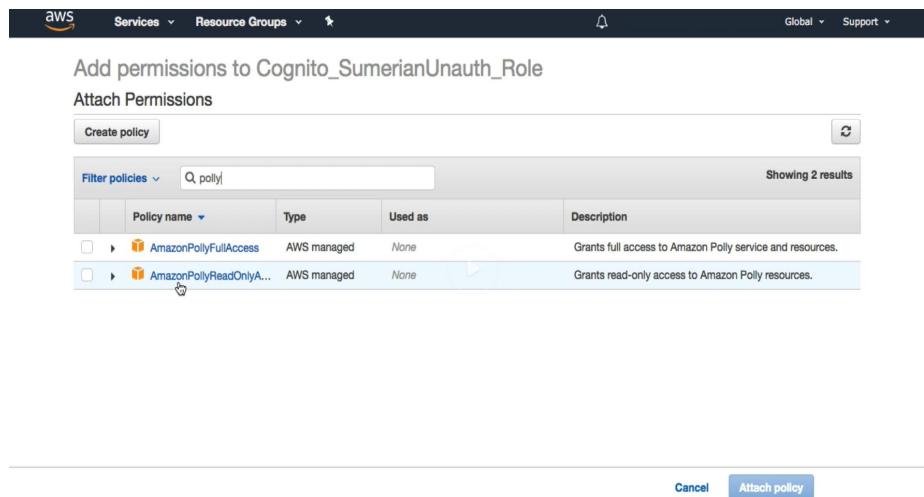- Search polly in search and click on AmazonPollyReadOnly and Attach Policy.

Fig no-12 Select PollyReadonly

- Now we are successfully done Policy AmazonPollyReadOnlyAccess has been attached for the Cognito_SumerianUnauth_Role.

Amazon Sumerian, there is no licensing fee to design and edit your augmented reality (AR) and virtual reality (VR) applications. Instead, you are charged based on the amount of storage used for the 3D assets in Sumerian and the volume of traffic generated by your scene during editing and when viewing your published scene. You also pay for the costs of any other AWS services, like Amazon Lex and Amazon Polly, that your Sumerian Host.

Now we building Sumerian. Search Sumerian in Search box.
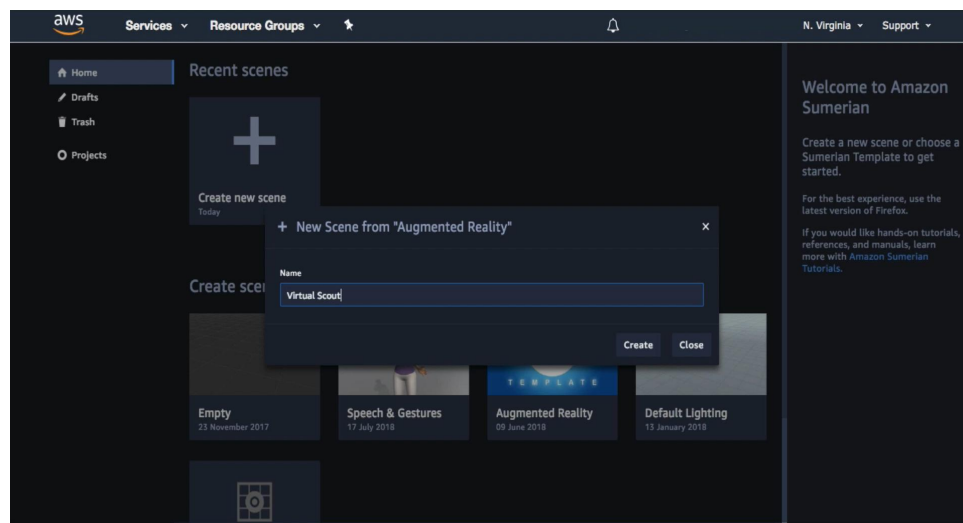When we reach to Sumerian dashboard. Create and name it.

Fig no-13 Open Amazon Sumerian

● Click on Import Assets and implement a 3D characters select one.
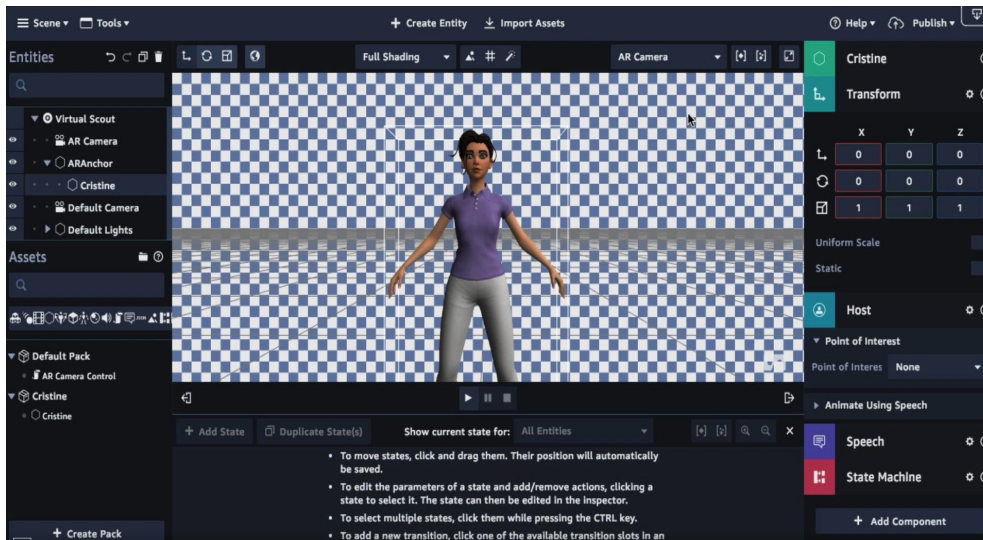
Fig no-14 Amazon Sumerian Dash board

• To move states, click and drag them. Their position will automatically be saved.

• To edit the parameters of a state and add/remove actions, clicking a state to select it. The state can then be edited in the inspector.

• To select multiple states, click them while pressing the CTRL key.

• To add a new transition, click one of the available transition slots in an action and drag it over to the destination state.

➢ Open the Host option and you can see the drop option and drag AR camera to the target entity.Now we are ready to move to the Next step
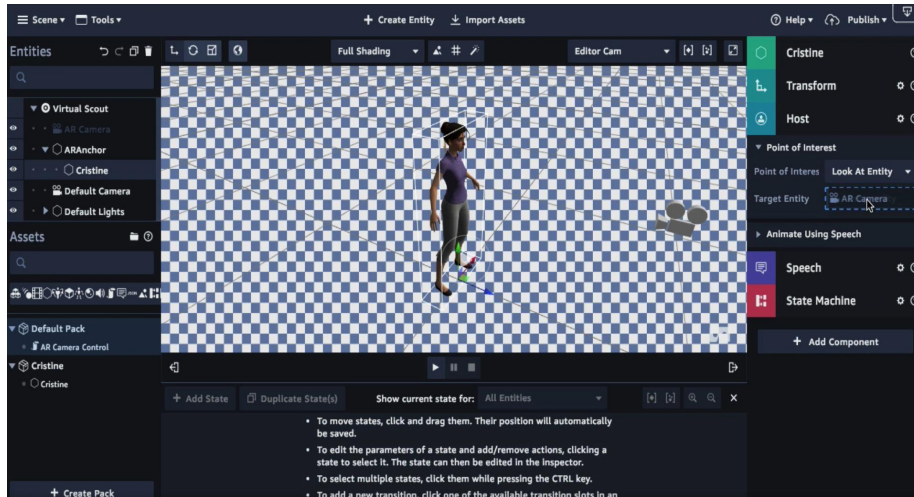
Fig no-15 Drag the Polly id

➢ Remember the cognito Polly id.

➢ With the help of this id we connect our cognito polly to sumerian

Fig No-16 Polly Id in red

➢ Enter your cognito identity pool id in right corner.

➢ Lets setup a ssml file for cristine to able to talk by integrating sumerian with polly.

➢ Lets go to the entities pannel click on cristine and then select the speech pannel click the plus button.
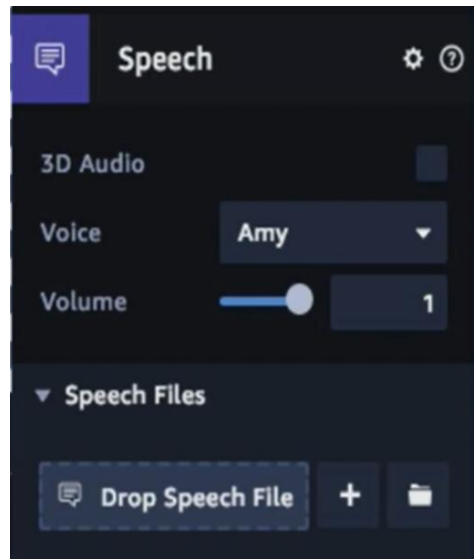
Fig no-17 Speech Panel

➢ First we rename the speech file to welcome speech

Fig no-18 welcome speech

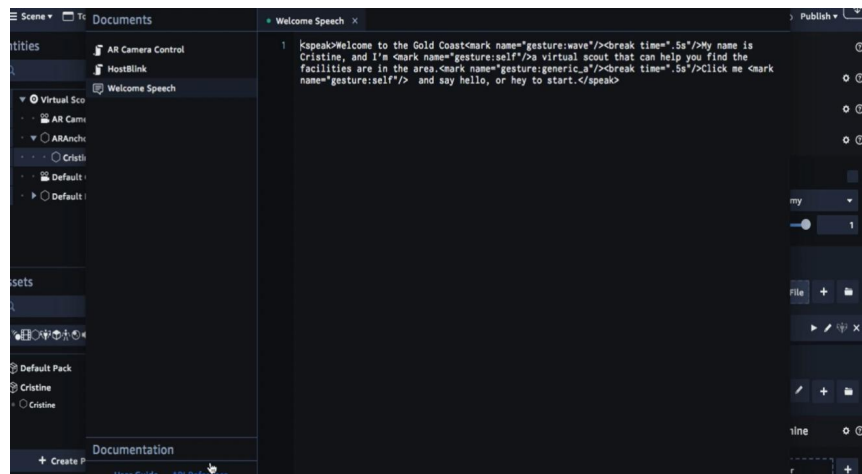➢ And write a welcome speak code in the pannel and in last save that speech.

   <speak>Welcome to the Gold Coast<mark name="gesture:wave"/><break time=".5s"/>My
name is Cristine, and I'm <mark name="gesture:self"/>a virtual scout that can help you find the
facilities are in the area.<mark name="gesture:generic_a"/><break time=".5s"/>Click me <mark
name="gesture:self"/> and say hello, or hey to start.</speak>
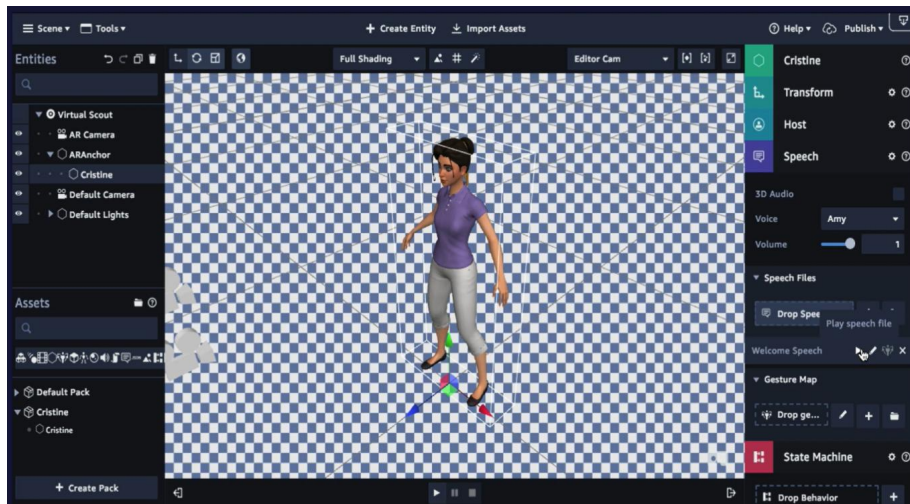
Fig no-19 Play the sound

➤ After completing this you can play the welcome speech and your sumerian speak.
➤ You can also change the voice of sumerian from the given option in right corner downwards.

And we now use the State Machine.That will help out me to make our 3d character so real we have use state machine to animates,special effect and even run script.
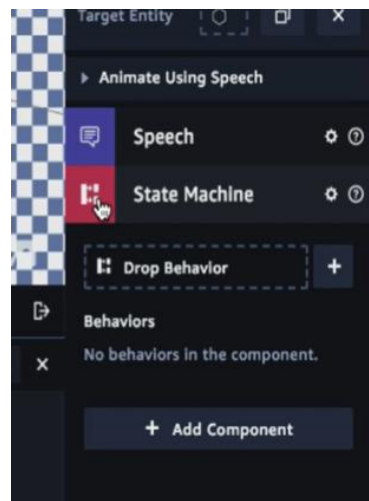
Fig no-20 Click the drop behavior

➤ Click on the state box on a right hand pannel select add action
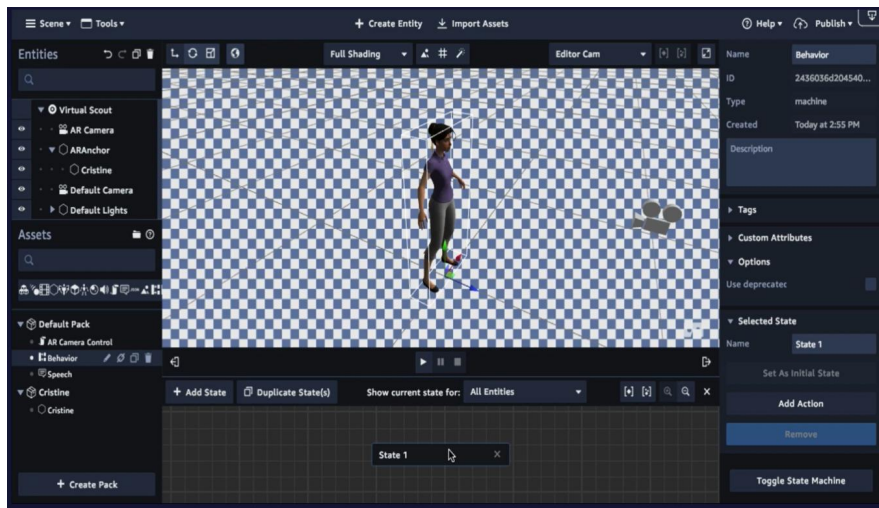
Fig no-21 Add Action

➢ Search tap in the search and add the click/tap on entity.
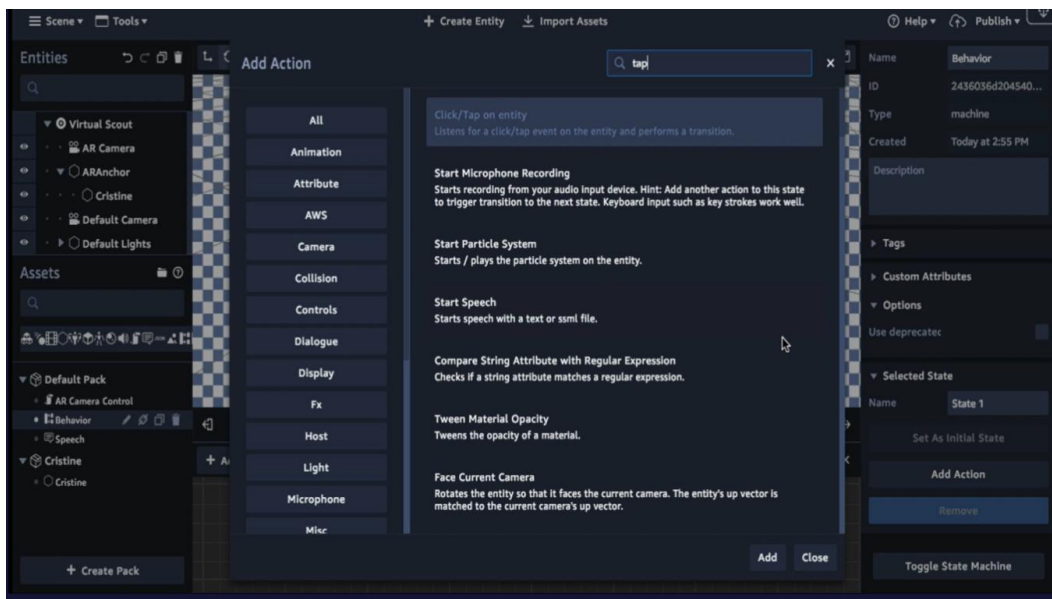
Fig no-22 search tap

➢ Now Cristine is ready to record our responce.

➢ Add another state

➢ One more time add action search start speech and add in the pannel
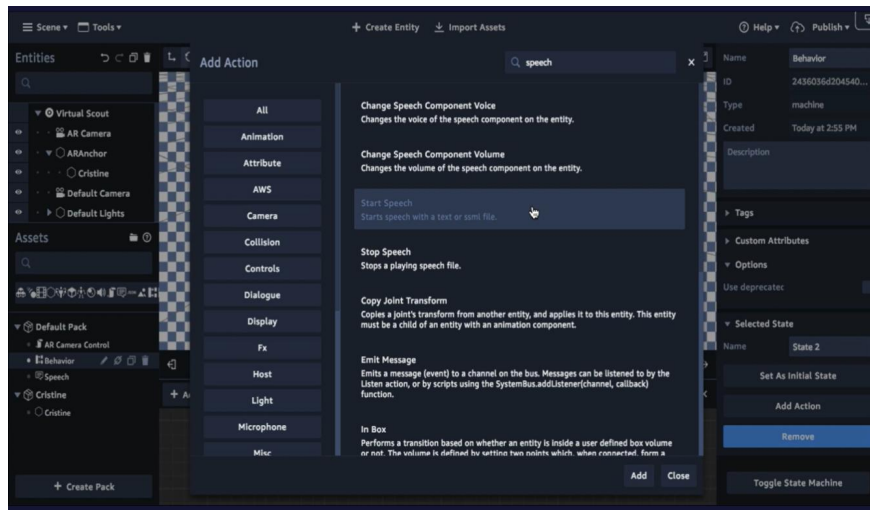
Fig no-23 search speech

➢ Draw a line between the state 1 and state 2

➢ It is work as a loop we cristine complete the welcome speech then it comes automatically comes to the second state.
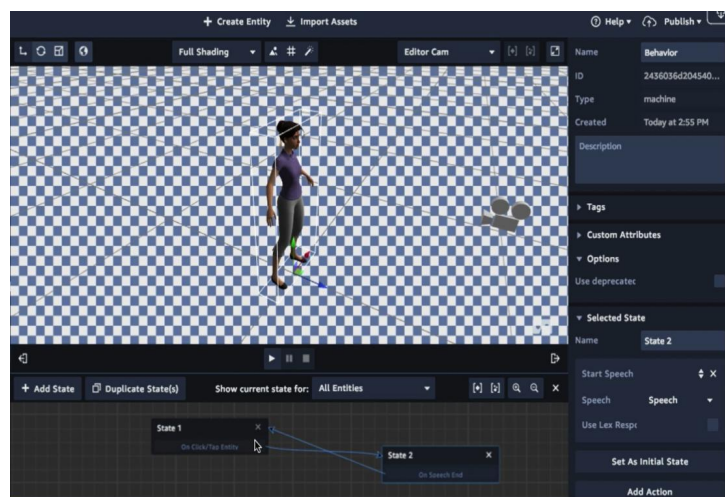
Fig no-24 State 1 and State 2

➢ Now we can check the character by play it .

➢ Now we can publish this it into AWS to implement.

➢ After this one URL is generated copy the URL.
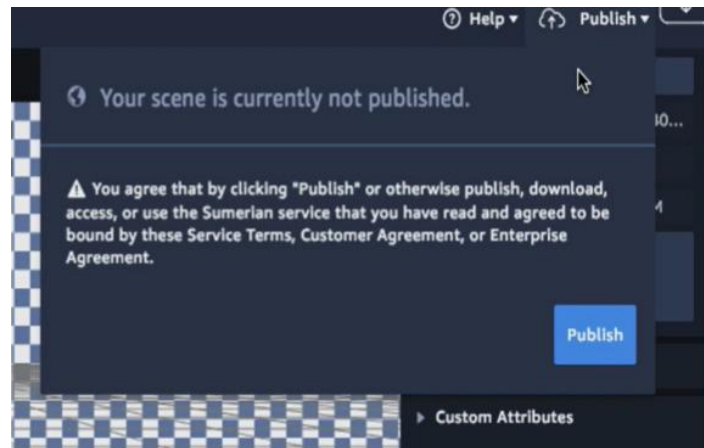
Fig no-25 Publish it

➢ By using Android Studio We can implement our 3D character in the application.

```java
package com.amazon.sumerianarcorestarter;

import android.opengl.GLES20;
import android.opengl.GLSurfaceView;
import android.support.v7.app.AppCompatActivity;
import android.os.Bundle;
import android.util.Log;
import android.view.View;
import android.view.WindowManager;
import android.webkit.WebView;
import android.widget.Toast;

import com.google.ar.core.Config;
import com.google.ar.core.Frame;
import com.google.ar.core.Session;

import javax.microedition.khronos.egl.EGLConfig;
import javax.microedition.khronos.opengles.GL10;

public class MainActivity extends AppCompatActivity implements GLSurfaceView.Renderer {
    private static final String TAG = MainActivity.class.getSimpleName();
    private static final String SCENE_URL = "https://us-east-1.sumerian.aws/9521afe4597e45f28f7d19487763618b.scene/?arMode=true";

    private GLSurfaceView mSurfaceView;
    private Session mSession;
    private SumerianConnector mSumerianConnector;

    private final BackgroundRenderer mBackgroundRenderer = new BackgroundRenderer();
```

```java
    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.activity_main);

        mSurfaceView = findViewById(R.id.gl_surface_view);

        // Set up renderer.
        mSurfaceView.setPreserveEGLContextOnPause(true);
        mSurfaceView.setEGLContextClientVersion(2);
        mSurfaceView.setEGLConfigChooser(8, 8, 8, 8, 16, 0); // Alpha used for plane
blending.
        mSurfaceView.setRenderer(this);
        mSurfaceView.setRenderMode(GLSurfaceView.RENDERMODE_CONTINUOUSLY);
    }

    @Override
    public void onWindowFocusChanged(boolean hasFocus) {
        super.onWindowFocusChanged(hasFocus);
        if (hasFocus) {
            // Standard Android full-screen functionality.
            getWindow().getDecorView().setSystemUiVisibility(
                    View.SYSTEM_UI_FLAG_LAYOUT_STABLE
                            | View.SYSTEM_UI_FLAG_LAYOUT_HIDE_NAVIGATION
                            | View.SYSTEM_UI_FLAG_LAYOUT_FULLSCREEN
                            | View.SYSTEM_UI_FLAG_HIDE_NAVIGATION
                            | View.SYSTEM_UI_FLAG_FULLSCREEN
                            | View.SYSTEM_UI_FLAG_IMMERSIVE_STICKY);
            getWindow().addFlags(WindowManager.LayoutParams.FLAG_KEEP_SCREEN_ON);
        }
    }

    @Override
    protected void onResume() {
        super.onResume();

        if (mSession == null) {
            // ARCore requires camera permissions to operate. If we did not yet obtain
runtime
            // permission on Android M and above, now is a good time to ask the user for
it.
            if (!CameraPermissionHelper.hasCameraPermission(this)) {
                CameraPermissionHelper.requestCameraPermission(this);
                return;
            }

            try {
                mSession = new Session(/* context= */ this);
            } catch (Exception e) {
                throw new RuntimeException(e);
            }

            final WebView webView = findViewById(R.id.activity_main_webview);
            mSumerianConnector = new SumerianConnector(webView, mSession, mSurfaceView);

            // Create config and check if supported.
            Config config = new Config(mSession);
            config.setUpdateMode(Config.UpdateMode.LATEST_CAMERA_IMAGE);
```

```java
            if (!mSession.isSupported(config)) {
                throw new RuntimeException("This device does not support AR");
            }

            mSession.configure(config);
            mSumerianConnector.loadUrl(SCENE_URL);
        }

        mSession.resume();
        mSurfaceView.onResume();
    }

    @Override
    public void onPause() {
        super.onPause();
        // Note that the order matters - GLSurfaceView is paused first so that it does not try
        // to query the session. If Session is paused before GLSurfaceView, GLSurfaceView may
        // still call mSession.update() and get a SessionPausedException.
        mSurfaceView.onPause();
        if (mSession != null) {
            mSession.pause();
        }
    }

    @Override
    public void onRequestPermissionsResult(int requestCode, String[] permissions, int[] results) {
        if (!CameraPermissionHelper.hasCameraPermission(this)) {
            Toast.makeText(this,
                    "Camera permission is needed to run this application",
Toast.LENGTH_LONG).show();
            if (!CameraPermissionHelper.shouldShowRequestPermissionRationale(this)) {
                // Permission denied with checking "Do not ask again".
                CameraPermissionHelper.launchPermissionSettings(this);
            }
            finish();
        }
    }

    @Override
    public void onSurfaceCreated(GL10 gl, EGLConfig config) {
        GLES20.glClearColor(0.1f, 0.1f, 0.1f, 1.0f);

        // Create the texture and pass it to ARCore session to be filled during update().
        mBackgroundRenderer.createOnGlThread(/*context=*/this);
        mSession.setCameraTextureName(mBackgroundRenderer.getTextureId());
    }

    @Override
    public void onSurfaceChanged(GL10 gl, int width, int height) {
        GLES20.glViewport(0, 0, width, height);

mSession.setDisplayGeometry(getSystemService(WindowManager.class).getDefaultDisplay().getRotation(), width, height);
    }
```

```java
    @Override
    public void onDrawFrame(GL10 gl) {
        // Clear screen to notify driver it should not load any pixels from previous
frame.
        GLES20.glClear(GLES20.GL_COLOR_BUFFER_BIT | GLES20.GL_DEPTH_BUFFER_BIT);

        if (mSession == null) {
            return;
        }

        try {
            // Obtain the current frame from ARSession. When the configuration is set to
            // UpdateMode.BLOCKING (it is by default), this will throttle the rendering
to the
            // camera framerate.
            final Frame frame = mSession.update();

            // Draw background.
            mBackgroundRenderer.draw(frame);
            mSumerianConnector.update();
        } catch (Throwable t) {
            // Avoid crashing the application due to unhandled exceptions.
            Log.e(TAG, "Exception on the OpenGL thread", t);
        }
    }
}
```

Chapter 4

Result

➢ After Implementing the code we can run our Application

Fig no-26 Result

Conclusion

The paper at last can be concluded to be one of the revolutionary application in the field of tourism and navigation sphere making use of the advance technology of augmented reality and virtual vector space creation. The paper concludes the effectiveness of the advance technology of augmented reality and virtual reality in view of creation interactive scout for navigation etc. The paper is made in view of displaying the design of the application and its effectiveness in full stretch and how it can be modified according to usage and requirement of the proposed project. The application is in demo phase but all the factors regarding the future potential are tried to be included and provide information anyone interested in the scope and scalability of the concept used and application of the project practically.

Future Scope

The application is demo phase and is not deigned yet to handle traffic for huge number user base. Proper installment of server will be executed once the application goes through various alterations in order to achieve a stable form which be soon done once the application is up and running for some time to reveal runtime bugs. Many other feature in the application has go added one by one by integration of different designs. The application also has to be well synced with cloud based platform which will be done soon in more scalable format.

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