1.INTRODUCTION

1.1Project Overview

Real-time communications (RTC) is any mode of telecommunications in which all users can exchange information instantly or with negligible latency or transmission delays.In RTC, there is always a direct path between the source and the destination. Although the link might contain several intermediate nodes, the data goes from source to destination without being stored in between them. In contrast, asynchronous or timeshifting communications, such as email and voicemail, always involve some form of data storage between the source and the destination. In these cases, there is an anticipated delay between the transmission and receipt of the information.

1.2 Purpose

Real-time communication (RTC) refers to any communication that happens between two (or more) individuals in real-time – with minimal latency and without transmission delays. Some examples of real-time communication include landline phones, mobile calls, instant messaging, VoIP, and video conferencing.

2.LITERATURE SURVEY

2.1 Existing Problem

In our society, we have people with disabilities. The technology is developing day by day but no significant developments are undertaken for the betterment of these people. Communication between deaf-mute and a normal person has always been a challenging task. It is very difficult for mute people to convey their message to normal people. Since normal people are not trained onhand sign language. In emergency times conveying their message is very difficult. The human hand has remained a popular choice to convey information in situations where other forms like speech cannot be used. Voice Conversion System with Hand Gesture Recognition and translation will be very useful to have a proper conversation between a normal person and an impaired person in any language.

2.2 References

1. Koufos, K., EL Haloui, K., Dianati, M., Higgins, M., Elmirghani, J., Imran, M. A., &Tafazolli, R. (2021). Trends in Intelligent Communication Systems: Review of Standards, Major Research Projects, and Identification of Research Gaps. Journal of Sensor and Actuator Networks, 10(4), 60.

2. Panda, G., Upadhyay, A. K., & Khandelwal, K. (2019). Artificial intelligence: A strategic disruption in public relations. Journal of Creative Communications, 14(3), 196-213.

3. Xu, G., Mu, Y., & Liu, J. (2017). Inclusion of artificial intelligence in communication networks and services. ITU J. ICT Discov. Spec, 1, 1-6.

2.3 Problem Statement Definition

In our society, we have people with disabilities. The technology is developing day by day but no significant developments are undertaken for the betterment of these people. Communications between deaf-mute and a normal person has always been a challenging task. It is very difficult for mute people to convey their message to normal people. Since normal people are not trained on hand sign language. In emergency times conveying their message is very difficult. The human hand has remained a popular choice to convey information in situations where other forms like speech cannot be used. Voice Conversion System with Hand Gesture Recognition and translation will be very useful to have a proper conversation between a normal person and an impaired person in any

language. The project aims to develop a system that converts the sign language into a human hearing voice in the desired language to convey a message to normal people, as well as convert speech into understandable sign language for the deaf and dumb. We are making use of a convolution neural network to create a model that is trained on different hand gestures. An app is built which uses this model. This app enables deaf and dumb people to convey their information using signs which get converted to humanunderstandable language and speech is given as output.

3.IDEATION AND PROPOSED SOLUTION

3.1 Empathy Map Canvas

Goal

Building a Real Time Communication System Powered by AI for Specially Abled

What do they think and Feel?

Pains

Their fear includes application going wrong,getting struck or difficultyusing it.

Gains

Using this application communication is made easy ,with zero assistance from other human being.

Who are we empathizing with?

1)We want to understand the specially abled person

2)They are in a situation who finds it hard to communicate with other people on their own

3)Their role is about communication

What do they need to do?

1)Get familiar with new technologies

2)Get familiar with sign language

3)See the emotion and reaction from the opposite side to know the result

What do they see?

1)App gets many downloads if it is a success

2)Many people with disabilities get to communicate well

What do they say?

1)Reviews and thoughts on improving the app

3.2 Ideation and Brainstorming

3.3 Proposed Solution

Date 28	October 2022
Team ID	PNT2022TMID28925
Project Name	Real-Time Communication System Powered by AI for Specially Abled

Maximum Marks 2 Marks

1. **Problem Statement (Problem to be solved)**

In our society, we have people with disabilities. The technology is developing day by day but no significant developments are undertaken for the betterment of these people. Communications between deaf-mute and a normal person has always been a challenging task. It is very difficult for mute people to convey their message to normal people. Since normal people are not trained on hand sign language. In emergency times conveying their message is very difficult. The human hand has remained a popular choice to convey information in situations where other forms like speech cannot be used. Voice Conversion System with Hand Gesture Recognition and translation will be very useful to have a proper conversation between a normal person and an impaired person in any language.

2. **Idea / Solution description**

The project aims to develop a system that converts the sign language into a human hearing voice in the desired language to convey a message to normal people, as well as convert speech into understandable sign language for the deaf and dumb. We are making use of a convolution neural network to create a model that is trained on different hand gestures. An app is built which uses this model. This app enables deaf and dumb people to convey their information using signs which get converted to human understandable language and speech is given as output.

3. **Novelty / Uniqueness**

Building mobile tools with data isn't as easy as importing an XML feed of your latest headlines. But if you're going to spend thousands of dollars developing a mobile app anyway, you might as well spend a little more to build a real application that helps solve problems and makes advertisers take notice.

4. **Social Impact / Customer Satisfaction**

These apps are using only for solve the problems. There are many different types of disabilities, and there are also many different ways in which people may use AI. The use of artificial intelligence is a boon for specially abled people. Technology had opened up new opportunities and created jobs where none had existed before, such as speech to text software that helped one woman find her voice after she was paralysed in an accident. Artificial Intelligence can help those with disabilities accomplish tasks they never thought possible; here are just a few ways we've seen AI technology impact lives: Facial recognition and predictive texting tools

5. **Business Model (Revenue Model)**

Building mobile tools with data isn't as easy as importing an XML feed of your latest headlines. But if you're going to spend thousands of dollars developing a mobile app anyway, you might as well spend a little more to build a real application that helps solve problems and makes advertisers take notice.

6. **Scalability of the Solution**

With the help of machine tasks that usually requires human intelligence, such as voice and speech synthesis, visual perception, predictive text functionality, judgement, and a variety of other tasks, AI can assist individuals with disabilities by making a significant distinction in their ability.

3.4 Problem Solution Fit

4.REQUIREMENT ANALYSIS

4.1 Functional Requirement

Following are the functional requirements of the proposed solution.

FR-1 User Registration

LOW VISION: As a user who has trouble reading due to low vision, I want to be able to make the text larger on the screen so that I can read it. Registration through Gmail

FR-2 User Confirmation

IMPAIRED USER: As a user who is hearing -impaired, I want a turn on video captions so that I can understand what is being said in videos. Confirmation via Email

FR-3 User Registration

COLOR BLINDNESS: As a user who is colour blind, I want to links to be distinguishable on the page so that I can find the links and navigate the site. Registration through Gmail

4.2Non-Functional Requirements

Following are the non-functional requirements of the proposed solution.

NFR-1 Usability

- Visual and Audio Help
- Text size scaling
- Reverse contrast

NFR-2 Security

Important information:

• Walking in single file or in narrow space.

• Steps, Stairs and Slope.

• Kerbs and Roads.

NFR-3 Reliability

To determine reliability measures are:

• Test-Retest Repeatability

• Individual Repeatability

NFR-4 Performance

To determine predictors of success in reading with low vision aids, in terms of reading acuity, optimum acuity reserve, and maximum reading speed, for observers with low vision for various causes.

NFR-5 Availability

Lack of adequate low vision services and barriers to their provision and uptake impact negatively on efforts to prevent visual impairment and blindness.

NFR-6 Scalability

There is a large selection of device to help people with low vision. Some are “Optical”, glass lenses such as magnifying glasses and telescopes.

5.PROJECT DESIGN

5.1 Data Flow Diagrams

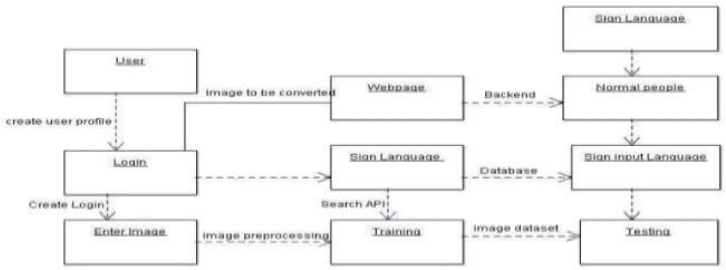
A Data flow diagram (DFD) is a traditional visual representation of the information flows within a system. A neat ad clear DFD can depict the right amount of the system requirement graphically. It shows how data enters and leaves the system, what changes the information ,Data Flow Diagrams.

5.2 Solution and Technical Architecture

The data drift monitoring task continuously profiles the input data, compares it with baseline, and the results are captured in cloud watch. This task runs on its own computation resources using deque, which checks that the monitoring job does not slow down your ML inference flow and scales with the data. The frequency of running this task can be adjusted to control cost, which can depend on how rapidly you anticipate that the data may change. The model quality monitoring task computes model performance metrics from actuals and predicted values. The origin of these data points depends on the use case. Demand forecasting use cases naturally capture actuals that can be used to validate past predictions. Other use cases can require extra steps to acquire ground-truth data. Sage Maker Clarify provides greater visibility into your training data and models, helping identify and limit bias and explain predictions. For example, the trained models may consider some

features more strongly than others when generating predictions. Compare the feature importance and bias between model-provided versions for a better understanding of the changes. As companies continue to use data analytics and ML to inform daily activity, data drift may become a more common occurrence. Recognizing that drift can have a direct impact on models and production-ready applications, it is important to architect to identify potential data drift and avoid downgrading the models and negatively impacting results. Failure to capture changes in data can result in loss of process confidence, downgraded model accuracy, or a bottom-line impact to the business.

5.3 User Stories



User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Customer (Low vision)	Registration	USN-1	As a user, who has trouble reading due to low vision, I want to be able to make the text larger on the screen so that I can read it.	I can access my account / dashboard	High	Sprint-1
Customer (Colour blindness)		USN-2	As a user, who is color blind, I want to have access to information conveyed in color so that, I do not miss anything and I understand the content.	I can receive confirmation email & click confirm	High	Sprint-1
Customer (Impaired user)		USN-3	As a user, who is hearing-impaired, I want a transcript of the spoken audio so that I can have access to all information provided in audio clips	I can register & access the dashboard with Facebook Login	Low	Sprint-2

6.PROJECT PLANNING AND SCHEDULING

6.1Sprint Planning and Estimation

Loading the Dataset & Image Data Generation

In [14]:
```
from tensorflow.keras.preprocessing.image import ImageDataGenerator
```

In [15]:
```
# Training Datagen
train_datagen = ImageDataGenerator(rescale=1/255,zoom_range=0.2,horizontal_flip=True,vertical_flip=False)
# Testing Datagen
test_datagen = ImageDataGenerator(rescale=1/255)
```

In [25]:
```
# Training Dataset
x_train=train_datagen.flow_from_directory(r'C:\Users\india\Desktop\Final_Project\Dataset\test_set',target_size=(64,64), class_mode='categorical',batch
# Testing Dataset
x_test=test_datagen.flow_from_directory(r'C:\Users\india\Desktop\Final_Project\Dataset\training_set',target_size=(64,64), class_mode='categorical',bat
```

```
Found 4969 images belonging to 9 classes.
Found 4969 images belonging to 9 classes.
```

In [26]:
```
print("Len x-train : ", len(x_train))
print("Len x-test : ", len(x_test))
```

```
Len x-train :  6
Len x-test :  6
```

In [27]:
```
# The Class Indices in Training Dataset
x_train.class_indices
```

Out[27]:
```
{'A': 0, 'B': 1, 'C': 2, 'D': 3, 'E': 4, 'F': 5, 'G': 6, 'H': 7, 'I': 8}
```

6.2Sprint Delivery Schedule

Model Creation

In [28]:
```
# Importing Libraries
from tensorflow.keras.models import Sequential
from tensorflow.keras.layers import Convolution2D,MaxPooling2D,Flatten,Dense
```

In [29]:
```
# Creating Model
model=Sequential()
```

In [30]:
```
# Adding Layers
model.add(Convolution2D(32,(3,3),activation='relu',input_shape=(64,64,3)))
model.add(MaxPooling2D(pool_size=(2,2)))
model.add(Flatten())

# Adding Hidden Layers
model.add(Dense(300,activation='relu'))
model.add(Dense(150,activation='relu'))

# Adding Output Layer
model.add(Dense(9,activation='softmax'))
```

In [31]:
```
# Compiling the Model
model.compile(loss='categorical_crossentropy',optimizer='adam',metrics=['accuracy'])
```

In [32]:
```
# Fitting the Model Generator
model.fit(x_train,steps_per_epoch=len(x_train),epochs=10,validation_data=x_test,validation_steps=len(x_test))
```

6.3 Reports From JIRA

```
Epoch 1/10
6/6 [==============================] - 23s 4s/step - loss: 5.1206 - accuracy: 0.1690 - val_loss: 3.6505 - val_accuracy: 0.3119
Epoch 2/10
6/6 [==============================] - 22s 4s/step - loss: 2.3945 - accuracy: 0.3266 - val_loss: 1.5087 - val_accuracy: 0.4991
Epoch 3/10
6/6 [==============================] - 22s 4s/step - loss: 1.4384 - accuracy: 0.4037 - val_loss: 1.0430 - val_accuracy: 0.5836
Epoch 4/10
6/6 [==============================] - 23s 4s/step - loss: 1.0761 - accuracy: 0.6488 - val_loss: 0.7109 - val_accuracy: 0.7955
Epoch 5/10
6/6 [==============================] - 27s 5s/step - loss: 0.7835 - accuracy: 0.7774 - val_loss: 0.4046 - val_accuracy: 0.9501
Epoch 6/10
6/6 [==============================] - 25s 5s/step - loss: 0.5470 - accuracy: 0.8756 - val_loss: 0.2540 - val_accuracy: 0.9752
Epoch 7/10
6/6 [==============================] - 22s 4s/step - loss: 0.4018 - accuracy: 0.9090 - val_loss: 0.1675 - val_accuracy: 0.9799
Epoch 8/10
6/6 [==============================] - 22s 4s/step - loss: 0.2862 - accuracy: 0.9406 - val_loss: 0.1185 - val_accuracy: 0.9847
Epoch 9/10
6/6 [==============================] - 22s 4s/step - loss: 0.2108 - accuracy: 0.9612 - val_loss: 0.0880 - val_accuracy: 0.9863
Epoch 10/10
6/6 [==============================] - 22s 4s/step - loss: 0.1548 - accuracy: 0.9738 - val_loss: 0.0736 - val_accuracy: 0.9843
```

Out[32]:

Saving the Model

In [33]:
```
model.save('asl_model.h5')
# Current accuracy is 0.98
```

In [ ]:

7.CODING AND SOLUTIONING(Explain the features added in the project along with code)

7.1 Feature 1

Model Building

In [54]:
```
import numpy as np
from tensorflow.keras.models import load_model
from tensorflow.keras.preprocessing import image
```

In [55]:
```
from keras.models import Sequential
from keras.layers import Dense
from keras.layers import Convolution2D
from keras.layers import MaxPooling2D
from keras.layers import Dropout
from keras.layers import Flatten
```

In [56]:
```
model=Sequential()
```

In [57]:
```
model.add(Convolution2D(32,(3,3),activation="relu",input_shape=(64,64,3)))
```

In [58]:
```
model.add(MaxPooling2D(pool_size=(2,2)))
```

In [59]:
```
model.add(Flatten())
```

In [60]:
```
model.add(Dense(200,activation='relu'))
model.add(Dense(9,activation="softmax"))
```

In [61]:
```
model.compile(loss="categorical_crossentropy",metrics=["accuracy"],optimizer='adam')
```

7.2 Feature 2

In [61]:
```
model.compile(loss="categorical_crossentropy",metrics=["accuracy"],optimizer='adam')
```

In [62]:
```
len(x_train)
```

```
---------------------------------------------------------------------------
NameError                                 Traceback (most recent call last)
 in
----> 1 len(x_train)

NameError: name 'x_train' is not defined
```

In [ ]:
```
len(x_test)
```

In [ ]:
```
model.fit(x_train,epochs=10,validation_data=x_test,steps_per_epoch=len(x_train)//10,validation_steps=len(x_test))
```

In [ ]:
```
model.save("aslpng.h5")
```

Testing the model

In [ ]:
```
from keras.models import load_model
import numpy as np
import cv2
```

In [ ]:
```
from tensorflow.keras.models import load_model
from tensorflow.keras.preprocessing import image
import numpy as np
```

7.3 Database Scheme (if applicable)

In [ ]:
```
model=load_model('asl_model_84_54.h5')
img=image.load_img(r'E:\Projects\SmartBridge\ModelGen\Dataset\test_set\D\2.png',
                   target_size=(64,64))
```

In [ ]:
```
model=load_model("aslpng.h5")
img = image.load_img(r"/content/drive/MyDrive/IBM project/test_set/D/10.png",target_size=(64,64))
img
```

In [ ]:
```
x = image.img_to_array(img)
x
```

In [ ]:
```
x.shape
```

In [ ]:
```
x = np.expand_dims(x,axis=0)
x.shape
```

In [ ]:
```
pred = model.predict(x)
```

In [ ]:
```
pred
```

In [ ]:
```
class_name=["A","B","C","D","E","F","G","H","I"]
pred_id = pred.argmax(axis=1)[0]
pred_id
```

In [ ]:
```
print("the alphabet is ",str(class_name[pred_id]))
```

8.TESTING

8.1 Test cases

In [1]:
```
import cv2
import numpy as np
from tensorflow.keras.models import load_model
from tensorflow.keras.preprocessing import image
```

In [4]:
```
class Video(object):
        def __init__(self):
                self.video = cv2.VideoCapture(0)
                self.roi_start = (50, 150)
                self.roi_end = (250, 350)
                self.model = load_model('asl_model.h5') # Execute Local Trained Model
                # self.model = load_model('IBM_Communication_Model.h5') # Execute IBM Trained Model
                self.index=['A','B','C','D','E','F','G','H','I']
                self.y = None
```

In [5]:
```
def __del__(self):
                self.video.release()
        def get_frame(self):
                ret,frame = self.video.read()
                frame = cv2.resize(frame, (640, 480))
                copy = frame.copy()
                copy = copy[150:150+200,50:50+200]
```

In [ ]:
```
# Prediction Start
                cv2.imwrite('image.jpg',copy)
                copy_img = image.load_img('image.jpg', target_size=(64,64))
                x = image.img_to_array(copy_img)
                x = np.expand_dims(x, axis=0)
                pred = np.argmax(self.model.predict(x), axis=1)
                self.y = pred[0]
                cv2.putText(frame,'The Predicted Alphabet is: '+str(self.index[self.y]),(100,50),cv2.FONT_HERSHEY_SIMPLEX,1,(0,0,0),3)
                ret,jpg = cv2.imencode('.jpg', frame)
                return jpg.tobytes()
```

8.2 User Acceptance Testing

Date	14 November 2022
Team ID	PNT2022TMID28925
Project Name	Project – Real time systems powered by AI for specially abled
Maximum Marks	4 Marks

1. PurposeofDocument

The purpose of this document is to briefly explain the test coverage and open issues of the [ProductName] project at the time of the release to User Acceptance Testing (UAT).

2. DefectAnalysis

Thisreportshowsthenumberofresolvedor closed bugs at each severity level, and how they were resolved

Resolution	Severity1	Severity2	Severity3	Severity4	Subtotal
By Design	11	2	3	2	18
Duplicate	1	3	4	0	8
External	3	5	0	0	8
Fixed	12	2	5	22	41
Not Reproduced	0	1	0	0	1
Skipped	0	0	1	2	3
Won'tFix	0	4	1	1	7
Totals	27	17	14	27	86

3. TestCaseAnalysis

Thisreportshowsthenumberoftestcasesthathavepassed,failed,anduntested

Section	TotalCases	Not Tested	Fail	Pass
PrintEngine	8	0	0	8
ClientApplication	49	0	0	49
Security	4	0	0	4
OutsourceShipping	4	0	0	4
ExceptionReporting	11	0	0	11
FinalReportOutput	2	0	0	2
VersionControl	1	0	0	1

9.RESULTS

9.1Performance Metrices

				Maximum Marks	4 marks						
TestCase ID	Feature Type	Component	Test Scenario	Pre-Requisite	Steps To Execute	Test Data	Expected Result	Actual Result	Status	Comments	TC for Automation
LoginPage_TC_001	Functional	Home Page	Verify user is able to see the Login/Signup popup when user clicked on My account button		1.Enter URL and click go 2.Click on My Account dropdown button 3.Verify Login/Signup popup displayed or not	https://[illegible].html/	Login/Signup popup should display	Working as expected	Pass		
LoginPage_TC_002	UI	Home Page	Verify the UI elements in Login/Signup popup		1.Enter URL and click go 2.Click on My Account dropdown button 3.Verify Login/Signup popup with below UI elements: a.email text box b.password text box c.Login button d.New customer? Create account link e.Lost password? Recovery password link	https://[illegible].html/	Application should show below UI elements: a.email text box b.password text box c.Login button with orange colour d.New customer? Create account link e.Lost password? Recovery password link	Working as expected	pass		
LoginPage_TC_003	Functional	Home page	Verify user is able to log into application with Valid credentials		1.Enter URL(https://[illegible].html/) and click go 2.Click on My Account dropdown button 3.Enter Valid username/email in Email text box 4.Enter valid password in password text box 5.Click on Login button	Username: [illegible] password: [illegible]	User should navigate to user account homepage	Working as expected	pass		
LoginPage_TC_004	Functional	Login page	Verify user is able to log into application with InValid credentials		1.Enter URL(https://[illegible].html/) and click go 2.Click on My Account dropdown button 3.Enter InValid username/email in Email text box 4.Enter valid password in password text box 5.Click on Login button	Username: [illegible] password: [illegible]	Application should show 'Incorrect email or password' validation message.	Working as expected	Pass		
LoginPage_TC_004	Functional	Login page	Verify user is able to log into application with InValid credentials		1.Enter URL(https://[illegible].html/) and click go 2.Click on My Account dropdown button 3.Enter Valid username/email in Email text box 4.Enter Invalid password in password text box 5.Click on Login button	Username: [illegible] password: [illegible]	Application should show 'Incorrect email or password' validation message.	Working as expected	pass		
LoginPage_TC_005	Functional	Login page	Verify user is able to log into application with InValid credentials		1.Enter URL(https://[illegible].html/) and click go 2.Click on My Account dropdown button 3.Enter InValid username/email in Email text box 4.Enter Invalid password in password text box 5.Click on Login button	Username: [illegible] password: [illegible]	Application should show 'Incorrect email or password' validation message.	Working as expected	pass		
Loginpage_TC_006	Functional	Login page	Verify user is able to see login page		1.Verify that cursor is focused on the "Username" text box on the page load (login page) 2.Verify that tab functionality is working properly or not. 3.Verify that Enter/Tab key works as a substitute for the Sign-in button. 4.Verify that the User is able to login with Valid Credentials.	Username: [illegible] password: [illegible]	User can use the login page	Working as expected	pass		
Loginpage_TC_007	Functional	Login page	Verify user is able to loginto application or not?		1.Verify that cursor is focused on the "Username" text box on the page load (login page) 2.Verify that tab functionality is working properly or not. 3.Verify that Enter/Tab key works as a substitute for the Sign-in button. 4.verify that user is able to loginto application	Username: [illegible] password: [illegible]	User canable to login into the application	Working as expected	Pass		
Loginpage_TC_008	Functional	Login page	Verify user is able to navigate to create your account page?		1.Verify that cursor is focused on the "Username" text box on the page load (login page) 2.Verify that Enter/Tab key works as a substitute for the Sign-in button. 3.verify that user is able to loginto application 4.verify that user is able to navigate to the next page	Username: [illegible] password: [illegible]	User can navigate to the account page to create an account	Working as expected	pass		
Loginpage_TC_009	Functional	Login page	Verify user is able to recovery password		1.Verify that cursor is focused on the "Username" text box on the page load (login page) 2.Verify that Enter/Tab key works as a substitute for the Sign-in button. 3.verify that user is able to enter email id and password 4.verify that user is able to recover password by giving forget password	Username: [illegible] password: [illegible]	User can able to recover the password	Working as expected	pass		
Loginpage_TC_010	Functional	Login page	Verify login page elements		1.Verify that cursor is focused on the "Username" text box on the page load (login page) 2.Verify that Enter/Tab key works as a substitute for the Sign-in button 3. verify that user is able to sign up 4.verify that user is able to enter the login elements like password email id etc	Username: [illegible] password: [illegible]	User can able to verify the login elements in the page		pass		
Search_TC_01	Functional	Search page	Verify user is able to search by entering keywords in search box		1.Verify that cursor is focused on the "Username" text box on the page load (login page) 2.Verify that Enter/Tab key works as a substitute for the Sign-in button 3. verify that user is able to search box 4.verify user is able to enter keyword in searchbox	Username: [illegible] password: [illegible]	User is able to search an word by entering keyword	Working as expected	pass		
Search_TC_02	Functional	Search page	Verify user is able to see suggestions based on keyword entered in search box		1.Verify that cursor is focused on the "Username" text box on the page load (login page) 2.Verify that Enter/Tab key works as a substitute for the Sign-in button 3. verify that user is able to search in search box 4.verify that user is able to see keyword while typing in searchbox based on their suggestion	Username: [illegible] password: [illegible]	User can able to see suggestion when entering in search box	Working as expected	pass		
Search_TC_03	Functional	Search page	Verify user is able to see related auto suggestions displaying based on keyword entered in search box		1.Verify that cursor is focused on the "Username" text box on the page load (login page) 2.Verify that Enter/Tab key works as a substitute for the Sign-in button 3. verify that user is able to search in search box 4.verify that user is able to see auto suggestions while typing	Username: [illegible] password: [illegible]	User can able to see auto suggestions while entering the requirements	Working as expected	pass		

10.ADVANTAGES AND DISADVANTAGES

ADVANTAGES

It enables employees from across the world to communicate with each other 24×7 and share ideas or solve problems quickly. It is a cost-effective way of getting several people from different locations to attend meetings and conferences – without having to spend time or money on travel, and accommodation.

DISADVANTAGES

The biggest disadvantage of communication is that it takes a lot of time to listen, speak, read, or write to someone. While trying to do one thing you can accidentally hurt another person's feelings by not listening or paying attention. This could result in damaging your relationship with them.

11.CONCLUSION

Real-time communication (RTC) workloads can be deployed on AWS to attain scalability, elasticity, and high availability while meeting the key requirements. Today, several customers are using AWS, its partners, and open source solutions to run RTC workloads with reduced cost and faster agility as well as a reduced global footprint.The reference architectures and best practices provided in this white paper can help customers successfully set up RTC workloads on AWS and optimize the solutions to meet end user requirements while optimizing for the cloud.

12.FUTURE SCOPE

1. Through image recognition technology, AI understands the context of objects in photos and describes photos to people.

2. The speech-to-text and text-to-speech technologies helped those people who had speech impediments

3. The product in AI that narrates the entire world around them visually impaired by reading texts, describing whereabouts and the looks of the nearby people by identifying and recognizing faces and emotions.

4. Autonomous vehicles are in trend and their success is due to AI technology. These vehicles can be beneficial to people living with limited physical mobility

13.APPENDIX

Source code

https://github.com/IBM-EPBL/IBM-Project-12283-1659446117

Github and project demo link