

LAB REPORT

Submitted by

**Cathy Anand [RA2011026010216]
G Veenasree [RA2011026010221]
Harshitha Kambham [RA2011026010235]**

Under the Guidance of

Ms. C.G. Anupama
Assistant Professor
(Department of Computational Intelligence)

In partial satisfaction of the requirements for the degree of

**BACHELOR OF TECHNOLOGY
in
COMPUTER SCIENCE ENGINEERING**

with specialization in Artificial Intelligence and Machine Learning



**SCHOOL OF COMPUTING
COLLEGE OF ENGINEERING AND TECHNOLOGY
SRM INSTITUTE OF SCIENCE AND TECHNOLOGY
KATTANKULATHUR - 603203**

JUNE 2022



SRM INSTITUTE OF SCIENCE AND TECHNOLOGY KATTANKULATHUR-603203

BONAFIDE CERTIFICATE

Certified that this lab report titled “**MAIA**” is the bonafide work done by Cathy Anand (RA2011026010216), G Veenasree (RA2011026010221) and Harshitha Kambham (RA2011026010235) who carried out the lab exercises under my supervision. Certified further, that to the best of my knowledge the work reported herein does not form part of any other work.

SIGNATURE

Ms. C.G. Anupama

SEPM – Course Faculty

Assistant Professor (O.G)

Department of Computational Intelligence

ABSTRACT

Communication in order to socially interact with all kinds of people. This becomes extremely important in our working life where we will be required to interact with different kinds of people and present our thoughts and ideas to them. This is in a formal setting where people would be required to give public speeches and presentations in front of large crowds.

The objective of MAIA is to aid people who seem to have a lack of confidence in their way of speaking by helping them change their vocal tones and improve vocabulary. MAIA's main feature is the AI Engine whose primary function is to clean up speech samples, analyse speech and prepare feedback.

There are two types of users that MAIA caters to: the users and the trainers.

The users are those who wish to MAIA to help improve their confidence. They will be using the complete features of MAIA for their improvement and they provide feedback on what could be improved.

The trainers are people who have a deeper understanding of MAIA and can volunteer to help train MAIA and improve its features. They are the ones responsible for training MAIA in her initial stages and will improve her AI algorithm to start doing smaller tasks on her own.

LIST OF FIGURES

FIGURE NO	TITLE	PAGE NO
1	Identifying Stakeholders Table	2
2	Spiral Model	4
3	Project Plan	7
4	Effort and Cost Estimation Table	8
5	Activity Description Table	9
6	Infrastructure Requirements Table	9
7	Maintenance and Support Cost Table	9
8	Team Member Responsibilities Table	10
9	Work Breakdown Structure diagram	11
10	Project planning, Analysis and Estimations	12
11	Designing system architectures and building the required code	12
12	Building MAIA and other app features	12
13	Risk Management Table	13
14	Risk Analysis Matrix	15
15	System Architecture	16
16	Use case diagram	16
17	Class Diagram	17
18	Entity Relationship Diagram	18
19	Dataflow Diagram	18
20	Sequence Diagram	19
21	Collaboration Diagram	19
22	MAIA Sign-in page	20
23	MAIA Login page	21
24	Prototype of Voice recording page	21
25	Prototype Feedback page	22

LIST OF ABBREVIATIONS

MAIA – A Myriad of Advanced and Intelligent Assurance

TABLE OF CONTENTS

CHAPTER NO	TITLE	PAGE NO
0	ABSTRACT	i
	LIST OF FIGURES	ii
	LIST OF ABBREVIATIONS	iii
1	PROBLEM STATEMENT	1
2	STAKEHOLDERS & PROCESS MODELS	2
3	IDENTIFYING REQUIREMENTS	5
4	PROJECT PLAN & EFFORT	7
5	WORK BREAKDOWN STRUCTURE & RISK ANALYSIS	11
6	SYSTEM ARCHITECTURE, USE CASE & CLASS DIAGRAM	16
7	ENTITY RELATIONSHIP DIAGRAM	18
8	DATA FLOW DIAGRAM	18
9	SEQUENCE AND COLLABORATION DIAGRAM	19
10	DEVELOPMENT OF TESTING FRAMEOWRK/USER INTERFACE	20
11	TEST CASES & REPORTING	23
12	ARCHITECTURE/ DESIGN/ FRAMEWORK/ IMPLEMENTATION	31
	CONCLUSION	35
	REFERENCES	36

PROBLEM STATEMENT

The Project

- Human speech is an essential part of communication in most workplaces, ranging from schools to office meetings. The main obstruction to a good, clear communication is the lack of confidence to do so. However, this is not only in the case of workplaces but also in the case of creating and maintaining social relationships. Hence, the function of this project: to be able to understand a person's speech and thus aid in improving it and giving them the confidence to speak.

The History

- When talking about speech recognition applications there are several ranging from smaller applications like in Word Documents and larger ones like Apple 'Siri' and Amazon 'Alexa' to name some.
- There are also applications for advanced security that use voice recognition for voice biometry.

Limitations

- MAIA requires an expensive and extensive AI engine, trained in all types of voices. This could prove to be a tedious process and the engine would require a long time to perform to the bare minimum.

Approach

- The goal is to create a user-friendly interface to aid in the learning and improvement of voice tones and human speech.
- This interface would be able to access an immense amount of voice and speech data through an extensive AI engine.

Benefits

- The sole purpose of MAIA is to understand the variance in human speech that could possibly show signs of lack in confidence. In return, through machine learning, the ideal system would be able to aid the user to become confident in their speech.

STAKEHOLDERS AND PROCESS MODELS

Identifying Stakeholders

Project stakeholder name	Specific Information needs	Project Interests	Impact on project	Role
Business manager	To supervise and lead a company's operations and employees.	To ensure company productivity and efficiency including implementing business strategies, evaluating company performances, and supervising employees.	Positive	Decision making
Top manager	Control and allocate resources	Lead and head the organisation a direction	Positive	Decision making
Project manager	Directing the team towards achieving the goal by solving and managing the problems	Works on the technical and other aspects of the project	Positive	Consultant and decision making
Sponsors	Funding the project for its over development	Provides financial aid for the project	Positive	Collaborator
Developers	Researching, designing, implementing, and managing software programs.	A programmer to integrate all the requirements of the customer and design them technically.	Positive	Collaborator

Suppliers/ Resource	Acquiring resources for the project	To contribute resources, materials, and, in many cases, expertise that does not exist in-house with companies, which can improve a company's ability to meet customer and shareholder needs.	Positive	Collaborator
Employees	To complete the prescribed task and obtain solutions	Collaborate with team members and managers	Neutral	Collaborator
Schools/colleges	A mode to encourage them for public speaking	To train the students in public speaking	Positive	User
Students/Adults	The final consumer of the product to enhance their speaking skills	The application will be used by this category for public speaking	Positive	User and recipient

Figure 1. Identifying Stakeholders Table

Identifying Process Model

- The Spiral Paradigm is a model for software development that is risk-driven. It is a hybrid of the waterfall and iterative models. The Spiral Model aids in the adoption of software development aspects from several process models for software projects based on unique risk patterns, resulting in a more efficient development process.
- This Process model has four phases:

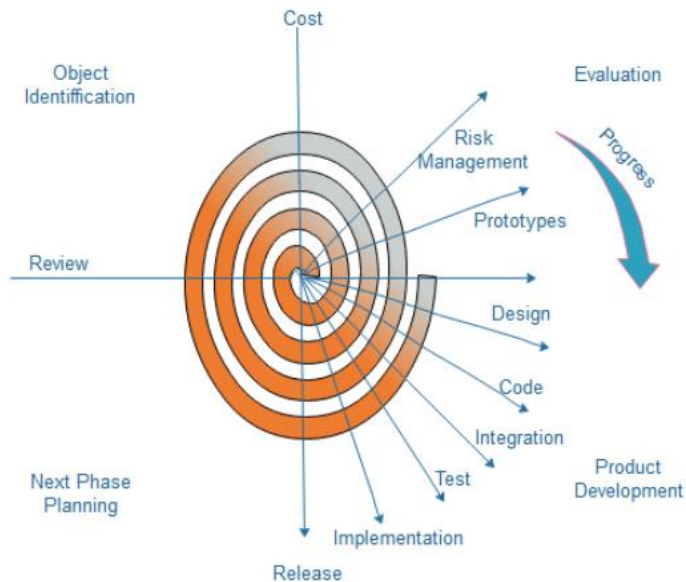


Fig. Spiral Model

Figure.2. Spiral Model

- The spiral model has been chosen because this project is large and complex. The requirements are unclear and complex as a lot of trial-and-error methods need to be adopted for the final product
- Many changes are required from time to time and it is a large and high budget project.

IDENTIFYING REQUIREMENTS

System Requirements

- CPU: current preferences include 2nd gen Xeon Scalable Platinum/Gold processor or 2nd gen AMD Epyc
- GPU: Handles the ML training as well as data categorization; typically, a Nvidia P100, V100 or A100 for training and V100, A100, T4 for inference.
- Memory: Typical servers have 128 to 512 GB DRAM because of the 16 to 32 GB modules used by current GPUs.
- Storage IOPS: for moving data between storage and compute subsystems.
- Speech and NLP, speech recognition, pattern recognition and anomaly detection.
- Content analysis, filtering and moderation (for the n voice samples for training)
- User personalisation

Non-Functional Requirements

- Availability: The app will never be idle as it will be available 24/7, assisting the users at any point of the day. There will be an assistance bot for the user to fill in their complaints.
- Performance: The app will take about two minutes to analyse and acquire results for the user inputs. The responsive time taken by the system will be reduced in the upcoming days after upgrading it. This app can be used simultaneously while working with other apps on the system.
- Security: We look forward to keeping our client's databases and information confidential. Some security measures taken are
 1. Account creation: On creating an account, we recommend the users keep a strong password and collect the required details.
 2. Security question answering: During account creation, the user has to answer some questions that will help in the verification process if the user forgets the password in the future.
 3. Account locking: The account will automatically get locked after many failed attempts. Our employees will reach out to the user for further assistance.
- Compatibility: The users can easily use the app with a click of a button on a laptop and mobile. It will be compatible with all the platforms.
- Capacity: By default, the user will be provided with 2 GB of storage for storing their voice notes or speeches. The user may upgrade using the premium plans available.
- Reliability: The employees will keep track of the app throughout for its maintenance in the backend.
- The developers will often test and debug the app for smooth running. All the upgrades will be synchronised without disturbing the existing data.
- Localization: The app will be available in all geographical locations. It will be available in English initially. The app will be able to support Hindi, German, Chinese and other major languages.
- Usability: A user-friendly User interface is given for the user to navigate easily in the app.

Functional Requirements

- User login:
 1. Users can create an account in MAIA and set their password.
 2. Users can enter MAIA using the login credentials.
 3. The user must be able to logout after they finish using MAIA.
- Cultural and political: The system should be available in different languages.
- The MAIA shall be capable of audio input (i.e., capturing user speech via one or more microphones)
- It is trained in all types of voices, so MAYA should be capable of recognizing all types of voice tones.
- Hold-to-talk: Touch-initiated products activated by the user holding down a physical control, such as a button, while speaking.
- The system should give output in such a way that it increases the confidence level of users.

PROJECT PLAN & EFFORT

Preparing Project Plan

S. No.	Focus	Details
1.	Risk management	<ul style="list-style-type: none">• The main risk would be the training part of this software. Considering the amount of time, it takes to complete as well as the thorough screening of training samples the training period could be extensive.• Since the project is quite lengthy and constant updates to it, unless there is a good market for this kind of product there is a possibility that other software could as easily replace this one.
2.	Estimation	<ul style="list-style-type: none">• Effort, cost estimation• Infrastructure/ resource cost• Maintenance, Support cost
3.	Project Team formation	<ul style="list-style-type: none">• Identification of team members roles and responsibilities<ol style="list-style-type: none">1. Machine Learning Engineers or Data scientist2. Data integration Engineers3. Software developers and DevOps Engineers4. Analysts, user experience designers and/or data visualisation developers5. ScrumMaster, Service Delivery Manager or an Agile Coach
4.	Communication Management	<ul style="list-style-type: none">• The systematic planning, implementing, monitoring, and revision of all the channels of communication within an organisation and between organisations.

Figure.3. Project Plan

Effort and Cost Estimation

Activity Description	Sub-Task	Sub-Task Description	Effort (in weeks)	Cost in INR
Design the user screen (Frontend)	E1R1A1T1 (Effort-Requirement-Activity-Task)	Confirm the user requirements (Acceptance criteria)	1	1600
	E1R1A1T2	Integrating the backend functionality of the screen components	1	2000
	E1R1A1T3	Provide UX/UI for the screen	2	2000
MAIA Server	Voice and speech processing	Based on user input, it will access the server libraries to produce a particular output	7	1,40,000
	Voice libraries	Collection of voice samples that have been verified by the users and refined by AI for global implementation	10	2,00,000
	Voice Refinement Engine	The main AI used in the server that refines given voice samples in order to produce clear sounds	7	1,40,000
App Features (Backend)	AF1 (Audio Record)	Record the audio from user as input	2	8000
	AF2 (Audio Playback of Voice)	User can listen to the speech	1	4000
	AF3(Voice Analyser)	Analyse and provide a report of the audio	3	8800

Figure.4. Effort and Cost Estimation Table

Infrastructure and Resource Cost

S. No.	Activity Description	Effort (week)	Cost per week (INR)	Total cost (INR)
1	Design the user screen (Frontend)	5 weeks	5,000	25,000
2	MAIA Server	24 weeks	20,000	4,80,000
3	App Features (Backend)	6 weeks	7,000	42,000
			Total	5,47,000

Figure.5. Activity Description Table

Infrastructure Requirement	Qty	Cost per qty (Rupees)	Cost per item (per year)
Python (version 3) (pip)	5	Free	free
Jasper	5	Free software based	free
Fimga (UX/UI)	3	Free software based	free
WIFI	5	2,000	10,000
PC'S	3	40,000	1,20,000
Amazon (Aws)Database	3	772	27,792
		Total	1,57,792

Figure.6. Infrastructure Requirements Table

Maintenance and Support Cost [OpEx]

Category	Details	Qty	Cost per qty per annum	Cost per item
People	Network, System, Middleware and DB admin Developer, Support, Consultant	3	80,000	2,40,000
Licence	Operating System, Database, Middleware, IDE	3	10,000	30,000
Infrastructures	Server, Storage and Network	3	10,000	30,000
			Total	3,00,000

Figure.7. Maintenance and Support Cost Table

COCOMO MODEL 1:

- The mode is Organic
- Kloc = 5
- Effort = 13.0056 Person-Month
- Development Time = 6.62688 Months
- Average Staff Required = 2 Persons
- Cost=Average Staff Required*10,666 = 2*10,666 = 21332 per week
- Cost per month = 21334*4 = Rupee 85,336

Identifying Jobs and Requirements

Name	Role	Responsibilities
Cathy, Veenasree, Harshitha	Key Business User (Product Owner)	Provide clear business and user requirements
Cathy	Project Manager	Manage the project
Veenasree, Harshitha	Business Analyst	Discuss and Document Requirements
Cathy	Technical Lead	Design the end-to-end architecture
Harshitha	UX Designer	Design the user experience
Cathy, Harshitha	Frontend Developer	Develop user interface
Veenasree, Cathy	Backend Developer	Design, Develop and Unit Test Services/API/DB
Veenasree	Cloud Architect	Design the cost effective, highly available and scalable architecture
Cathy, Veenasree, Harshitha	Cloud Operations	Provision required Services
Harshitha, Cathy, Veenasree	Tester	Define Test Cases and Perform Testing

Figure.8. Team Member Responsibilities Table

WORK BREAKDOWN STRUCTURE & RISK ANALYSIS

Work Breakdown Structure (WBS) Diagram

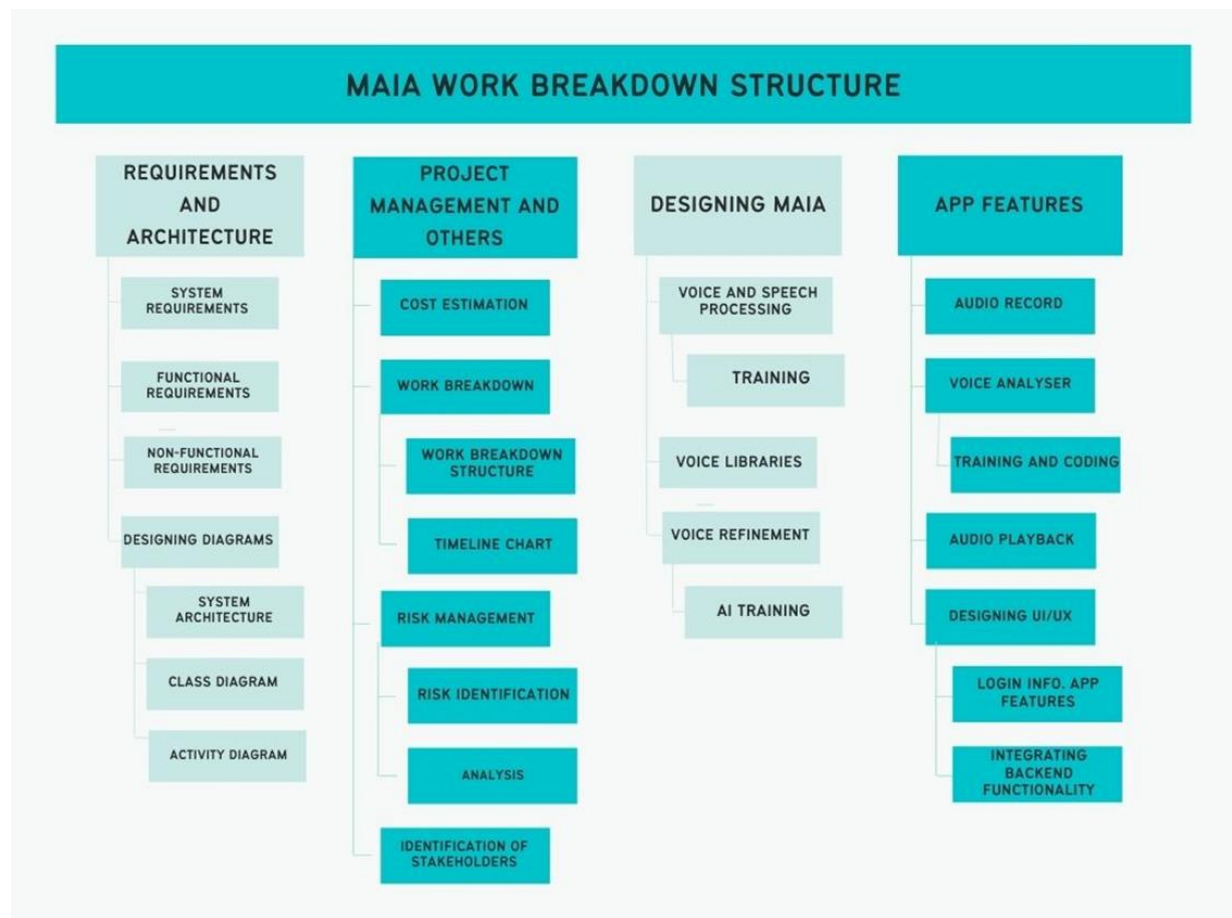


Figure.9. Work Breakdown Structure diagram

Timeline – Gantt chart

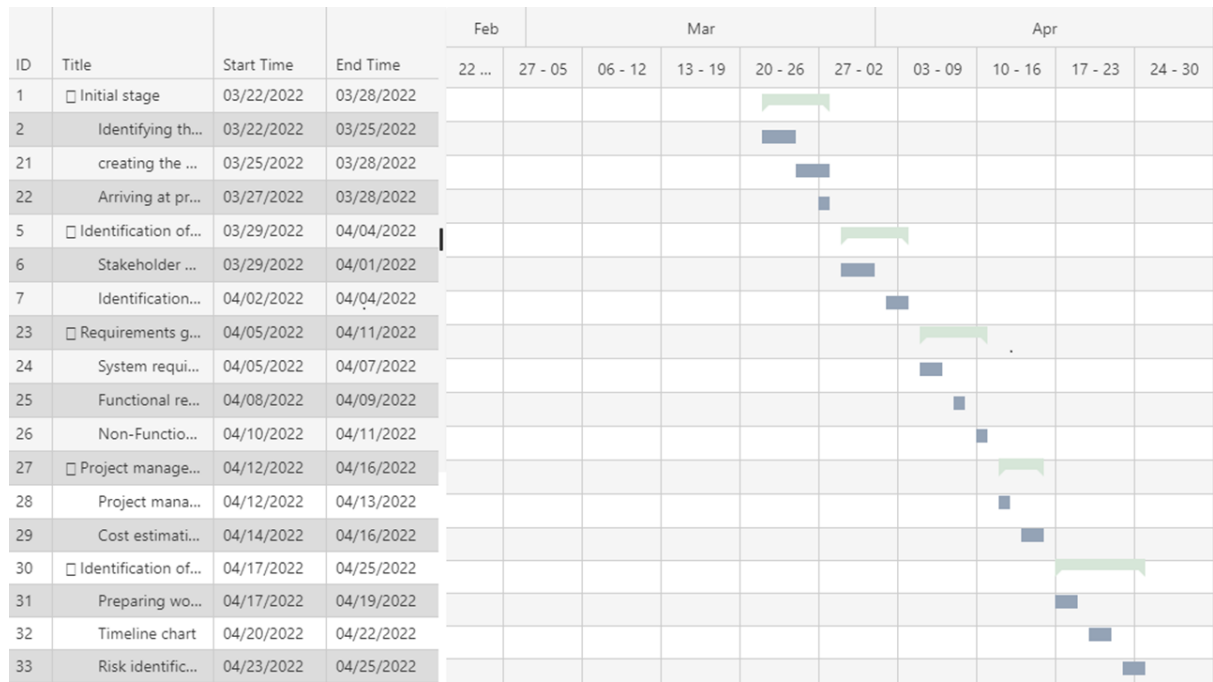


Figure.10. Project planning, Analysis and Estimations

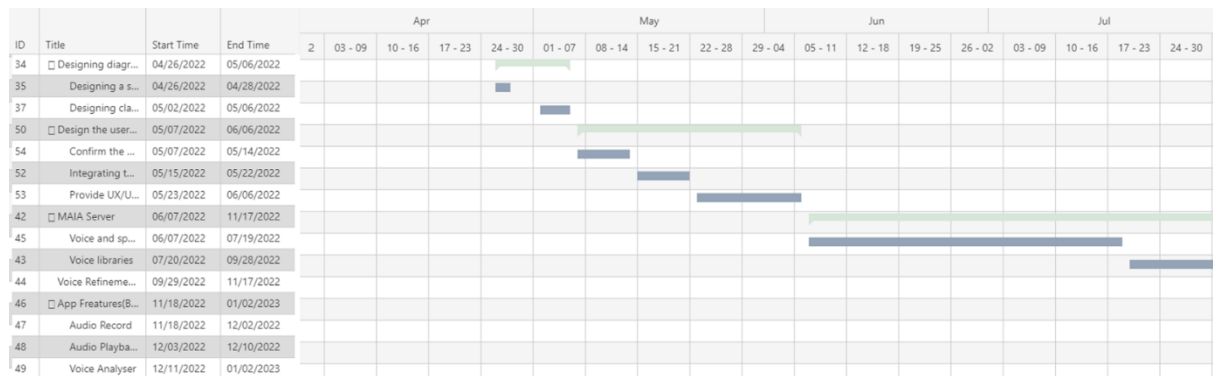


Figure.11. Designing system architectures and building the required code

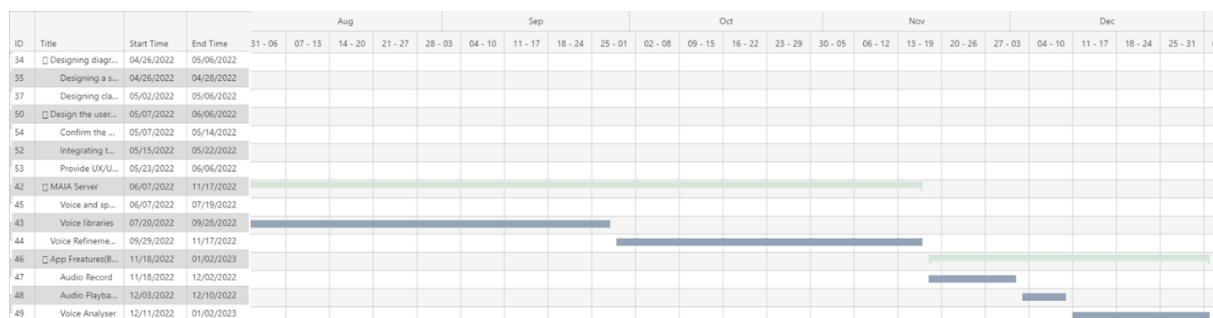


Figure.12. Building MAIA and other app features

Risk Management

S. No.	Risk	Impact (5)	Probability (5)	Total = Impact * Probability	Mitigation ways
1	Voice Recognition (for various accents, tones)	5	2	10	Train the AI machine for various voices at different decibel levels
2	Exceeding the budget estimation	4	2	8	while estimating the budget, 20% extra need to be calculated Discuss with a set of experience developers hence the project sticks to the estimation
3	Unavailability of skilled workers	5	2	10	Learn the prerequisite required to develop the app
4	Choosing wrong software while developing	4	2	8	Choose an efficient software with minimum cost for the completion of the project
5	Loss of Internet	5	2	10	Backup power supply, both on-premises and at server centres, can add an even greater degree of protection. SLA (Service-level agreement) can help mitigate losses, hence look for a vendor who can guarantee uptime of 99% or more.
6	Major competitors in market	3	3	9	Know the existing competitors in the market Updating the app with new features hence the company is one step ahead

7	Security Breach	5	1	5	Building a strong firewall Having regular monitor check-ups.
8	Long duration in training the AI Engine	4	3	12	Training the machine to for different accents
9	Choosing a wrong vendor and suppliers	4	1	4	Inspect Vendors' Precedence and Certification History Of Constancy in Quality Service Delivery
10	Complex internal system to integrate with	5	3	15	Add a task in Discovery for analysis of the current system, infrastructure Request existing documentation on the internal system

Figure.13. Risk Management Table

Risk Matrix

	1 Negligible	2 Minor	3 Moderate	4 Major	5 Catastrophic
(5) Very Likely					
(4) Likely					
(3) Moderate			Major competitors in market	Long duration in training the AI Engine	Complex internal system to integrate with
(2) Not Likely				Exceeding the budget estimation Choosing wrong software while developing	Voice Recognition (for various accents, tones) Loss of Internet
(1) Very unlikely				Choosing a wrong vendor and suppliers	Security Breach

Figure.14. Risk Analysis Matrix

SYSTEM ARCHITECTURE, USE CASE & CLASS DIAGRAM

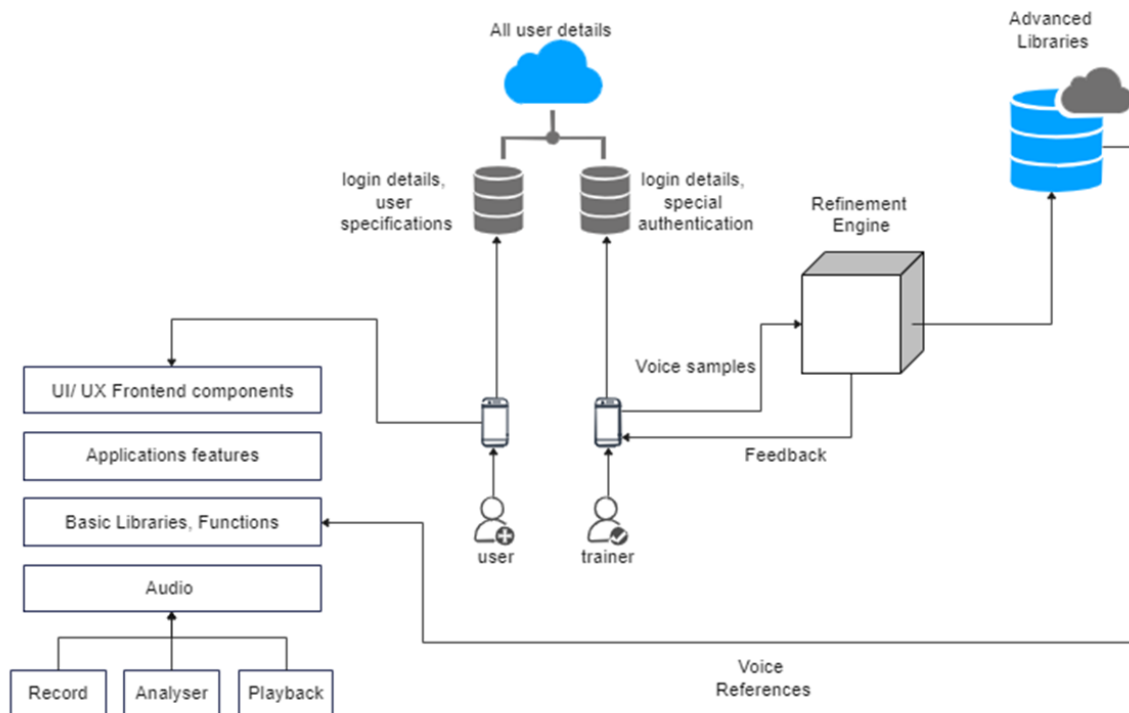
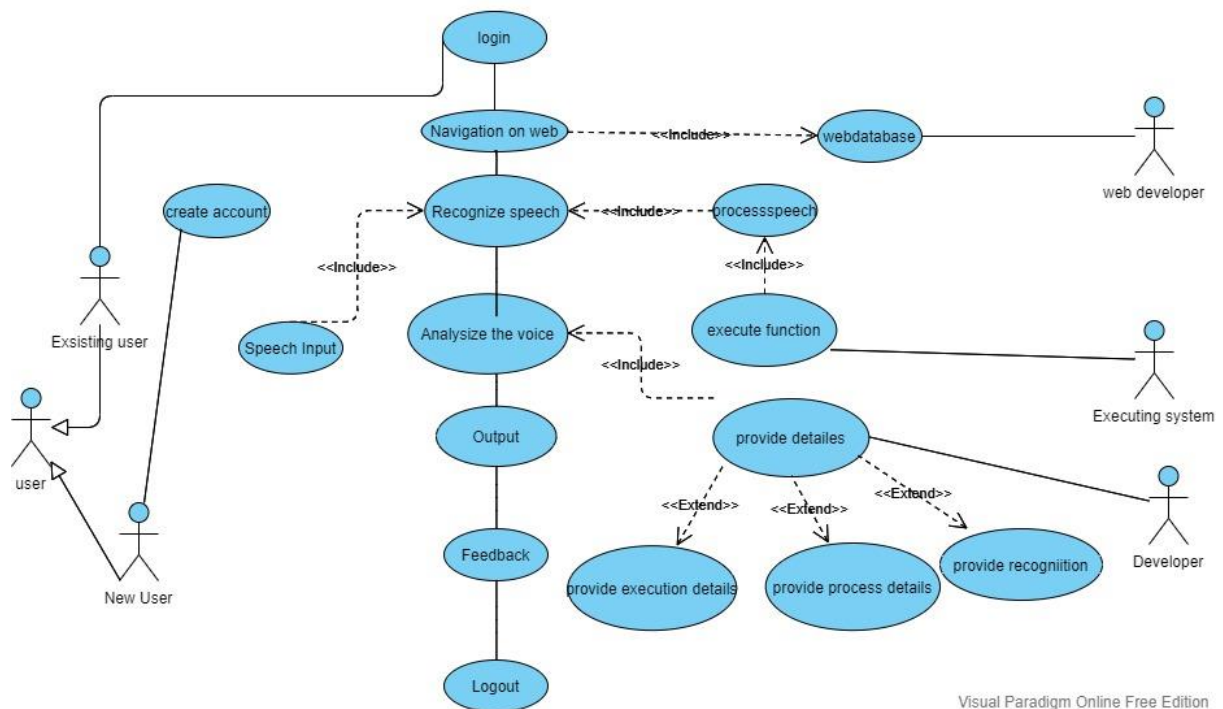


Figure.15. System Architecture

Visual Paradigm Online Free Edition

UseCase Diagram



Visual Paradigm Online Free Edition

Figure.16. Use case diagram

Class diagram

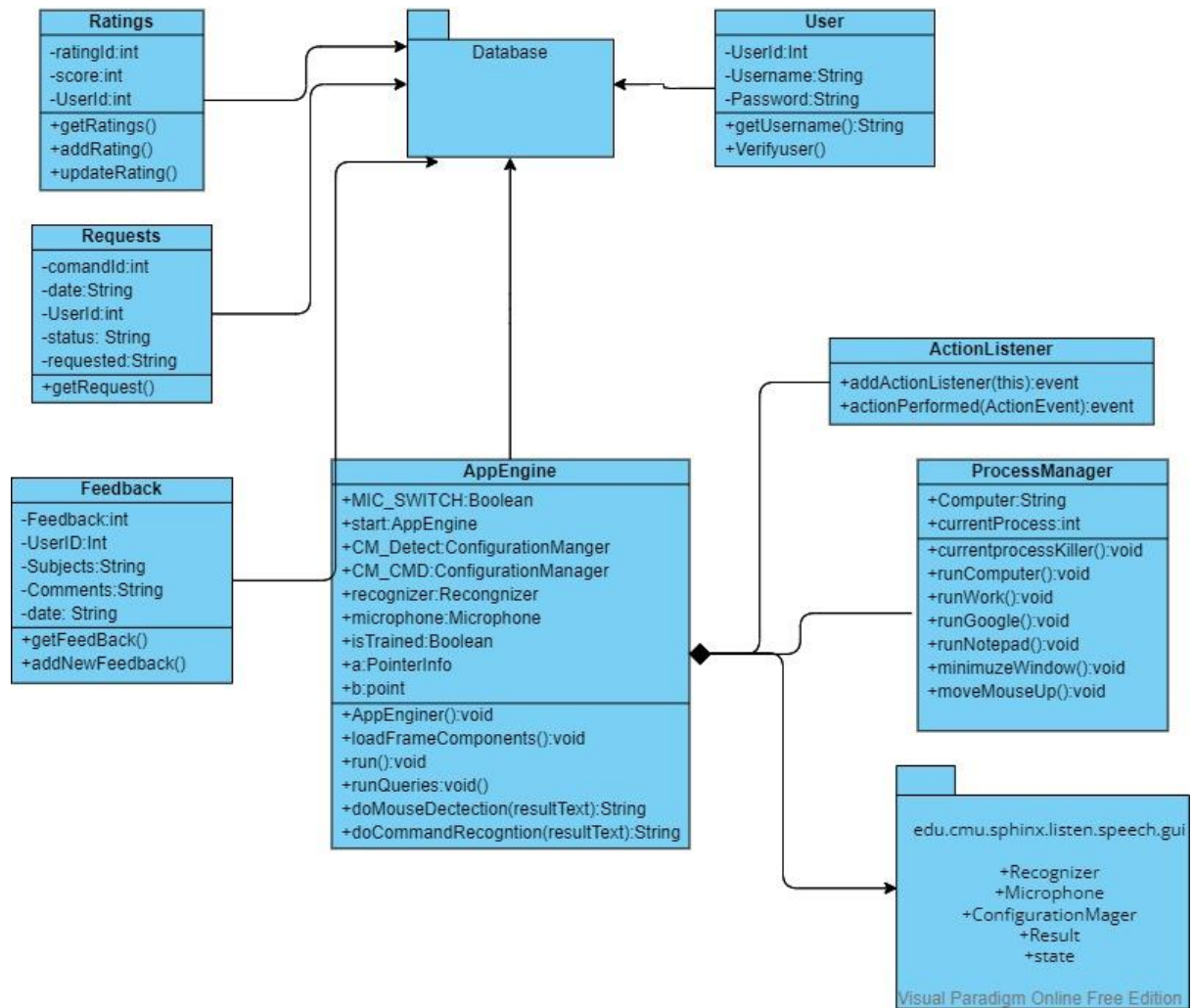


Figure.17. Class Diagram

ENTITY RELATIONSHIP DIAGRAM

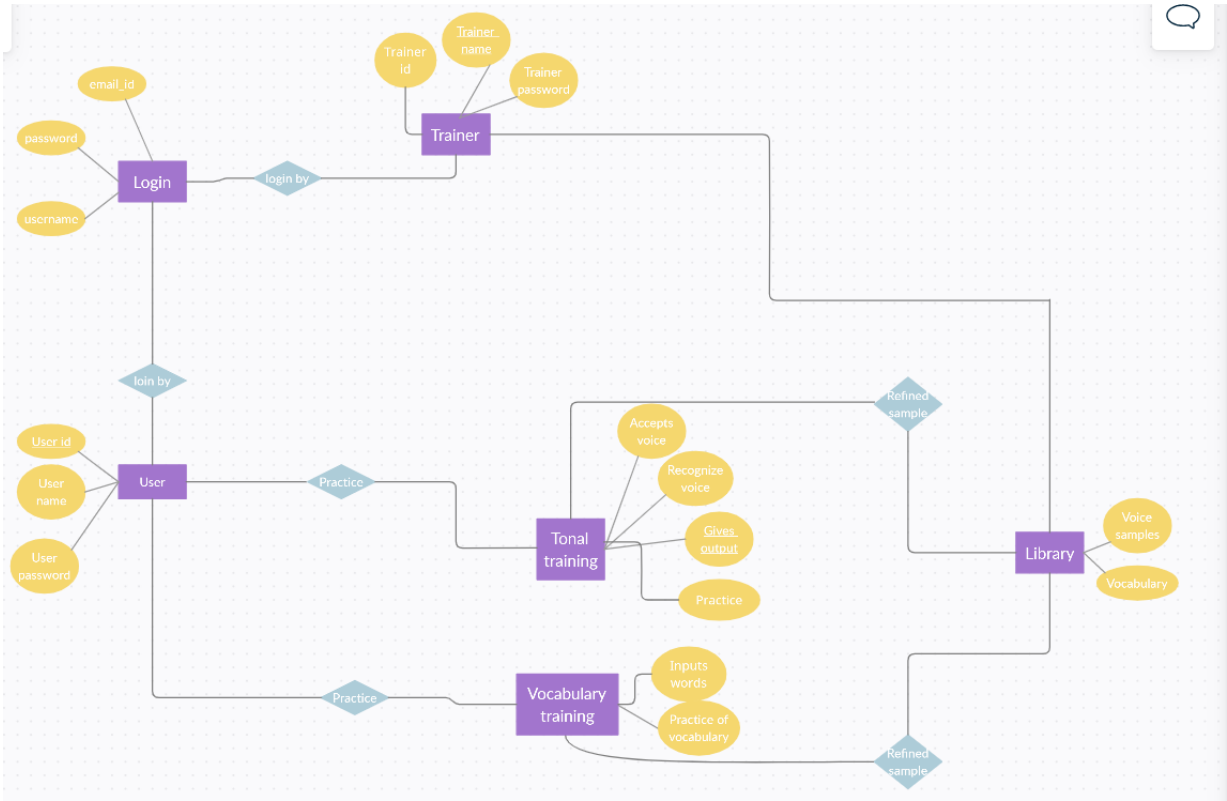


Figure.18. Entity Relationship Diagram

DATA FLOW DIAGRAM

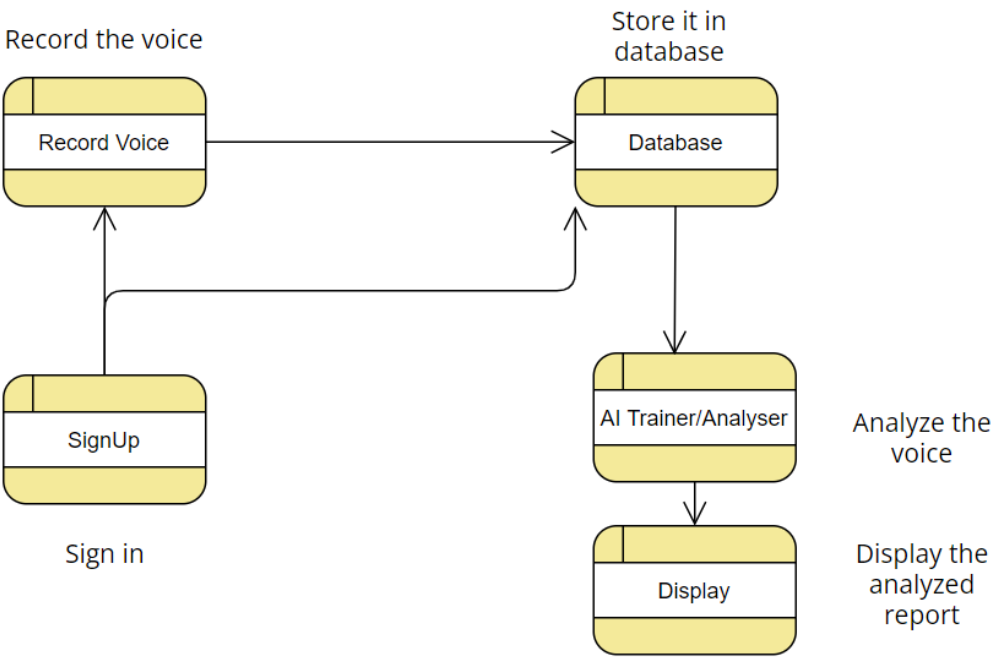


Figure.19. Dataflow Diagram

SEQUENCE & COLLABORATION DIAGRAM

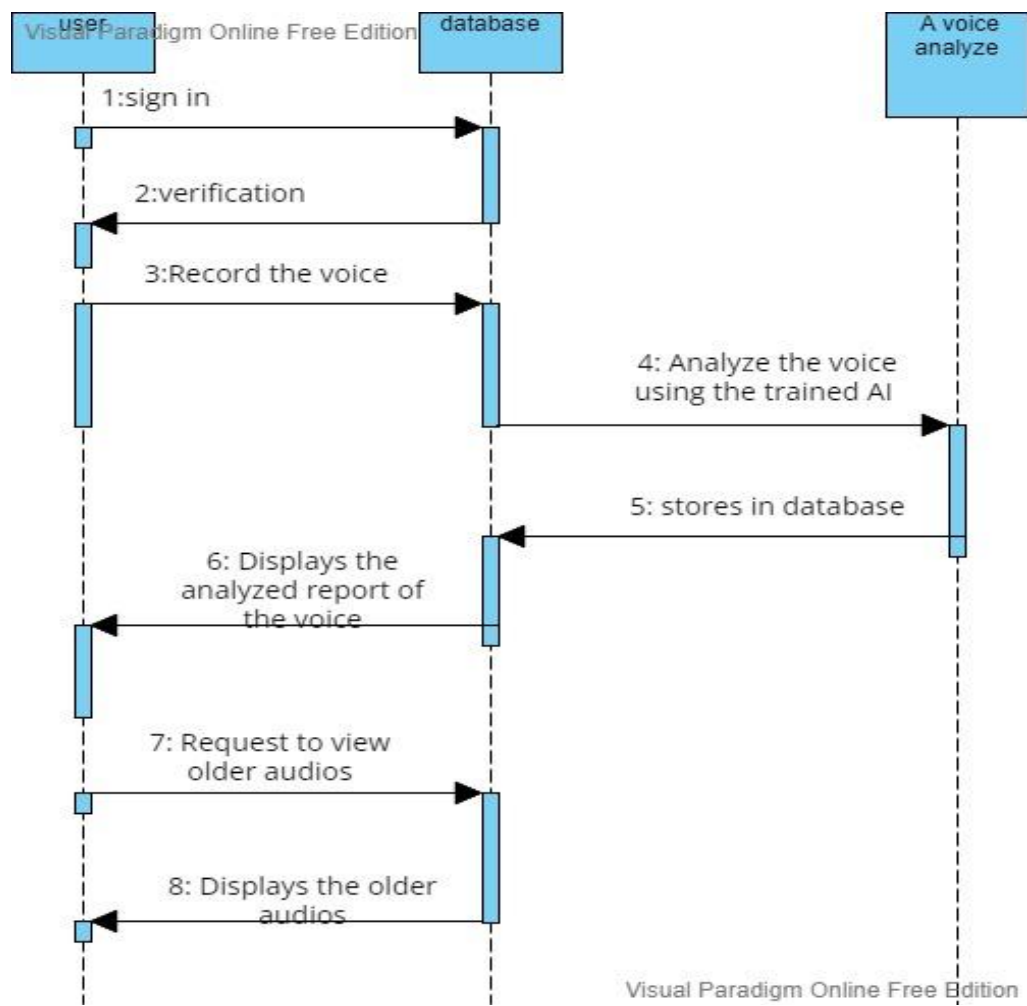


Figure.20. Sequence Diagram

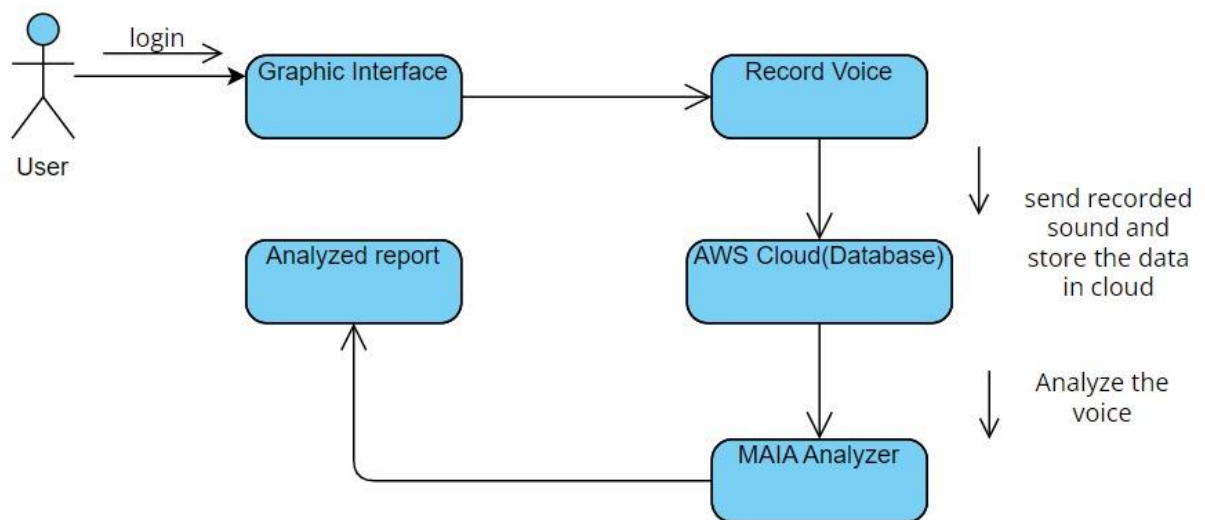


Figure.21. Collaboration Diagram

DEVELOPMENT OF TESTING FRAMEWORK/USER INTERFACE

SIGN IN

User name

First name

Last name

E-mail

Phone number

Gender

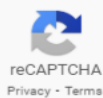
Password

Confirm password

☐ I agree to the [Terms & Conditions](#) and [Privacy Policy](#).



I'm not a robot



SIGN IN

Figure.22. MAIA Sign-in page

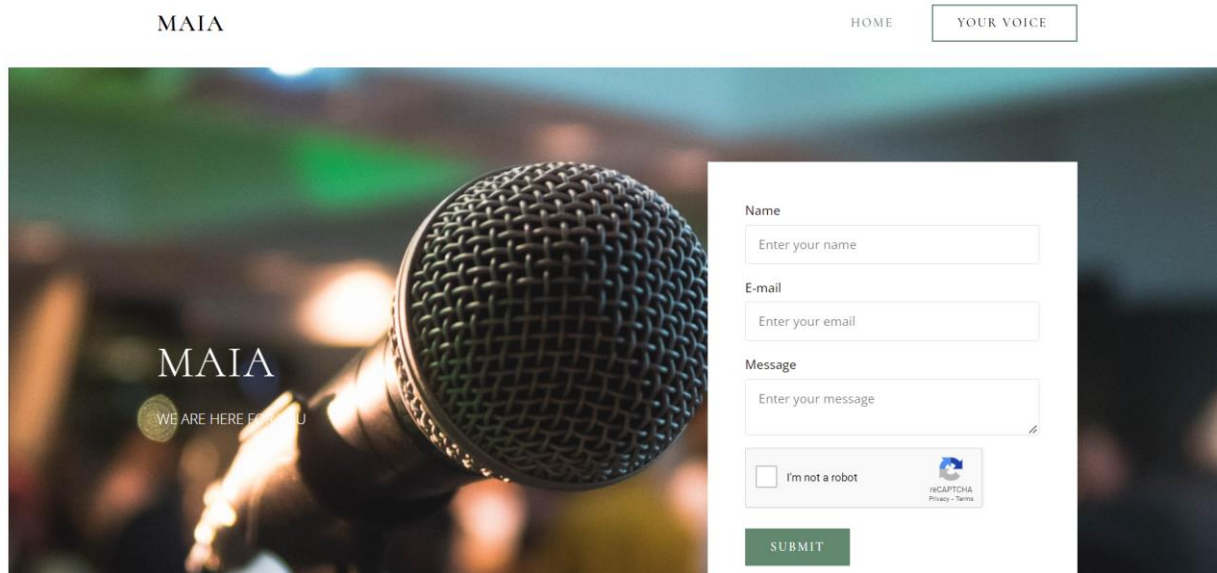


Figure.23. MAIA Login page

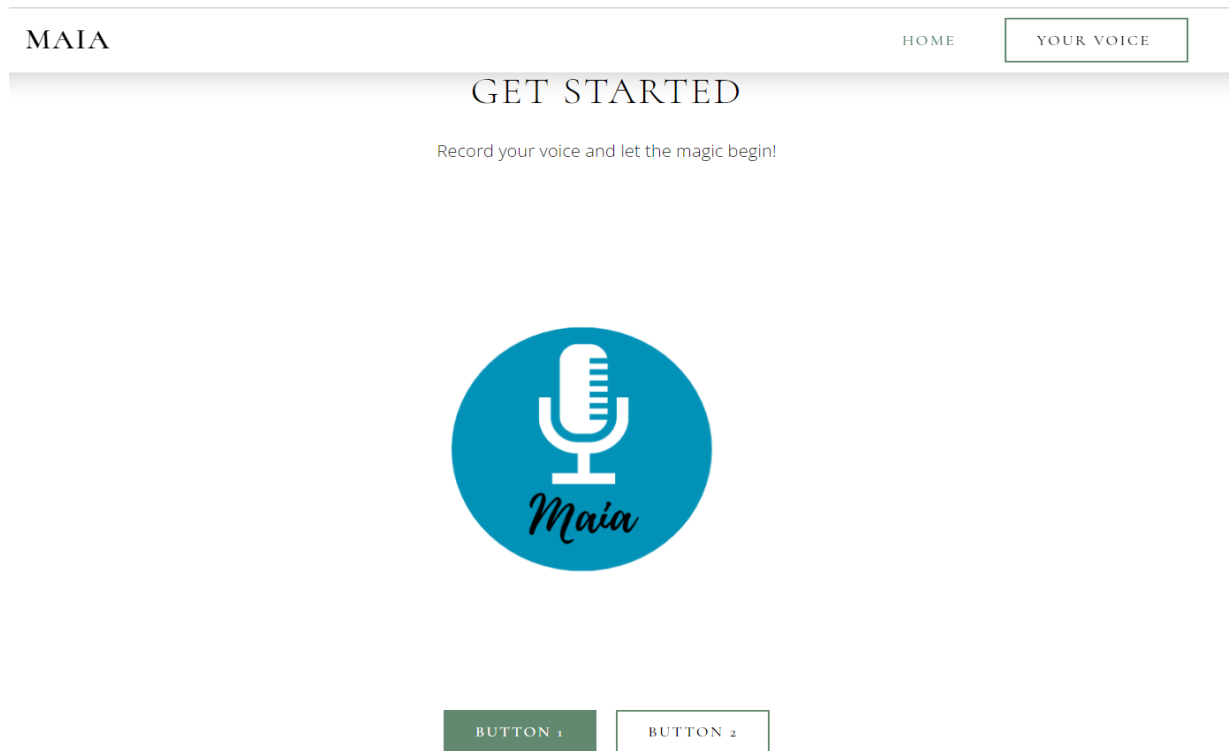


Figure.24. Prototype of Voice recording page

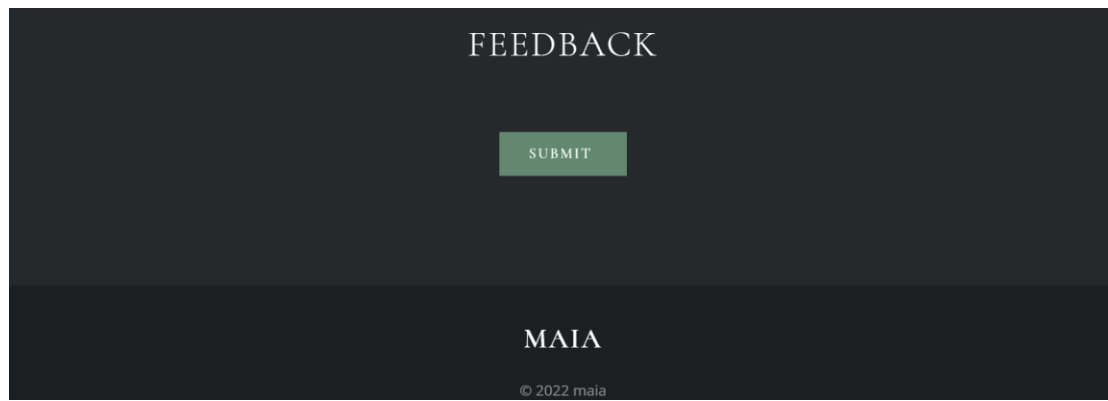


Figure.25. Prototype Feedback page

TEST CASES & REPORTING

Test ID (#)	Test Scenario	Test case	Execution steps	Expected outcome	Actual Outcome	Status	Remarks
01	Enter the username	Length > 35	1. User clicks on the username box 2. Enter the username in the box	Should not accept the username	It is not accepted	Pass	Successful testcase
02	Enter the username	length<3	1. User clicks on the username box 2. Enter the username in the box	Should Not accept the username	It has not accepted	Pass	Successful testcase
03	Enter the username	length>=3 and length<36	1. User clicks on the username box 2. Enter the username in the box	Should Accept the username	It has accepted	Pass	Successful testcase
04	Enter the username	Only Alphabets	1. User clicks on the username box 2. Enter the username in the box	Should Accept the username	It has accepted	Pass	Successful testcase
05	Enter the username	Only Numerical	1. User clicks on the username box 2. Enter the username in the box	Should Accept the username	It has accepted	Pass	Successful testcase
06	Enter the username	Alphanumeric	1. User clicks on the username box 2. Enter the username in the box	Should Accept the username	It has accepted	Pass	Successful testcase

07	Enter the username	Entered Already Existed Username	1.User clicks on the username box 2.Enter the username in the box	Should not Accept the username	It has not accepted	Pass	Successful testcase
08	Enter the username	Entered Already Existed Username	3.User clicks on the username box 3.Enter the username in the box	Should not Accept the username	It has not accepted	Pass	Successful testcase
09	Enter the First Name	Length<1	1.User clicks on the First name box 2.Enter the First Name in the box	Should not accept the First name	It has not accepted	Pass	Successful testcase
10	Enter the First Name	Length>15	1.User clicks on the First name box 2.Enter the First Name in the box	Should not accept the First name	It has not accepted	Pass	Successful testcase
11	Enter the First Name	Length>= 1 and Length<= 15	1.User clicks on the First name box 2.Enter the First Name on First Name box	Should accept the First name	It has accepted	Pass	Successful testcase
12	Enter the First Name	Only Alphabets	1.User clicks on the First name box 2.Enter the First Name in the box	Should accept the First name	It has accepted	Pass	Successful testcase
13	Enter the First Name	Only Numerical	1.User clicks on the First name box 2.Enter the First Name on First Name box	Should Not accept the First name	It has not accepted	Pass	Successful testcase

14	Enter the First Name	Only Alphanumeric	1.User clicks on the First name box 2.Enter the First Name on First Name box	Should Not accept the First name	It has not accepted	Pass	Successful testcase
15	Enter the First Name	Only Special Characters	1.User clicks on the First name box 2.Enter the First Name on First Name box	Should Not accept the First name	It has not accepted	Pass	Successful testcase
16	Enter the Last Name	Length<1	1.User clicks on the Last Name box 2.Enter the Last Name on Last Name box	Should not accept the Last name	It has not accepted	Pass	Successful testcase
17	Enter the Last Name	Length>15	1.User clicks on the Last Name box 2.Enter the Last Name on Last Name box	Should not accept the Last name	It has not accepted	Pass	Successful testcase
18	Enter the Last Name	Length>= 1 and length<=15	1.User clicks on the Last Name box 2.Enter the Last Name on Last Name box	Should accept the Last name	It has accepted	Pass	Successful testcase

19	Enter the Last Name	Only Alphabets	1.User clicks on the First name box 2.Enter the Last Name on Last Name box	Should accept the Last name	It has accepted	Pass	Successful testcase
20	Enter the Last Name	Only Numerical	1.User clicks on the Last name box 2.Enter the Last Name on Last Name box	Should Not accept the Last name	It has not accepted	Pass	Successful testcase
21	Enter the Last Name	Only Alphanumeric	1.User clicks on the Last name box 2.Enter the Last Name on Last Name box	Should Not accept the Last name	It has not accepted	Pass	Successful testcase
22	Enter the Last Name	Only Special Characters	1.User clicks on the Last name box 2.Enter the Last Name on Last Name box	Should Not accept the Last name	It has not accepted	Pass	Successful testcase
23	Enter the email Id	Length>3 and Length<= 320	1.User clicks on the email Id box 2. Enter the email Id on mail Id box	Should Accept the Mail Id	It has accepted	Pass	Successful testcase
24	Enter the email Id	email Id without @domain name	1.User clicks on the email Id box 2. Enter the email Id on mail Id box	Shou Id not Accept the Mail Id	It has not accepted	Pass	Successful testcase
25	Enter the email Id	email Id with @domain name	1.User clicks on the email Id box 2. Enter the email Id on mail Id box	should Accept the Mail Id	It has accepted	Pass	Successful testcase
26	Enter the phone	length=10	1.User clicks on the Phone	Should Accept	It has accepted	Pass	Successful testcase

	number		No box 2.Enter the Phone No on phone no box	thePhone No	the phoneNo		
27	Enter the phone number	Only numeric	1.User clicks on the Phone No box 2.Enter the Phone No on phone no box	Should Accept thePhone No	It has accepted the phoneNo	Pass	Successful testcase
28	Enter the phone number	Only Alphabets	1.User clicks on the Phone No box 2.Enter the Phone No on phone no box	Should Not Accept thePhone No	It has Not accepted the phoneNo	Pass	Successful testcase
29	Enter the phone number	Alphanum eric	1.User clicks on the Phone No box Enter the Phone No on phone no box	Should Not Accept thePhone No	It has Not accepted the phoneNo	Pass	Successful testcase
30	Enter the gender	Selecting from the options	1.User clicks on the gender box2. User selects the gender in the box	Should Accept the gender	It has t accepted the phoneNo	Pass	Successful testcase
31	Enter The Password	length<6	1.User clicks on the Password box 2.Enter the password in the box	Should Not Accept the password	it has not accepted the password	Pass	Successful testcase
32	Enter The password	length>10 0	1.User clicks on the Password box 2.Enter the password in the box	Should Not accept the password	It has not accepted the password	Pass	Successful testcase

33	Enter The password	length>=6 and length<=100	1.User clicks on the Password box 2.Enter the password in the box	Should Accept the password	should accept the password	Pass	Successful testcase
34	Enter The password	Only Alphabets	1.User clicks on the Password box 2.Enter the password in the box	Should Not accept the password	It has not accepted the password	Pass	Successful testcase
35	Enter The password	Only Numerical	1.User clicks on the Password box 2.Enter the password in the box	Should Not accept the password	It has not accepted the password	Pass	Successful testcase
36	Enter The password	Only Special Characters	1.User clicks on the Password box 2.Enter the password on the Passwordbox	Should Not accept the password	It has not accepted the password	Pass	Successful testcase
37	Enter The password	Only Alphanumeric	1.User clicks on the Password box 2.Enter the password on the Passwordbox	Should Not accept the password	It has not accepted the password	Pass	Successful testcase
38	Enter The password	Alphanumeric With special Characters	1.The user clicks on the Password boxes 1. Enter the password on the Passwordbox	Should Not accept the password	It has not accepted the password	Pass	Successful testcase
39	Enter the password	Entering the password	1. The user clicks on the Password boxes 2. Enter the password on the Password box	The entered should be shown in star characters	the password is shown in star characters	Pass	Successful testcase

40	Enter the Confirm Password	Different password	1. The user clicks on the Confirm Password box 2. Enter the Different password on the Confirm Password box	Should show the 'try again' password	It has not accepted the password	Pass	Successful testcase
41	Enter the Confirm Password	Same password	1. The user clicks on Confirm Password box 1. Enter the Different password on the Confirm Password box	Should accept the password	It has accepted the password	Pass	Successful testcase
42	Enter the Confirm password	Entering the same password	1. The user clicks on the Passwordbox 2. Enter the password on the Password box	The entered should be shown in star characters	The password is shown in star characters	Pass	Successful testcase
43	Select the create account option	Some boxes are not filled	1. The user will select the create option	Should not create an account	It has not created an account	Pass	Successful testcase
44	Select the create account option	All boxes are filled	1. The user will select the create option	Should create an account	it has created an account	Pass	Successful testcase
45	Recording voice	Frequency of voice < 100 hertz	1. Open the home screen 2. Click on "Record voice"	Voice sample should not be recognized	A message showing "Can't recognize the voice" is shown	Pass	Successful testcase
46	Recording voice	Frequency of voice > 100 and < 120 hertz	1. Open the home screen 2. Click on "Record voice"	Voice should be recognized and output should be given	Voice has been recognized and output is given	Pass	Successful testcase
47	Recording voice	Frequency of voice > 120 hertz	1. Open the home screen 2. Click on "Record voice"	Voice can't be recognized	A message "Voice is not clear" is shown	Pass	Successful testcase

48	Recording voice	Voice is given but there is no internet	1.Open the home screen 2.Click on "Record voice"	Voice can't be recorded	A message "Check your network connection and try again" is shown	Pass	Successful testcase
49	Database access	Speech analysis	1.Record a voice sample 2.Press enter for speech analysis	It should give feedback on voice tones and vocabulary	It will give feedback on voice tones and vocabulary	Pass	Successful testcase
50	Special library access	Getting output	1.Record voice sample 2.Press enter for speech analysis	Sample should be processed and cleaner feedback should be given	Cleaner feedback is given	Pass	Successful testcase

Code for speech recognition

```
// modules imported for speech recognition
using Microsoft.CognitiveServices.Speech;
using Microsoft.CognitiveServices.Speech.Audio;
using Microsoft.CognitiveServices.Speech.Dialog;
using System;
using System.Diagnostics;
using System.IO;
using System.Text;
using Windows.Foundation;
using Windows.Storage.Streams;
using Windows.UI.Xaml;
using Windows.UI.Xaml.Controls;
using Windows.UI.Xaml.Media;

namespace helloworld
{
    public sealed partial class MainPage : Page
    {
        private DialogServiceConnector connector;

        private enum NotifyType
        {
            StatusMessage,
            ErrorMessage
        };

        public MainPage()
        {
            this.InitializeComponent();
        }

        private async void EnableMicrophone_ButtonClicked(
            object sender, RoutedEventArgs e)
        {
            bool isMicAvailable = true;
            try
            {
                var mediaCapture = new Windows.Media.Capture.MediaCapture();
                var settings =
                    new Windows.Media.Capture.MediaCaptureInitializationSettings();
                settings.StreamingCaptureMode =
                    Windows.Media.Capture.StreamingCaptureMode.Audio;
                await mediaCapture.InitializeAsync(settings);
            }
            catch { }
        }
    }
}
```

```

    }
    catch (Exception)
    {
        isMicAvailable = false;
    }
    if (!isMicAvailable)
    {
        await Windows.System.Launcher.LaunchUriAsync(
            new Uri("ms-settings:privacy-microphone"));
    }
    else
    {
        NotifyUser("Microphone was enabled", NotifyType.StatusMessage);
    }
}

```

```

private void NotifyUser(
    string strMessage, NotifyType type = NotifyType.StatusMessage)
{
    // If called from the UI thread, then update immediately.
    // Otherwise, schedule a task on the UI thread to perform the update.
    if (Dispatcher.HasThreadAccess)
    {
        UpdateStatus(strMessage, type);
    }
    else
    {
        var task = Dispatcher.RunAsync(
            Windows.UI.Core.CoreDispatcherPriority.Normal,
            () => UpdateStatus(strMessage, type));
    }
}

```

```

private void UpdateStatus(string strMessage, NotifyType type)
{
    switch (type)
    {
        case NotifyType.StatusMessage:
            StatusBorder.Background = new SolidColorBrush(
                Windows.UI.Colors.Green);
            break;
        case NotifyType.ErrorMessage:
            StatusBorder.Background = new SolidColorBrush(
                Windows.UI.Colors.Red);
            break;
    }
}

```

```

StatusBlock.Text += string.IsNullOrEmpty(StatusBlock.Text)
    ? strMessage : "\n" + strMessage;

if (!string.IsNullOrEmpty(StatusBlock.Text))
{
    StatusBorder.Visibility = Visibility.Visible;
    StatusPanel.Visibility = Visibility.Visible;
}
else
{
    StatusBorder.Visibility = Visibility.Collapsed;
    StatusPanel.Visibility = Visibility.Collapsed;
}
// Raise an event if necessary to enable a screen reader
// to announce the status update.
var peer =
Windows.UI.Xaml.Automation.Peers.FrameworkElementAutomationPeer.FromElement(StatusBlock);
if (peer != null)
{
    peer.RaiseAutomationEvent(
        Windows.UI.Xaml.Automation.Peers.AutomationEvents.LiveRegionChanged);
}
}

// Waits for and accumulates all audio associated with a given
// PullAudioOutputStream and then plays it to the MediaElement. Long spoken
// audio will create extra latency and a streaming playback solution
// (that plays audio while it continues to be received) should be used --
// see the samples for examples of this.

private void SynchronouslyPlayActivityAudio(PullAudioOutputStream activityAudio)
{
    var playbackStreamWithHeader = new MemoryStream();
    playbackStreamWithHeader.Write(Encoding.ASCII.GetBytes("RIFF"), 0, 4); //
    ChunkID
    playbackStreamWithHeader.Write(BitConverter.GetBytes(UInt32.MaxValue), 0, 4); //
    ChunkSize: max
    playbackStreamWithHeader.Write(Encoding.ASCII.GetBytes("WAVE"), 0, 4); //
    Format
    playbackStreamWithHeader.Write(Encoding.ASCII.GetBytes("fmt "), 0, 4); //
    Subchunk1ID
    playbackStreamWithHeader.Write(BitConverter.GetBytes(16), 0, 4); //
    Subchunk1Size: PCM
    playbackStreamWithHeader.Write(BitConverter.GetBytes(1), 0, 2); // AudioFormat:
    PCM

```

```

        playbackStreamWithHeader.Write(BitConverter.GetBytes(1), 0, 2); // NumChannels:
        mono
        playbackStreamWithHeader.Write(BitConverter.GetBytes(16000), 0, 4); //
        SampleRate: 16kHz
        playbackStreamWithHeader.Write(BitConverter.GetBytes(32000), 0, 4); // ByteRate
        playbackStreamWithHeader.Write(BitConverter.GetBytes(2), 0, 2); // BlockAlign
        playbackStreamWithHeader.Write(BitConverter.GetBytes(16), 0, 2); // BitsPerSample:
        16-bit
        playbackStreamWithHeader.Write(Encoding.ASCII.GetBytes("data"), 0, 4); //
        Subchunk2ID
        playbackStreamWithHeader.Write(BitConverter.GetBytes(UInt32.MaxValue), 0, 4); //
        Subchunk2Size

        byte[] pullBuffer = new byte[2056];

        uint lastRead = 0;
        do
        {
            lastRead = activityAudio.Read(pullBuffer);
            playbackStreamWithHeader.Write(pullBuffer, 0, (int)lastRead);
        }
        while (lastRead == pullBuffer.Length);

        var task = Dispatcher.RunAsync(
            Windows.UI.Core.CoreDispatcherPriority.Normal, () =>
            {
                mediaElement.SetSource(
                    playbackStreamWithHeader.AsRandomAccessStream(), "audio/wav");
                mediaElement.Play();
            });
    }

    private void InitializeDialogServiceConnector()
    {
        // New code will go here
    }

    private async void ListenButton_ButtonClicked(
        object sender, RoutedEventArgs e)
    {
        // New code will go here
    }
}

```


CONCLUSION

A successful prototype and building plan for MAIA has been created. Using the specifications, MAIA can now be built and improved upon further.

From working on this project abstract, it is understood about the complexity of building an AI engine and integrating it to an application for usage. Not only that, but also, the complexity of understanding the requirements that include hardware and human work is also important.

It can be understood that a lot of planning goes behind the creation and implementation of large projects. Understanding the risks, planning out the architecture and getting people to work with us were all important things that were not initially considered.

Eventually, all of these things have successfully led to the conceptualisation of MAIA and her implementation.

REFERENCES

- LAB SESSION I
<https://docs.google.com/document/d/1caPy0oOmStAE6ZWRd9k41G8SBMkEpS7ZiUsT20SyKKQ/edit>
- LAB SESSION II
<https://docs.google.com/document/d/1IH5xV2NSpCmn2nK1HvxPsLB7oGt6PnDYRjHwHUMryJs/edit>
- LAB SESSION III
<https://docs.google.com/document/d/1cXHG8Wjb91QPYblmrJA5jL-72gHhFY9AVhC69rpNCvY/edit>
- LAB SESSION V
https://docs.google.com/document/d/1hzFJRijgempAMxL6KXFFeqnlkFjd2REjD_Hbyb_iaSI/edit
- LAB SESSION VI
https://docs.google.com/document/d/1jqinotS5Brm_0sNPPwRkrKZXm1E14G4KaSzQUOK1X9g/edit
- LAB sessions 4 - 6
<https://docs.google.com/presentation/d/1p3POgu110089c5dp0lZEBWoGAEW9TSzi/edit#slide=id.p1>