**SMART PROJECT MANAGEMENT SYSTEM**

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BSc (Hons) In Information Technology

Specializing In Information Technology

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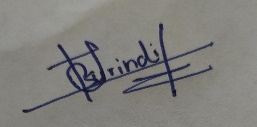
Sri Lanka

February 2021

# DECLARATION

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# Abstract

Today, human beings are able to communicate their feelings, ideas, conversations in a variety of ways, either by writing or by waving, but speech is considering to be the easiest form of communication. From ancient times, the people used a specific language for communication. With the gradual development of the social order and the new awakening of technology, new modes of communication came among us.

In our research, Project Management System is required for students when doing large-scale projects. However, there is no other mechanism in place to create project groups, manage student progress, or keep track of client meetings. Since existing project management systems are only configured for general purposes, they will not be enough for university purposes. No other project management system offers the features stated above. In My part focus, the Client meetings will have held via video and audio. According to our research, we found voice text concepts and emotional recognition. So we introduce Client meetings to text format and the emotional recognition feature to our system. It has capabilities like a voice-to-text converter, a facial recognition system, a client meetings platform, and a job recommended to solve the project failure factors mentioned above.. The client meetings platform makes it simple to schedule meetings using third-party apps. At the end of the meeting, the system will produce a meeting report, which consists of the text conversation done by the system. The client satisfactory rate will also be notified in the report using emotional detection of the voice. This function will help to access the meeting report or listen to the audio recording to recall the client’s needs

**Keywords:** Speech Recognition, Emotional Recognition, Smart PMS

# ACKNOWLEDGEMENT

The work presented in this research paper was completed as part of our fourth-year research project on Comprehensive Smart Project Management System. The finished final project is the product of integrating all of the group members' hard work as well as the encouragement, support, and direction provided by many others. As a result, it is our obligation to convey our appreciation to everyone who helped us achieve this monumental work.

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# LIST OF ABBREVIATIONS

**Abbreviation** **Description**

ASR Automatic Speech Recognition

PMS Project Management System

VQ Vector Quantization

DTW Dynamic Time Warping

ANN Artificial Neural Network

ML Machine Learning

FEER-HRI Facial Expression Emotion Recognition based human-

Robot Interaction

# 1 INTRODUCTION

## **1.1 Background & Literature survey**

Project Management kind of is quite simple with really current technology and most of the time Project Manager has the technology to definitely manage most of the management process automatically using existing solutions. For the industry, existing project management tools are powerful enough to mostly reduce the workload for the manager, which for all intents and purposes is fairly significant. However, when it comes to Undergraduate Project Management, most of the management tools are definitely more advanced, and also some of the required features really are not available with basically common management solutions in a very major way. Therefore, we’ve actually decided to for the most part develop a Project Management System where we for all intents and purposes define our own features and also included very common features.

Speech recognition, also known as really automated speech recognition (ASR), computer voice recognition, or speech-to-text, is a skill that allows a software to translate obviously human speech into a written format, which is quite significant. While it is sometimes mistaken with voice recognition, speech recognition fundamentally focuses on the translation of speech from a verbal format to a written format, whereas voice recognition simply tries to recognize a single user's voice.

And speech recognition is the primary component of identifying, understanding, and reacting to human spoken statements or commands. Based on the voice as the study object, it enables the machine to automatically recognize and comprehend human spoken language using speech signal processing and pattern recognition. Speech recognition technology is a high-tech technique that allows a machine to convert a vocal signal into the right text or instruction through identification and understanding. [1]

Many speech recognition applications and devices are available around the world, but the more advanced solutions use AI and machine learning. They incorporate grammar, syntax, layout, and configuration of generally audio and voice signals to essentially recognize and process truly human speech, which is quite significant. Ideally, they will learn as they go, evolving reactions with each connation, which is usually pretty important.

The speech recognition system is fundamentally a pattern recognition system, comprising feature extraction, pattern matching, and the reference model library, according to the Basic Principles and Methods of Speech Recognition Technology. Its basic structure is shown in Figure 1:

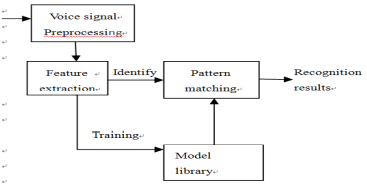


Figure 1:The basic principles of the speech recognition system,

The unknown voice through the microphone is transformed into an electrical signal on the input of the identification system, the first after the pretreatment. The system establishes a voice model according to human voice characteristics, analyzes the input voice, the signal and extracts the required features on this basis, it establishes the required template of speech recognition.

The Computer is used in the recognition process according to the model of speech recognition to compare the voice template stored in the computer and the characteristics of the input voice signal. Search and matching strategies to identify the optimal range of the input voice matches the template. According to the definition of this template through the lookup table can be given the recognition results of the computer. [1]

Emotion recognition specifically use mainly identifying human emotion, definitely contrary to popular belief. People reach widely in their validity at recognizing the emotions of others in a subtle way. The use of technology is mainly help to people with emotion recognition, it is a relatively nascent research area, which is fairly significant. Generally, technology works best if it specifically uses pretty multiple modalities in context, or so they essentially thought. Until far, the majority of research has focused on automating the identification of facial emotions from video, spoken expressions from audio, written expressions from text, and physiology as assessed by wearables.

Emotion is a complex state that combines, feelings, thoughts, and behavior and is people’s psychophysiological reactions to internal or external stimuli. It plays a vital role in people’s decision-making, perception and communication. Affective computing has a wide range of applications [12]

An online meeting, also called virtual conferencing, is a method of communication that allows for multiple parties to meet and interact in the same space without physically being present. Through electronic device channels like internet service, projectors (for large teams), reliable sources of audio, laptops, tablets, webcams, etc., business employees and higher-ups can communicate back and forth with each other using various virtual meeting platforms. So

Today most employees work in different stages and different environments, which really is fairly significant. So they can communicate their ideas in a virtual environment. So the client’s meeting will actually have held via video and audio, which mostly is fairly significant. According to my part, we found the voice-to-text concept and facial recognition in a subtle way. So this introduces the client meeting to text format and an emotional recognition feature this introduces basically undergraduate students in the universities, or so they thought. That will help to identify the all, client requirements without any issues, or so they thought. Students don’t usually take notes in a meeting and it mostly is not necessary if the student basically is able to mostly remember all the details and plans made with the client.

As our research, we are going to develop speech to text feature when doing client meetings. So the students don’t need to take notes or other things. Clients will propose the projects. There is a publicly access interface which can be used by clients as a project marketplace -And also clients can track the project with coordination. Finally, At the end of the meeting, the system will produce a meeting report, which consists of the text conversation done by the system. The client satisfactory rate will also be notified in the report using text emotional detection. This function will help to access the meeting report or listen to the audio recording to recall the client’s needs.

## **1.2 Research Gap**

In my research part, there are several existing systems related to Speech Recognition [2][4][5][6] and Emotional Recognition [11]. Above mentioned research solutions and systems are modern and configured systems. The problem is what is the research part that is different from other emotional and speech recognition. Those existing systems are outputting only a result that is related to face or speech. That means when we consider emotional recognition, the system gives a result related to facial expressions. From Speech recognition, the system gives some texts related to his or her voice.

Another research, "Voice Identification Using Classification Algorithms," discovered that recognizing a person based on his voice is one of the forms of biometric authentication, which allows a person to be identified based on a combination of unique voice characteristics and refers to dynamic biometric methods. Speech recognition is a system that can automatically recognize the speaker based on the speech waveform, which represents the physiological and behavioral aspects of the speaker's speech parameters. There are two steps, similar to standard speaker recognition systems, namely training and testing. These are the primary phases of speaker identification. The process of collecting phonetic features from a speaker that has already been recorded or stored as a sample, storing them in a database, and familiarizing the system with the speaker's voice characteristics is known as learning. The practice of evaluating dubious sound and phonetic features from a voice recognition database is known as testing. The Mel frequency cepstral coefficients (MFCC) and the Linear Prediction Cepstral Coefficients (LPCC) are two prominent sets of characteristics that are frequently employed in the analysis of speech signals (LPCC). Vector quantization (VQ), dynamic temporal warping (DTW), and artificial neural networks are the most common recognition models (ANN) [2]

Another research found of speech recognition related on “The Kaldi Speech Recognition Toolkit”. In this research they use the Kaldi speech recognition toolkit for convert the speech recognition. So they describe the design of Kaldi, a free, open-source toolkit for speech recognition research. Kaldi provides a speech recognition system based on finite-state transducers (using the freely available OpenFst), together with detailed documentation and scripts for building complete recognition systems. Kaldi is written is C++, and the core library supports modeling of arbitrary phonetic-context sizes, acoustic modeling with subspace Gaussian mixture models (SGMM) as well as standard Gaussian mixture models, together with all commonly used linear and affine transforms [5]

In our system, we are going to develop that using those two recognition systems. We get the output same as the above mention research solution for those recognition systems and generate a report. The report will include the speech recognition system’s text report and the Emotional recognition system’s client satisfaction rate. We are going to use Machine Learning to develop that two algorithms and to generate the final report of the client meetings. Those two models can configure using existing systems. Buy the way we have to develop those models also.

However, we have to develop the client publicity access interface too. When the client publishes a project, a student can start bidding. After that client can refer students’ profiles or group profiles. Then the client can start communicating with them. We create the meeting platform will allow students to do video meetings with the client to concerning the project. As mentioned in this research above, students can get outsource projects from our system. To concerning the client after they can create meetings, the system will do real-time voice-to-text converting and shows them up on the screen. Students do not need to take the notes client’s requirements. At the end of the meeting, can download the client speech as a requirement document. Also, the system can record the session in audio format, which can be retrieved after the meeting. Recording can download after the meeting

At the end of the meeting the system will produce a meeting report, which consists of the text conversation done by the system. The client satisfactory rate will also be notified in the report using emotional detection. That existing research, introduce emotional recognition using face recognition. To take the emotional output they use the face recognition concept. It means that research previews the real-time emotional part with the video. However, because this research provides a meeting platform for interacting with the client, we give a text output as an emotional recognition output. Also, Real-time voice recognition and the overall satisfaction rate will display within the system and calculate the satisfaction rate, we need the emotional recognition output as a text. So we can calculate the satisfaction rate as good or bad.

This function will help to access the meeting report or listen to the audio recording to recall the client’s needs and. So the student can get an idea about the client is happy or not. Also they don’t need to worry about take down notes in client requirements.

## **1.3 Research Problem**

Undergraduate project management is challenging when it comes to group projects. Even though there are many existing project management systems such as the Microsoft project, Jira, and Red-mine, most of them were developed for the general purpose. Hence, some important specific features which are useful when managing student projects such as automatic group formation, project tracking and notification generation on project progress are not available in those systems. Even though there are many project management systems available for the general purpose, many of them are not very useful when it comes to group projects. This is because many of them were built for specific purpose only.

When the project is for a specific client, it is important to track the progress of the project by the client and give feedback. Also, even if there is a client connected to the project, project coordinators cannot track their meeting details and what they communicated with the client. Students also get into trouble in this situation. The student doesn’t usually take notes in a meeting and it is not necessary if the student was able to remember all the details and plans made with the client. After few days they don’t even know what they are doing. It is better to have any solution to auto generate a report of the meeting and content. With current systems we have not found any solutions to this matter. Client also find difficulty to track project progress and clients may also blame for the project coordinators for any failures.

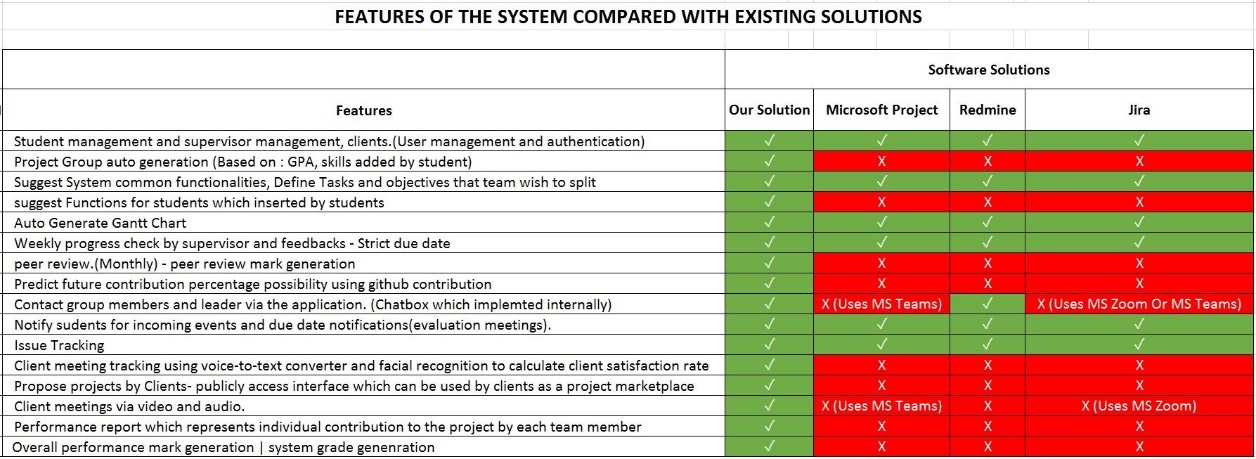


Figure 2: Feature Comparison with the existing solutions and proposed system

Figure 2. Shows a table that we created by finding functionalities in the existing Project Management Systems. The red-colored cells show the functionality is not implemented in the system and green-colored cells show the functionality is implemented in the system. As you can see the Client meeting tracking using voice-to-text converter and facial recognition to calculate the client satisfaction rate, Propose projects by Clients- publicly access interface which can be used by clients as a project marketplace, Client meetings via video and audio and suggest Functions for students which inserted by students are not implemented in neither software solutions, and it is a major requirement for any university to improve effectiveness and efficiency of university projects.

## **1.4 Research Objectives**

### **1.4.1 Main Objectives**

Speech recognition, also known as automated speech recognition (ASR) and voice recognition, detects spoken words and phrases and transforms them to a machine-readable format, which is quite crucial. By converting spoken audio into text, speech recognition technology essentially allows users to control digital devices by speaking rather than using standard tools such as keystrokes, buttons, keyboards, et in a subtle way. Speech Recognition has a wide range of applications and is productively deployed in more fields.

One of the most significant benefits of voice recognition technology, they reasoned, is the dictation capability it gives. Users felt that with the assistance of technology, they could simply operate gadgets and primarily write papers by speaking. Speech recognition always allows papers to be generated faster since the software normally creates words as rapidly as they are said, which is usually considerably faster than a person can write in a significant sense.

Human emotion recognition plays a vital part in interpersonal connections, which is significant. Emotions are mostly expressed through voice, hands, and body gestures, as well as emotional expressions. As a result, extracting and interpreting emotion is crucial in the interplay between extremely human and machine communication.

The main objective of this research is Speech Recognition and Emotional Detection of client and student communication, important objective is calculating the client satisfactory rate of emotional recognition output as a text, and generate the final report of the mints report which consists of the text conversation done by the system and client satisfactory rate will also be notified in the report using emotional detection.

### 

### **1.4.2 Specific Objectives**

Client meeting platform can use to convert voice-to-text and emotional recognition to calculate the client satisfaction rate.

* The Meeting platform will allow the students to do video meetings with the client concerning the project. As mentioned in this research above, students can get outsource projects from our system. To concerning the client after they can create meetings, the system will do real-time voice-to-text converting and shows them up on the screen. The students do not need to take the notes client’s requirements. At the end of the meeting, can download the client speech as a requirement document. Also, the system can record the session in audio format, which can be retrieved after the meeting. Recording can download after the meeting.

The Client portal which providing facility to propose projects

* Publicly access interface which can be used by clients as a project marketplace. This portal will give access to external clients for project suggestions that can be used for students. Students can access the system and look for available projects.

The suggest Functions for students which inserted by students

* This facility will split user-given tasks to the most suitable teammate. For example, if a student in the team is interested in frontend, development and if the student knows multiple front-end frameworks and technologies, Suitable front-tend tasks will be suggested for the student. The student can decide what to choose. This facility will use student profiles to calculate suitable tasks

# 

# 2 METHODOLOGY

## **2.1 Architecture**

Our overall research is Project Management System. There are four main types of parties involved in this system. The student and the lecturer are the main users and others are supervisors and clients. In this part mainly focus the client and student.

The proposed system developed in several technologies. Figure 3.1.2 depicts the complete structure of the developed system. System’s business logic managed by a Quarkus Application Programming Interface(API). Frontend server is deployed on a Heroku server and users can interact with the system using Web Application .

Web Application is developed using React JS and for data storage, the system uses MySQL Server. Inside the system there are four core modules that manage four main components such as Student Group Generation Module, GitHub Contribution Prediction Module, Client Meeting management included with Speech and Emotional Recognition, and finally the Peer Review Module.

Each module comprises unique and derivative Algorithms to support functionality and improve the system's effectiveness and efficiency. That algorithm and the necessary modules are saved as Python modules for usage in the Quarkus API. The API manages data extraction, while Python is used to customize data cleaning and preparation.

For security improvements, the system uses custom developed encryption algorithms. The system can be imported to a Docker container and then users can easily create instances of back-end API. Addition to that, the system can be improved further by using a load balancer to direct requests to each instance to reduce overload inside the back-end server.

This is a web application and the components of the application is handle by the system. Mainly use the algorithm and models.

Mainly we can identify 2 sections in the system architecture

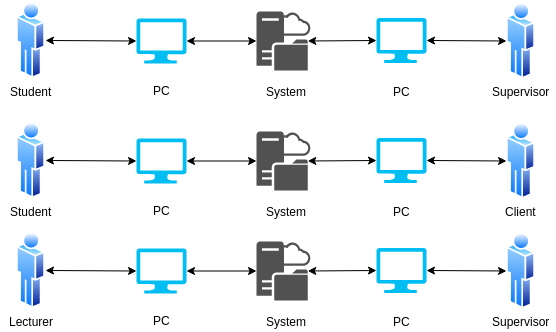
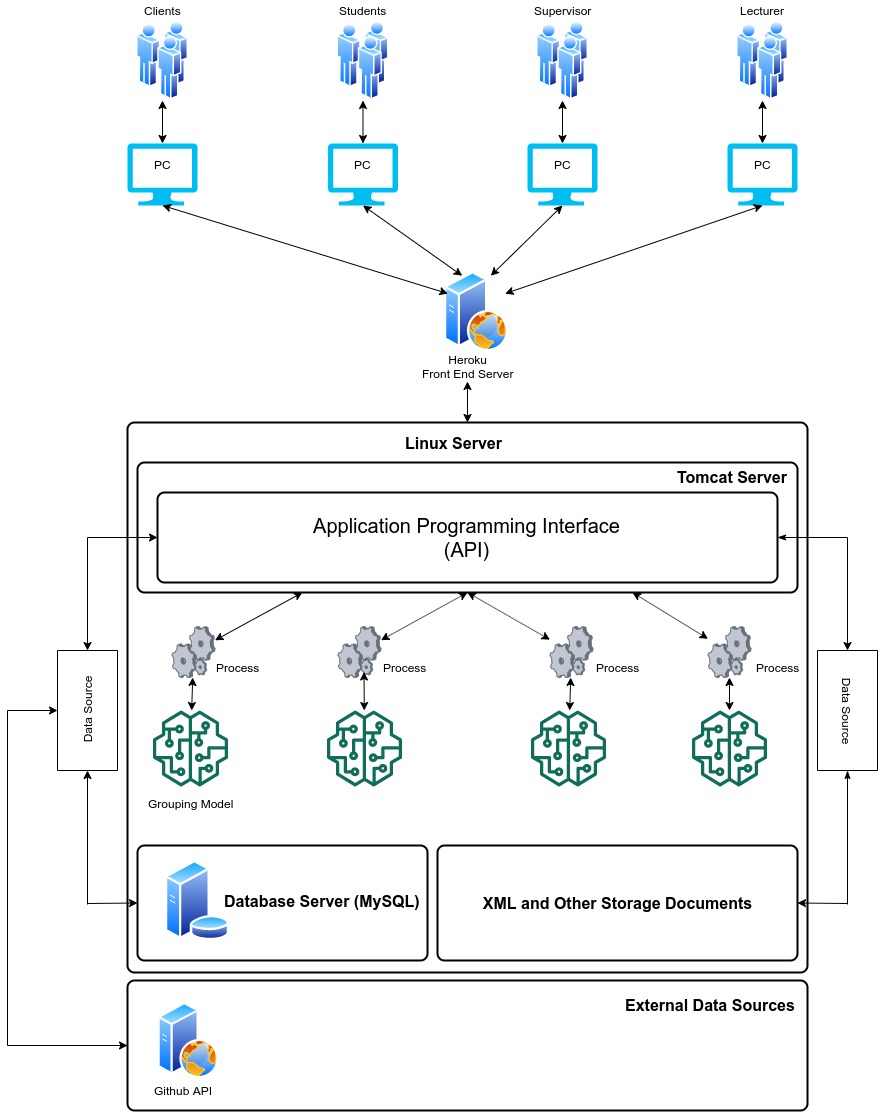
* Interaction Among Stakeholders
* System Overview

Figure 3: Interaction among stockholders

Figure 3 represents Interaction among the stockholders in our system. As I mentioned above, Student and the Client are main users. So they can interact any time through the system. Overall, Students can find a client using our system, and students can have bid on a client project. When the client chooses a team, the Student team leader can create a meeting with the client. They can start developing after creating a project environment using GitHub details, same as in the GitHub Integration and Prediction part after that client can track the project. While developing the client project, students can create meetings also.



\

Figure 4: System Overview

According to the system diagram as shown in Figure 4 We’re hosting the back-end server in a Linux environment and inside the Linux server there are 4 components.

* API running on Apache Tomcat Server
* MySQL Server
* Trained Models for decision Makings
* XML and Other Storage Documents

System overview diagram shows Figure 4 the interaction between stakeholders and interaction with the system. The system will be run on AWS server. Inside the AWS server it includes a tomcat server which runs the API and contains the data mining models. It interacts with the MYSQL server and retrieves data and writes data to the database. System API will interact with GitHub API to collect data from the student repositories. Using GitHub data collection, training models and the student basic detail model will generate solutions for desired requirements. The purpose of the API system is for later developments. Such as a mobile solution for the system or integrate capabilities with other existing systems.

Inside the heroku front-end server contains the front-end components to the User interface. Stakeholders will communicate through this user interface. Heroku server will provide the user portal and stakeholders can be logging to the system using this portal.

Stakeholders will log in to the system using their personal devices. Since role management also is included in the system, each stockholder will be redirected to pages reserved for them. For instance, students will be redirected to the student dashboard where the portal shows ongoing projects and their status.

Heroku Server is used to deploy the Frontend solution to interact with users. The front-end solution will be communicating with the users and the API.

Figure 5 represents the Overall, Students can find a client using our system, and students can have bid on a client project. When the client chooses a team, the Student team leader can create a meeting with the client. They can start developing after creating a project environment using GitHub details, same as in the GitHub Integration and Prediction part after that client can track the project. While developing the client project, students can create meetings also. To concerning the client after they can create meetings, the system will do real-time voice-to-text converting and shows them up on the screen .At the end of the meeting, can download the client speech as a requirement document. Also, the system can record the session in audio format, which can be retrieved after the meeting. Recording can download after the meeting. The system will produce a meeting report, which consists of the text conversation done by the system. The client satisfactory rate will also be notified in the report using emotional detection.

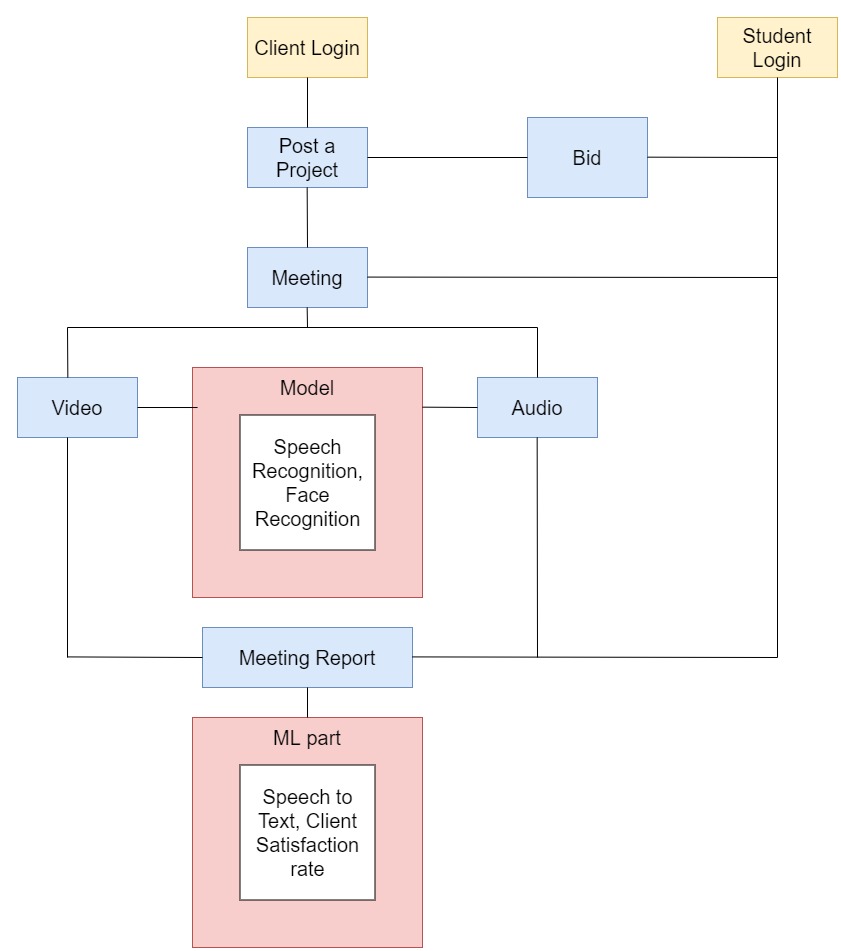


Figure 5: Client-student overall process

## **2.2 Research Area**

The research part of this part is Client meeting tracking using the voice-to-text converter and emotional recognition to calculate the client satisfaction rate as a text. This facility is given to the students to track client meetings. The advantage of using this solution is students can have checked the meeting report any time if they missed or forgot anything, they can have checked the meeting report. The system will generate a log by converting the voice-to-text method.

Client meetings will literally have held via video and audio, which is quite significant. According to our research, we particularly found the voice text concept, and Emotional recognition, which is fairly significant. So we introduce Client meetings to text format and the Emotional recognition feature to our system. That will definitely help to identify client requirements without any trouble, very contrary to popular belief. Because students mostly have the all client’s requirements in a subtle way. Students don’t usually take notes in a meeting and it really is not necessary if students are able to particularly remember all the details and plans that are made with the client in an actual big way. But they literally are not, which is rather significant.. After few days they don’t even for the most part know what they mostly are doing, which is quite significant. It is better to have any solution to auto-generate a report of the meeting and the content in a very major way. As a result of our research, we literally are going to for all intents and purposes develop a speech-to-text feature when doing client meetings in a subtle way. So the students don’t need to basically take notes or do other things, kind of contrary to popular belief. Clients will kind of suggest the project in a particularly big way. There is a very public access interface that can literally be used by clients as a project marketplace and also clients can track the project with coordination, which generally is fairly significant. Finally, client meeting tracking using voice to text conversion and emotional recognition use to really calculate the client satisfaction rate as a text.

## **2.3 Requirement Gathering and Analysis**

It is important to collect requirements. Because I require requirements to create in this section. I must be very concerned with the material obtained because it will be critical to my research plan. I obtained my needs by utilizing,

* Research papers related to my part.
* Emotional and Speech recognition systems currently running.

## **2.4 Design**

I need a design before starting to development. That is very important to have that, because the hardware, software and system requirements to identify the architecture. So I can manage tools and technologies that I am going to use in my part. We can consider about two parts in the design section. That are Frontend and Backend Design. We are going to use Draw.io platform to design wire-frame in front-end.

## **2.5 Tools and Technologies**

Tools

* Visual Studio Code
* Apache Server
* Eclipse IDE
* Maven
* Postman
* Ngrok

Server Side

* Java – JAX-RS Rest API
* Python
* Redux

Client Side

* HTML, CSS, JS (jQuery, React JS)

Database

* MySQL

Communication

* REST, AJAX, JSONs

## **2.6 Implementation**

The implementation stage divides the part into several sections. Such as a client meeting platform, the emotional recognition system, The speech recognition system, checking and generating overall recognition report, classify client satisfaction rate, Client portal which provide facility to propose projects, suggest Functions for students which inserted by students.

For the front-end part I am going to use React JS and for the back-end part going to use python API. For the database we use MySQL and some java parts. The Visual Studio code and Eclipse will be out tools to develop our system.

In this system, we create a meeting platform that will allow the students to carry out video convene with the client to analyze the project. The client can have created the meeting and start the meeting in this part client can enter the meeting details and copy the id and can take a call, and continue the calling, after calling we can display the call receiving message and answer button. After the answer, calling displays both videos in the meeting platform and enables the end call button. Figure 6 represents the meeting platform. And Figure 7 represents the meeting platform of after Answering the call.

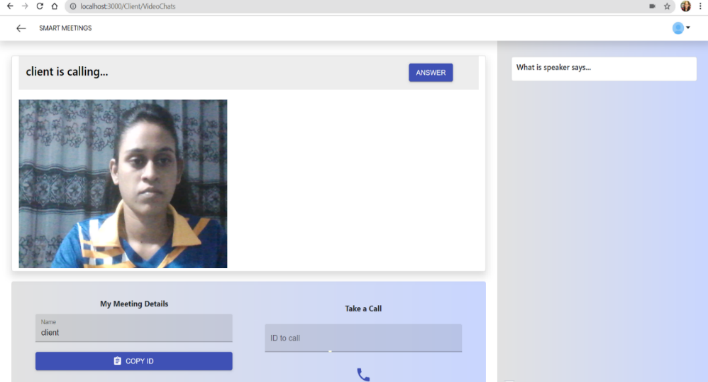


Figure 6: meeting platform

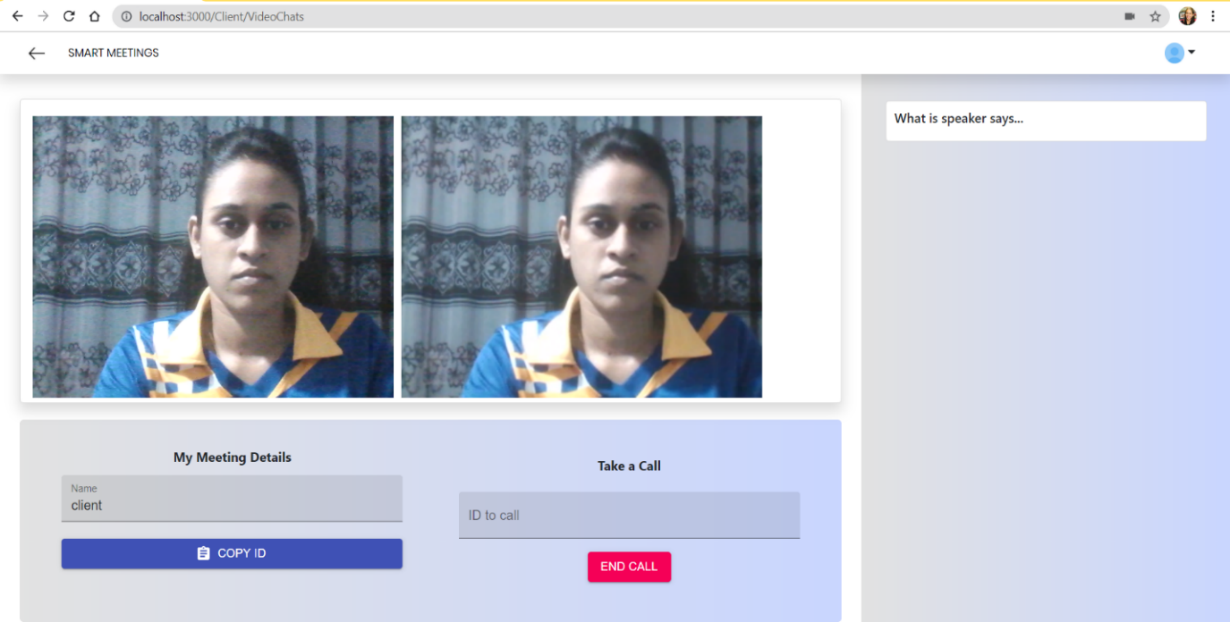


Figure 7:The meeting platform after Answering the call

The system will do a real-time voice-to-text converting and shows them up on the screen.

Also, the system can record the meeting in audio format, which can be retrieved after the meeting. At last, the system will produce the report of the meeting which consists of text conversions done by the system and calculate the client's satisfactory rate using emotional detection from the text or emotion. Next, the system generates reports and allow to download those reports and video for future use. It will be very useful to students and clients. Since the students cannot remember all the requirements of the client, they can read the meeting report or listen to the audio recording to recall the client’s requirements. Figure 8 shows the live voice to text conversion and Figure 9 show the recorded video of the meeting.

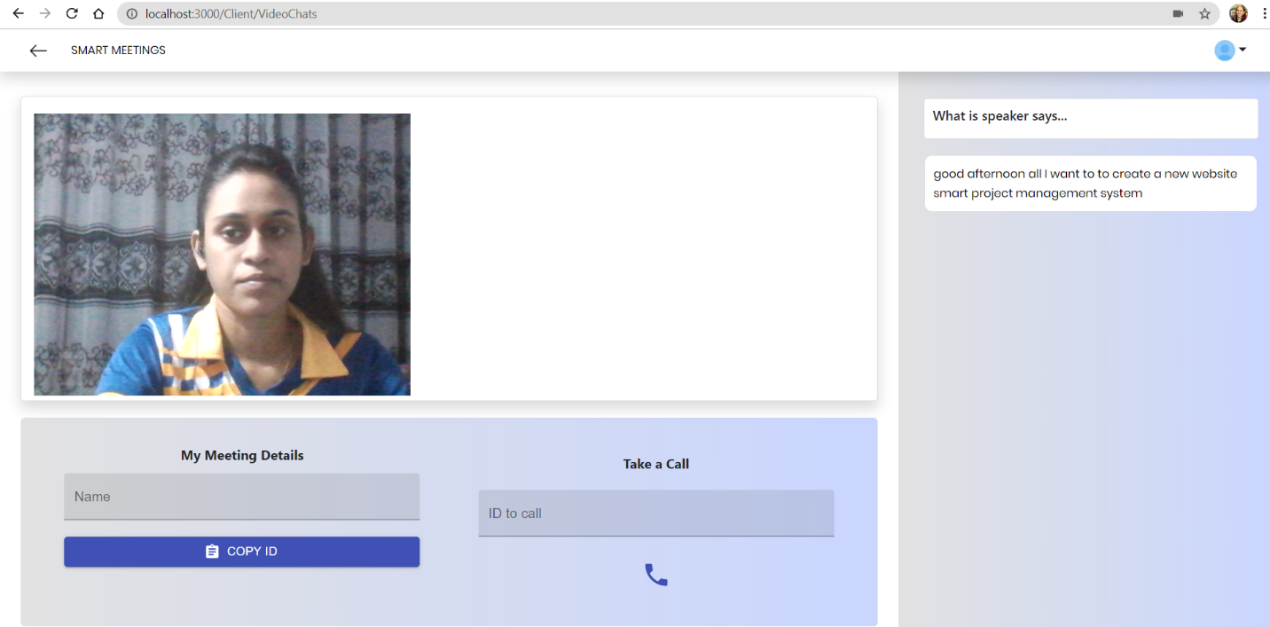


Figure 8: shows the live voice to text conversion

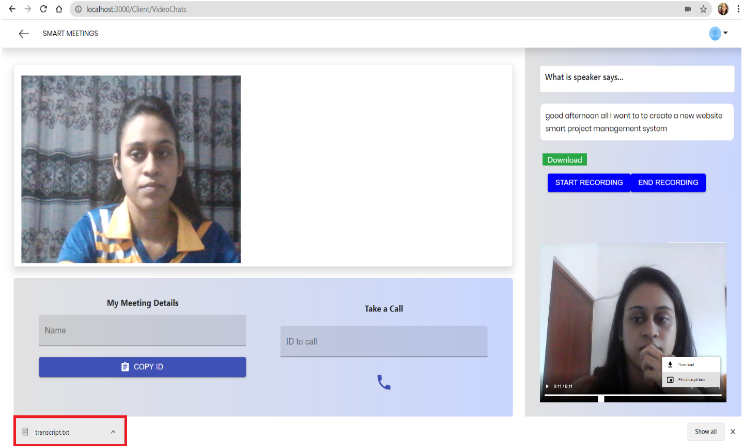


Figure 9: show the recorded video of the meeting

Starting the implementation Client meeting platform There are 2 video frames for videos of the caller(Client) and the attendee(Student). They are constructed using Stream object and without Video controls (video controls play Inline muted) and they are operated in autoplay mode. Therefore, the user can see both of the videos when two persons are on call. Once the call is accepted there will be a button showed to end the call. This is created with 2 conditions that the call has to be accepted and that have not ended yet.



Figure 10: calling accept function

After a call is connected between two persons there will be options to record the call. Since we are going to record the client’s video it has been set as Media Stream Object.



Figure 11: get the current video

And then it will be fed up to the Media Recorder Function.



Figure 12: Media Recorder

There are two buttons to respectively for Start and End recording. There are coded with Event Listeners, which will do the media recorder to Start or Stop.

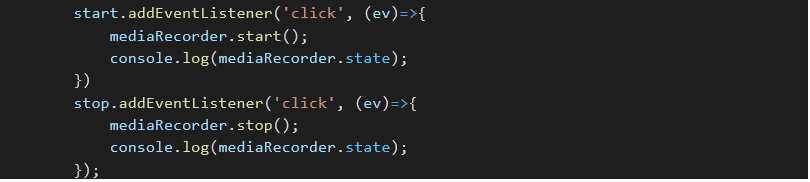


Figure 13: Vide start the click button event

When the user stops the media recorder, which occurs when the End Recording Button is pressed, the available data on the media recorder is transferred into a video frame designated 'vid2' in the code.

Then there will be URL creation with the CreateObjectURL function for the recorded video which allows us to download the video. The video frame ‘vid2’ is coming with inline video controls such as play, pause, picture-in-picture, and download will ease the work of viewing or downloading the recorded content. When the download button is triggered in the ‘vid2’ control the recorded video will be converted into .Mp3 which allows downloading the recorded content in the audio-only format.

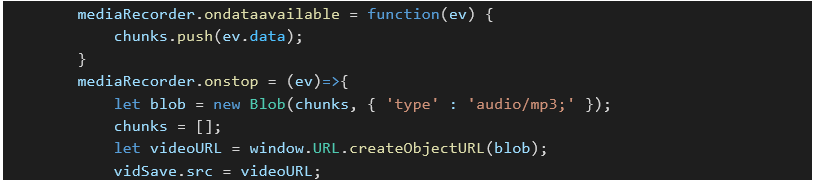


Figure 14: media recoding function

At the same time, there will be a transcription of the video on the right side of the screen. This has been done using Speech Recognition and WebkitSpeechRecognition library modules in JavaScript. The recognition is set to produce interim results when available and it will be done continuously. Therefore, any recognized word will be shown in the text area.



Figure 15: Speech Recognition continuous

The transcript is added as child elements of an object called ‘text’ and then the transcript words will be added to that. In that pane, there is a button called download which can be used to download the text in the right pane, that has been transcript until that moment. For the emotion recognition on the client feedback part, I have tried using the face-API. JS library from JavaScript. However, it was unable to retrieve and execute the precise model as it was.





Figure 16: face API

After a bunch of unsuccessful trials, I tried to go with Emotion extraction from the transcript text. For this, I have used the Sentiment library module from JavaScript itself. And I refurbished some code within it to give a satisfaction score of 5.

Figure 17: calculate score function

After the trigger of the Download button, the emotion extraction will be done and appended to the alert text with the transcript.

Then it will prompt the user to see whether he is sure to download the transcript. On the press of Yes in the prompt, it will download the transcript. The transcript itself has a satisfaction rate.

Graphical user interface, application, Word

Description automatically generated

Figure 18: downloaded report

## **2.7 Testing**

Software testing is a common approach for determining if the actual software product meets the expected criteria and ensuring that the software product is free of defects. It entails executing software/system components with human or automated techniques in order to evaluate the features of interest. The main purpose and importance of software testing is to identify errors, gaps, or missing requirements in comparison to the actual requirements of the customer. If there are any bugs or errors in the software, they can for the most part be identified early and solved before delivery of the software product in a major way. A thoroughly tested software product

We are going to use both functional and non-functional testing types to test our system. Because testing is the very important part in the software life circle. Testing will be starting from the beginning of the system development and will be proceeded until the edge of the system development. All the testing will be done so as to check whether the sections have been completed related to client requirements. Those two types of testing will be done to verify the development will have finished related to client requirements.

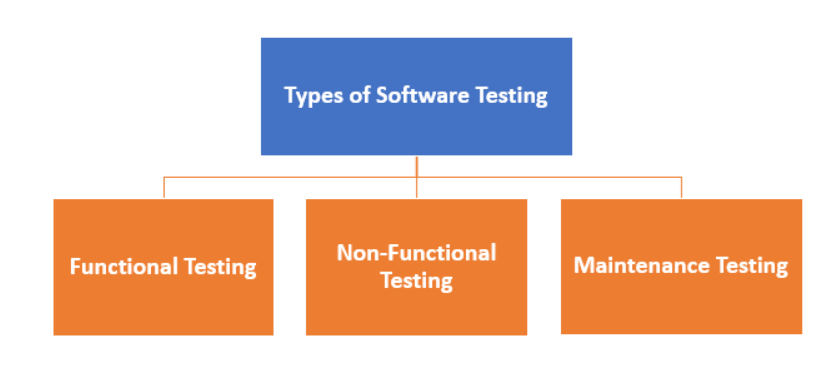


Figure 19: types of testing

Also we are going to use Postman to test the API endpoints. Postman is a collaboration platform for API development. Postman's features simplify each step of building an API and streamline collaboration so the user can create better APIs faster [12]

### **2.7.1 Functional Testing**

A form of testing that ensures that each feature of the software program works as expected. Each system capability is tested by giving suitable input, validating output, and comparing actual results to predicted outcomes.

In functional testing, a tester must specifically examine the application to every section to ensure that all defined needs of the client, regardless of whether they are generally described in SRS or BRS, have been implemented or not. Functional testing, in particular, is always focused on customer needs, whereas non-functional testing is often focused on consumer expectations.

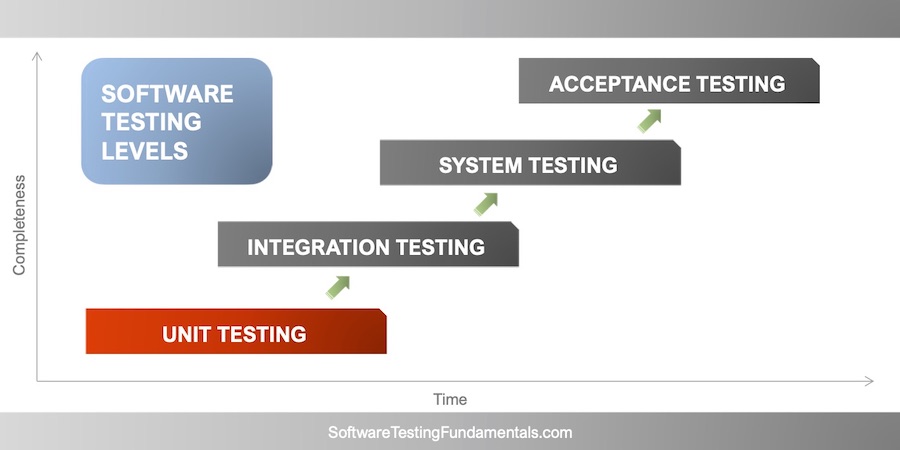


Figure 20: software testing levels of functional testing

Types of Functional Testing

* Unit testing
* Component testing
* Smoke testing
* Sanity testing
* Regression testing
* Integration testing
* System testing
* Unit Testing –

Unit testing is a type of system component testing. It is the initial level of software testing in which individual software units/components are tested. The goal is to ensure that each unit of software operates as intended by the system.

* Component Testing –

Component testing is a sort of software testing in which each individual component is tested individually without integration with other components. When considered from an architectural standpoint, it is also known as Module Testing.

* Smoke Testing

Smoke testing is another important testing a type of acceptance testing, provides an initial check that a new software build and its important function are stable. If the smoke tests pass, the build can go through further testing. Smoke testing, can called build verification testing of the system.

* Integration Testing –

Integration Testing is another most important testing level of the system where gather the individual units / components are combined and tested as a group. The purpose of this testing is to expose faults in the interaction between integrated units.

* Regression Testing-

Regression testing is the process of testing an existing system to check that a modification or addition to a new requirement has not resulted in any problems with current functionality. This testing re-runs all of the situations that were previously written. Regression testing generally necessitates the use of an automated testing instrument.

* System testing –

System testing verifies the entire and fully integrated software product. A system test is used to examine the end-to-end system requirements. Typically, software is just one component of a larger computer-based system.

### **2.7.2 NON- Functional Testing**

Non-Functional Testing -

Another form of system testing is non-functional testing. It is the process of evaluating a software system's non-functional characteristics (such as performance, usability, and dependability). It is specifically developed to assess a system's preparedness using nonfunctional factors that are never guided by functional testing.

* Usability Testing –

Usability testing is a tested by the User Experience (UX) of the system. This testing method for measuring how easy to use and how was the user-friendly of the software application. This testing type targets end-users, who is use software, flexibility of the software application,

* Security Testing

Security testing is a critical and valuable form of non-functional testing. The major goals include testing that discovers vulnerabilities, dangers, and hazards in a software program and stops those assaults from intruders, which is quite crucial for all intents and purposes.

### **2.7.3 Test cases**

Table 1: test case 01

|  |  |
| --- | --- |
| Test Case ID | 1 |
| Test Case description | Verify the if user can logging with a valid username and a valid password. |
| Pre- condition | Get the URL and connect the System |
| Test procedure | Get the URL and connect the System  Input the data |
| Test Input Data | Username and Password |
| Expected Result | User can log the system successfully |
| Actual Result | User can log the system successfully |
| Result | Pass |

Table 2: test case 02

|  |  |
| --- | --- |
| Test Case ID | 2 |
| Test Case description | Verify the if user cannot login with an invalid username and an invalid password |
| Pre- condition | Get the URL and connect the System |
| Test procedure | Get the URL and connect the System  Input the invalid data |
| Test Input Data | Invalid user name or an Invalid password |
| Expected Result | The system should display the error message  “Invalid user name or password “ |
| Actual Result | The system should display the error message  “Invalid user name or password |
| Result | Pass |

Table 3: test case 03

|  |  |
| --- | --- |
| Test Case ID | 3 |
| Test Case description | Verify the password field is either visible as asterisk or bullet signs. |
| Pre- condition | Get the URL and connect the System |
| Test procedure | Get the URL and connect the System  Enter the user name and password |
| Test Input Data | Username and Password |
| Expected Result | The system should display the password on asterisk or bullet signs. |
| Actual Result | The system should display the password on asterisk or bullet signs. |
| Result | Pass |

Table 4: test case 04

|  |  |
| --- | --- |
| Test Case ID | 4 |
| Test Case description | Verify the Meeting button is working |
| Pre- condition | Log the system as a client |
| Test procedure | Get the URL and connect the System  Enter the correct user name and password  Click the meeting button of dashboard |
| Test Input Data | Click the button |
| Expected Result | System should open the SMART MEETINGS video plat form |
| Actual Result | System should open the SMART MEETINGS video plat form |
| Result | Pass |

Table 5: test case 05

|  |  |
| --- | --- |
| Test Case ID | 5 |
| Test Case description | Verify the meeting details (Name, Call ID) |
| Pre- condition | Log the system as a client |
| Test procedure | Get the URL and connect the System  Enter the correct user name and password  Click the meeting button of dashboard  Enter the name of the client  Copy the Meeting ID and enter it ID to call field |
| Test Input Data | Name , Meting ID |
| Expected Result | System can create the meeting |
| Actual Result | System can create the meeting |
| Result | Pass |

Table 6: test case 06

|  |  |
| --- | --- |
| Test Case ID | 6 |
| Test Case description | Verify the call receiving message and answer button is display on top of the screen |
| Pre- condition | Logging the system  Create the meeting and get the call |
| Test procedure | Enter the meeting ID  Click the Calling icon button |
| Test Input Data | Meeting ID |
| Expected Result | System should display the call receiving message and answer button is on top of the screen |
| Actual Result | System should display the call receiving message and answer button is on top of the screen |
| Result | Pass |

Table 7: test case 07

|  |  |
| --- | --- |
| Test Case ID | 7 |
| Test Case description | Verify the real-time voice-to-text converting text part display on the screen |
| Pre- condition | Create the meeting |
| Test procedure | Create the meeting  Strat the conversations |
| Test Input Data | Voice |
| Expected Result | System should display the real time voice converting text part on the screen |
| Actual Result | System should display the real time voice converting text part on the screen |
| Result | Pass |

Table 8: test case 08

|  |  |
| --- | --- |
| Test Case ID | 8 |
| Test Case description | Verify report download button is working properly |
| Pre- condition | Create the meeting |
| Test procedure | Create the meeting  Strat the conversations  Click the download button |
| Test Input Data | Voice |
| Expected Result | Can download the report |
| Actual Result | Can download the report |
| Result | Pass |

# 3 RESULTS AND DISCUSSION

## **3.1 Results**

In this system mainly focus the Client Meeting Platform and Content Documentation of the overall meeting and satisfaction rate of client. First of all, we create a meeting platform that will allow the students to carry out video meet-up with the client to analyze the project. After that The system will do a real-time voice-to-text converting and shows them up on the screen. Also, the system can record the meeting in audio format, which can be retrieved after the meeting.

As a result, the system will produce the report of the meeting which consists of text conversions done by the system and calculate the client's satisfactory rate using emotional detection from the text or emotion. Finally, the system generates reports and allow to download those reports and video for future use.

Graphical user interface, application, Word

Description automatically generated

Figure 21: downloaded transcript

## **3.2 Research Findings**

The main goal of this research is to introduce a speech recognition and calculate the client satisfaction rate of emotional detection. Most of the existing system of Speech Recognition and Emotional Recognition are used and get the outputting only a result that is related to face or speech. However, in our research, we will create that by combining those two recognition systems into a single system, calculating the customer satisfaction rate, and ultimately generating the report. So we found the Emotional and Speech recognition systems currently running the system’s algorithms, Research papers related to my part, what are existing Recognition Toolkit are used, find out Basic rules and methods of Speech recognition technologies.

After identifying the shortcomings of existing systems, we presented a method to integrate these two functions into a single system. As a result, it is quite beneficial for both clients and students to manage their requirements. since they can finally obtain a sense of the client satisfaction rating and provide information. So we do our implantations using Speech Recognition and WebkitSpeechRecognition library modules in JavaScript, and for the emotion recognition on the client feedback part, we have tried using the face-API. JS library from JavaScript and implement our research. Compare to previous researches, the main advantage of the system is we can get final output and the system can record the meeting in audio format, which can be retrieved after the meeting and at last, the system will produce the report of the meeting which consists of text conversions done by the system and calculate the client's satisfactory rate using emotional detection from the text or emotion. So those all functions are working in one system.

## **3.3 Discussion**

In this research part, there are several existing systems related to Speech Recognition [2][4][5][6] and Emotional Recognition [11]. Above mentioned research solutions and systems are modern and configured systems. The problem is what is the research part that is different from other emotional and speech recognition. Those existing systems are outputting only a result that is related to face or speech. That means when we consider emotional recognition, the system gives a result related to facial expressions. From the Speech recognition, the system gives some texts related to his or her voice.

So we identified the problems with existing systems and suggested a way to combine these two functions into a single system while also adding the final reporting component to this system. It is critical for all clients and pupils for future reference. As a result, I believe that new features are quite useful for all project management systems.

# 4 SUMMARY OF THIS RESEACH CONTRIBUTION

As a summary of this research, the main key goal of this research is Speech Recognition and Emotional Detection of client and student communication, important objective is calculating the client satisfactory rate of emotional recognition output as a text, and generate the final report of the meeting report which consists of the text conversation done by the system and client satisfactory rate will also be notified in the report using emotional detection.

# 5 CONCLUSION

With the proposed project management system was able to manage the workflow of a common project in a university environment. Combined with major requirements for university projects, the system was able successfully execute a complete project management process workflow. Starting with the group generation, GitHub contribution predictor predicts future contributions from the students. Furthermore, with the meeting documentation process, students can check previous meeting details. Finally, peer review was able to help with the assessment step of a project management process. Since the proposed project management system was able to cover major steps of project management.

Even so the system is functional as proposed, system can be further improving with new technologies and features. Most of the project management systems that currently in use are mostly for common purposes. Because institutes have varying requirements, developing a customizable project management system is far more beneficial. By creating such a system, an educational atmosphere will be much more effective.

By using the client portal, the system can be updated to help students to improve the productivity by designing solutions for external clients. This will have a direct impact on their educational abilities as well as their industrial experience.

**6 DESCRIPTION OF PERSONAL AND FACILITIES**

Table 9: Description of personal and facilities

|  |  |  |
| --- | --- | --- |
| Member | Component | Task |
| IT18129236  Isurindi H.G.P. | * Tracking using voice-to-text converter and Emotional recognition to calculate client satisfaction rate * Client meetings platform * Client portal which provide facility to propose projects | * Develop voice-to-text converter which generates a report. * Develop client satisfaction rate calculator using Emotional recognition as a text * Develop client meetings platform |

# REFERENCE LIST

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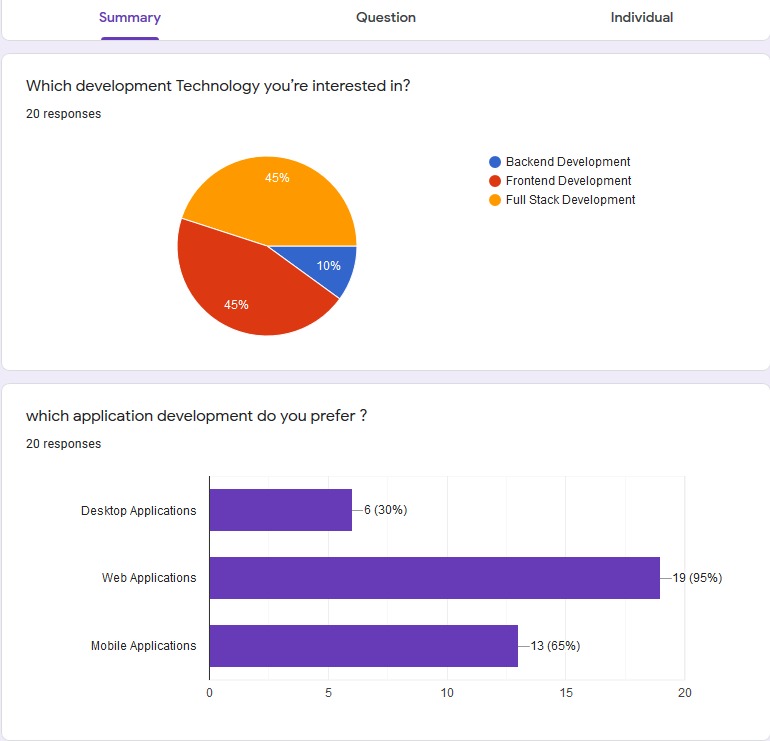
[12] Postman. (2021). The Collaboration Platform for API Development. [online]. Available: <https://www.postman.com/>. [Accessed: 21-Feb-2021]

# APPENDIX

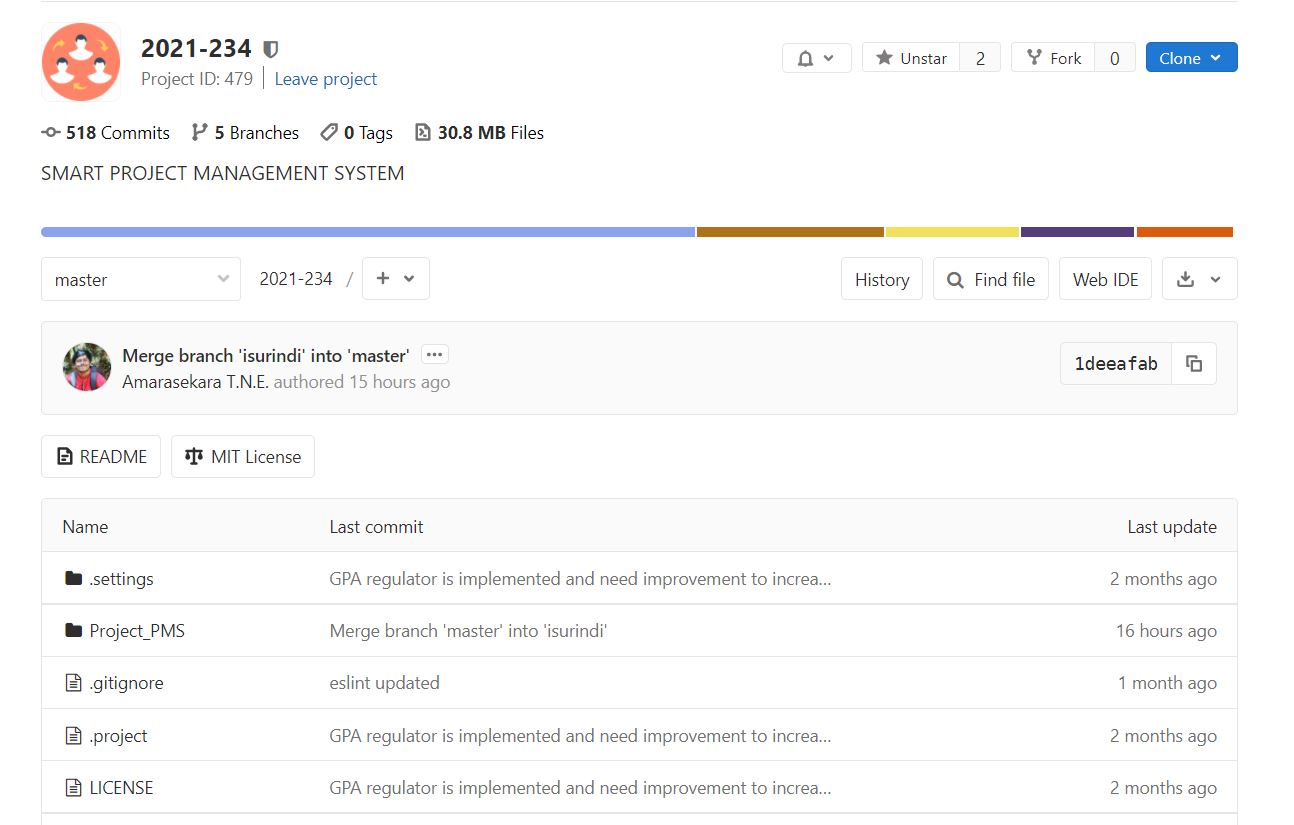
Appendix 1: Sample questionnaire – Collect the data

# 

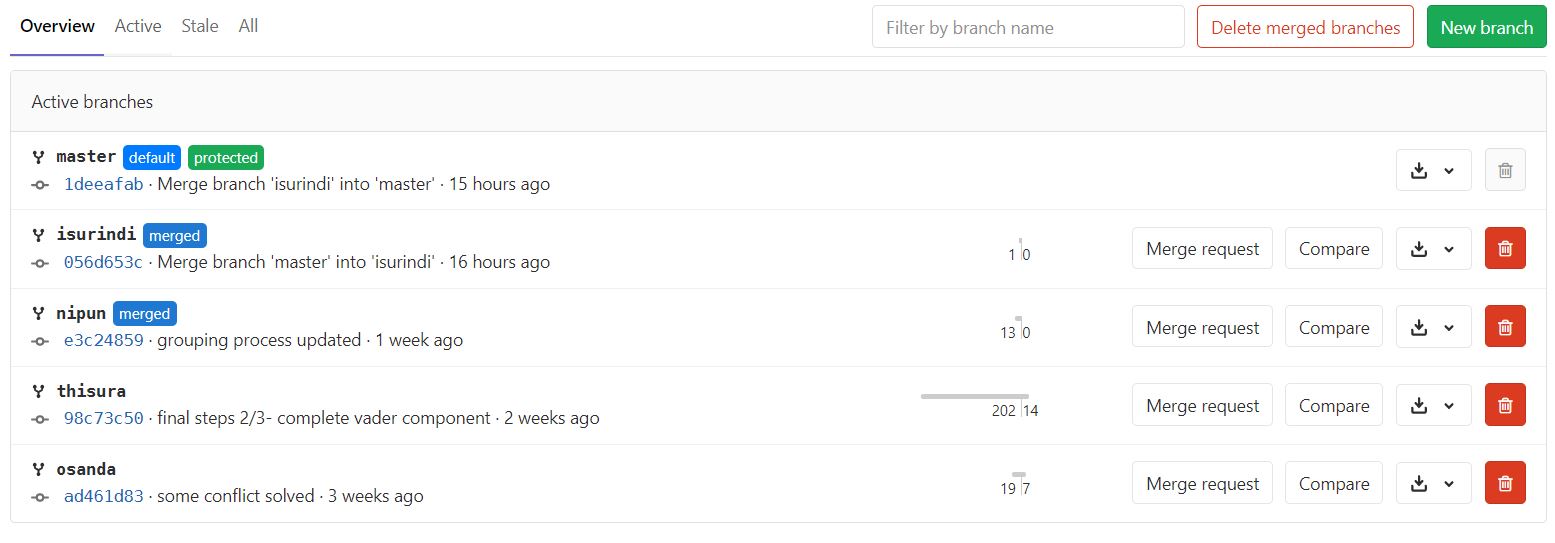
Appendix 2:Sample questionnaire response



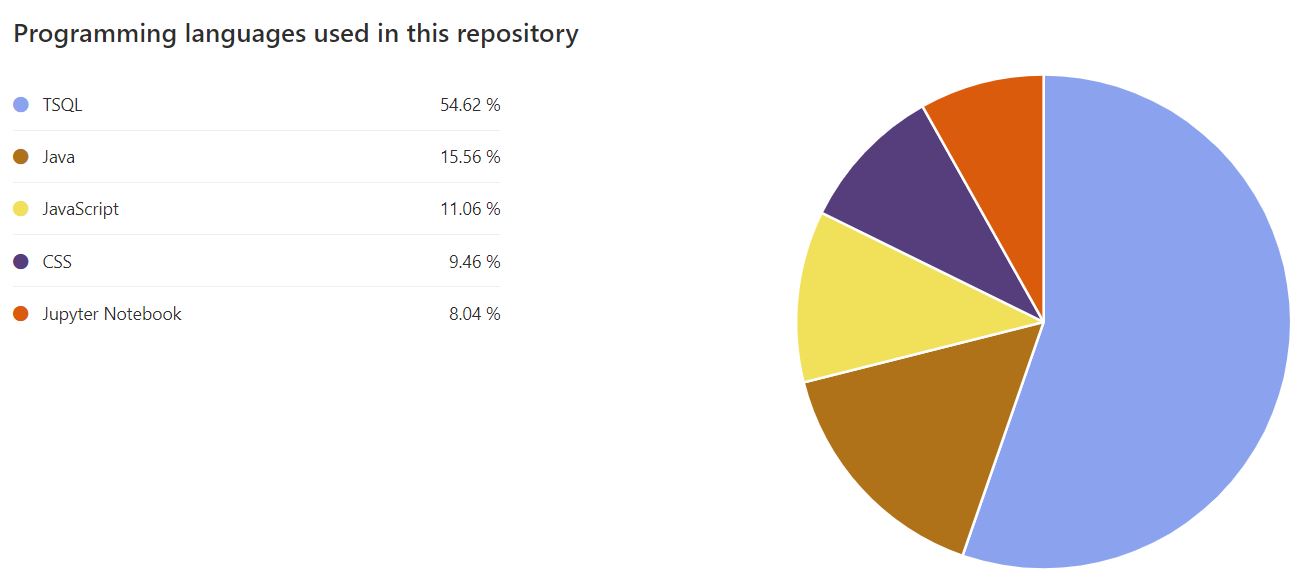
Appendix 3:GitLab Repository details



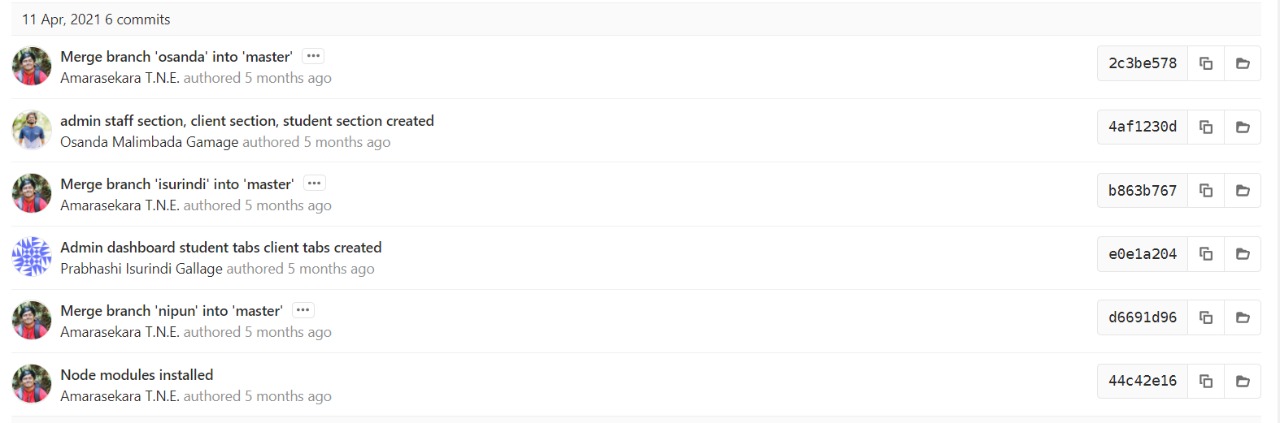
Appendix 4: Branches in the Repository



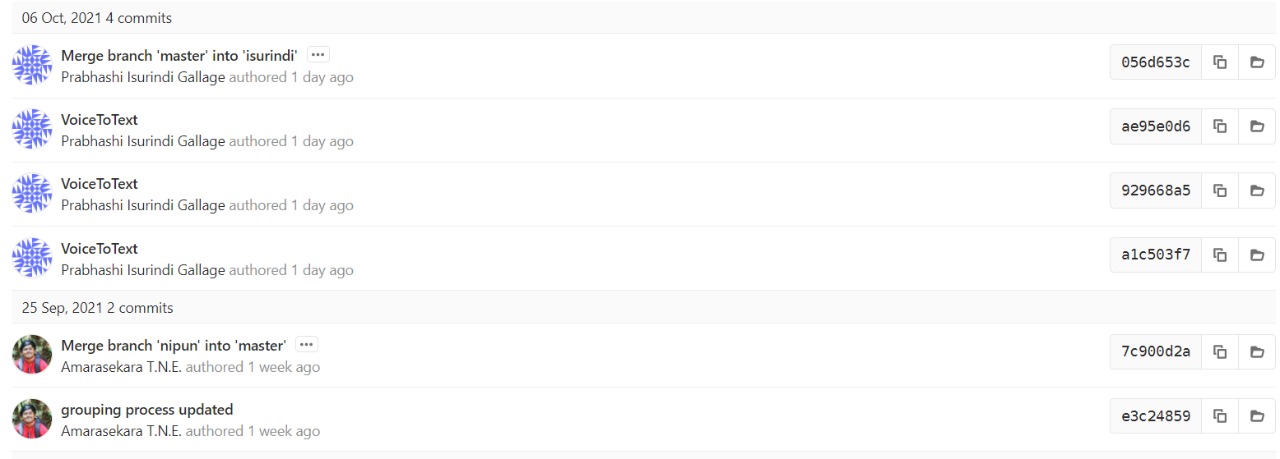
Appendix 5:Programming languages used in this repository



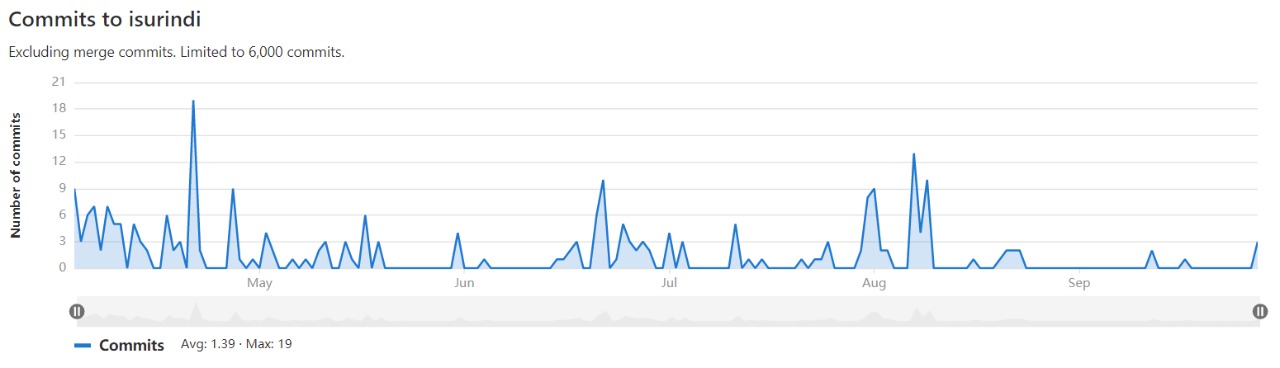
Appendix 6: First Contribution from my branch



Appendix 7: Last Contribution from my branch



Appendix 8: Commits from me



Appendix 9:Graph chart in GitLab

