SMART CLASSROOM – AN ANDROID APPLICATION

BY

Quazi Masudur Rahman
ID: 191-15-12569

AND

Shammi Akter
ID: 191-15-12095

This Report Presented in Partial Fulfillment of the Requirements for the
Degree of Bachelor of Science in Computer Science and Engineering

Supervised By

Mr. Md. Aynul Hasan Nahid
Lecturer
Department of CSE
Daffodil International University

Co-Supervised By

Md. Sazzadur Ahamed
Assistant Professor
Department of CSE
Daffodil International University

DAFFODIL INTERNATIONAL UNIVERSITY
DHAKA, BANGLADESH
JANUARY 2023

APPROVAL

This Project titled **"Smart Classroom – An Android Application"**, submitted by Quazi Masudur Rahman, ID: 191-15-12569 and Shammi Akter, ID: 191-15-12095 to the Department of Computer Science and Engineering, Daffodil International University has been accepted as satisfactory for the partial fulfilment of the requirements for the degree of B.Sc. in Computer Science and Engineering and approved as to its style and contents. The presentation has been held on 26-01-2023.
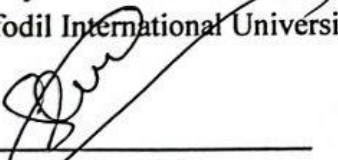
BOARD OF EXAMINERS

Chairman

Dr. Touhid Bhuiyan
Professor and Head
Department of Computer Science and Engineering
Faculty of Science & Information Technology
Daffodil International University

Internal Examiner

Sazzadur Ahmed
Assistant Professor
Department of Computer Science and Engineering
Faculty of Science & Information Technology
Daffodil International University

Internal Examiner

Ms. Sharmin Akter
Senior Lecturer
Department of Computer Science and Engineering
Faculty of Science & Information Technology
Daffodil International University

External Examiner

Dr. Ahmed Wasif Reza
Associate Professor
Department of Computer Science and Engineering
East West University

DECLARATION

We hereby declare that, this project has been done by us under the supervision of **Mr. Md. Aynul Hasan Nahid, Lecturer, Department of CSE** Daffodil International University. We also declare that neither this project nor any part of this project has been submitted elsewhere for award of any degree or diploma.

Supervised by:

Mr. Md. Aynul Hasan Nahid
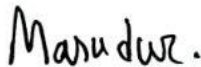Lecturer
Department of CSE
Daffodil International University

Co-Supervised by:

Md. Sazzadur Ahamed
Assistant Professor
Department of CSE
Daffodil International University

Submitted by:

Quazi Masudur Rahman
ID: 191-15-12095
Department of CSE
Daffodil International University

Shammi Akter
ID: 191-15-12095
Department of CSE
Daffodil International University

ACKNOWLEDGEMENT

First, we express our heartiest thanks and gratitude to almighty Allah for His divine blessing makes us feasible to complete the final year project successfully.

The real spirit of achieving a goal is through the way of Excellence and severe discipline. We should have never succeeded in completing our task without the cooperation, encouragement, and help provided to us by several personalities.

We really grateful and wish our profound our indebtedness to **Mr. Md. Aynul Hasan Nahid**, **Lecturer**, Department of CSE Daffodil International University, Dhaka. Deep Knowledge & keen interest of our supervisor in the field of "Mobile application" to carry out this project. His endless patience, scholarly guidance, continual encouragement, constant and energetic supervision, constructive criticism, valuable advice, reading many inferior drafts and correcting them at all stage have made it possible to complete this project.

We would like to express our hardest gratitude to **Professor Dr. Touhid Bhuiyan**. Head Department of CSE program Daffodil International University, for his kind help to finish our project and We would also like to admit with much appreciation the crucial role of the staff of Daffodil International University who permit us to access all kind of library materials and equipment to gain knowledge and to clear out our understandings and we have to appreciate the guidance given by the other supervisor and lecturers who have helped us to clear we understanding and create a concern and importance of completing the project report carefully with maintaining good knowledge.

Finally, we must acknowledge with due respect the constant support and patients of our parents.

ABSTRACT

Education is the backbone of a nation. A proper education is highly recommended for a student to build his/ her future and nation bright. But in our country, the number of students in a class is higher than an ideal class. For this reason, some students are not able to understand the lecture from the teacher clearly because of sitting far from the teacher desk. Teachers are unable to send their data to them. Based on this situation we have made an android application that will send all data from teachers to students directly by using their cellphones and for this we don't need any internet. This will communicate by Wi-Fi direct connection by turning on the client's mobile Wi-Fi automatically but the location mush has on. This concept will reduce the noise and gathering from the classroom, allowing us to understand and deliver lectures easily. Teachers/ hosts are not only able to deliver lectures but also can record the class, draw on a whiteboard for better understanding and taking notes etc.

TABLE OF CONTENTS

CONTENTS   **PAGE**

LIST OF FIGURES

CHAPTER 1

Introduction

1.1 Introduction

In this era of modern technology, everyone has their own communicating device on their hand. Because of the revelation of technology, the whole world comes in hand by using cellphones. Through this technology the world is exploring day by day. It also has an impact on education. Teachers can easily teach, learners can easily learn with or without presence. Classrooms are also becoming modern for using technologies. But in Bangladesh, as our population is huge, it becomes a problem to reach-out all the students in a class for a teacher and teach.

What will it look like if every student is getting the same lecture content and same understanding in the classroom by connecting all student's devices as clients with a host as a teacher who will deliver the lecture by a digital classroom?

To make this happen we have implemented a mobile application that will build a Wi-Fi direct connection with some devices. In this project there are 3 options: Connect, Drawing, Recording. In connect page host needs to on his/her Wi-Fi. He can click on it by clicking the Wi-Fi button. Then it will discover devices nearby and will show a list of those. Client devices request the host to connect and the host gives the permission of connection which device he/ she wants to connect by accepting clients request so that any other devices cannot access the class who are from outside of class. Client have to accept request within 30 seconds. If needed the class can be recorded for further uses, drawing in the whiteboard, notification. Also, you can use this app in any assembly or rally alternative of a physical speaker. Because it is able to connect any Bluetooth speaker and any one can give their speech by the project Smart Classroom.

1.2 Motivation

As our teachers have to manage more students than a teacher can be. So, it's become a challenging situation for a teacher to manage all students in the class. It is quite impossible to deliver the full lecture loudly in every class, sometimes the teacher can be sick or some others issue to speak loudly. So, at the last benches students did not get proper lectures and also not attentive in the class. Day by day they lost their spirit of learning. To get rid of this situation we have decided to make an application which will connect the student's device with the teacher's one so that everyone gets the same knowledge and information, because at this time everyone has an android phone. Also, it will reduce the hassle of setting speakers and microphone for every class and teacher.

1.3 Objective

Our main objective of this project is to convert our normal classroom into a smart and digital classroom, noise free and calm classroom where every student will be able to gather equal lectures and information from the teacher to make learning interesting. Moreover, speaking loudly also causes some diseases.

Sometimes students are absent and they won't get the lecture, but using this platform they can find the recorded lectures and give any source, documentation and notice etc.

Teachers and students can draw and delete any diagram that will be easier and more understandable, also can save that figure for further knowledge and while the teacher is drawing a sketch it will be shareable to all student's devices. Teachers can have the knowledge of those who are not attentive in the class and doing unnecessary work. These tasks will happen without any internet connection. That's how every student will get proper education and care. These small efforts will shine their future and can be a legend from a little classroom.

1.4 Expected Outcome

The expected outcome from this android application are,

- A digital platform of learning smartly by connection client's devices with host without internet.
- Deliver all lectures and documents to all over the class's student, who are not so close to the teacher using their mobiles speaker.
- Recording of the class for farther uses.
- To bring the attention of all student in the class.
- Ability of knowing every students condition in the class and take the proper feedback.
- Can handle inattentive student of class.
- Can draw, share and save diagram.
- Can also work as Bluetooth speaker.

1.5 Report Layout

The report layout describes a summary of the entire chapter. Here is a summary of all the chapters:

Chapter 1: Describes an introduction Smart Classroom, Motivation,

Objectives, Expected Outcome and Design of the report.

Chapter 2: To Describe the Introduction, Related works, Comparative studies, The scope of the problem, challenges.

Chapter 3: To Describes the full projects with Model Diagrams and requirements.

Chapter 4: Describes the Design of Project, Interaction Design, and UX.

Chapter 5: Describe the Main Fact of Project Implementations and Testing Purpose.

Chapter 6: Describes the Impact of our Projects on Environment, Society and Sustainability.

Chapter 7: Describes the Discussion & Conclusion, Scope for Further Developments.

CHAPTER 2

Background Study

2.1 Introduction

We are launching our "Smart Classroom" project to manage classes in an interesting, equally knowledgeable and digital way, which is an android application. As a student we face some problems listening and understanding the lectures while sitting in the last and corner part of class. We are not able to understand the lecture as well as miss important notices also. Teachers have also faced various problems to deliver his/ her content. Our project solves this problem to bring all of us together in a digital platform. We have implemented a project where the host can deliver his/ her content properly without speaking loudly, and can draw on their whiteboard for better understanding. They can take notes and save that in their phone. This helps most because visualization gives more information. Classes can be recorded and able to share and listen. The connection will be stablished creating socket and Wi-Fi direct connection. The Wi-Fi Direct is a form of direct, device-to-device communication. Unlike 'normal' Wi-Fi, which requires several devices to connect to a centralized device (like a router), Wi-Fi Direct lets users directly connect one device to another (hence the term Direct). The reason for it being termed as Wi-Fi Direct is because it uses the same security protocols as our normal Wi-Fi connections do (WPS and WPA/WPA2) [1]. Then the socket connection is established and the host performs his/ her lecture using his/ her cellphones microphone and listeners listen to the lecture with their cellphones speaker or headphone. A socket is bound to a port number so that the TCP layer can identify the application that data is destined to be sent to [2].

2.2 Related Works

There are also some relatable projects such as our "Smart Classroom". Like- google Classroom, The Smart Classes, Smart Education Center etc. But each and every project must have an internet connection where we are launching without this. Moreover, those

projects are basically for e-learning purposes but our project is for managing the physical classroom smartly, where there will not be any shouting, every student will be able to listen and understand lectures perfectly fully.

2.3 Comparative Studies

To start the project, we have to research so many things to know about the concept of android, networking, communicating devices, data processing, sharing and so on. Mostly we did not get sufficient documentation and information that matched with our project but we managed those problems. We had to find out how a device connects with others by creating socket connections, enabling Wi-Fi direct connection from a device to another device, how a TCP protocol works and setup using this protocol, we have to learn about mobile threading and handlers. Sometimes the latency becomes much because of the TCP protocol and we are working on it.

2.4 Scope of the Problems

"Smart Classroom" an android application which is implemented by using Java. Its concept is to transfer a teacher's lecture to all students. So that teacher doesn't need to speak loudly and students can listen to the content by their phone's speaker. Some extra features are also there for drawing sketches, taking notes, and recording class. While implementing the project the main problem was connecting multiple devices to the host device and transferring data. Sometimes when the connection becomes many then it crushes and conflicts with the host and users.

2.5 Challenges

The most challenging part was how to achieve this connectivity so that it is power and time efficient. First, we chose to connect using "Local Only Hotspot" but the connection process

was so time consuming, then we moved to Wi-Fi Direct. In Wi-Fi Direct we don't need any access point so devices can connect so easily just like Bluetooth. Connecting multiple devices with the host by TCP protocol was the most difficult part. Because to connect with multiple clients we had to maintain several socket connections and after achieving this we faced some UI freezing issues and had to apply Multithreading programming so that socket connection can be achieved. The class recording part was another challenge because android has many versions and different configuration devices. For each version we needed to configure the code.

CHAPTER 3

Requirement Specification

3.1 Business Process Modeling

Our project "Smart Classroom" is implemented for generating our traditional noisy classroom to be calm and interesting for the students. This project will give the vibe of digitalization by connecting the student's device with the teacher's one so that, teacher can easily deliver lectures to all over the class with the same effort and every student can listen to the teacher's content equally. It will deliver the voice of the teacher all over the class and also can draw any diagram to teach or personal notes and so on features. Now let's see the project criteria step by step.

3.2 Requirements and Features

Here are the Connection criteria:

- Wi-Fi – Open hosts Wi-Fi
- Discover – Host will discover for connecting device
- Start – starts delivering lectures
- Stop - End of the class
- Mic to speaker – Connects Bluetooth device

Here are the Drawing criteria:

- Colors pencil – Draw needed diagram, note
- Save – Saves drawing
- Erase – Erases drawings
- Line size, preview, next view

Here are the Recording criteria:

- Records lectures
- Saves lectures
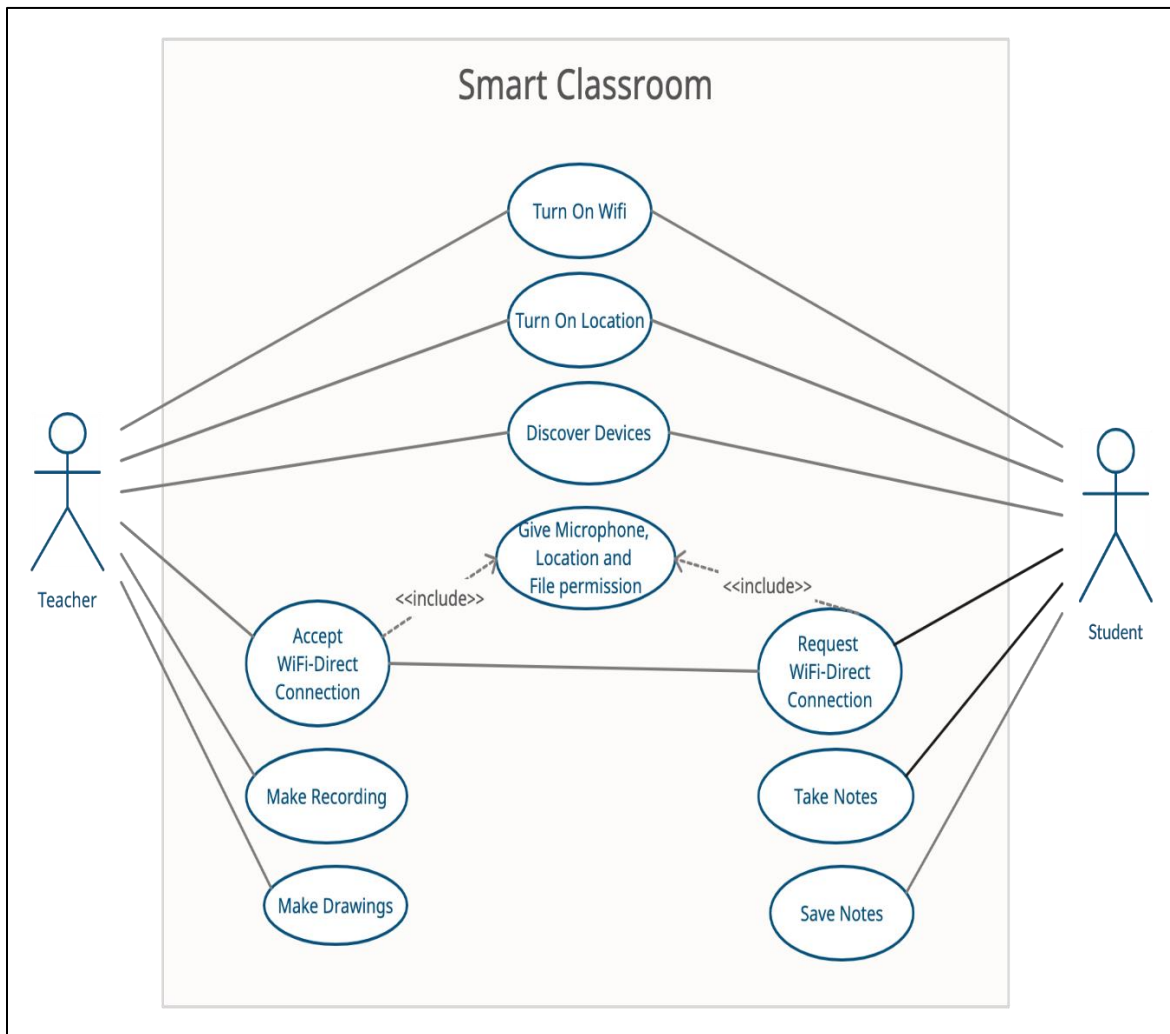- Play and pause

3.3 Use Case Modeling and Descriptions

Fig.3.3.1: Use case diagram of Smart Classroom.

3.4 Design Requirements

In our project it needs some requirements to perform the task from the Host side and User side.

Host:

- Needs to turn on Wi-Fi
- Must give location permission

Users:

- Must give location permission

CHAPTER 4

Design Specification

4.1 Connectivity Design

Here is the connection process of our "Smart Classroom" –

It's the initial interface of connection section. It has WIFI button to open device's WIFI, Discover button to discover others devices, Start, Stop for speaking and Mic to Speaker for connecting with Bluetooth devices.
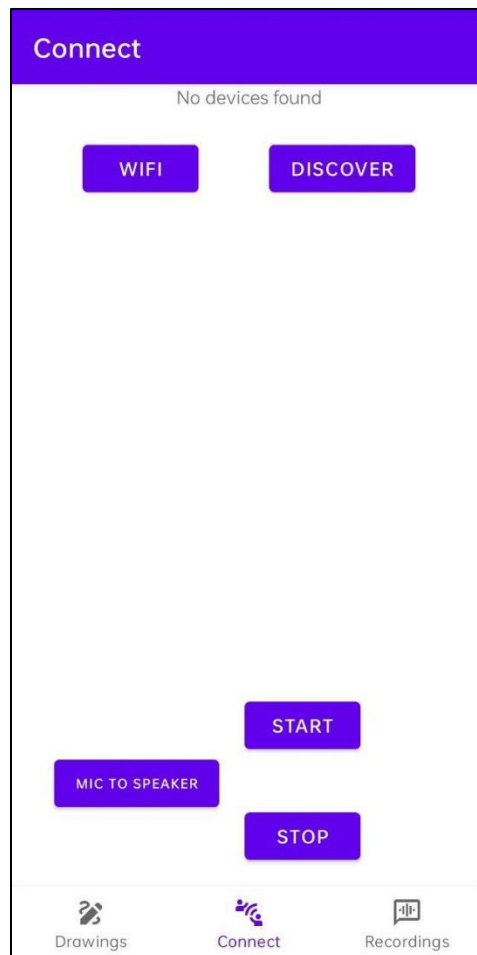
Figure 4.1.1: Initial connection page.

First, you have to turn on your device's Wi-Fi and location. If these two options are off then when you click WIFI and DISCOVER button they will redirect you to turn on Wi-Fi and location.
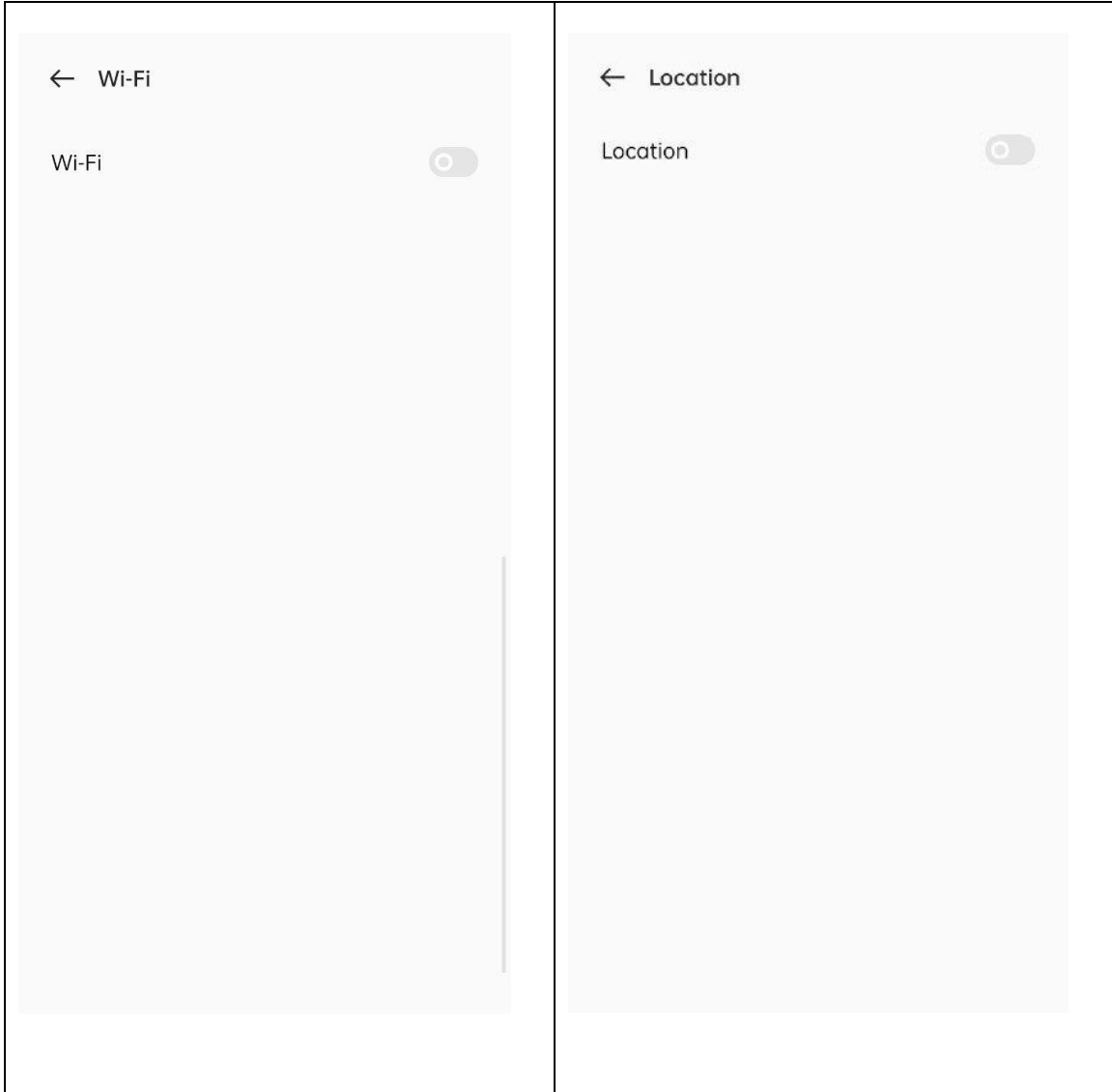
Figure 4.1.2: Turn on Wi-Fi and Location.

If host click discover button then it will be started discovering with showing the message 'Discovery Started' and give a list of devices name that are in the location.
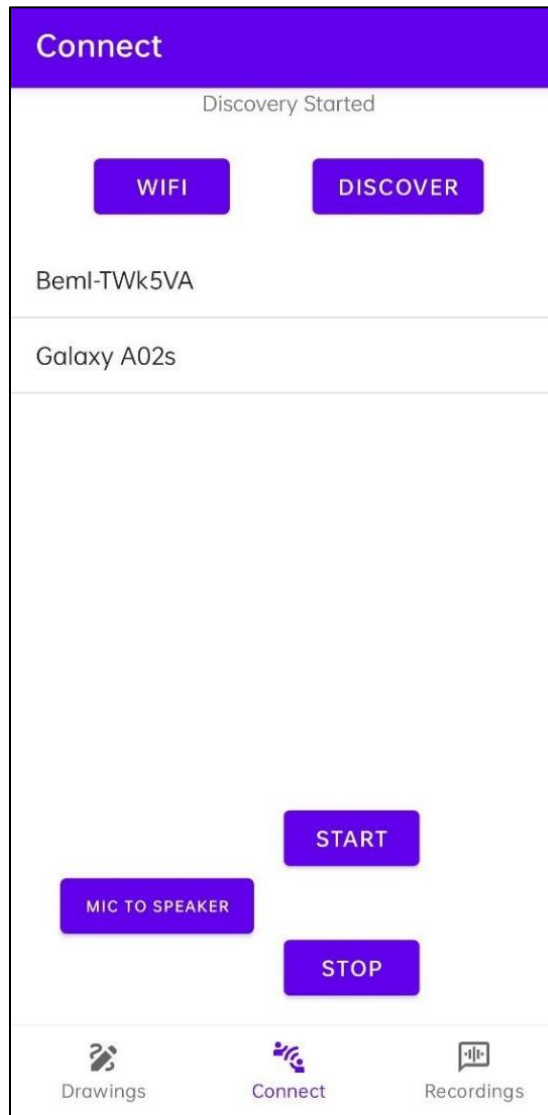

Figure 4.1.3: Discovering devices.

After clicking from those device's name that device will get a invitation message and have to accept within 30 second. After 30 second that device won't have connecting permission.
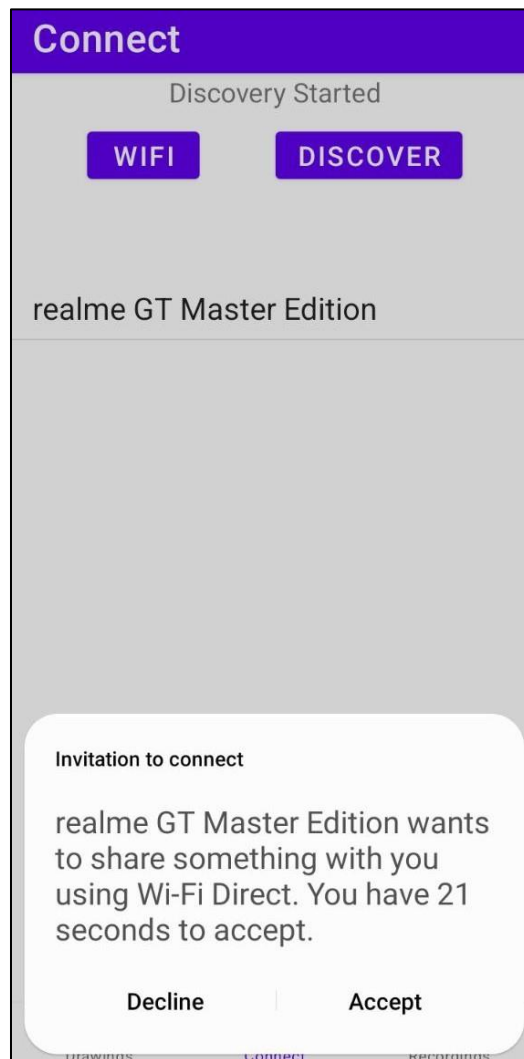

Figure 4.1.4: Invitation message for joining class.

When HOST, CLIENT is visible to the screen then host can start giving lecture by clicking START button and finish by clicking STOP button.
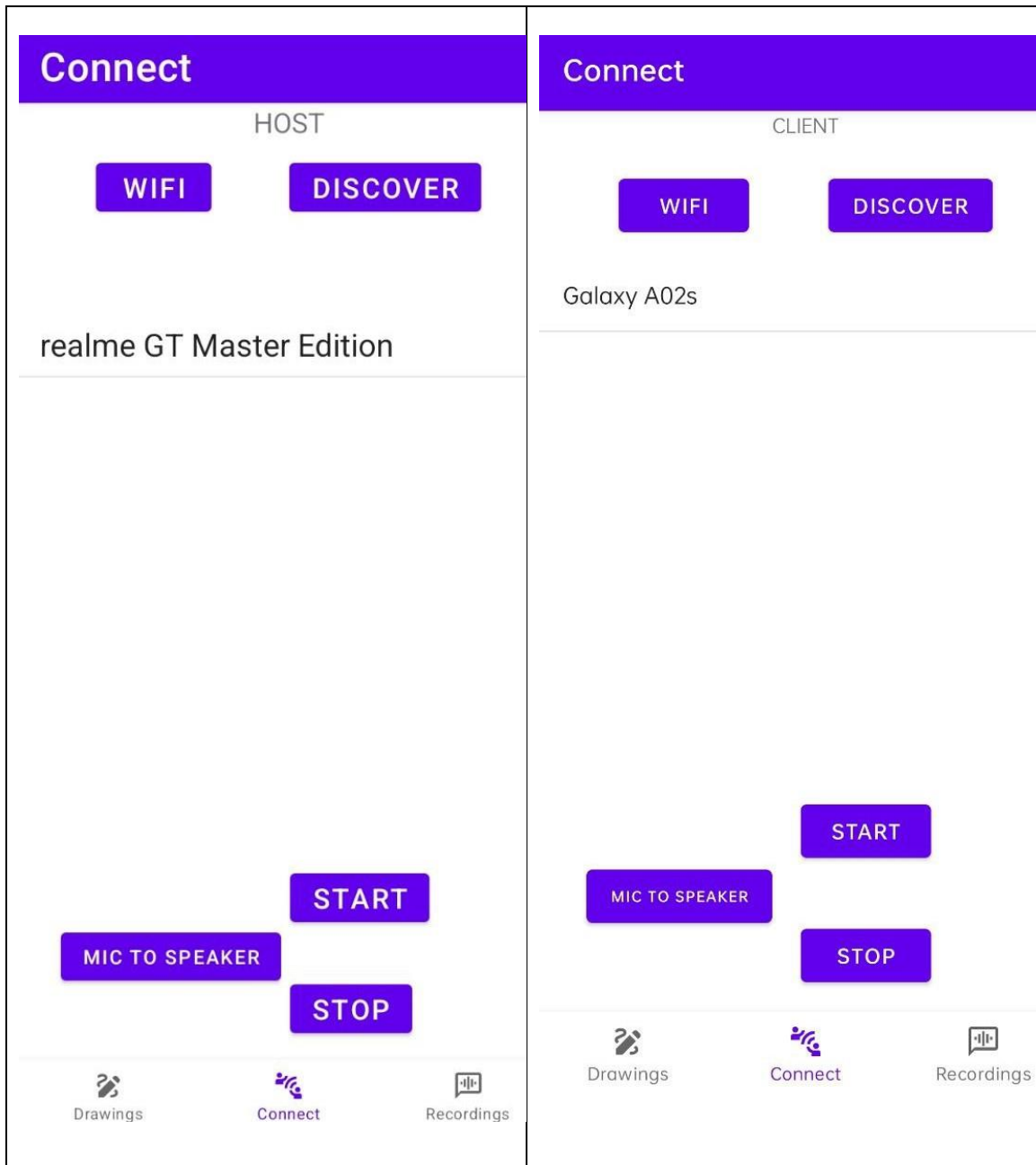

Figure 4.1.5: Host and Client interface.

If anyone wants to connect with any Bluetooth device then he/ she can do this by clicking Mic to Speaker button. Then press the start icon and start giving speech at any concert, assembly or conference.
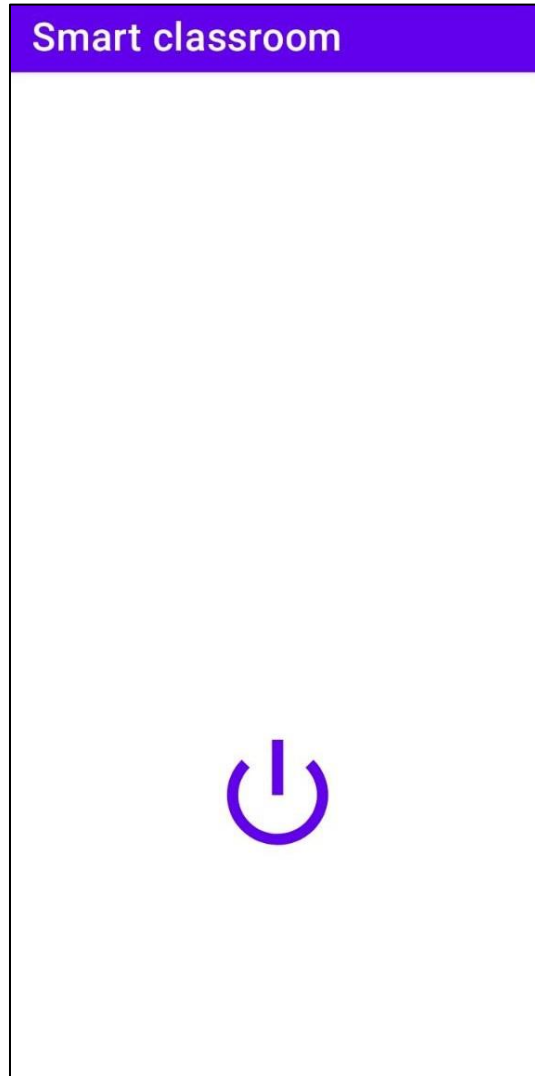

Figure 4.1.6: Connecting with Bluetooth.

4.2 Recording Design

Here is the Recording process of our "Smart Classroom" –

Recording page will looks like this with a mic icon. If there haven't any previous recording file then it will show 'No Recording Found". After any recording that will show in this page.
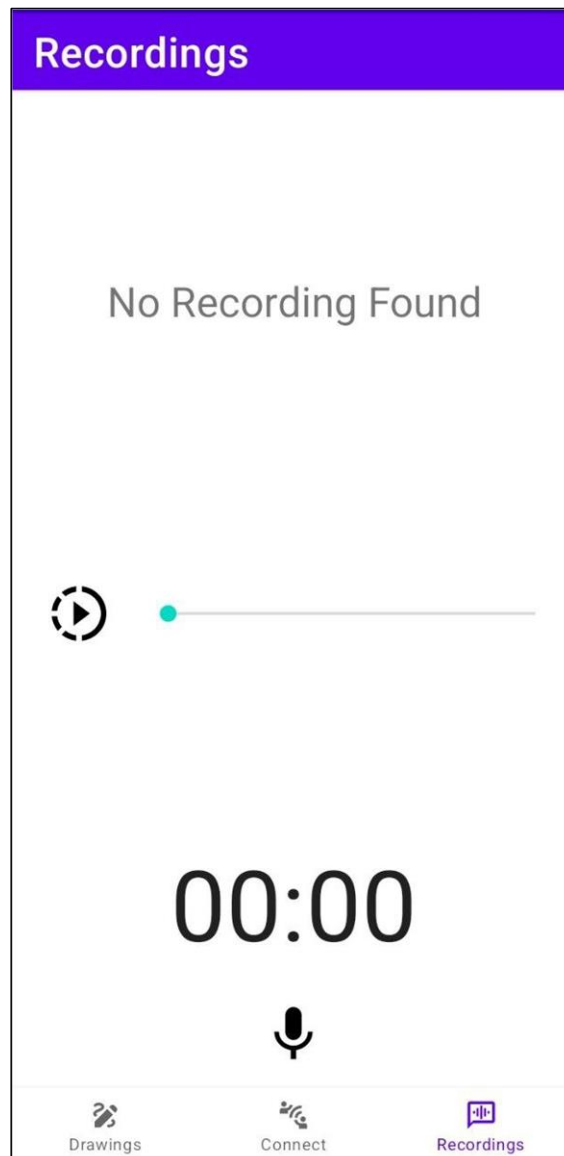

Figure 4.2.1: Initial recording page.

If host click speaking button then it will be start recording the class showing with a notification of Started and the recorded file name.
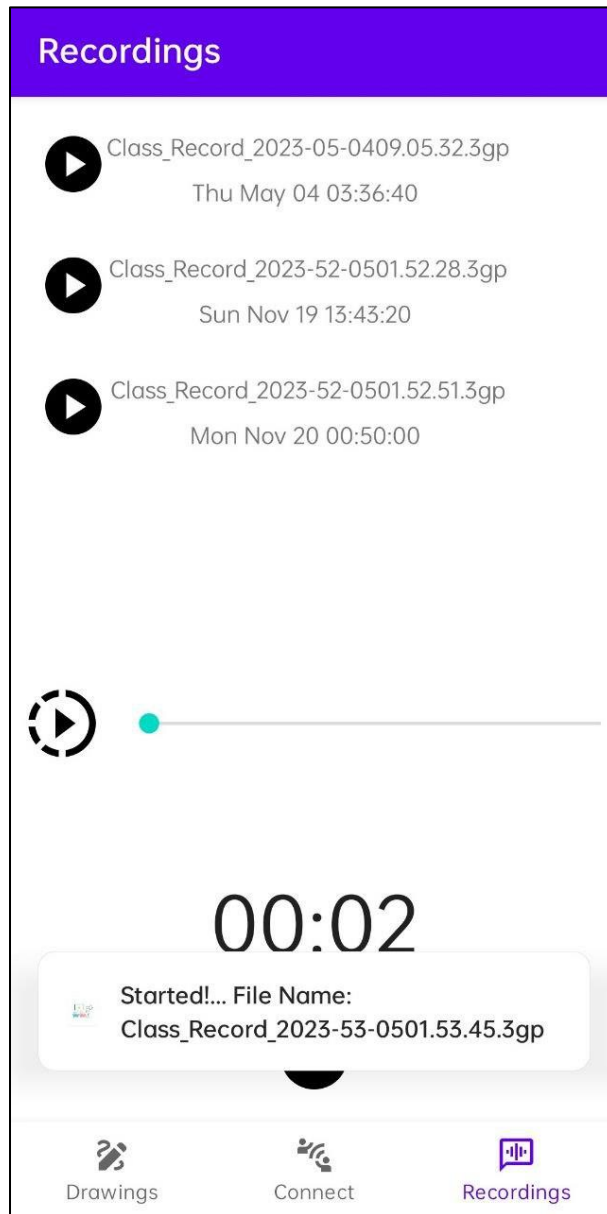

Figure 4.2.2: Started recording the class.

While the class has finished then click the speaker icon again to stop recording then it will show File saved message and the class recording will visible above at the same page.
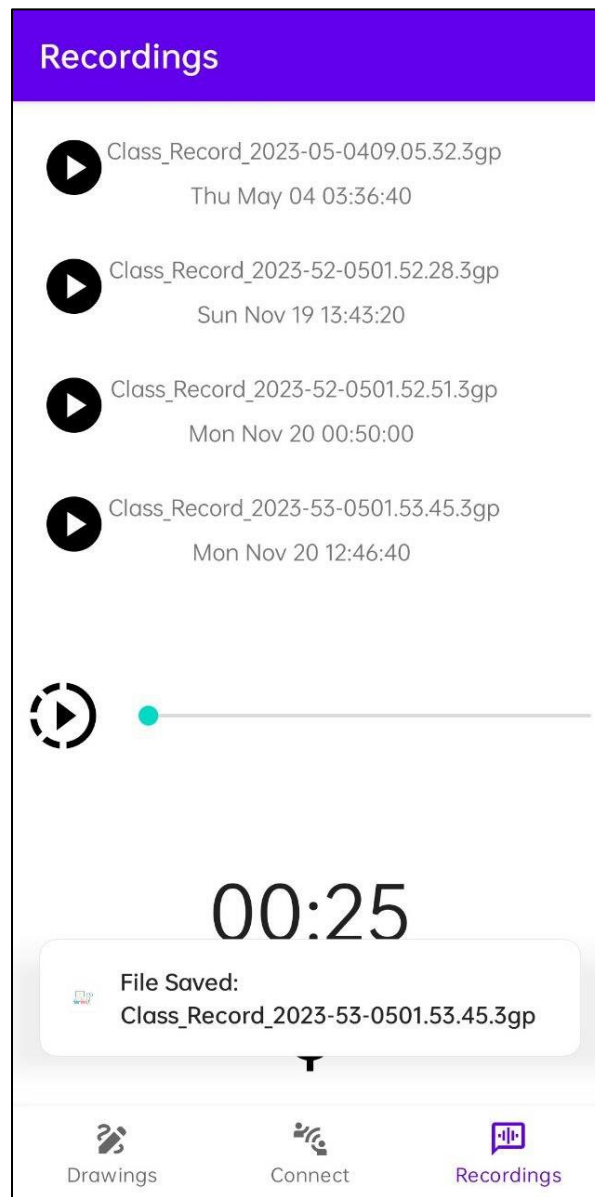

Figure 4.2.3: End of recording.

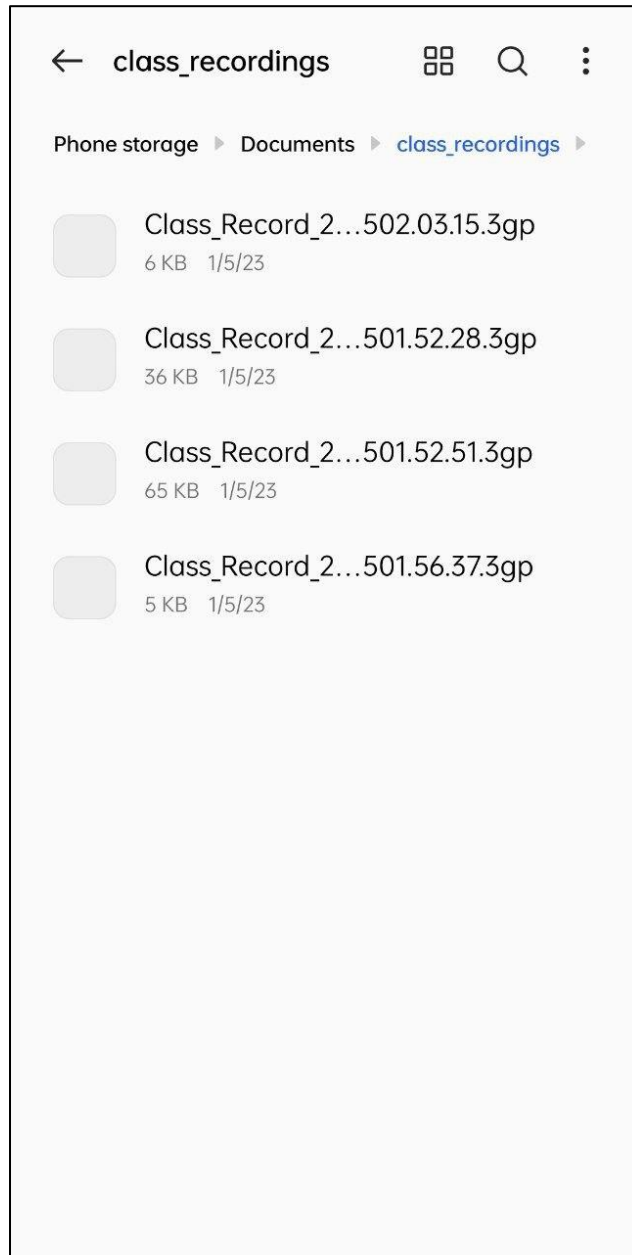After saving recording host can also see those recording in his/ her phone's storage.

Figure 4.2.4: Saved in phone's internal storage.

If user delete the recording from internal storage then that recording will be deleted from app's recording list also.
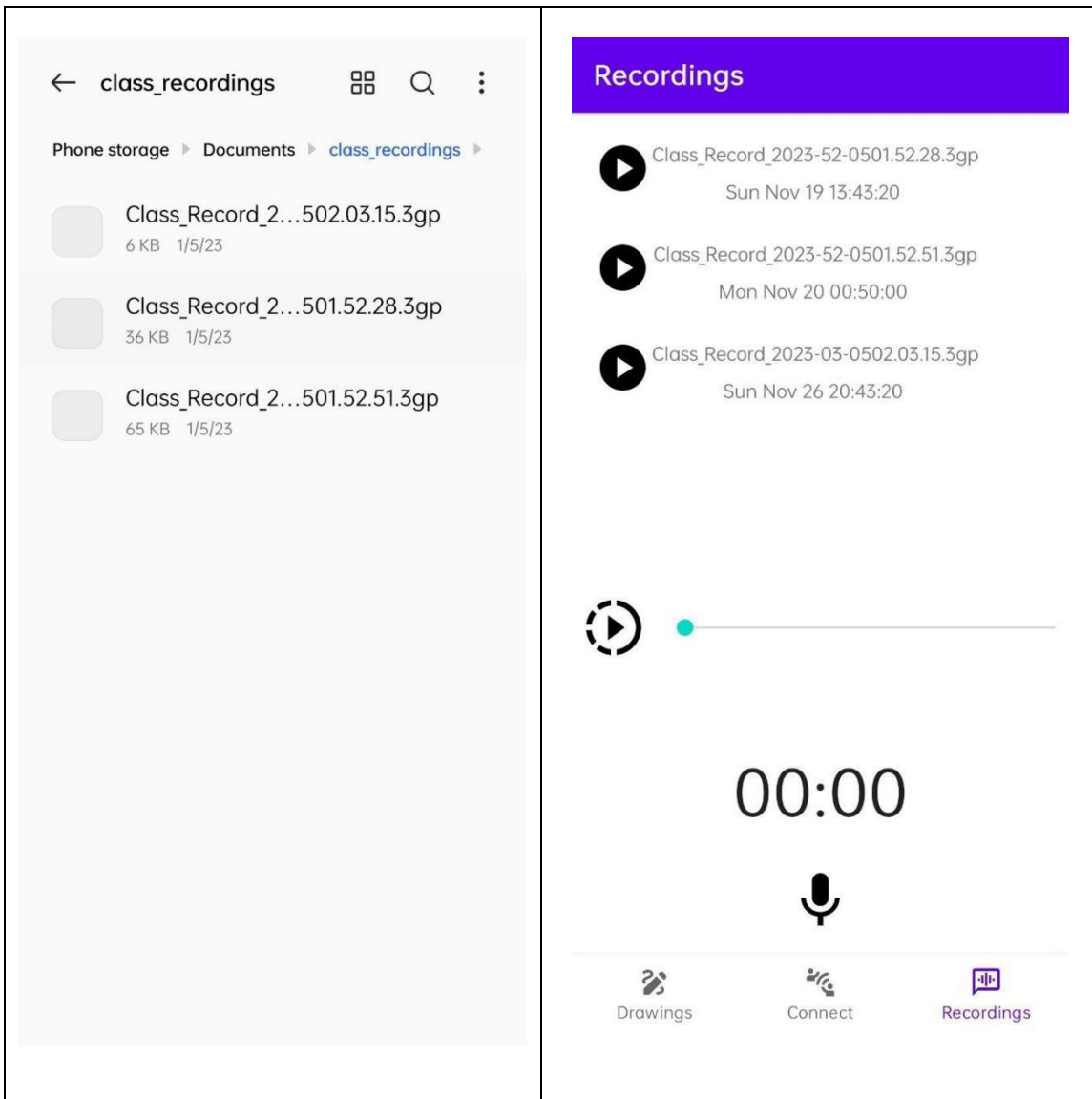

Figure 4.2.4: Saved in phone's internal storage.

4.3 Drawing Design

Here is the Drawing process of our "Smart Classroom" –

This is the Drawing page where user can draw any sketch. This section contains some colors: Black, Red, Green and Blue for line drawing. Its also have a size bar by which user can define line size, preview, next, close, erase and save button.
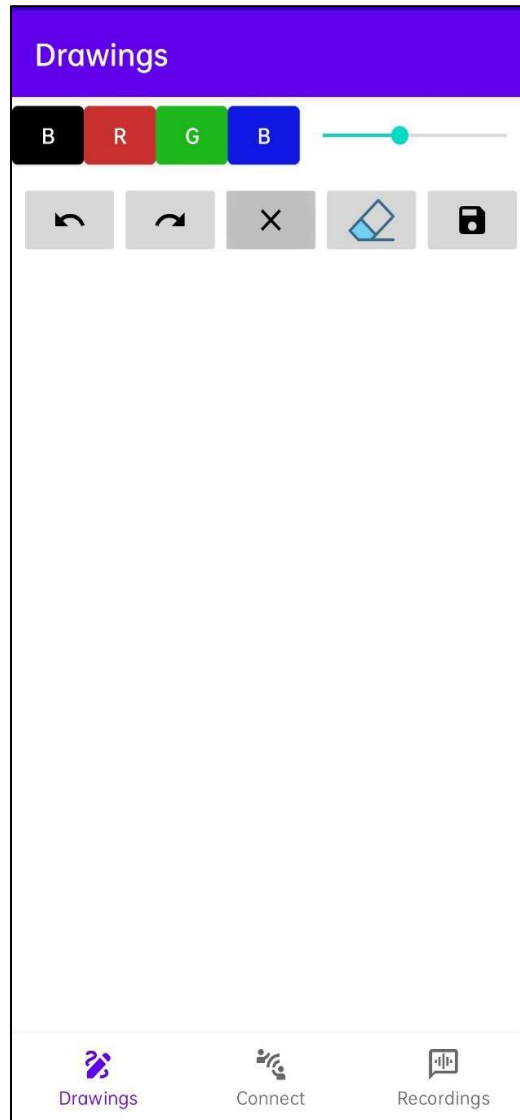

Figure 4.3.1: Drawing page.

Here's the drawing using the whiteboard of "Smart Classroom" by selecting color as per the sketch:

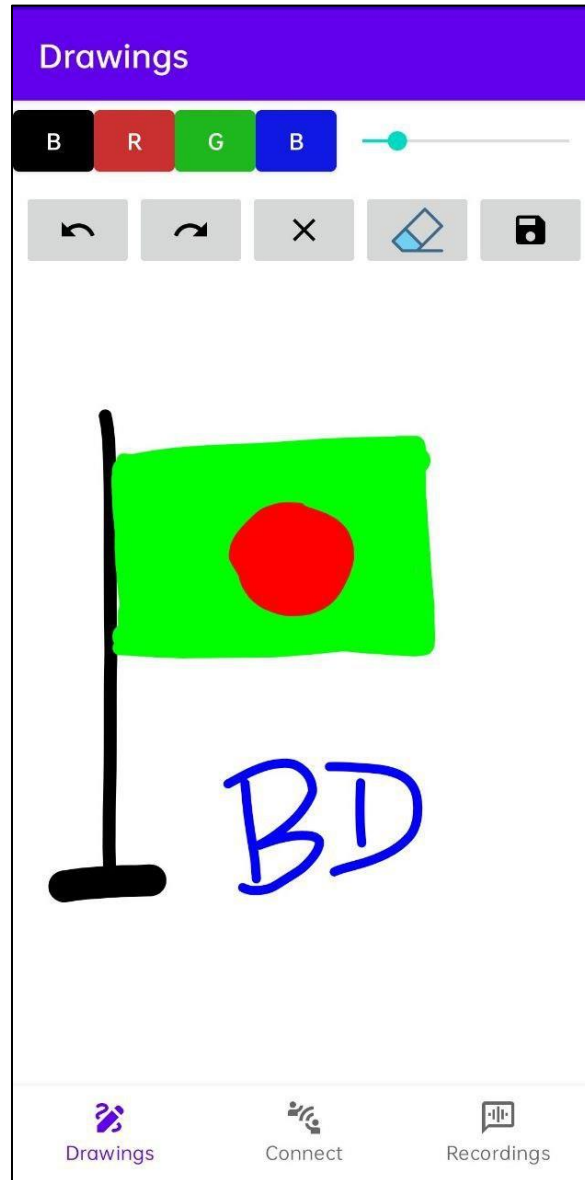Figure 4.3.2: Sketch of Bangladesh's National Flag.

User can preview and next view his/ her sketch by clicking preview and next view button

Figure 4.3.3: Preview and Next view.
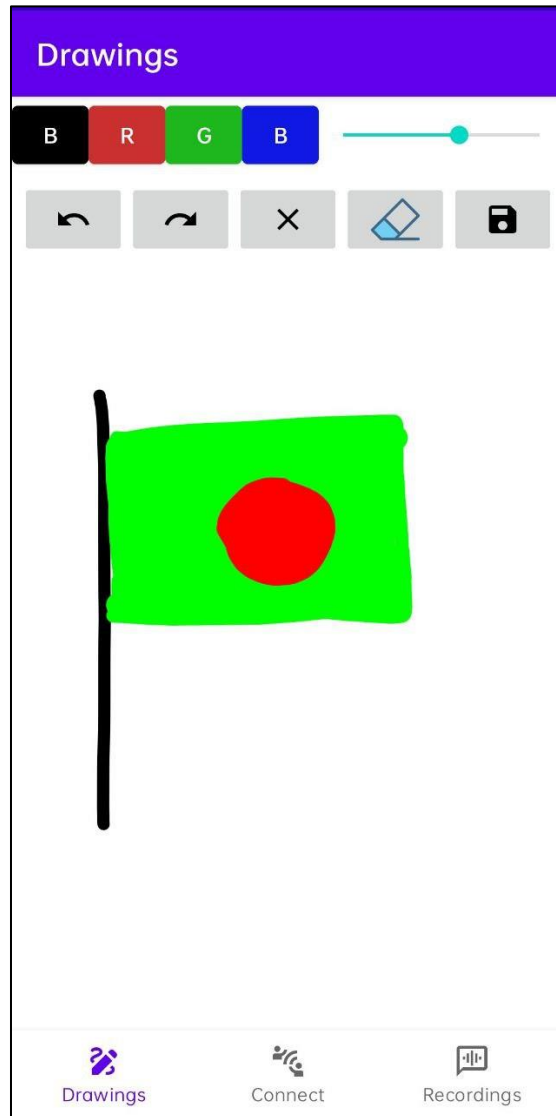
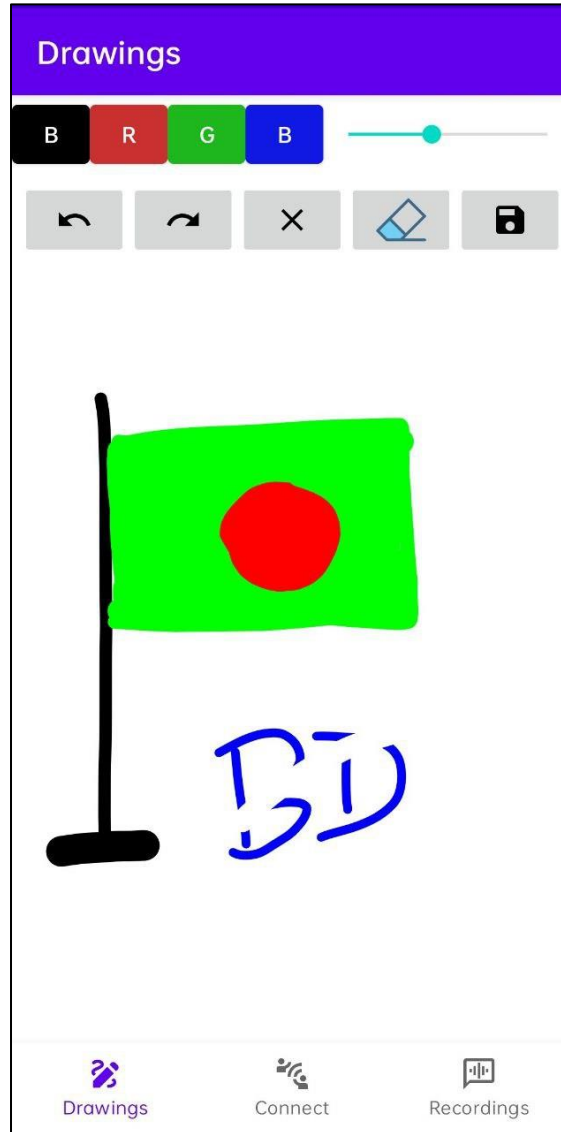User can erase any line by clicking erase icon:

Figure 4.3.4: Erase any line.

After clicking the save icon the drawing will be saved in phone's internal storage.
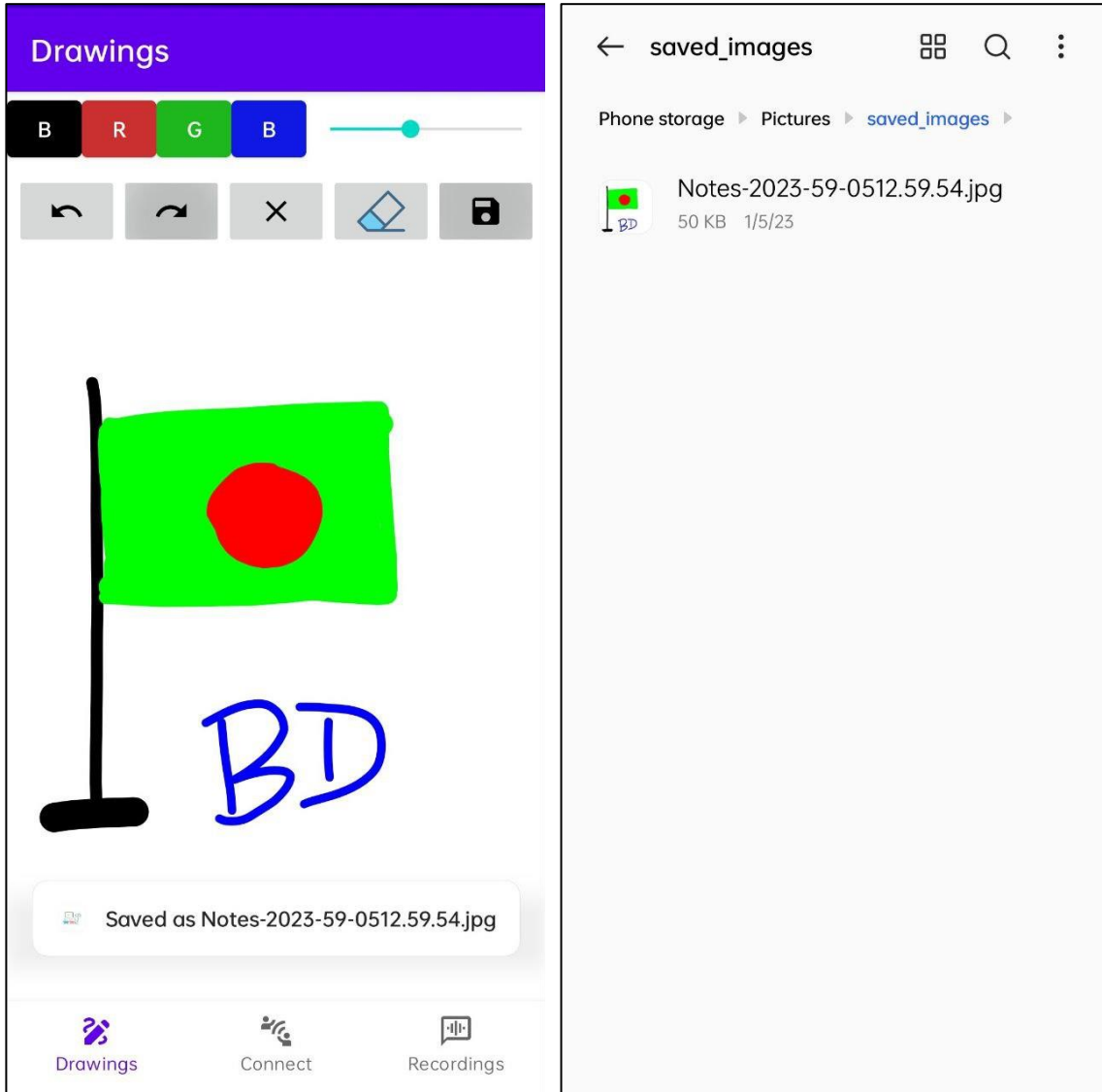

Figure 4.3.5: Saves the drawing in phones storage.

While your sketch is done and wants to new drawing just click cross button and get new screen for drawing.
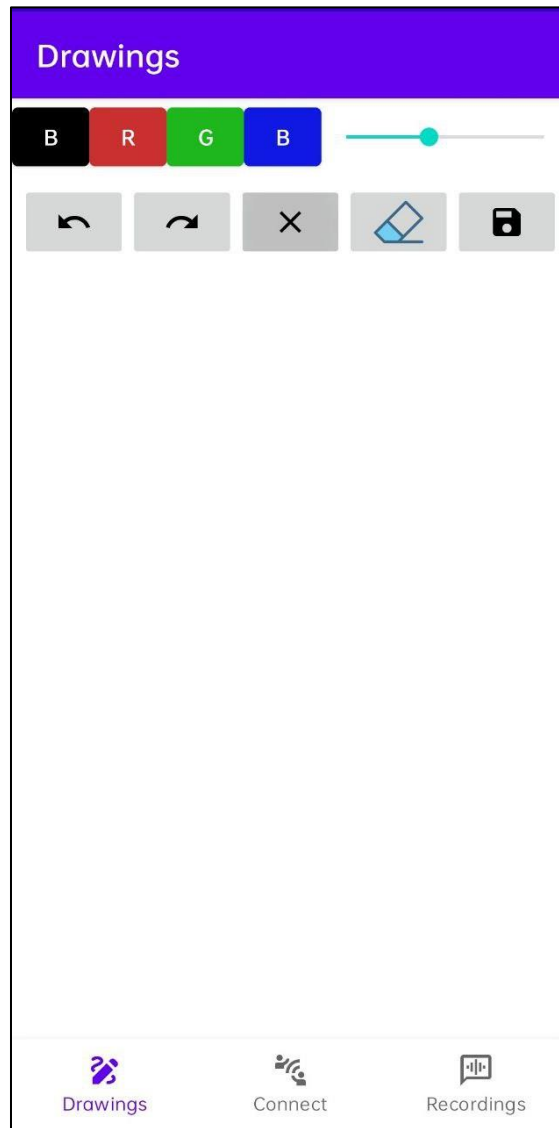

Figure 4.3.6: Clear screen by clicking close button.

CHAPTER 5

Implementation and Testing

5.1 Implementation of Project

The "Smart Classroom" project is implemented by using Java programming language and Android.

Java is a general-purpose, class-based, object-oriented programming language designed for having lesser implementation dependencies. It is a computing platform for application development. It is fast, secure, and reliable, therefore. [3]

Android Studio is the official integrated development environment (IDE) for Android application development. To support application development within the Android operating system, Android Studio uses a Gradle-based build system, emulator, code templates, and GitHub integration. [4]

5.2 Testing Implementation

In our project we have made this for the intention of making our so-called boring class as a smarter way. Its main purpose is to transfer teacher's lecture to all of the class's students who are sitting quite longer from the teacher and not listening to the content perfectly with some extra facilities.

To make this project applicable we have tested in various ways with many devices. Every task is performing as we wanted to do. The connection part is connecting and delivering lectures. The Recording section is recording as well as playing clearly. We have tested this project with some of our friend's mobile phones and this is working correctly.

Testing of connection, recording and drawing -
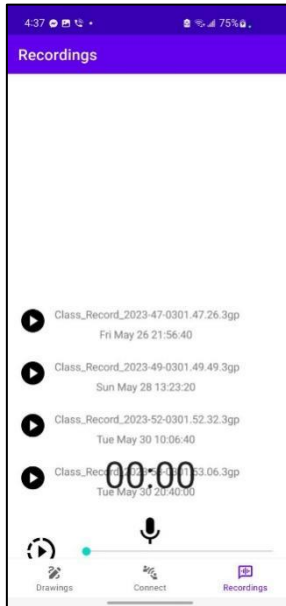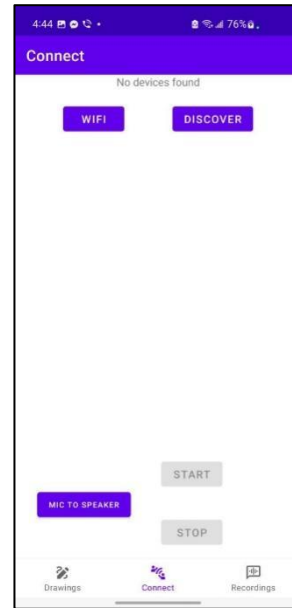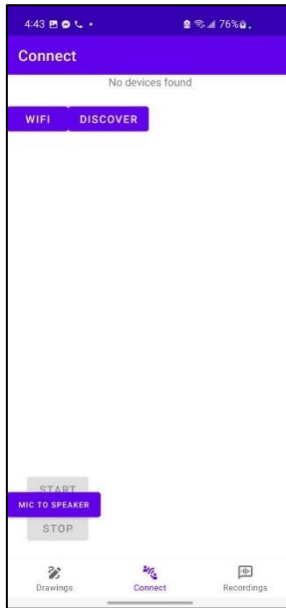
Figure 5.2.1: Testing of connection, recording, drawing.

CHAPTER 6

Impact on Society, Environment and Sustainability

6.1 Impact on Society

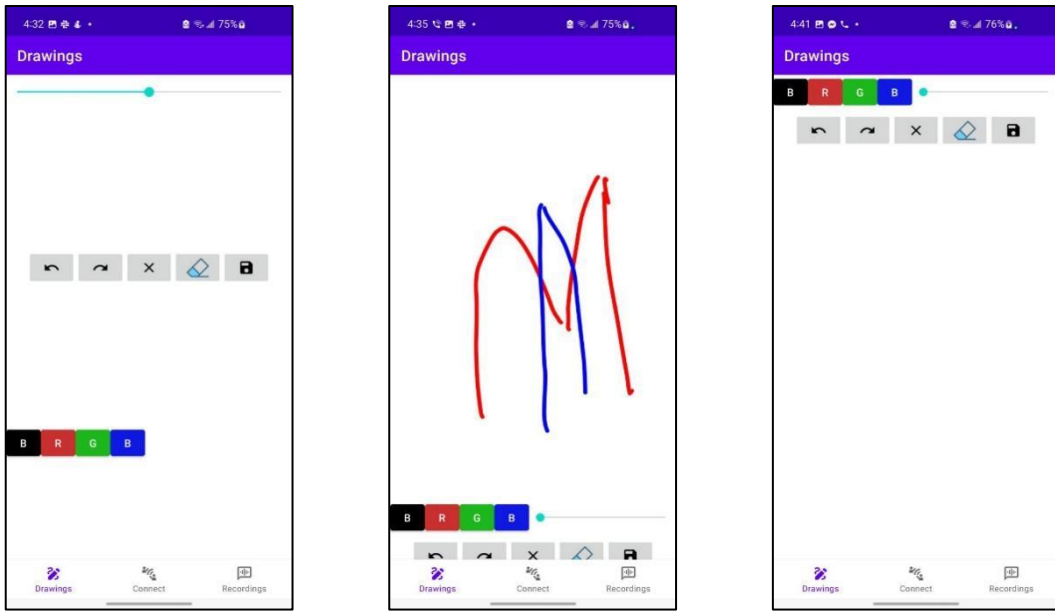Students are the future leader of the nation. So, every student must have to acquire knowledge properly. But in our country's classrooms it is quite impossible to deliver quality over so many students. That's why the students who are far from the teacher are not able to grab the opportunity. Our project "Smart Classroom" has removed this barrier between teacher and student. It delivers the same content all over the students of the classroom. Also, they can get recordings of class for further knowledge and keep notes as per their needs. This concept will help the student to learn more and encourage mostly. As students get proper knowledge so it will have the power to reduce the tradition of private tutoring and coaching business, nowadays this term looks like a bloody curse of a society. Somewhere it disrespects the professional and qualified teachers.

Moreover, by this project people will be inspired for making their future strongly. Like – students will learn properly and some youth will get the spirit of working with new technology (Networking, Software developing, coding etc).

So, at the end we can say that this project will help our society to bring a new world.

6.2 Impact on Environment

This "Smart Classroom" project is basically to save our students and teachers from their trouble. Because of this project the school college will get back their real respect by giving proper education. If students get proper knowledge then they can make the world a golden planet. Also, the sound pollution is growing rapidly day by day because of using high decibel sound in any assembly or rally. But if we use "Smart Classroom" then it can reduce this problem as well as for this assembly it has to use many microphones, speakers,

batteries, wires etc which are quite costly. But this extra cost can be made zero by using the app. Also like the other application it does not need any internet connection to perform.

But on the other hand, this project has an unconditional truth. That is – if we continue the system of using technology also when we are presented physically then the term of human interaction is in danger. Because, we are interacting with one another through the mobile phone. So, we are losing our characteristic of human beings. But in the era of modern technology, "Smart Classroom" will be a revolutionary step to move one step closer in modern life.

6.3 Ethical Aspect

There are also some ethical considerations of our "Smart Classroom" project –

Saves Money: Our project performs without any internet connection. So, you don't need to buy any internet. Here we can draw virtually so traditional pages are not so required. The cost of buying microphones, speakers, boards, pens in classrooms or any assembly will also be reduced by this project.

Saves Time: As we can record our class lectures so we can revise from that recording. It will save us many times which we can use for another purpose. Teachers also have not to repeat the same lecture more and more to reach the students in the last row.

Reduce Harassments: Set up speakers, microphones, boards, pens, recorders in every class and maintaining those makes extra efforts. But by using "Smart Classroom" those will be solved easily.

6.4 Sustainability plans

As our project is in the initial phase so it does not have so much capability to connect and pass content frequently and clearly. We will continually improve and manufacture our project. Because there is no end to any improvement.

CHAPTER 7

Conclusion and Future Scope

7.1 Discussion and Conclusion

At the end of our project description we will expect and demand that our project "Smart Classroom" is based on clarifying the classroom problems which are facing students and teachers from the past decade and this project will be able to do perfectly all the work which were described. We are also still working on it and hope to achieve the success of this project and be able to connect and transfer contents properly. We have made many efforts to simplify the user interface for the user and also the host to interact. Now it's ready to live activity and safe to claim that this project will be a revolutionary project.

7.2 Future Scope

The project "Smart Classroom" is in just an initial phase. We have some more and exciting ideas for future works. Such as,

- We will implement the broadcasting process for faster output.
- An announcement and reminder system for upcoming work.
- We will implement a calendar notification option to send student about important notifications.
- Attendance system to take students attendance.
- Students can also record class by getting permission from teacher and raise hand for any queries.
- Count screen timing so that none can use others applications while they are in the classroom.

7.3 Limitations

There are some limitations in our project "Smart Classroom". Like,

- While connecting more devices it becomes slower.
- The latency becomes high while connecting more devices.
- Sometimes the app is crashed.
- Sometimes it conflicts with the host and user.

REFERENCES

[1] NEXT PIT, available at https://www.nextpit.com/what-is-wifi-direct, last accessed on 06-01-2023 at 10.00PM

[2] ORACLE, available at https://docs.oracle.com/javase/tutorial/networking/sockets/definition.html#:~:text=A%20socket%20is%20one%20endpoint,address%20and%20a%20port%20number, last accessed on 06-01-2023 at 10.00PM

[3] J. Hartman, available at https://www.guru99.com/javaplatform.html#:~:text=Java%20is%20a%20general%2Dpurpose,secure%2C%20and%20reliable%2C%20therefore, last accessed on 29-12-2022 at 3.30PM

[4] TechTarget Network, available at https://www.techtarget.com/searchmobilecomputing/definition/Android-Studio, last accessed on 29-12-2022 at 4.00PM

[5] Android Developers, available at https://developer.android.com/guide/topics/manifest/uses-permission-element, last accessed on 30-12-2022 at 1.00AM

[6] Android Developer, available at https://developer.android.com/guide/topics/media/media-formats, last accessed on 30-12-2022 at 1.30AM

[7] developers, available at https://developer.android.com/guide/topics/manifest/uses-permission-element, last accessed on 30-12-2022 at 1.40AM

SMART CLASSROOM

26%	**26**%	**7**%	**22**%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	**Submitted to Daffodil International University** Student Paper	**13**%
2	**dspace.daffodilvarsity.edu.bd:8080** Internet Source	**7**%
3	**1001tipstricksandroid.blogspot.com** Internet Source	**1**%
4	**Hossam EL-Zayady, Mohamed S. Mohamed, Khaled Badran, Gouda Salama. "A hybrid approach based on personality traits for hate speech detection in Arabic social media", International Journal of Electrical and Computer Engineering (IJECE), 2023** Publication	**1**%
5	**ostoday.org** Internet Source	**1**%
6	**www.coursehero.com** Internet Source	**1**%
7	**Submitted to Duke Kunshan University** Student Paper	**1**%

8 "Proceedings of International Conference on Computational Intelligence, Data Science and Cloud Computing", Springer Science and Business Media LLC, 2021
Publication

1 %

9 sigport.org
Internet Source

<1 %

10 "Innovations in Computer Science and Engineering", Springer Science and Business Media LLC, 2020
Publication

<1 %

11 www.manualslib.com
Internet Source

<1 %

| Exclude quotes | Off | Exclude matches | Off |
| Exclude bibliography | Off | | |