National College of Ireland

Business information system

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HelpMe App

Technical Report

Contents

Executive Summary

This report will discuss the final year project that has been submitted in May 2022 for the major in Business Information Systems. In this report, there is detailed explanation behind the motivation of implementing the HelpMe project. The HelpMe project focuses on an issue that has been around for years, namely violence. The project could be used to tackle this issue. This report will outline the development of the project with regards to the technology used and the system requirements to use the HelpMe project. This report will be subdivided into three parts: firstly, the project will be introduced. In this section, the idea of this project alongside the purpose of creating this project will be outlined in detail. Thereinafter, the system requirements insofar as the user and data requirements will be discussed before finally describing the project outline.

1.0 Introduction

1.1. Background

The fear of violence has always been an issue for many people. It is common for individuals to feel unsafe in a variety of places, for example, walking alone in the street, particularly at night-time where there have been numerous instances of attacks. It is fortunate that awareness for this issue has been raised due to the documentation of these attacks across social media platforms. This heightened awareness causes people to be more careful when walking in the street or towards strangers as the threat of violence is something they are more conscious of. The origin of the HelpMe project came to mind after witnessing several online videos of innocent people getting attacked. This sparks the question: how many individuals have been ambushed without having any direct communication with their loved ones?

According to national statistics in the United States, approximately 20 people per minute are getting physically attacked which indicates that over 10 million people are abused by their partners on an annual basis. Moreover, studies show that 1 out of 3 women and 1 out of 4 men have been abused by their partners.

Therefore, action should be taken as it has become customary for women to take pictures and send messages to their families when they are being abused. According to The Mirror, a Manchester United player has been banned from the club after the abuse of his girlfriend circulated when voice notes and photos of the physical violence emerged online (Varley, 2022).

This shows that the ability to send messages and photos to others led to action being taken. The HelpMe project will allow people who are getting attacked to send messages to their family and friends and spread the awareness.

1.2. Aims

The purpose of this project is to develop an application that will work on both mobiles and tablets by using the android studio. The aim of this project is to help users to contact their friends and family by sending them messages, calls, and share their location if they fail unsafe.

There are four aims for the HelpMe project:

1- Speech recognition to speak to AI where the user can ask questions

2- Send a message by text to speech.

3- Call help centre.

4- Share location with anyone.

1.2.1 Speech recognition

To perform speech recognition in the HelpMe application, users must create an account in the application. When users register for HelpMe, they will need to enter information like their email address as they will need a valid email to verify their account. Users' data will be kept secret from other users. When users are logged in, they will be directed to the speech recognition page. The speech recognition layout will help users to perform some features of the app and ask some questions using the speech recognition.

Some features the speech recognition can perform include:

1- The user can ask questions to the speech recognition such as "what can I ask you?" and the speech recognition (Jarvis) will answer.
2- It will be able to open all other features of the app, for example, if the user said, "open message", the send message layout will be opened.
3- "Share location" speech recognition will share the location of the user.

1.2.2 Send a message

The 'send a message' feature will enable users to send messages to anyone by simply entering their phone number. Users of the app must enter a valid number where a message can either be typed or users can opt for text to speech. When users click the microphone button in the app, their speech will be recognized and turned into text which can then be sent as a message. The send a message feature will give users the opportunity to send messages to non-users of HelpMe because the message notification will be received in the 'messages' app.

1.2.3 Call help centre

In the call help centre, the application will provide a help centre that will be available 24/7 for users wherein they will be able to ask for any kind of help. The help centre page will provide any help they need, especially if they get abused by anyone because help will come if they can call emergency services. The aim of the help centre is to provide users with the ability to reach the emergency number of any country because often tourists do not know the emergency number of the country they are visiting.

1.2.4 Share location

Share location will allow users to share their location with non-users as they will be able to send their location through the message application. Users must allow the application to use their location so that their whereabouts is tracked. The location of users will be kept secret between them and the people that they want to send their location to.

1.3Technology

Technologies that have been used to implement HelpMe project.

Android studio

It will be the main platform we will use to develop the application.

Java

We will apply Java language to develop the application as we will use Java in android studio to develop the application.

Firebase

Firebase will be set as our database to store user information such as their registration details.

CSS

CSS will be used to design the layout of HelpMe application.

GitHub

It will be used to store the project files and be back-up any files that were lost during the process of making the application.

Dropbox

It will be used as a backup to store files, especially files of the HelpMe project and documents that will be created or using during the process of the project, for example, the technical report.

Lucid Chart

It will be used to create all the diagrams we need to build the project.

Xml

This will be used to design our application layout and make it responsive for all users when the use the HelpMe application as the application will work on both mobiles and tablets.

1.4 Structure

For the remaining part of the technical report, we will discuss the following:

- Firstly, we will discuss the system of the HelpMe application which includes discussing many different topics using a case diagram. This will be followed by a list of requirements, for example data and user requirements. This will then be succeeded by the implementation, graphical user interface, testing, and evaluation.
- The third section is the conclusion of the project which will include a summary of the project's technical report.
- The fourth section includes any further development wherein developments that can be made to further enhance the app will be discussed
- The fifth section consists of references which will include any sources we have used to complete the project
- The sixth section include appendices, project proposal and reflective journals.

2.0 System

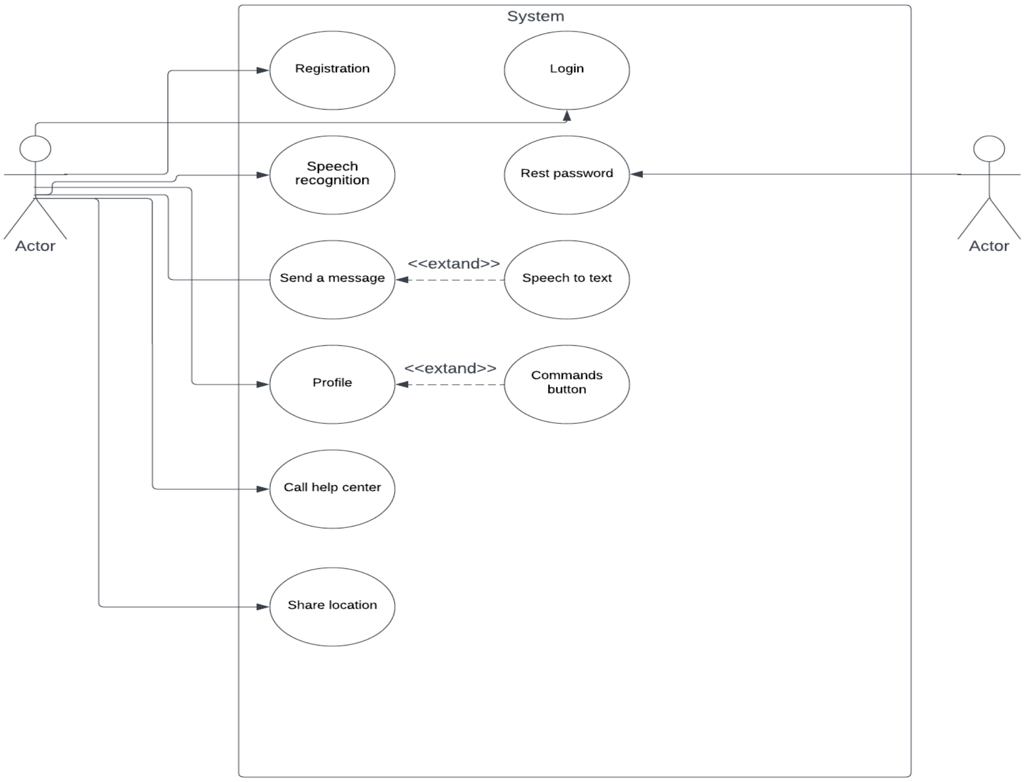
2.1. Requirements

There are important requirements we will focus on to complete the project in terms of functional, data, user, environmental and usability requirements that will be discussed below.

2.1.1. Functional Requirements

1. Users must have android devices
2. Users must create an account
3. Users must verify their email
4. Users must login with their registration email and password
5. The system must enable users to login if they provide the right information when they click register
6. Users can see the login page
7. Users must enable microphone permission and speak English to use speech recognition.
8. Users must click the help button to know the commands for speech recognition
9. The system must open the send message page when the user says send message.
10. The application must allow users to send a message to the message's application by speech to text or by typing the message that users want to send.
11. The system must open call centre layout when the user says open call
12. Users must be able to call help centre when they click call centre button.
13. The system must open share location page when the user says share location
14. Users must allow the HelpMe application to use their location
15. Users must be able to share their location when they click share location

2.1.1.1. Use Case Diagram



2.1.1.2. Use Case

Functional requirement: 1 registration

Id	1
title	registration
priority	High
Scope	The user can register to the system
Description	The user enters their registration details such as name and email to register into the system
Actors	user
Precondition	The user is not register. The user entered an invalid email. The user did not fill all the require fields. The user entered a password less than 6 digits.
Activation	The use case starts when the user click register button
Main flow	1-The user is in the registration screen. 2-The user fills all the requirements to register 3-The user clicks register

	4-The system shows the user a message to the user that is being registered. 5-the user is in the login page.
Exception-flow	The user enters invalid phone number.
Termination	The system can send the message to the phone number that has been chosen after the user clicks the send button.
Post condition	The system shows the user that the message has been sent.

Functional requirement 2: Login

Id	**2**
title	Login
Scope	To allow the user to login into the system as it is the only way to use the application features
Description	The user enters his email and password from his registration information to login into the system
Actors	User
Precondition	1-The user is not registered 2-The user did not verify his email. 3-The user did not input the correct email and password. 4-The user did not click login.
Activation	User logs in
Main flow	1-The user goes to the login page after being registered 2-The user verifies their email 3-The user enters their email and password. 4-The user clicks login.
Exception-flow	The user enters an invalid email or password.
Termination	The system can send the message to the phone number that has been chosen after the user clicks the send button.
Post condition	The system shows the user that the message has been sent.

Functional requirement 3: Send a message

Id	**3**
title	Send a message
Scope	The user can send a message to a friend

Description	The user enters a mobile phone number and an any message in the field and the receiver of the message will receive the message in the message's application
Actors	User
Precondition	The user is not registered or login. The user is in the profile page. The user did not speak to the speech recognition. The user did not enter any phone number. The user did not give permission to the system to send SMS.
Activation	The use case starts when a user says to speech recognition send message
Main flow	1-The user goes to the login page. 2-The user logged into the app 3-The user enters profile page. 4-The user clicks chat button. 5-The user enters a valid phone number and message. 6-The user clicks send button. 7-The receiver receives the message.
Exception-flow	The user enters an invalid phone number.
Termination	The system can send the message to the phone number that has been chosen after the user clicks the send button.
Post condition	The system shows the user that the message has been sent.

Functional requirement 4: Share location

Id	**4**
title	Share location
Scope	Users can share their location by SMS

Description	A user enters share location page to share his GPS by SMS so it can be seen where they are.
Actor	User
Precondition	The user is not registered or login. The user is in the home screen. The user did not speak to the speech recognition. The user did not click share location The user did not give permission to the system to track his location.
Activation	The use case starts when the user shares their location
Main flow	1-The user goes to the login page. 2-The user logged into the app 3-The user enters profile page. 4-The user say to speak recognition share location. 5-The user enters share location screen. 6-The user enters valid phone number. 7-The user clicks share location.
Exception-flow	The user did not give permission to the system to track his location.
Termination	The user's phone is calling help centre
Post condition	The user is speaking to the help centre.

Functional requirement 5: call help centre

Id	**5**
title	Call help centre
Scope	The user can call the help centre of the HelpMe application to request help.
Description	The user enters help centre screen and clicks call help centre.
Actors	User

Precondition	The user is not registered or login. The user is in the profile page. The user did not say open call to the speech recognition The user did not click call help centre button.
Activation	The use case starts when a user says to speech recognition open call
Main flow	1-The user goes to the login page. 2-The user logged into the app 3-The user enters profile page. 4-The user says to speak recognition open call. 5-The user enters call help centre screen. 6-The user clicks call help centre button. 7-The user's phone is calling help centre.
Exception-flow	The user in the home screen.
Termination	The system can send the message to the phone number that has choose after the user clicks the send button.
Post condition	The system shows the user that the message has sent.

Functional requirement 6: speech recognition

Id	**6**
title	Speech recognition
Scope	The user can speak to the speech recognition where they perform commands
Description	The user enters home screen and holds the microphone where it will appear in the textbox that the speech recognition is listening and the user can say something such as hello and the speech recognition (Jarvis) will say hello, how can I help you.

Actors	User, system
Precondition	The user is not register or logged in The user is in the profile page. The user did not give microphone permission to the system. The user did not hold the microphone button The user did not speak to the speech recognition The user did not speak in English.
Activation	The use case starts when a user says to speech recognition open call
Main flow	1-The user goes to the login page. 2-The user logged in to the app 3-The user enters profile page. 4-The user holds the microphone button and speaks 5-The user speaks in English. 6-The user says some commands in the help button. 7- Speech recognition is answering the user
Exception-flow	The system did not hear the user's voice.
Termination	What the user said is showing in the textbox
Post condition	The system is answering the user.

Functional requirement 7: Reset password

Id	**7**
title	Reset password
Scope	Allows users to reset their password
Description	Users can reset their password when they click forget password button
Actor	User, system
Precondition	The user forgot their password. The user wants to change his password. The user is not logged in.

Activation	The use case starts when the user click reset password button.
Main flow	1-The user goes to the login page. 2-The user cannot login 3-The user clicks forgot password button 4-The user enters their email 5-A message shows check your email to reset your password. 6-The user update resets their password.
Exception-flow	The system did not catch the user voice.
Termination	What the user said is showing in the text box
Post condition	The system is answering the user.

2.1.2. Data Requirements

User data:

The HelpMe application will use firebase to store user registration data only and it will not store any personal information about the user. HelpMe will only store the name, password, email, and age to use it for the user purpose as needed to access the application. As the HelpMe application required users to create an account to be able to use all the features, this is the reason the data is stored.

Personal data:

When the user is logged into the system, it will ask the user for permission. The first permission users will be asked is to record an audio as users have to allow record audio to use the microphone in the home screen. Secondly users will be asked to allow the HelpMe application to send and receive SMS messages as the application will send messages to SMS. Thirdly, users must give the app permission to use location to send the whereabouts to the user’s friends. Finally, users should allow the app to make a call for them so they can call the help centre of HelpMe. However, users are allowed to give permission for one time only or while using the application.

2.1.3. User Requirements

Android devices

The HelpMe application is only working in android devices such as tablets and phones because users are required to have android studio to use the application.

Email address

Users are required to have a valid email address as the HelpMe application will require an email address because the users must verify their email address to use the application.

2.1.4. Environmental Requirements

- Windows 10 operating system
- Windows 11
- Android virtual devices
- Android SDK (API level 23 minimum)

2.1.5. Usability Requirements

Availability

The application must be always available at any part of the day. Firebase will always be running to ensure users can register and login to the application.

Security

The HelpMe application will be using google firebase to restore users' details. Firebase allows us to use a Realtime database which allows us as database creators to easily store users' information and restrict any changes to read and write where only users can change their details such as their password.

Performance

The application must load quickly because users must have no lag or other problems when running the application. Android studio will be used to develop the application which should have no problems running any application as quickly as possible if there is no error in the application.

2.2. Design & Architecture

Design

The user design flow below describes the HelpMe app system. Information technology professionals and system analysts use data flow diagrams to demonstrate to users how data travels across different operations in a system. The purpose of using a design flow diagram is to shows graphically how information flows between operations in a system.

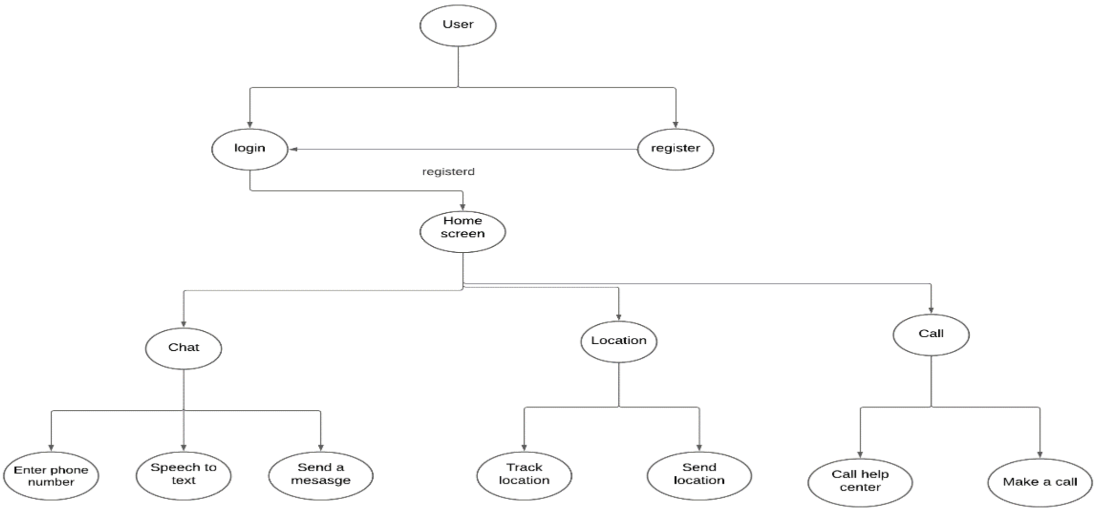


Figure 2

Figure 1

The design flow shows users what is assigned to each requirement

First flow

Login →= home screen. Or if the is user not registered Login → register → login → home screen.

Users must register or login. If the user has an account, they will be directed to the home screen and if they do not have an account, then users must register and then they will be directed to the login page.

Second flow

Home screen →= chat

In the chat, the user will be able to enter phone numbers, send messages and chat by sending speech to text message.

Third flow

Home screen → location

The user in the home screen can access the location screen and can track and send their location as illustrated in Figure 2.

Architecture

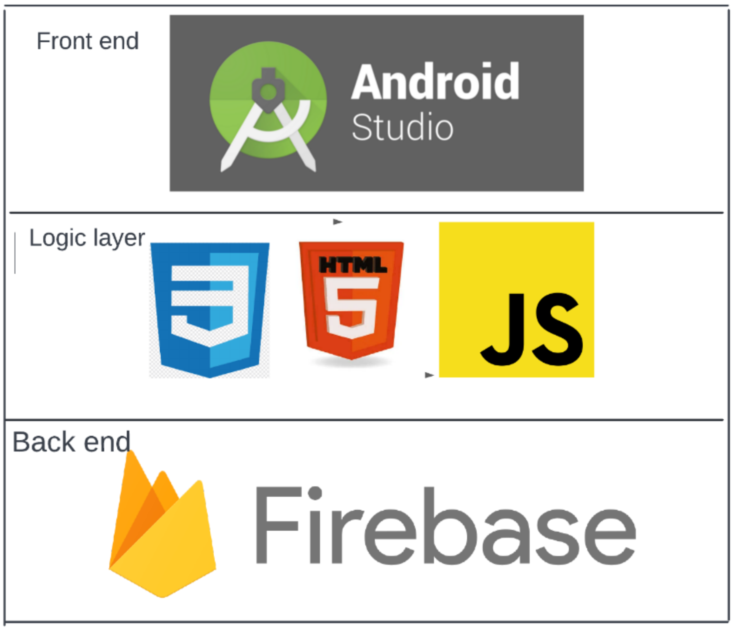
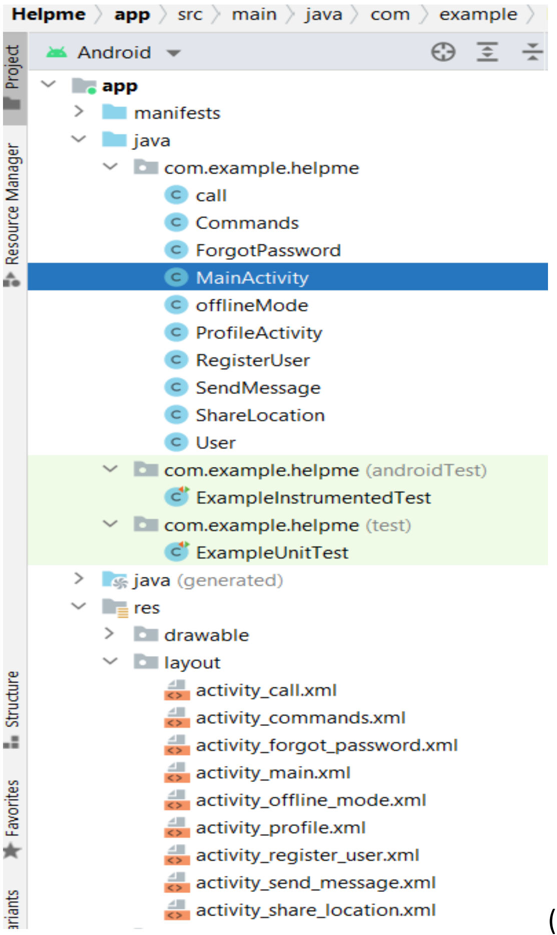


Figure 3

The architecture of the HelpMe application will be designed as shown in Figure 3. Firstly, for the front end, we will use android studio to design the HelpMe application. Secondly, we will use JavaScript as the main language for our code and HTML as the secondary language to design our app to assist us in conjunction with the java coding. We will be using CSS to design the layout of our application. Finally for the back end, we will use firebase real time database to help us store user's registration information. Firebase is an easy method of storing data and ensuring that all users data is being stored correctly. Firebase as well the application store data helps the application to authorise the user identification as we will use email verification to ensure the user enters a valid email to register with the HelpMe application.

2.3. Implementation

In this part of the paper, we will discuss how the various aspects of the HelpMe application function with the aid algorithms and functions. We will mainly discuss our modules and JavaScript files that we created in the application.



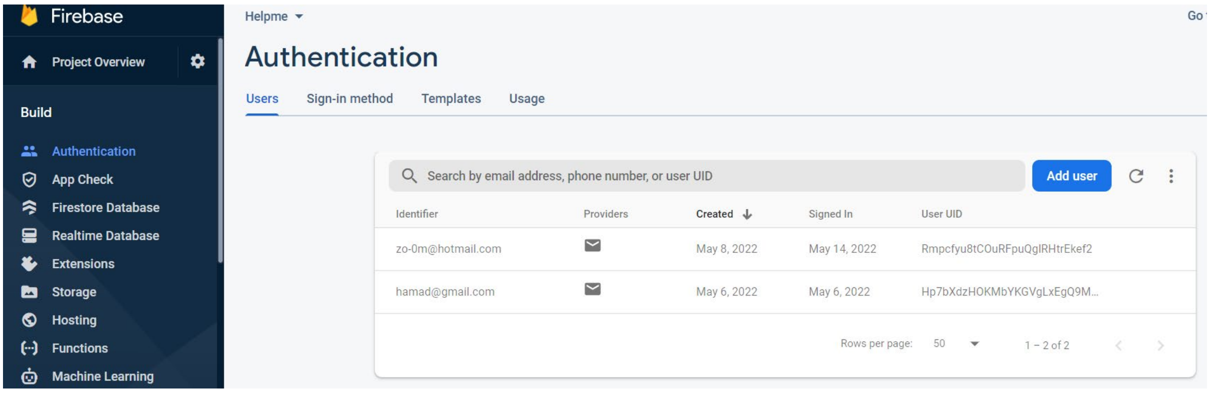
```
app
  manifests
  java
    com.example.helpme
      call
      Commands
      ForgotPassword
      MainActivity
      offlineMode
      ProfileActivity
      RegisterUser
      SendMessage
      ShareLocation
      User
    com.example.helpme (androidTest)
      ExampleInstrumentedTest
    com.example.helpme (test)
      ExampleUnitTest
  java (generated)
  res
    drawable
    layout
      activity_call.xml
      activity_commands.xml
      activity_forgot_password.xml
      activity_main.xml
      activity_offline_mode.xml
      activity_profile.xml
      activity_register_user.xml
      activity_send_message.xml
      activity_share_location.xml
```

(figure4)

First, we used android studio to create HelpMe application. We created 10 java classes and 9 xml files. Each file will represent an activity we created to perform the application.

User registration and login

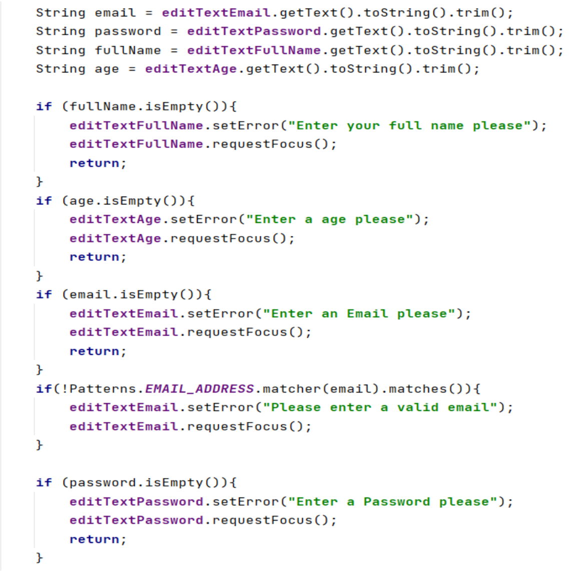
We created a real-time database in firebase to store all user's information for sign in purposes as the application only works if the user has an account. We will be using email as the method of signing in for our users.



Identifier	Providers	Created ↓	Signed In	User UID
zo-0m@hotmail.com	✉	May 8, 2022	May 14, 2022	Rmpcfyu8tCOuRFpuQglRHtrEkef2
hamad@gmail.com	✉	May 6, 2022	May 6, 2022	Hp7bXdzHOKMbYKGVgLxEgQ9M...

Rows per page: 50 1 – 2 of 2

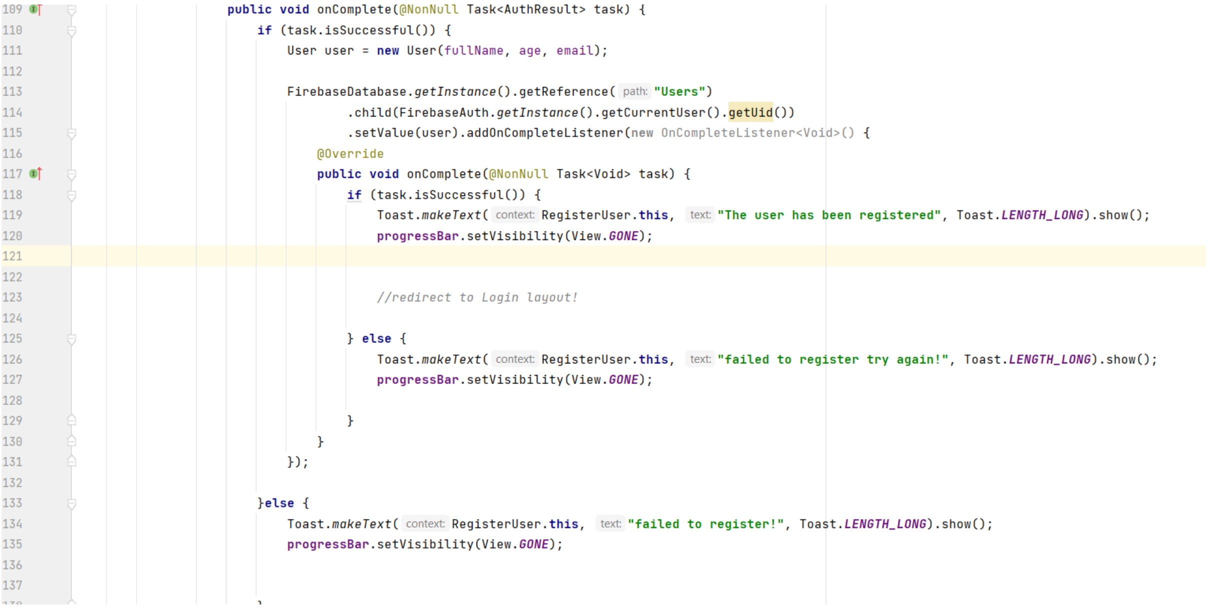
Figure (5)



```
String email = editTextEmail.getText().toString().trim();
String password = editTextPassword.getText().toString().trim();
String fullName = editTextFullName.getText().toString().trim();
String age = editTextAge.getText().toString().trim();

if (fullName.isEmpty()){
    editTextFullName.setError("Enter your full name please");
    editTextFullName.requestFocus();
    return;
}
if (age.isEmpty()){
    editTextAge.setError("Enter a age please");
    editTextAge.requestFocus();
    return;
}
if (email.isEmpty()){
    editTextEmail.setError("Enter an Email please");
    editTextEmail.requestFocus();
    return;
}
if(!Patterns.EMAIL_ADDRESS.matcher(email).matches()){
    editTextEmail.setError("Please enter a valid email");
    editTextEmail.requestFocus();
}

if (password.isEmpty()){
    editTextPassword.setError("Enter a Password please");
    editTextPassword.requestFocus();
    return;
}
```

(Figure 6)

This is our registration class in the application where we created some functions as shown in figure 6. We created an if statement as well if the users entered enter any empty information, the users will not be registered into the system to avoid any fake users in the application. If any user provides an empty field, it will return an error and a message will be shown to the user. For example, if a user leaves their full name empty, then a message stating "Enter your full name please" will be shown to the user.

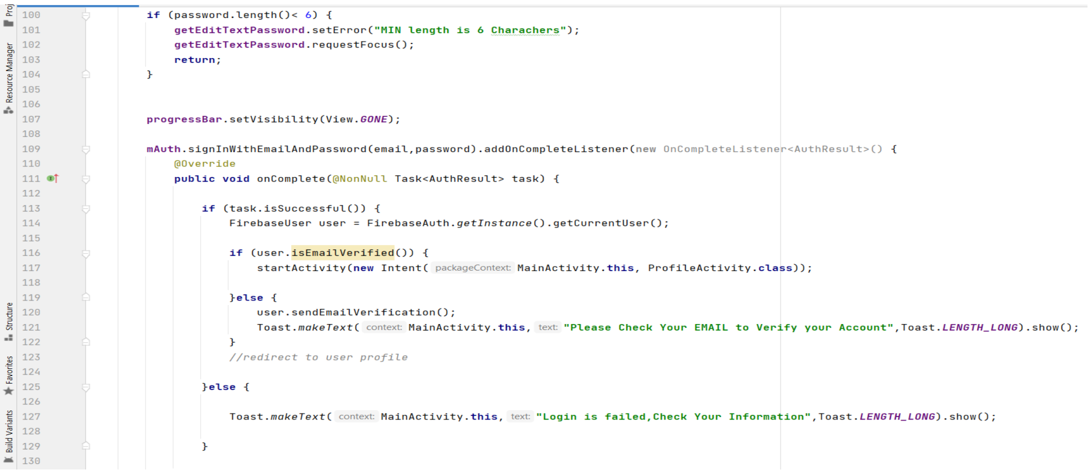


```
109     public void onComplete(@NonNull Task<AuthResult> task) {
110         if (task.isSuccessful()) {
111             User user = new User(fullName, age, email);
112
113             FirebaseDatabase.getInstance().getReference( path: "Users")
114                     .child(FirebaseAuth.getInstance().getCurrentUser().getUid())
115                     .setValue(user).addOnCompleteListener(new OnCompleteListener<Void>() {
116                 @Override
117                 public void onComplete(@NonNull Task<Void> task) {
118                     if (task.isSuccessful()) {
119                         Toast.makeText( context: RegisterUser.this,  text: "The user has been registered", Toast.LENGTH_LONG).show();
120                         progressBar.setVisibility(View.GONE);
121
122
123                         //redirect to Login layout!
124
125                     } else {
126                         Toast.makeText( context: RegisterUser.this,  text: "failed to register try again!", Toast.LENGTH_LONG).show();
127                         progressBar.setVisibility(View.GONE);
128
129                     }
130                 }
131             });
132
133         }else {
134             Toast.makeText( context: RegisterUser.this,  text: "failed to register!", Toast.LENGTH_LONG).show();
135             progressBar.setVisibility(View.GONE);
136
137
```

(Figure 7)

Lines 109 to 115 show the complete part of our if statement from figure 6 because if the user fills in their details in the registration screen, their name, age, and email will be added to the Firebase database. From line 117 to 135, we created a task for our if statement because if all registration information is correct, then a message will be shown that the user has been registered, otherwise a message will be shown stating failed to register, try again.

In figure 8, it shows our login implementations: we implemented an email verification. If the user completes all the fields, a message will show “please check your email” because the user needs to verify their email before logging for the first time. If the user could not verify their email, a message will be shown as you can see below.

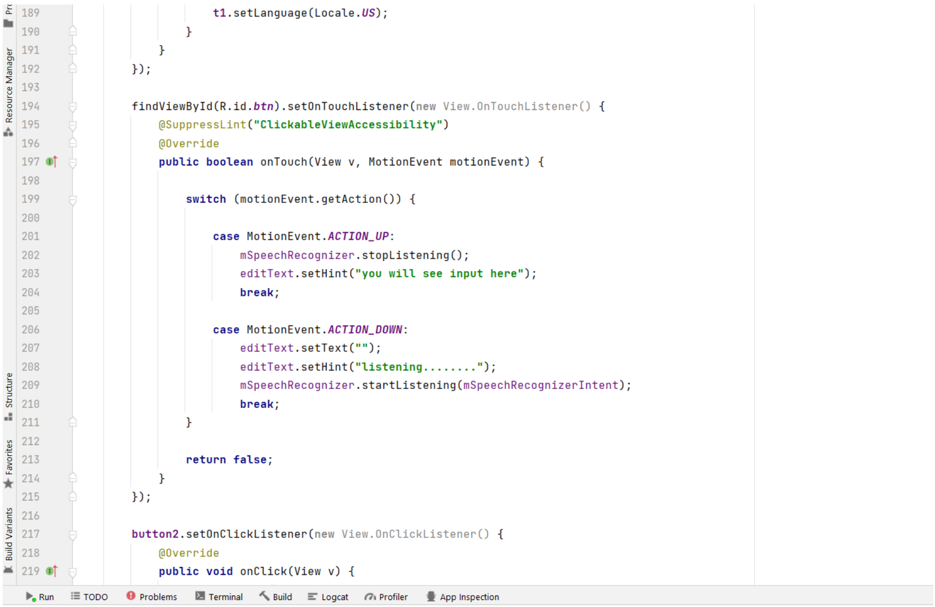


```
if (password.length()< 6) {
    getEditTextPassword.setError("MIN length is 6 Charachers");
    getEditTextPassword.requestFocus();
    return;
}


progressBar.setVisibility(View.GONE);

mAuth.signInWithEmailAndPassword(email,password).addOnCompleteListener(new OnCompleteListener<AuthResult>() {
    @Override
    public void onComplete(@NonNull Task<AuthResult> task) {

        if (task.isSuccessful()) {
            FirebaseUser user = FirebaseAuth.getInstance().getCurrentUser();

            if (user.isEmailVerified()) {
                startActivity(new Intent( packageContext: MainActivity.this, ProfileActivity.class));

            }else {
                user.sendEmailVerification();
                Toast.makeText( context: MainActivity.this, text: "Please Check Your EMAIL to Verify your Account",Toast.LENGTH_LONG).show();
            }
            //redirect to user profile

        }else {

            Toast.makeText( context: MainActivity.this, text: "Login is failed,Check Your Information",Toast.LENGTH_LONG).show();

        }
```

(Figure 8)

Home screen

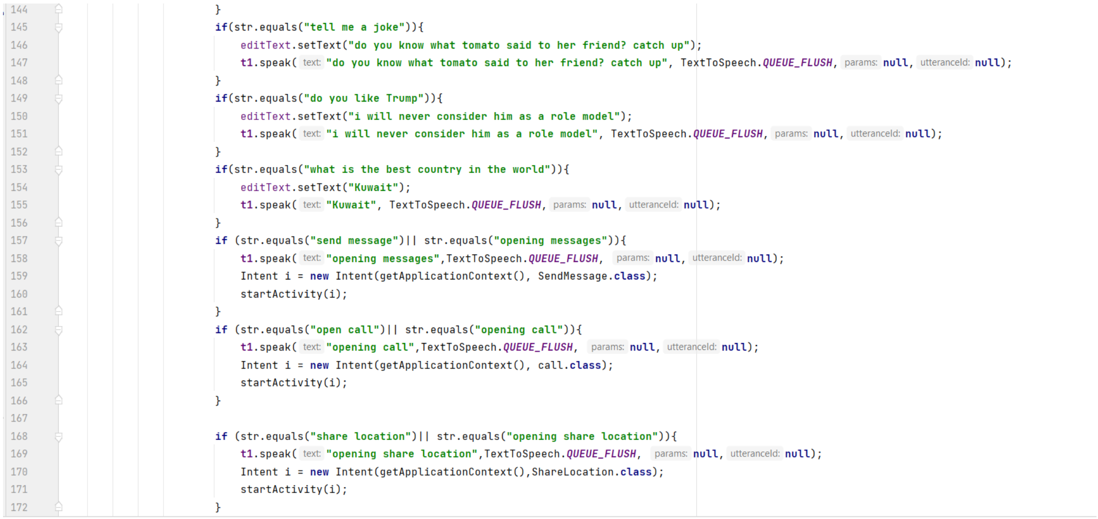
In the home screen, we implemented some features for the HelpMe application. We implemented speech recognition features that will help users to use commands. If users speak and say one of the commands, then the speech recognition will answer the user’s query. The user must press the microphone and then a message will show that the speech recognition is listening as illustrated in figure 9. As we implemented a switch statement, when the user starts speaking, whatever the user says will be shown in the textbox. Users can use the application by typing the command as well as talking.



```
            t1.setLanguage(Locale.US);
        }
    }
});

findViewById(R.id.btn).setOnTouchListener(new View.OnTouchListener() {
    @SuppressLint("ClickableViewAccessibility")
    @Override
    public boolean onTouch(View v, MotionEvent motionEvent) {

        switch (motionEvent.getAction()) {

            case MotionEvent.ACTION_UP:
                mSpeechRecognizer.stopListening();
                editText.setHint("you will see input here");
                break;

            case MotionEvent.ACTION_DOWN:
                editText.setText("");
                editText.setHint("listening........");
                mSpeechRecognizer.startListening(mSpeechRecognizerIntent);
                break;
        }

        return false;
    }
});

button2.setOnClickListener(new View.OnClickListener() {
    @Override
    public void onClick(View v) {
```

(Figure 9)

These are some of the commands we implemented for the users to use. If the user performs one of the commands by using either text or speech, a message will show in the text box and the user will also hear the answer of the commands. From line 162 to 171, it shows that some commands will open some layouts we created, for example, if the user says, “open call,” the speech recognition will say opening call and the all layout will open automatically.

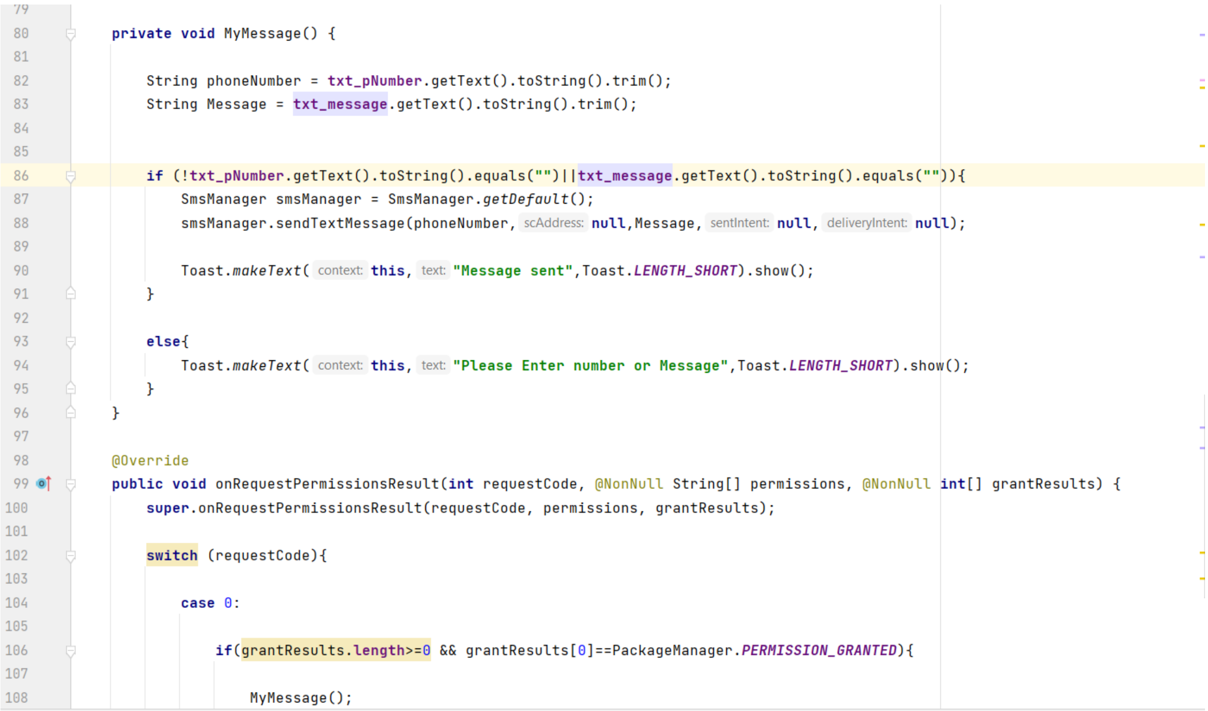


```
144  }
145  if(str.equals("tell me a joke")){
146      editText.setText("do you know what tomato said to her friend? catch up");
147      t1.speak( text: "do you know what tomato said to her friend? catch up", TextToSpeech.QUEUE_FLUSH, params: null, utteranceId: null);
148  }
149  if(str.equals("do you like Trump")){
150      editText.setText("i will never consider him as a role model");
151      t1.speak( text: "i will never consider him as a role model", TextToSpeech.QUEUE_FLUSH, params: null, utteranceId: null);
152  }
153  if(str.equals("what is the best country in the world")){
154      editText.setText("Kuwait");
155      t1.speak( text: "Kuwait", TextToSpeech.QUEUE_FLUSH, params: null, utteranceId: null);
156  }
157  if (str.equals("send message")|| str.equals("opening messages")){
158      t1.speak( text: "opening messages",TextToSpeech.QUEUE_FLUSH,  params: null, utteranceId: null);
159      Intent i = new Intent(getApplicationContext(), SendMessage.class);
160      startActivity(i);
161  }
162  if (str.equals("open call")|| str.equals("opening call")){
163      t1.speak( text: "opening call",TextToSpeech.QUEUE_FLUSH,  params: null, utteranceId: null);
164      Intent i = new Intent(getApplicationContext(), call.class);
165      startActivity(i);
166  }
167
168  if (str.equals("share location")|| str.equals("opening share location")){
169      t1.speak( text: "opening share location",TextToSpeech.QUEUE_FLUSH,  params: null, utteranceId: null);
170      Intent i = new Intent(getApplicationContext(),ShareLocation.class);
171      startActivity(i);
172  }
```

(Figure 10)

Send a message

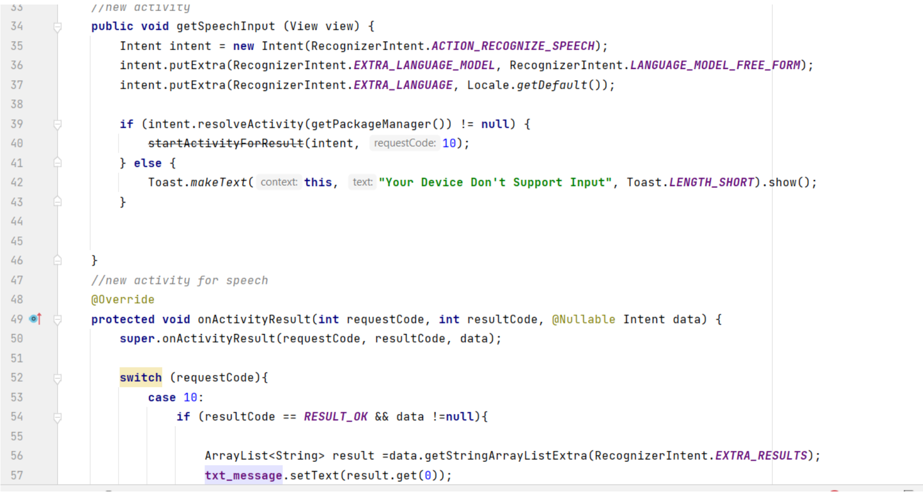
For our send message layout in the HelpMe application, we implemented two features that will allow users to send text messages easily. Firstly, we implemented a manual function where the user must type the phone number and the body of their text. The message will send after the user click send as shown in figure 11. If the user did not enter a message or phone number, a message will show requesting the user to input a message or number.



```java
    private void MyMessage() {

        String phoneNumber = txt_pNumber.getText().toString().trim();
        String Message = txt_message.getText().toString().trim();


        if (!txt_pNumber.getText().toString().equals("")||txt_message.getText().toString().equals("")){
            SmsManager smsManager = SmsManager.getDefault();
            smsManager.sendTextMessage(phoneNumber, scAddress: null,Message, sentIntent: null, deliveryIntent: null);

            Toast.makeText( context: this, text: "Message sent",Toast.LENGTH_SHORT).show();
        }

        else{
            Toast.makeText( context: this, text: "Please Enter number or Message",Toast.LENGTH_SHORT).show();
        }
    }

    @Override
    public void onRequestPermissionsResult(int requestCode, @NonNull String[] permissions, @NonNull int[] grantResults) {
        super.onRequestPermissionsResult(requestCode, permissions, grantResults);

        switch (requestCode){

            case 0:

                if(grantResults.length>=0 && grantResults[0]==PackageManager.PERMISSION_GRANTED){

                    MyMessage();
```

(Figure 11)

Secondly, we implemented the speech to text feature where the user can speak in the textbox and their message will be shown. If the user's device does not support the system, a message will be shown. The language has been set as a default so the user can speak in the language that the phone settings are in, so if the language of the phone is Arabic, the user can speak in Arabic.

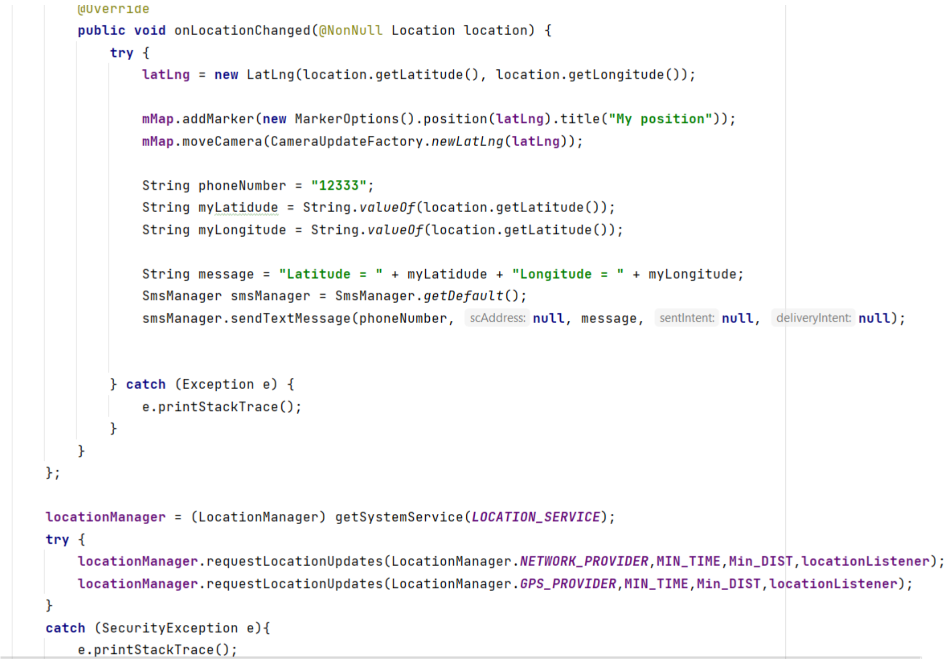


```java
    //new activity
    public void getSpeechInput (View view) {
        Intent intent = new Intent(RecognizerIntent.ACTION_RECOGNIZE_SPEECH);
        intent.putExtra(RecognizerIntent.EXTRA_LANGUAGE_MODEL, RecognizerIntent.LANGUAGE_MODEL_FREE_FORM);
        intent.putExtra(RecognizerIntent.EXTRA_LANGUAGE, Locale.getDefault());

        if (intent.resolveActivity(getPackageManager()) != null) {
            startActivityForResult(intent, requestCode: 10);
        } else {
            Toast.makeText( context: this, text: "Your Device Don't Support Input", Toast.LENGTH_SHORT).show();
        }


    }
    //new activity for speech
    @Override
    protected void onActivityResult(int requestCode, int resultCode, @Nullable Intent data) {
        super.onActivityResult(requestCode, resultCode, data);

        switch (requestCode){
            case 10:
                if (resultCode == RESULT_OK && data !=null){

                    ArrayList<String> result =data.getStringArrayListExtra(RecognizerIntent.EXTRA_RESULTS);
                    txt_message.setText(result.get(0));
```

(Figure 12)

Share location

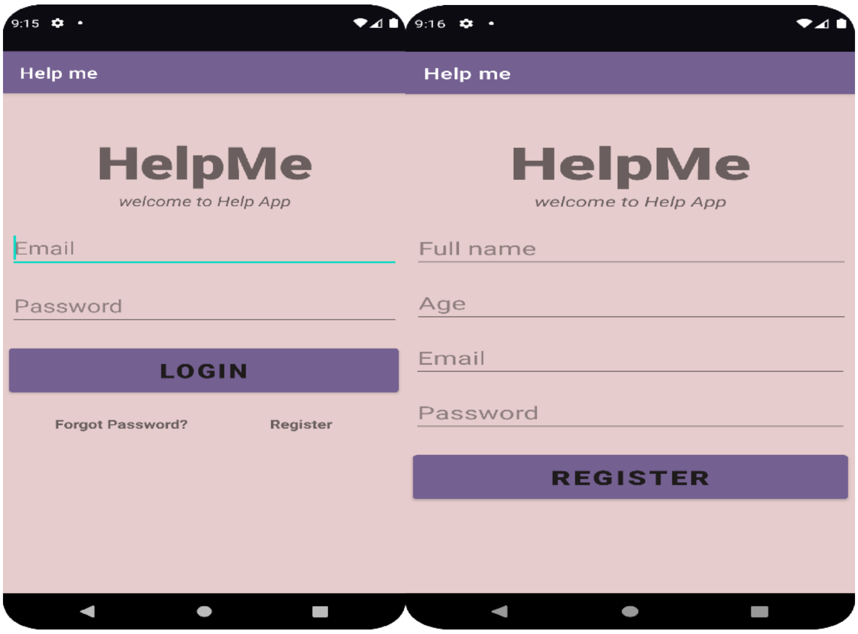
We implemented a layout for users to share their location via SMS. The user’s location will be shared when the user enters share location and clicks send. We used to google app to find our user’s location and then it will send it to the default number. It will send the numbers of latitude and longitude by SMS.



```
        @Override
        public void onLocationChanged(@NonNull Location location) {
            try {
                latLng = new LatLng(location.getLatitude(), location.getLongitude());

                mMap.addMarker(new MarkerOptions().position(latLng).title("My position"));
                mMap.moveCamera(CameraUpdateFactory.newLatLng(latLng));

                String phoneNumber = "12333";
                String myLatidude = String.valueOf(location.getLatitude());
                String myLongitude = String.valueOf(location.getLatitude());

                String message = "Latitude = " + myLatidude + "Longitude = " + myLongitude;
                SmsManager smsManager = SmsManager.getDefault();
                smsManager.sendTextMessage(phoneNumber,  scAddress: null, message,  sentIntent: null,  deliveryIntent: null);


            } catch (Exception e) {
                e.printStackTrace();
            }
        }
    };

    locationManager = (LocationManager) getSystemService(LOCATION_SERVICE);
    try {
        locationManager.requestLocationUpdates(LocationManager.NETWORK_PROVIDER,MIN_TIME,Min_DIST,locationListener);
        locationManager.requestLocationUpdates(LocationManager.GPS_PROVIDER,MIN_TIME,Min_DIST,locationListener);
    }
    catch (SecurityException e){
        e.printStackTrace();
```

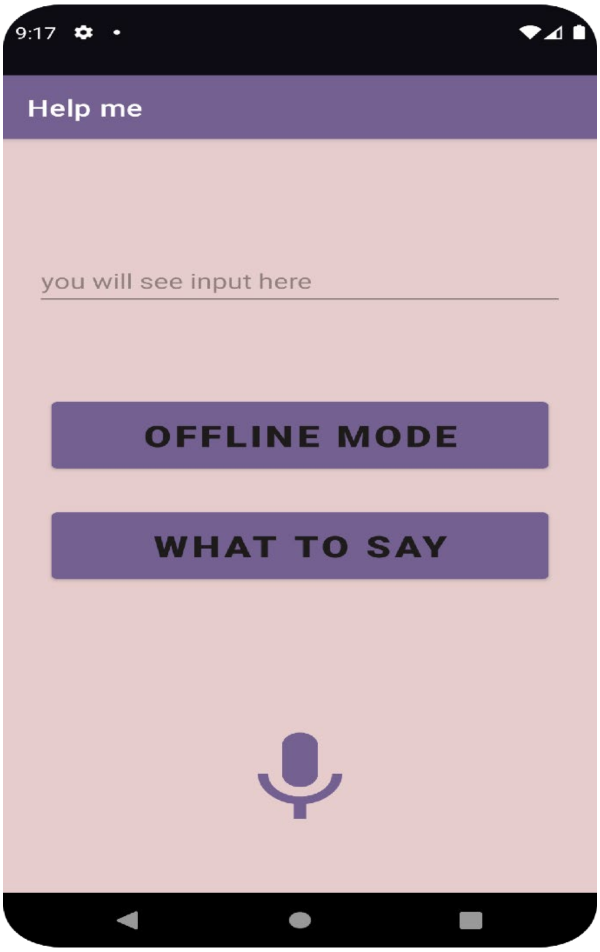
(Figure 13)

2.4. Graphical User Interface (GUI)



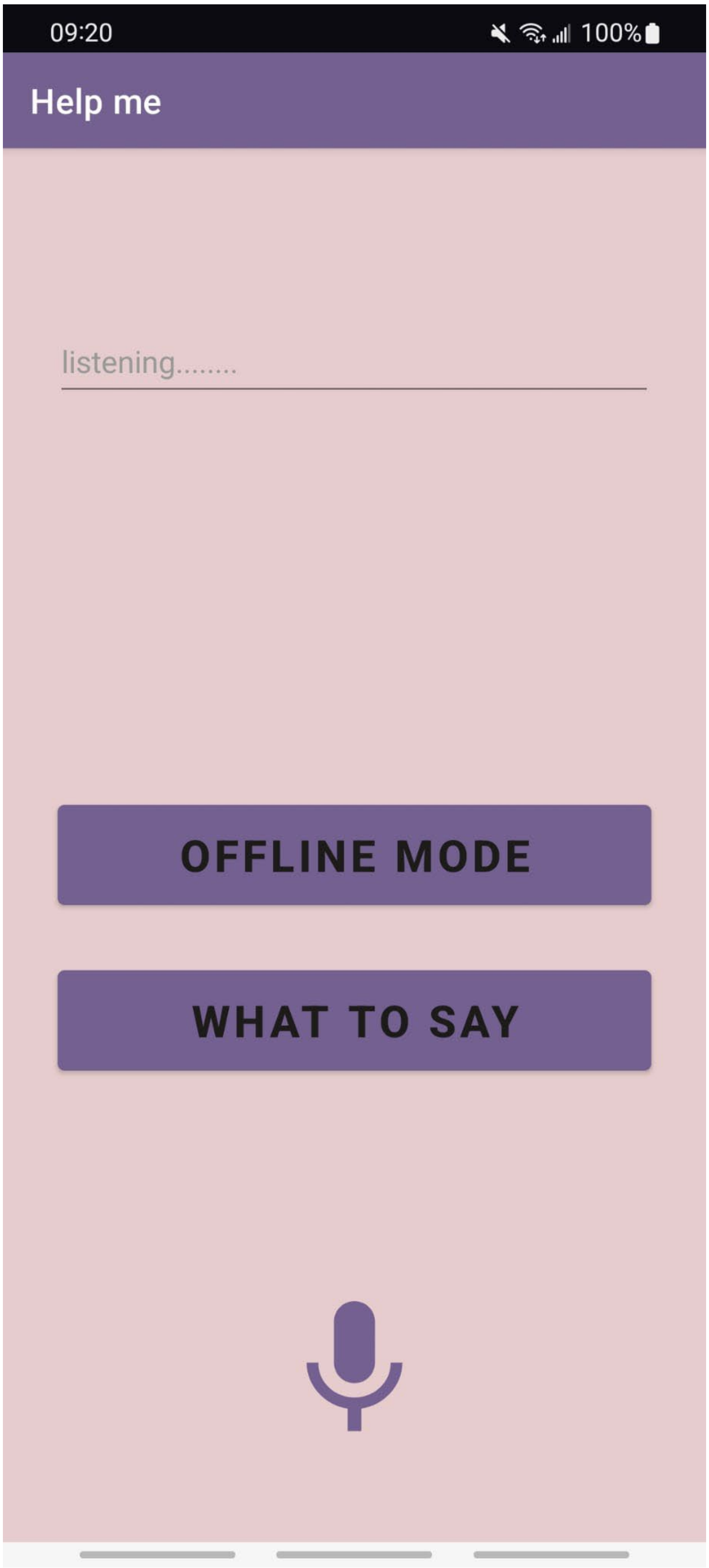
(figure14,15)

Firstly, the login screen is shown when the user opens the application. If the user is not logged in, they can click the register button. When the user clicks register, they will be directed to the registration page where they must register to use the application. When the user is registered, they will be redirected to the login page because users must verify their emails before they can log in.



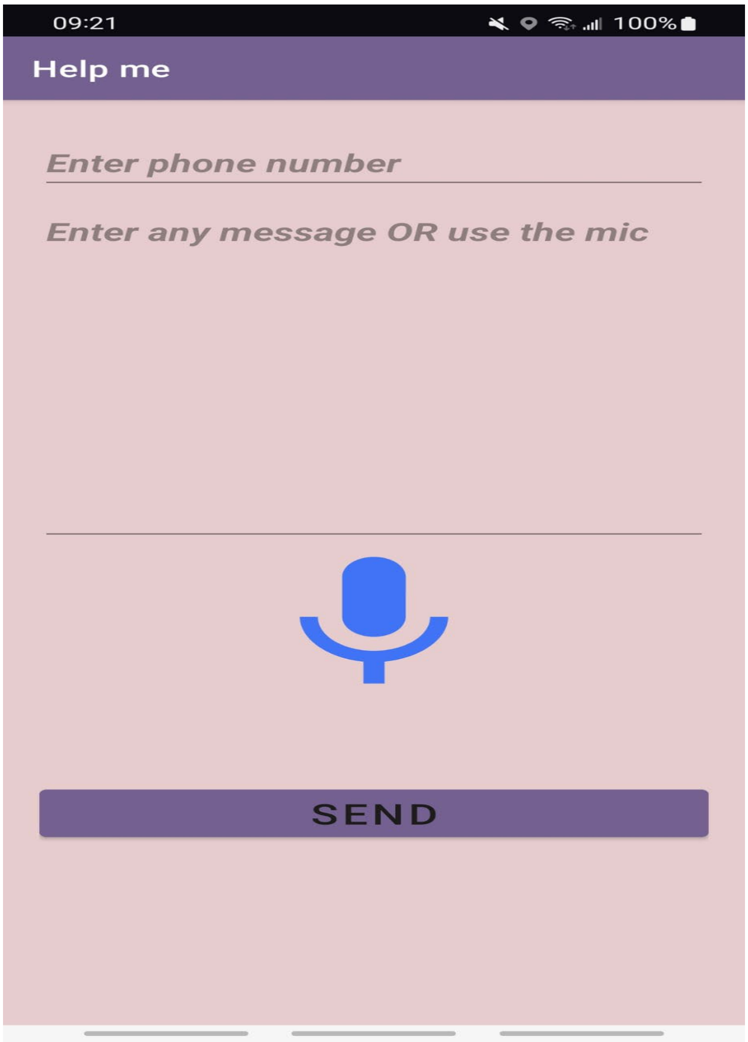
(Figure 16)

When users click login, they will be directed to the home screen as depicted above. In the home screen, users can utilise the speech recognition. There is also an offline mode if the user is offline, they can still perform a feature called send message that which will be shown in figure (18). Secondly, there is a button to teach the user what to say to the speech recognition “Jarvis” to perform all the app’s features.



(figure17)

If the user holds the microphone above, a message will show in the text box that Jarvis is listening to them and whatever the users say will be shown in the text box.

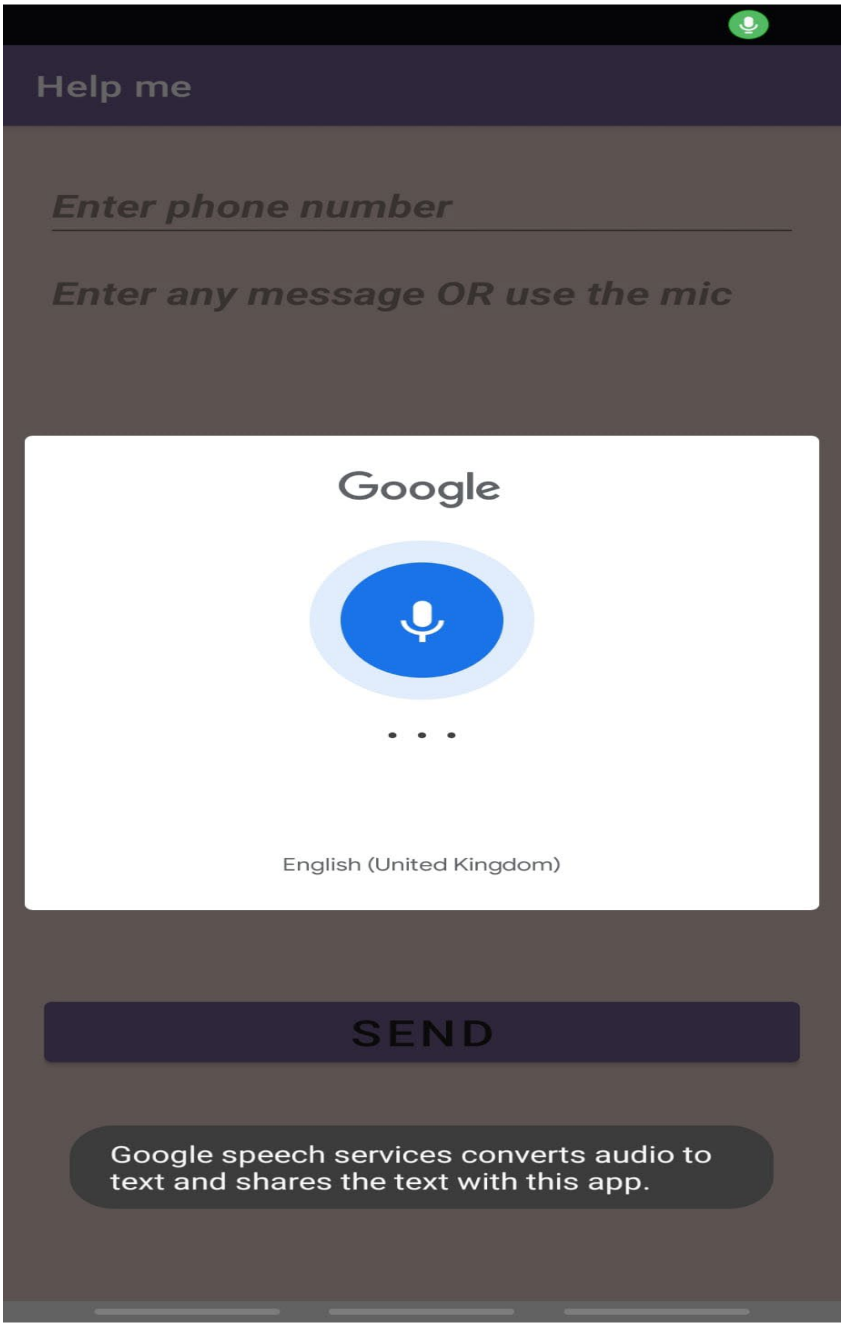


Enter phone number

Enter any message OR use the mic

(Figure 18)

This feature is sent message by SMS: if the user enters a phone number and writes a text message, it will send. We have also added speech to text feature that will function if a user holds the microphone and speaks, their message will show up in the textbox.



Help me

Enter phone number

Enter any message OR use the mic

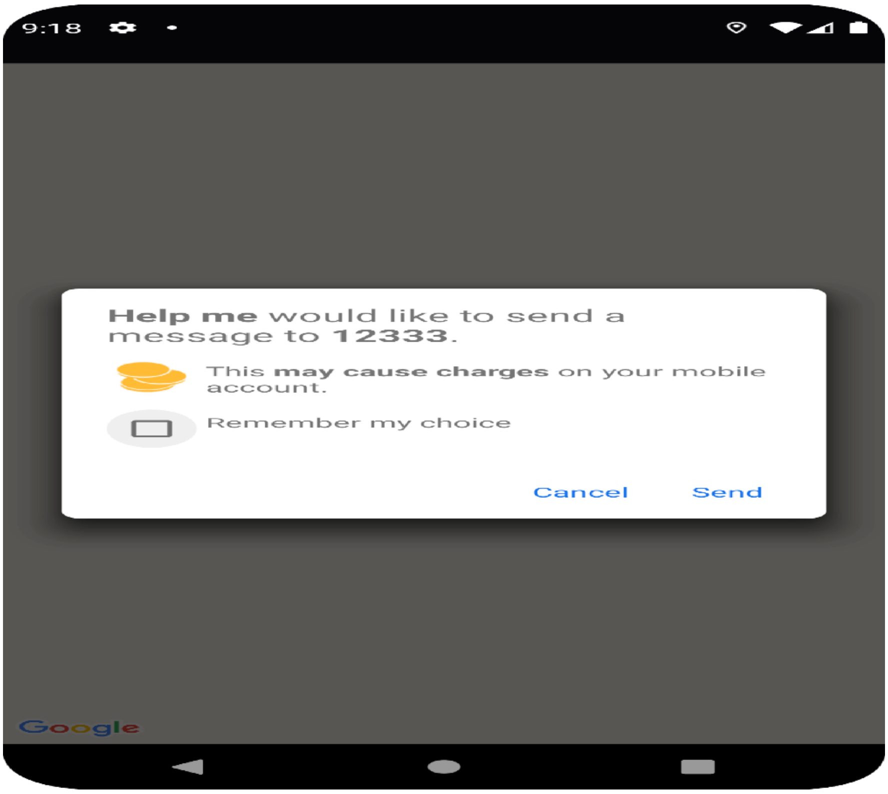
English (United Kingdom)

SEND

Google speech services converts audio to text and shares the text with this app.

(Figure 19)

As mentioned in figure 18, if the user holds the microphone, this box above will appear, and the speech will turn into text in the textbox.



9:18

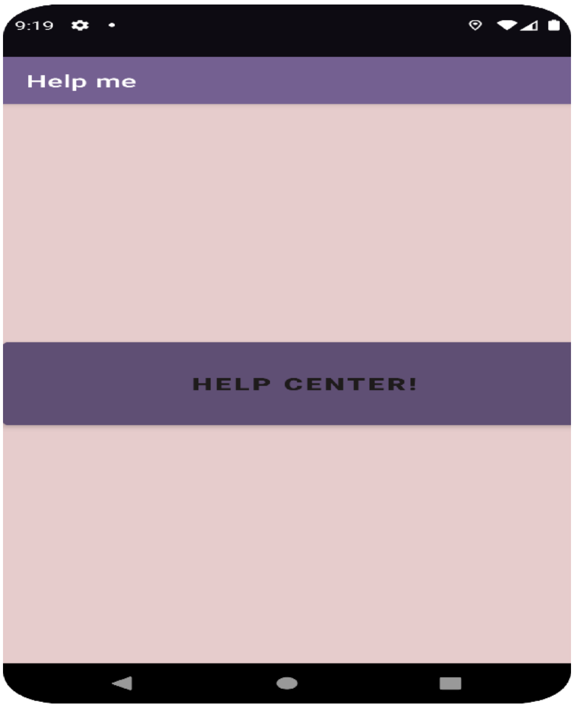
Help me would like to send a message to **12333**.

This **may cause charges** on your mobile account.

□ Remember my choice

Figure (20)

Share Location: When the user enters the share location screen, they will be able to send their location to another phone number via SMS as shown.

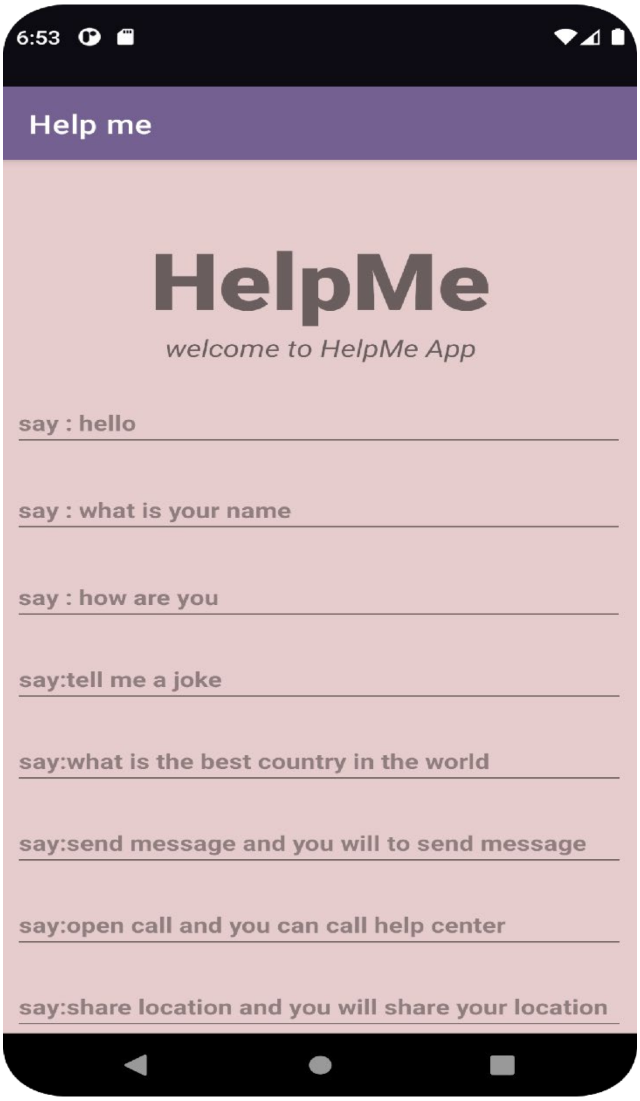


9:19

Help me

Figure (21)

Lastly, the help centre screen: if the user presses help centre, they can call a phone number that will speak to them if they need help.



6:53

Help me

HelpMe

welcome to HelpMe App

say : hello

say : what is your name

say : how are you

say:tell me a joke

say:what is the best country in the world

say:send message and you will to send message

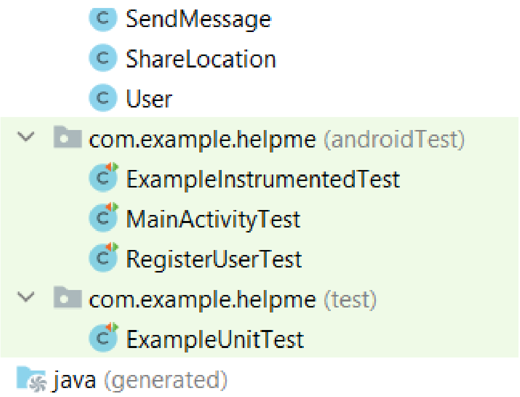
say:open call and you can call help center

say:share location and you will share your location

Figure (22)

Finally, a list of command that a user can say to the speech recognition in the home screen layout.

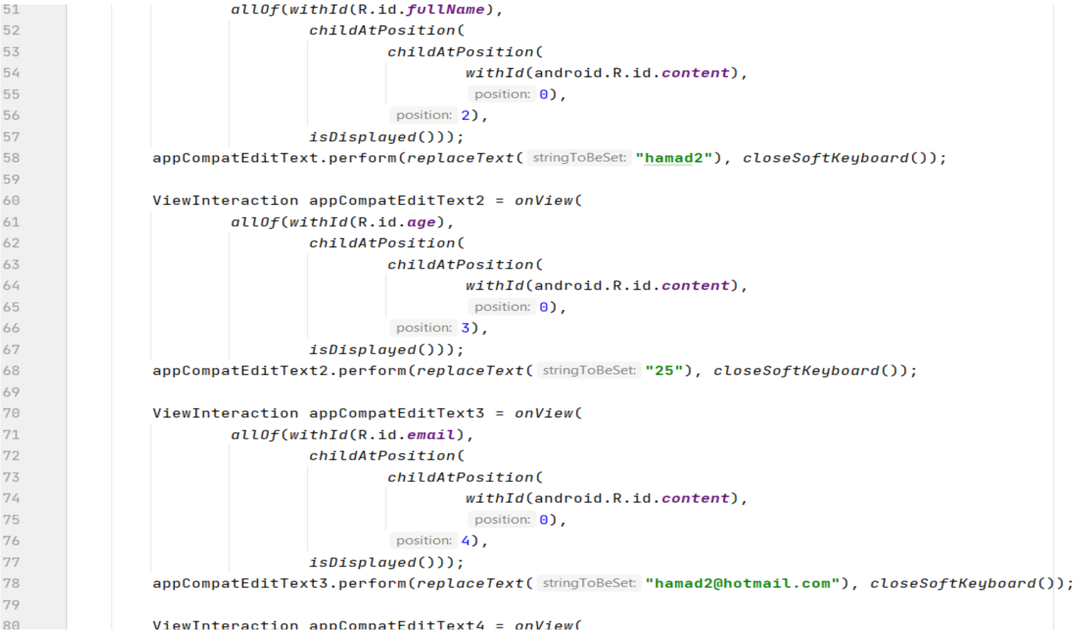
2.5. Testing

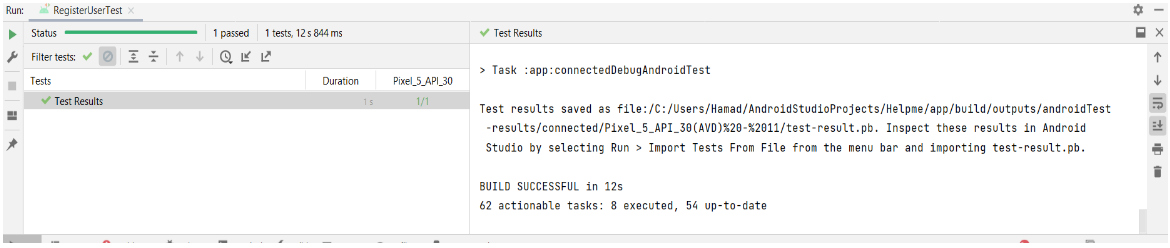

```
    SendMessage
    ShareLocation
    User
com.example.helpme (androidTest)
    ExampleInstrumentedTest
    MainActivityTest
    RegisterUserTest
com.example.helpme (test)
    ExampleUnitTest
java (generated)
```

This shows the test classes we created to test the HelpMe application. We will be using JUnit testing as well using espresso test to test the HelpMe application.

Registration

First, we tested our registration class to see if the user can register. As shown below, all the variables have been tested such as full name, age, and email with the user information.


```
                allOf(withId(R.id.fullName),
                        childAtPosition(
                                childAtPosition(
                                        withId(android.R.id.content),
                                         position: 0),
                                 position: 2),
                        isDisplayed()));
        appCompatEditText.perform(replaceText( stringToBeSet: "hamad2"), closeSoftKeyboard());

        ViewInteraction appCompatEditText2 = onView(
                allOf(withId(R.id.age),
                        childAtPosition(
                                childAtPosition(
                                        withId(android.R.id.content),
                                         position: 0),
                                 position: 3),
                        isDisplayed()));
        appCompatEditText2.perform(replaceText( stringToBeSet: "25"), closeSoftKeyboard());

        ViewInteraction appCompatEditText3 = onView(
                allOf(withId(R.id.email),
                        childAtPosition(
                                childAtPosition(
                                        withId(android.R.id.content),
                                         position: 0),
                                 position: 4),
                        isDisplayed()));
        appCompatEditText3.perform(replaceText( stringToBeSet: "hamad2@hotmail.com"), closeSoftKeyboard());

        ViewInteraction appCompatEditText4 = onView(
```



1 passed | 1 tests, 12 s 844 ms

Tests	Duration	Pixel_5_API_30
✓ Test Results	1 s	1/1

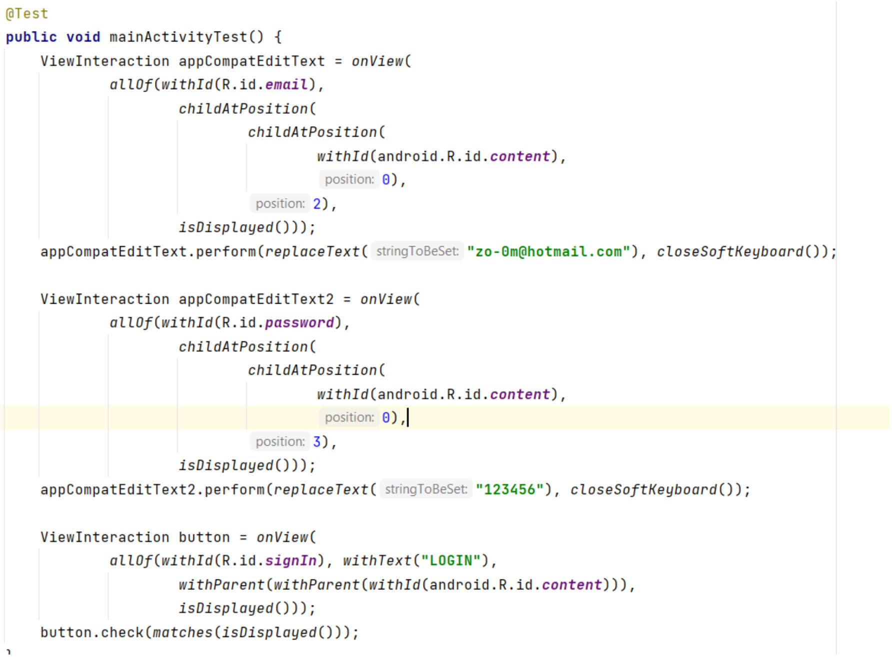
✓ Test Results

```
> Task :app:connectedDebugAndroidTest

Test results saved as file:/C:/Users/Hamad/AndroidStudioProjects/Helpme/app/build/outputs/androidTest
 -results/connected/Pixel_5_API_30(AVD)%20-%2011/test-result.pb. Inspect these results in Android
 Studio by selecting Run > Import Tests From File from the menu bar and importing test-result.pb.

BUILD SUCCESSFUL in 12s
62 actionable tasks: 8 executed, 54 up-to-date
```

The result of our registration is successful after we tested it.

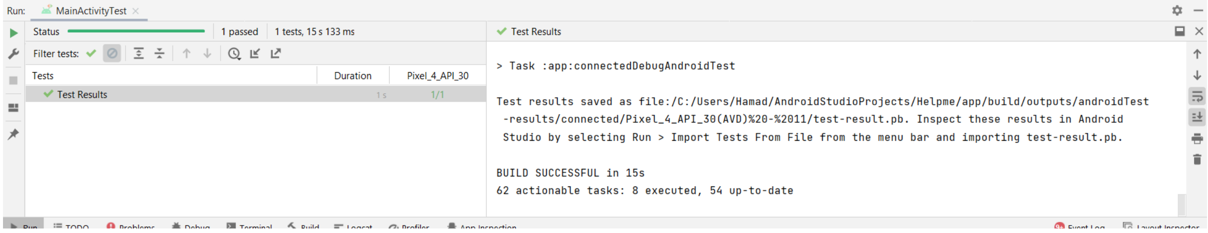
Login

Secondly, we tested our main activity, which is the login layout as shown below, we implemented our login process, and we tested our login button to determine if it is working.



```
@Test
public void mainActivityTest() {
    ViewInteraction appCompatEditText = onView(
            allOf(withId(R.id.email),
                    childAtPosition(
                            childAtPosition(
                                    withId(android.R.id.content),
                                    position: 0),
                            position: 2),
                    isDisplayed()));
    appCompatEditText.perform(replaceText( stringToBeSet: "zo-0m@hotmail.com"), closeSoftKeyboard());

    ViewInteraction appCompatEditText2 = onView(
            allOf(withId(R.id.password),
                    childAtPosition(
                            childAtPosition(
                                    withId(android.R.id.content),
                                    position: 0),
                            position: 3),
                    isDisplayed()));
    appCompatEditText2.perform(replaceText( stringToBeSet: "123456"), closeSoftKeyboard());

    ViewInteraction button = onView(
            allOf(withId(R.id.signIn), withText("LOGIN"),
                    withParent(withParent(withId(android.R.id.content))),
                    isDisplayed()));
    button.check(matches(isDisplayed()));
```

The test for our login button was successful as shown below.



```
> Task :app:connectedDebugAndroidTest

Test results saved as file:/C:/Users/Hamad/AndroidStudioProjects/Helpme/app/build/outputs/androidTest
 -results/connected/Pixel_4_API_30(AVD)%20-%2011/test-result.pb. Inspect these results in Android
 Studio by selecting Run > Import Tests From File from the menu bar and importing test-result.pb.

BUILD SUCCESSFUL in 15s
62 actionable tasks: 8 executed, 54 up-to-date
```

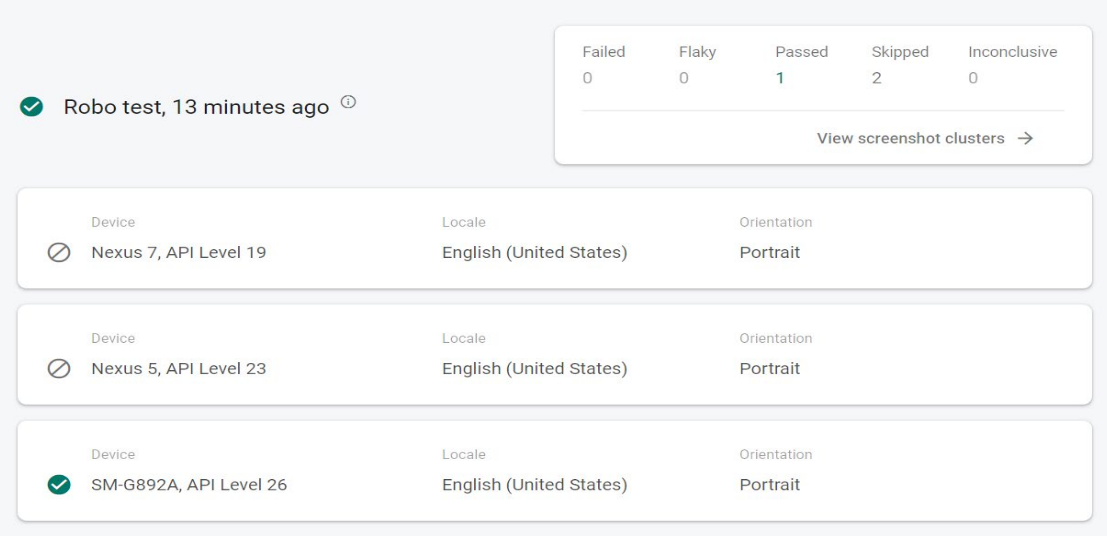
For our app's functions to comply with requirement functions, we created some use case to match with each other.

ID	Test case description	Expect	Result
Test case 1	Check if the microphone works when the user holds it.	The microphone is working and listening to the message shown in the textbox.	Pass

Test case 2	Check when the user clicks the call centre button if it will call help centre	The button is working, and it is calling help centre	Pass
Test case 3	Check if speech to text is working in send message class is working.	Speech to text feature is working and is shown on the screen	Pass

2.6. Evaluation

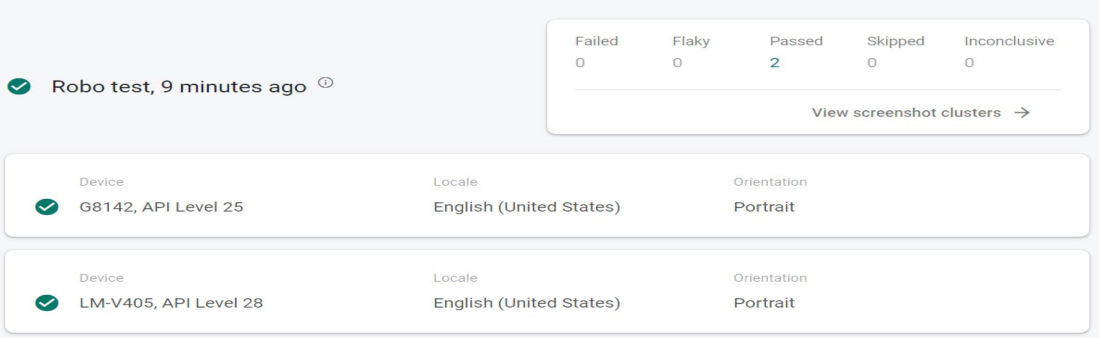
As part of the non-functional testing, we ran the HelpMe application to test the performance of the application. We used one of the firebase testing's which is Robo testing. Robo testing was the best choice for our application as it runs on multiple devices and uses multiple versions of android API. Robo testing allows us to analyse the performance as we can see on the graph, video, and accessibility of the application. We used 9 versions of android studio with different API levels to ensure that the HelpMe application works on multiple devices.



✓ Robo test, 13 minutes ago

Failed	Flaky	Passed	Skipped	Inconclusive
0	0	1	2	0

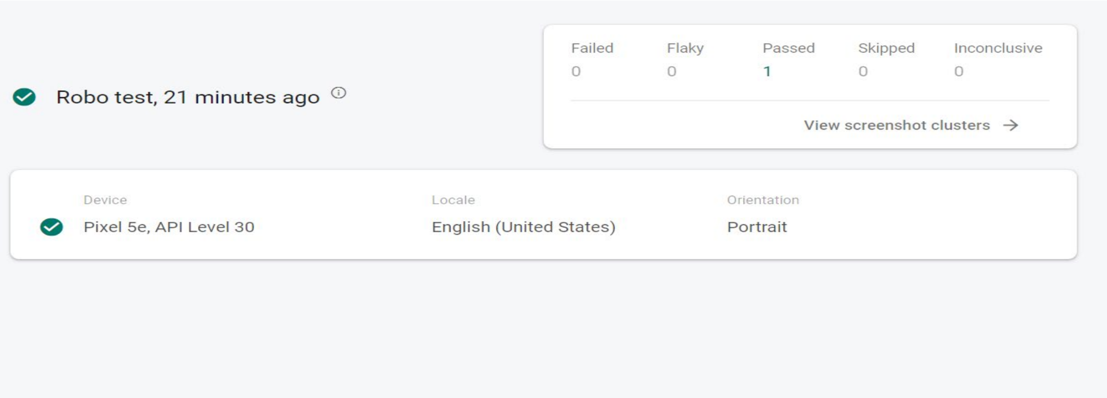
	Device	Locale	Orientation
⊘	Nexus 7, API Level 19	English (United States)	Portrait
⊘	Nexus 5, API Level 23	English (United States)	Portrait
✓	SM-G892A, API Level 26	English (United States)	Portrait



✓ Robo test, 9 minutes ago

Failed	Flaky	Passed	Skipped	Inconclusive
0	0	2	0	0

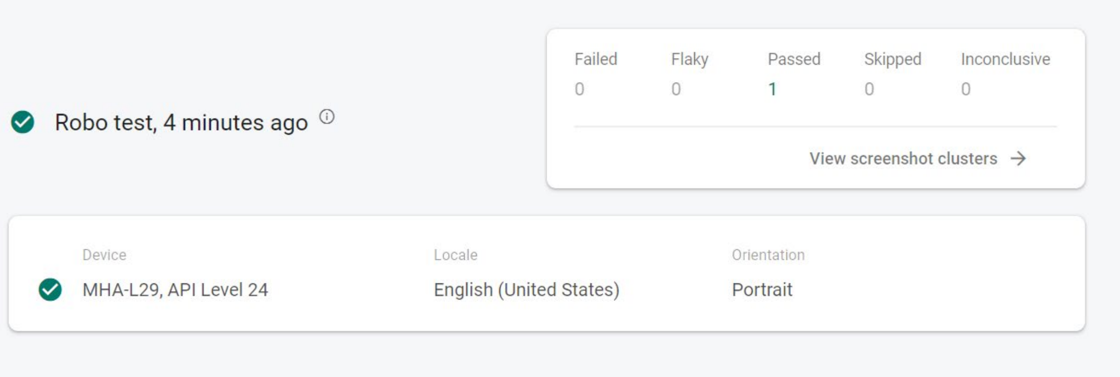
	Device	Locale	Orientation
✓	G8142, API Level 25	English (United States)	Portrait
✓	LM-V405, API Level 28	English (United States)	Portrait



✓ Robo test, 21 minutes ago ⓘ

Failed	Flaky	Passed	Skipped	Inconclusive
0	0	1	0	0

	Device	Locale	Orientation
✓	Pixel 5e, API Level 30	English (United States)	Portrait



✓ Robo test, 4 minutes ago ⓘ

Failed	Flaky	Passed	Skipped	Inconclusive
0	0	1	0	0

	Device	Locale	Orientation
✓	MHA-L29, API Level 24	English (United States)	Portrait

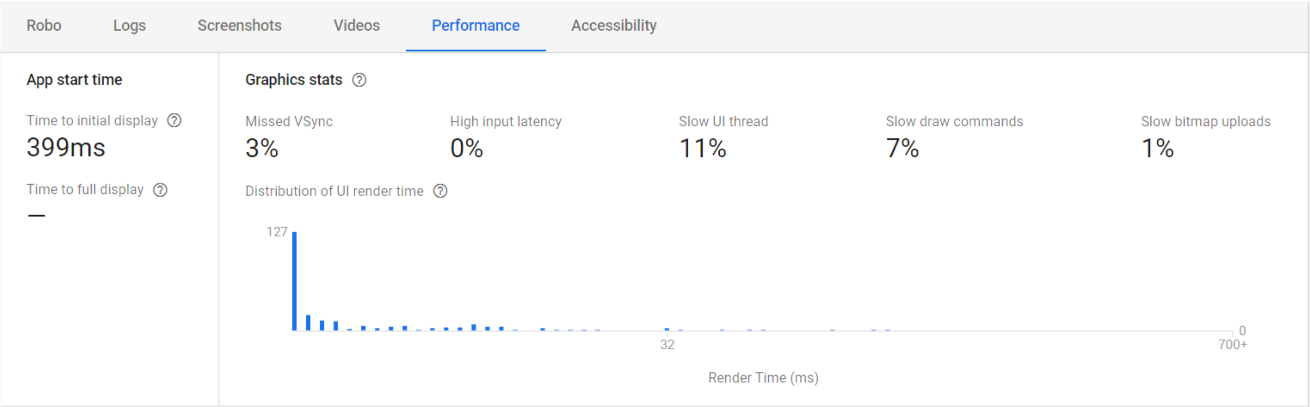
Result:

For the result part of the Robo test, we will discuss three parts of the testing: accessibility, performance, and usage of memory in HelpMe application.

Accessibility:

In terms of accessibility, we tested the HelpMe application as shown from the screenshots above on 10 devices and it worked. We did not have access to API levels 19 to 23; however, the application can be accessible from API level 23 to the latest version of android.

Performance:



App start time

Time to initial display
399ms

Time to full display
—

Graphics stats

Missed VSync
3%

High input latency
0%

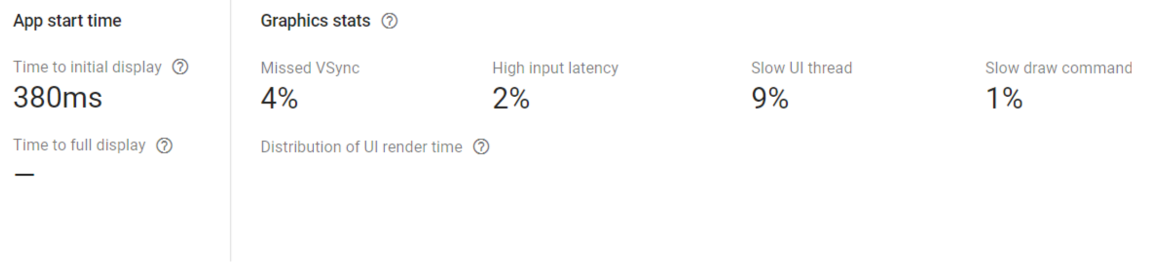
Slow UI thread
11%

Slow draw commands
7%

Slow bitmap uploads
1%

Distribution of UI render time

The screenshot above shows the performance at API level 24 which is the lowest version that the HelpMe application will work on. As is shown, the slow thread is 11% and the time to the initial display is 390ms which is less than half a second which shows the application has a quick display time.



App start time

Time to initial display
380ms

Time to full display
—

Graphics stats

Missed VSync
4%

High input latency
2%

Slow UI thread
9%

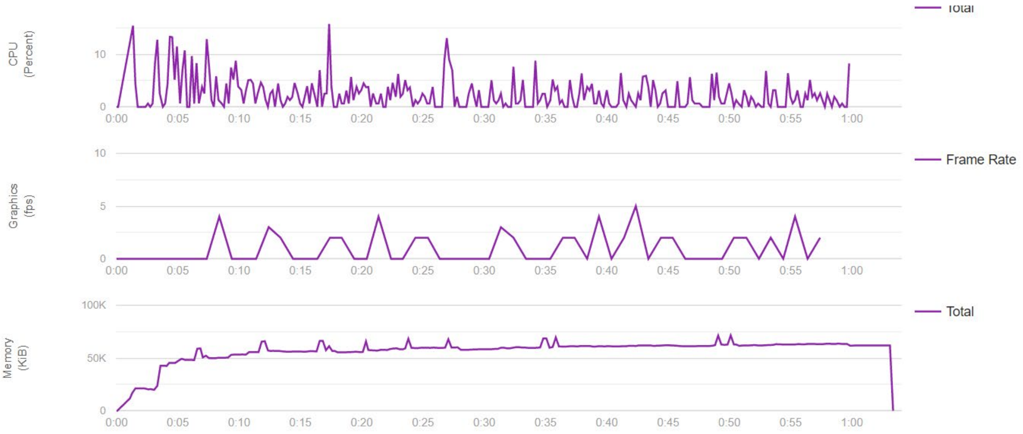
Slow draw command
1%

Distribution of UI render time

In the screenshot above, we tested the performance of API level 30 as shown above. The slow thread is slightly better in this API level when compared with the display time of API level 24.

Usage:

In this part, we will discuss the usage of memory, CPU, and network in the application in two different version of API level 24.



This shows that the CPU which is moving normally as expected. 15 was the highest CPU and average is 7. The memory usage is low as well - it only uses 50K KIB because the application only collects user registration data to use it for the user login purposes.

3.0 Conclusions

In summation, the project has been a long journey to work on. We have been working on this project from September 2021 to May 2022. This project has many advantages and disadvantages of the project that we will discuss further below.

Advantages

There are numerous advantages of the HelpMe application. Firstly, the application enables users to send a message to anyone without the need of internet connection because the HelpMe application will use the messages application to send messages. The application gives the user the ability to share their location with their friends in a fast and efficient manner because users will be asked if they would like to share their location when entering the share location page. Lastly, the speech recognition allows the user to say some commands and the speaker recognition will answer and the user will also be able to open the activities of the application by speech.

Disadvantages

There are many disadvantages in the application we will discuss. One of these disadvantages is the limitation in sign in methods because we only created a sign in for the application with email. Secondly, the HelpMe application only works on android devices that have more than 23 API levels which does not give the opportunity to people who have an API level lower than 23. Thirdly, the application does not always work properly as it will be slow to show the message to the user when they log in.

4.0 Further Development or Research

There are many developments that can be done for this project. Firstly, for the login and registration page, we will add a Gmail sign in method as we only have one sign in method which is email. Secondly, in the speech recognition screen we will add more commands to the application but most importantly we will give users the ability to to speak to Jarvis the speech recognition from anywhere in the application and open an activity. Thirdly, for the location layout, we will add a feature for the user to enter a more than one person’s phone number to up to five phone numbers at the same time. This will allow users to share their location with more people more efficiently.

5.0 Reference

6.0 Firebase (2019). *Firebase Realtime Database | Firebase Realtime Database | Firebase*. [online] Firebase. Available at: https://firebase.google.com/docs/database.

7.0 Software Testing Help. (2022). JUnit Tests: How To Write JUnit Test Case With Examples. [online] Available at: https://www.softwaretestinghelp.com/junit-tests-examples/ [Accessed 9 May 2022].

8.0 Pow, K. (2021). *What Is the Purpose of a Data Flow Diagram? | Techwalla.com*. [online] Techwalla. Available at: https://www.techwalla.com/articles/what-is-the-purpose-of-a-data-flow-diagram [Accessed Apr. 2022].

8.1. appendix

National College of Ireland

Business information system

Academic Year 2021/2022

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HelpMe App

Project proposal

Contents

Contents

Objectives

The main goal of this project is to help people send messages and share location when people feel unsafe. The app will send messages and location via SMS to contact individuals that do not have other application as the HelpMe application will send messages from the application to SMS which make it easier for people as both users do not need to have the app to contact each other.

9.0 Background

The idea of this application was inspired by George Floyd who was killed by a police officer As George Floyd’s murder was filmed, everyone knows his story and believed that it happened. The main reason of creating this application is to help people to send messages as it got me wondering how many people were killed or assaulted without having the ability to notify their family and friends. I believe this application will help to tackle the issue of violence.

10.0 State of the Art

There are some similar applications that already exist such as Glympse and life360. Glimpse and life360 have almost the same idea where the user can share their location to other users such as family members to track their location when they feel unsafe. These applications have 27 million active users and are extremely popular which indicates that competition will be tough. There are many different application features on offers such as record a video and the receiver does not need to have the application to watch the video that has been recorded. The first difference is that our application will record a video for 8 minutes and send it automatically to your family member. The second difference is that our application will provide the receiver with the video even if the recipient does not have the app installed as the video will be sent to black box where only family members can view it using cryptography technology.

11.0 Technical Approach

There are some requirements that need to be developed to build a project that meets stakeholders' goals and to implement the project in the perfect way

1- The user must have an android device because we will build the project using android studio
2- The user must register to use the application
3- The user must agree to allow permissions for the application as the application will require the user's permission for features such as microphone, location, and SMS.
4- The system must be able to register the user into the database when the user verifies his email address.
5- The system must be able to send location by itself when the user clicks send.
6- The system must run smoothly when the user is using the application

12.0 Technical Details

There are many technologies we are planning to use for this project such as android studio and JavaScript.

Android studio

It will be the main platform we will use to develop the application.

Java

We will Java language to develop the application as we will use java in android studio to develop the application and to develop our website.

Firebase

Firebase will be used as our database. It will be used to store user information such as their login details.

Html

We will use HTML to develop our website for the project

CSS

It will be used to design the colours of the website.

GitHub

It will be used to store the project files and backup any files lost during the process of making the website.

Dropbox

It will be used as backup to store files especially the documents that will be created or used during the process of the project.

Lucid Chart

It will be used to create all the diagrams we need to build the project.

13.0 Special Resources Required

For this project, there is one special requirement which is speech recognition which will be implemented to answer user's queries and open the application activities. This project will require users to allow permission to use their location. The requirement will be achieved when the receiver such as a family member or a friend receive the location.

14.0 Project Plan

I divided the project plan into 3 phases to make it easier for me to organize the project plan.

Phase 1

Step one: project proposal

Timeline: 2/11/2021 - 7/11/2021

Description: write the project proposal and how the plan of the project will be

Step two: discussed with supervisor

Timeline: 7/11/2021 - 11/11/2021

Description: discuss the project with the supervisor of the student

Phase 2

Step three: start building the website

Timeline: 12/11/2021 -16/11/2021

Description: start working on the basics of the website such as layout page

Step four: finish building the website

Timeline: 17/11/2021 - 23/11/2021

Description: finish the website by having four pages such as main page and review page.

Step five: start build the application

Timeline: 24/11/2021 - 12/12/2021

Description: in this stage, we will start building the login page

Step six: Midpoint presentation

Phase 3

Timeline: 20/12/2021 - 21/12/2021

Description: in this step, we will represent what we have done so far such as the website and the login page

Step six: finish building the application

Timeline:22/12/2021- 1/03/2022

Description: in this step, we will finish the application by having all part done

Step seven: Final Implementation & Documentation

Timeline:2/3 /2022- 15/05/2022

Description: in this step we will prepare everything we have done to be ready of the showcase project.

Step eight: video presentation

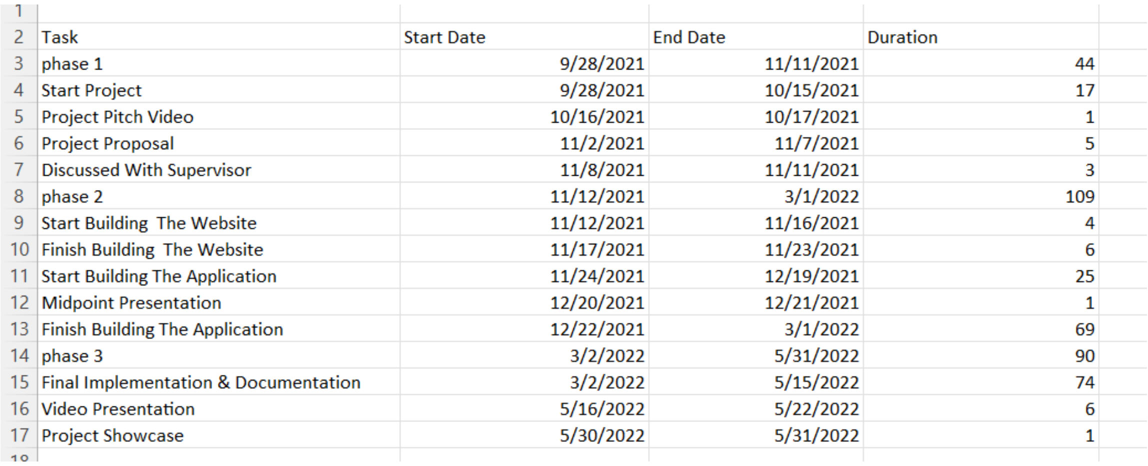
Timeline: 16/05/2022 – 22/5/2022

Final step: project showcase

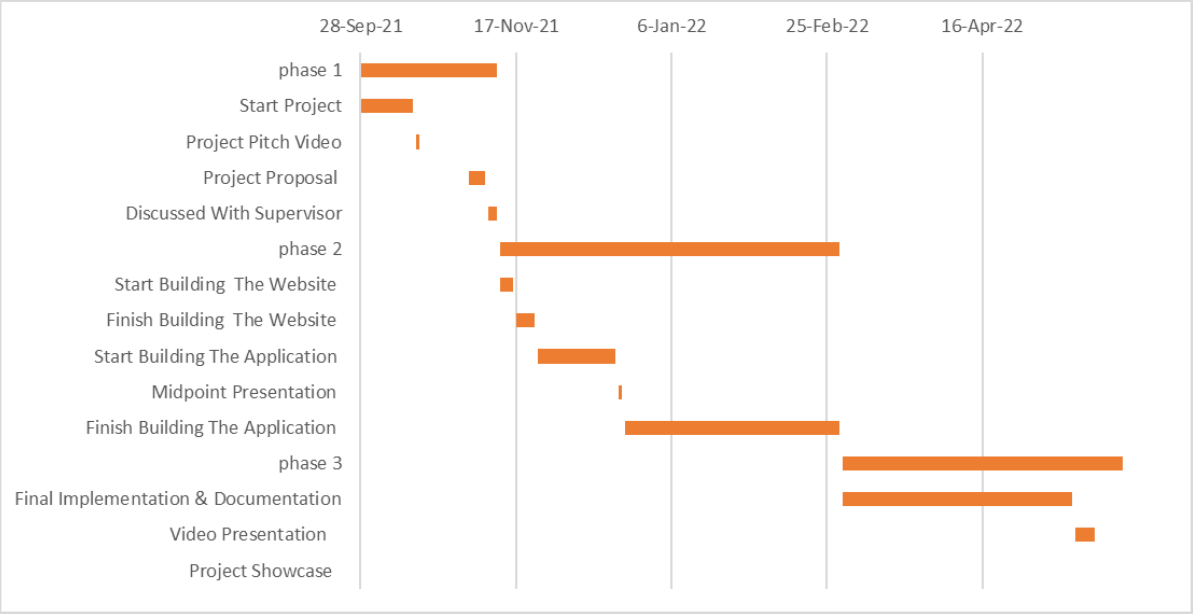
Timeline: 30/05/2022 - 31/05/2022

Description: we will represent everything we have done such as the full application and the website and how our business will work

Here is a better explanation on how the project plan will go according to the plan I have set.



1				
2	Task	Start Date	End Date	Duration
3	phase 1	9/28/2021	11/11/2021	44
4	Start Project	9/28/2021	10/15/2021	17
5	Project Pitch Video	10/16/2021	10/17/2021	1
6	Project Proposal	11/2/2021	11/7/2021	5
7	Discussed With Supervisor	11/8/2021	11/11/2021	3
8	phase 2	11/12/2021	3/1/2022	109
9	Start Building The Website	11/12/2021	11/16/2021	4
10	Finish Building The Website	11/17/2021	11/23/2021	6
11	Start Building The Application	11/24/2021	12/19/2021	25
12	Midpoint Presentation	12/20/2021	12/21/2021	1
13	Finish Building The Application	12/22/2021	3/1/2022	69
14	phase 3	3/2/2022	5/31/2022	90
15	Final Implementation & Documentation	3/2/2022	5/15/2022	74
16	Video Presentation	5/16/2022	5/22/2022	6
17	Project Showcase	5/30/2022	5/31/2022	1



14.1. Reflective Journal

October

In October, I have not done much work. I just sent the project pitch video as I am still waiting for approval to start working on the idea. In early October, I had an idea for two years that I was thinking to do for my final year project about food application but this month, my brother told me an idea about helping people by taking videos or recording a voicemail to help them from violent attack. I chose my brother's idea because of what happened with George Floyd. As he was filmed, everyone knew his story, but it made me wonder how many people got killed without anyone knowing their real story. Therefore, I decided to proceed with this idea. In the middle of October, I sent the project pitch video with the hope of getting approval. Finally, at the end of October, I started to look at what technology I will be using such as android studio to build the application. To summarize my journey in October, I was very interested as this is the most important month as it was the month, I had to choose which project to pursue.

November

In the month of November, I discovered many things about the project by meeting with my supervisor and getting new ideas to develop. In early November, I got the approval of my idea which meant I could start working on the project. After I got the approval, I wrote the project proposal where I discovered many things about the project such as the project plan and the technology I will be using in the project. By writing the project plan, I set up the plan about the project – determining when it would start and when it would end. The project plan was very helpful in completing the project. Secondly, in the project proposal, I discovered all the technology that will be used to complete the project such as android studio which will be used to build the application. In the end of November, I met with my supervisor where he was very helpful as he described everything about the project and gave me his opinion about the idea. The supervisor also explained what I need to do to get the highest possible grade. To sum up November, I noticed many things that I was not aware of it in terms of the project plan.

December

In this month, I have implemented the application, and I have done the technical report of the project. This month has been a journey as I worked a lot on this project in comparison to October and November. In this month, I have done a lot of preparation and research to be ready for the midpoint presentation. To sum up the month of December, I faced many challenges and difficulties during the implementation of the project, but it has been a lot of fun because I am learning something new every day.

January

Not a lot has been done since the midpoint presentation at the start of the month but at the end of the month, I started to complete the project. At the end of the month, I worked on linking the project and uploading it to some platform as I uploaded the project to GitHub and drobox as this will protect the project if I ever lose the project on my computer. Secondly, I was looking at different designs of android studio applications because I will change the aspects of the application's design such as the color and the background as I discovered that colors make a difference in the way users look at your application and users will prefer to use applications that have a good design and more appealing colors.

February

For this month, I have been practicing on finding the best tool to test the applications as there are many websites that can test the application. Page speed can test my android application but because I am using firebase for my database, I will continue to use firebase to test the application. As firebase provides Robo test which shows the performance and can also test the application on more than one device with different API levels which will help me to discover which versions of android applications the app will operate most effectively on.

March

What I have done

There were some bugs in the login page such as the layout of the page and therefore, I made a better layout that fits the login page. Secondly, I will add a voice recognition to help the user use the app by using their voice to use the app features. The user will be able to use his voice to send messages to their friends and family. This feature will help the user to send messages quicker. Thirdly, I had a problem with a google firebase as there was a time limit to use the database and I had to fix these feature as only premium users can use the data for as long as they want.

What I will do in April

I will continue working on the voice recognition feature as this is the most important feature in the application. Secondly, I will finish the registration and the login pages.

April

For the month of April, I created the application fully. I created 10 java classes and 8 layouts for my android studio as each of the layout working as expected. For this month I was planning to create 12 java classes and 10 layouts as I was hoping to create more activity for the application as one of them will allow the user to speak and give commands from outside the application, but I had problem as I could not verify my google console account as I got refused two times due to many reasons out of my control.