

# Android Based Instant Messaging Application Using Firebase

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**Abstract:** Communication through internet is becoming vital these days. An online communication allows the users to communicate with other people in a fast and convenient way. Considering this, the online communication application must be able to share the texts or images or any other files in a faster way with minimum delay or with no delay. Firebase is one of the platforms which provides a real-time database and cloud services which allows the developer to make these applications with ease. Instant messaging can be considered as a platform to maintain communication. Android provides a better platform to develop various applications for instant messaging compared to other platforms such as iOS. The main objective of this paper is to present a software application for the launching of a real-time communication between operators/users. The system developed on android will enable the users to communicate with another user through text messages with the help of internet. The system requires both the device to be connected via internet. This application is based on Android with the backend provided by Google Firebase.

**Keywords:** communication; firebase; android; Instant messaging; real-time databases; group messaging.

## I. INTRODUCTION

In the real world, communication plays a very vital role. People have been communicating with each other through various applications or mediums. In the beginning, people communicated with each other using letters or other sources, as these mediums could take much time to deliver the content. Cell phones are another medium of communication, but the drawback is for any limited or small message which needs to be passed to another user, then a phone call is not an ideal way. Developers then looked to implement a text-based communication which would allow an instant communication service. In 1984, the concept of SMS was developed in the Franco-German GSM cooperation by Friedhelm Hillebrand and Bernard Ghillebaert. The limitation of SMS was the limited size, i.e., 128 bytes [1] [2], after the rise of smartphones from a decade, many messaging applications have been developed. Some are Bluetooth-based and some are internet-based such as WhatsApp [3], WeChat [4] and others.

Android is an operating system for mobiles which was developed by Google. This operating system allows the applications to be used on mobiles. As it was developed by Google, Android users can develop mobile applications and can be sold through Android application stores such as Play Store.

Firebase is a NoSQL database which makes use of sockets which allows the users to store and retrieve the data from the database [5]. An Android version should be greater than 2.3, Android Studio 1.5 or higher version, and Android Studio

project are the prerequisites to connect the Firebase to an Android application. Firebase provides a various kind of services such as:

**Authentication [6]:** Firebase Authentication is useful to both developers and the users. Developing and maintaining sign-in set-up may be a bit difficult and time-taking. Firebase provides an easy API [6] for sign-in. It also provides the data backup using real-time databases.

**Cloud Storage [7]:** For storing the data such as video, text, pictures, building the infrastructure would be difficult and expensive for a new developer, so the Firebase provides the platform of cloud storage [7].

**Real-time Database:** It is a cloud-hosted NoSQL database. Apart from the authentication, cloud service, and real-time databases, Firebase also provides a service for crash reporting.

**Crash Reporting:** When some unexpected crashes occur in any applications, it may be difficult to conclude why the application crashed. Firebase provides crash reporting service to deal with these crashes.

This paper is concerned with a software application for the establishment of a real-time communication service between operators/users. Chat application, many-to-many type of communication system where the users will be able to exchange the messages among themselves [8]. User can create the chatroom according to the requirement or can also join to the existing chatroom.

### 1.1 Related Work

Most of the internet public messaging, image or file sharing applications are using logic through which the content that has shared publicly will be collected under one reference or name. Instagram or Facebook, which has an instant image or video sharing feature, uses this kind of mechanism.

The algorithm for this logic is to check whether the text posted by the user contains a special character hash symbol (number sign or pound sign) at the beginning of it. The hash symbol is considered as a key and checks whether the name is already existing or not. If yes, then the content posted by the user is shared and shows up to other users when relevant search requests originate. If the name is new, then the room is created in the database and the remaining mechanism is same as mentioned.

## II. GOALS

The basic goal is to create a system which can create chatroom according to the users and store the related data at a single place.

To implement the real-time



chatting application which can allow the user to make instant group messages. Implementing google firebase cloud and real time databases to store the data.

### III. PROPOSED WORK

It is an internet based instant messaging application which provides the user to communicate with other users in a fast and convenient way [9]. Both the devices must have an active internet connection for the communication. There are many other chat applications like WeChat, hike, WhatsApp, Telegram, Facebook messenger, Snap Chat, Line etc but in this system the pdf creation and pdf reading feature will be included [10]. As a part of day to day life, academic or professional life users need to send and receive files. By using this system, the user need not have any other pdf reader-writer application on the device. Using this application user can communicate with any user all over the world. In this application we are using Google firebase as the backend to store the data of the application such as messages, pictures, files and more. User has to register or sign-in through their respective mail id and can use the services. When the user sign-in to the application, user can search for another user where the communication is need to be done. The user can be able to delete the chat after the communication. User can create their profile according to which other users will be able to identify each other. This application is designed of android mobile phone users. User can respond to the messages received by just typing the reply message and press the send button [11]. This application also provides the user to delete the account. User can also sign-out from the present device and can sign-in through another.

#### 3.1 Algorithms used

There are certain algorithms which are been used to develop the application, which includes

**Authentication:** Most of the application requires the identity of the user which will help making the data of the user safer and more secured in a cloud. Firebase provides backend, SDK and ready to use libraries which help the developer to provide authentications effortlessly.

```

declare and initialize sign_in variable of type private integer to 1
function onActivityResult
    if request code equals to sign_in then
        display signin successful
        display chat messages
    else
        display signin unsuccessful
    end task
    
```

**Fig. Algorithm1**

The algorithm lets the user to login into the application with a valid email id. The algorithm first initializes the variable sign\_in to 1. That means true. The user then enters the email id which is stored in another variable internally in the database. The email id is then verified and the result is stored in a variable request\_code. If the value of the request\_code matches with the value of the variable if both the values are same then it is considered as the email is valid and the user sing in to the application. If the values do not match then the

signin will not be done and the task ends. Send and receive messages: After a successful signin the user can now able to send and receive the messages.

```

create function onclick
    initialize variable of type EditText to input id
    FirebaseDatabase.getInstance().getReference().push().setValue
    (new classname(input.getText().toString(),
    FirebaseAuth.getInstance().getCurrentUser().getEmail()));
    set the input to null
    if(current username from database instance is not equal to null then
        display welcome and username
        call function display
    end function
    
```

**Fig. Algorithm2**

The function onclick is a function defined and the variable of type EditText is declared and initialized to the id of input text which is retrieved from the layout xml file. Email id and username of the sender is received from the firebase database instance along with the text which need to be sent. These two are converted to string and stored in the database reference of the database root node. When this process is done then the input is set to null and the user is allowed to send another message. Secondly, for the existing users if the current user name from the firebase database is not equal to null then the user will get a welcome screen with the previous messages and new messages by calling the message display function.

```

create function display
    initialize variable list of type ListView to list id
    declare TextView variables text and user
    initialize text to text id
    initialize user to user id
    set text to model.gettext
    set user to model.getuser|
    display list of messages
    end function
    
```

**Fig. Algorithm3**

A variable of type ListView is initialized to list id. Text and user variables of type TextView are initialized to text and user id that means the sender text and name are stored in these variables. By using predefined function 'model.get' the data is stored into the variables and displayed at the time of the function call.

**Chat room:** when the user wants to get the information about any topic then the user can search for the room by giving the keyword. If user finds any relevant chat room then the user can directly join the room. If there is no chat room with that name existing then user can create the chat room and refer it to another users. After the users are joined in the chat room, users can decide whether the messages which they send will be displayed along with the sender name or not. If the user wants to be visible to other users then the messages are displayed along with the username. If the user does not want the actual name to be visible then a unique id is generated as a username for that particular chat room and the messages are displayed with the generated name. The chatroom can be deleted by the user who created them. The following flow chat explains the chat room work flow.

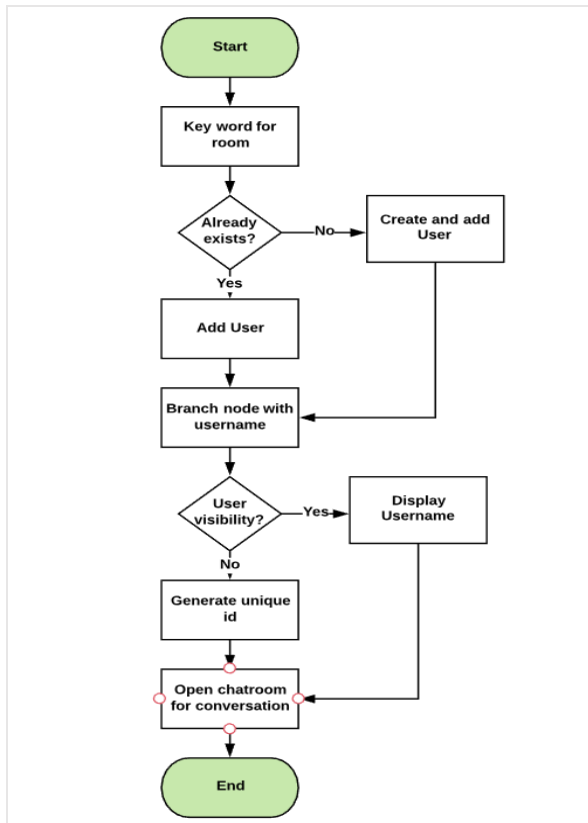


Fig. chat room work flow chart

#### IV. FEEDBACK SURVEY

Many chatting applications are emerging these days and are being used by people very effectively. In order to develop the application, the customer feedback about what is needed and what is existing in the current applications available.

This survey was based on the features of the existing applications like WhatsApp, Snap Chat, Hike, Telegram, Facebook Messenger.

The following are some questions which were asked among a group of 50 people of different age groups:

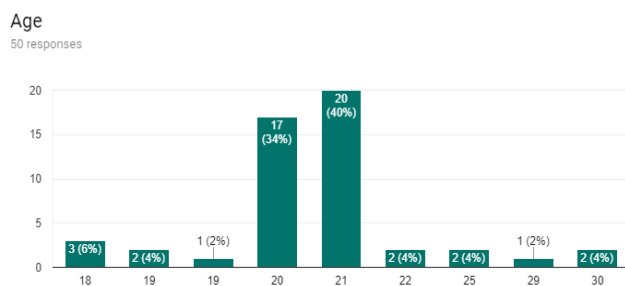


Figure 1: Ages of the participants in the survey

##### 1. Most liked features from the following:

- Unnamed messaging (receivers don't know who the sender is)
  - Disappearing messages (self-delete after viewing for a given/mentioned time)
  - VoLTE (Voice over LTE)
  - Group messaging
  - Text message (SMS)
  - Message encryption (for security)

- File sharing (e.g. sharing Word, Excel, PDF files)
- Emojis (Small digital icons)
- Stickers
- Call Recording
- Character restrictions
- WebRTC (web-based real time communications)
- Face detection



Figure 2: graph showing the percentage of people liking each component.

##### 2. Purpose of using

- Texting
- File sharing
- Image sharing
- Professional Use

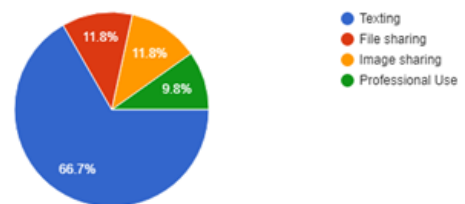


Figure 3: Pie chart showing the percentage of usage in different types of communication.

##### 3. Time spent on these applications per day

- Less than 1 hour
- 1-3 hours
- 3-5 hours
- More than 5 hours

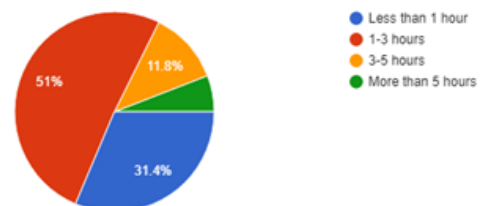
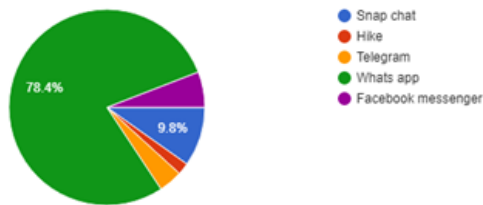


Figure 4: Pie chart for the amount of time in a day the user uses the applications.

##### 4. Which among the following applications is preferred?

- Snap Chat
- Hike
- Telegram
- WhatsApp
- Facebook messenger





**Figure 5: Pie chart for percentage of user preference in the mentioned communication applications.**

According to the survey the group of users prefer WhatsApp and like to communicate using Emoji .

51% of the group uses the chat applications on an average of 1-2 hours a day.

Most of the purpose of using is for texting.

### V. RESULT

The final system will result as a real time communication application which provides the users to communicate to each other with an ease. The application will have a login page through which the user can register and login themselves. Home page of the application contains the previous messages if any. The user can be

able to search for the other user. User can send and receive text messages. The user can create chat rooms and can search for the content or information. With these chat rooms users can exchange views and information about various topics. The identity of the user can also be made hidden in these public chat rooms.

### VI. CONCLUSION AND FUTURE SCOPE

There is always some place for enhancements in any software application, however good and efficient the application may be.

Right now, we are dealing with only the instant messaging between the peers. In future the application may further developed to include some features such as

1. Voice messaging.
2. Group calling
3. Live streaming
4. Messages auto delete after a given time.
5. Personalized message tunes.

And a messaging application feature which allows the user to create chat room while in conversation with another user by just sending the chatroom name with the hash symbol at the beginning

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