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Emergency SOS-A Novel Tool

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Abstract: *Online communication has become very popular through Android and the World Wide Web. Our project aims to develop websites and Android applications that will revolutionize the field of Mobile Health Technology (MHT). Our main app will bridge the gap in the market and technology of MHT. The project will allow users to communicate with each other in real-time through an Android and Web-based system with backend support provided by Google Firebase for Authentication, Real-time Databases and Firebase Storage. The main objective of this application is to build a system where users can assist each other and quickly locate hospitals or help centers nearby so they can move immediately from their location to the destination location for helping. This system will provide much more efficient, cost-effective and life-saving ways for common users as well as hospitals.*

Keywords: *Firebase, Android, Location, System, Communicate.*

I. INTRODUCTION

Android is a widely used operating system that can be used to connect people in the era of digital technology. Our proposed system uses Firebase and Android to provide a fast and easy-to-use application for common users and doctors. The application is mainly developed to provide life-saving facilities to ordinary users. We guarantee that user profile data and accident images are totally safe and secure. The application also uses Google Maps to locate hospitals where patients are admitted so that an ordinary users can help those patients who require blood (O-, O+, AB-, AB+), kidney transplant under the guidance of a nephrologist, or nerve transplant under a specialized doctor.

We are living in an era of technology where we are constantly trying to make our lives more comfortable through new inventions. Communication between two or more people on the internet has become more convenient with the use of new technologies. The system we have developed a new design for an easy and secure chat application. The main objective of this project is to develop a life-saving application that is designed for usability, extensibility, portability and tested to meet all necessary conditions which will be authorized and secured. This app will be entirely India-based and inspire other Indian startups to uplift the mission “Aatmanirbhar Bharat” (1).

Doctors are essential to our world, and their timely presence is critical to avoid serious consequences. Nowadays, mobile health applications are booming in the real-world scenario. Our system uses an Android platform and Firebase as a backend service. Android is a Linux operating system that is open-source and used in mobile phones with outstanding performance (2).

II. BENEFITS FIREBASE IN ANDROID APPLICATION

- 1) **Authentication:** Many android application is needed some kind of authentication feature which is very much essential for user identification.
- 2) **Real-time Database:** It also works offline with its local cache which is stored in mobile phones.
- 3) **Free use of Dynamic Links:** Dynamic links are URLs that allow marketers to advertise the application through a variety of outside channels, including social media, email, the web and more.
- 4) **Storage:** It is built for android as well as web applications that can store the audio, video as-well-as any document or generate links with its metadata.
- 5) **Cloud Messaging:** It is a hybrid-platform messaging application that allow interchange of messages from one device to another at zero cost.

Our system is designed to allow various users to talk with one another in real-time and fulfill our goal of providing a life-saving feature. We have introduced our application named “EMERGENCY-SOS”. With the emergence of the COVID-19 pandemic, we saw a huge surge in the use of chat applications for locating hospital locations, business development, etc., which gave us the idea of creating an emergency application. The primary goal of this Android application is to permit ordinary users to save the life of any unspecified or known users by communicating with the concerned person efficiently (3). The main goal of this project is to build a fully-functional real-time helping application for everyone using Kotlin and Firebase.

Mobile health applications have been revolutionizing the healthcare ecosystem by improving communication, efficiency, and quality of service. Nowadays, cellular technology is chart-topping in many sectors of society. Many mobile applications are available such as Future Forecasting Solutions apps, Voice Recognition, and Internet of Things (IoT) devices for better results (4). Cellular technology has become extensively helpful in the sector of healthcare, education, finance, etc. In the past few years, the use of these healthcare applications has also significantly increased. The EMERGENCY-SOS app has a bunch of novel tools for Android users so that it can be used with ease of one hand. Our application will have a direct impact on the healthcare sector and will also improve the two-way communication between patient's family and the doctor.

In the Emergency-SOS application, we harnessed a way toward sending and receiving the client's posts and messages using Firebase. Google Maps provides an API. There are numerous applications that integrate Google Maps API, and all the map-related queries are processed with the help of Google Map API (5). In Emergency-SOS, we require permission to use Google Map for knowing the exact location of the hospital where the patient is admitted. This feature is indispensable for our application. In this case, if anyone ought to be so they can take advantage of this feature. A few more things required by Google Map API are location (latitude or longitude coordinates) or hospital address so that the assist-helper can take the shortest and less busy way previously designed by Google's parent Company, i.e., Alphabet Inc.

III. SYSTEM REQUIREMENT SPECIFICATION

The application has broad requirements that can be subdivided into two different kinds: non-functional and functional requirements. Basically, functional requirements can describe the behavior of software or are directly related to the software functionalities. These requirements also verify whether all the functionalities mentioned in the requirement section match or not. Non-functional requirements cannot be related to the behavior of software. Some of the basic non-functional requirements are storage, security, performance, and usability.

A. Non-Functional Requirements

- 1) The GUI (Graphical User Interface) must be easily operated.
- 2) The application must run on all Android devices.
- 3) The system support multi-users for Messaging.
- 4) Instruction Manual developed for helping the new user and familiar with each functionality of application.
- 5) It can bear 10,000 users simultaneously.

B. Functional Requirements

- 1) Users must create their account.
- 2) Users must easily access their account at any point of time.
- 3) Users must logout their account easily.
- 4) Application must provide list of all users using the application.
- 5) Users must send or receive the messages for communication.
- 6) Users must post their location or hospital location where the bedded in hospital.
- 7) Users must login their account easily.
- 8) Users must get the shortest path from their location to hospital location.

C. Tools for Creating the Software

- 1) Android SDK (System Development Kit)
- 2) Firebase Real-time Database
- 3) Android Studio IDE
- 4) Firebase Authentication
- 5) Visual Studio
- 6) Firebase Storage
- 7) NoxPlayer
- 8) Adobe Illustrator(Logo & Splash Screen)

D. Operating System

- 1) Windows 10
- 2) Windows 7 (32/64 - bit)
- 3) Windows Server 2016
- 4) Windows 8 (32/64 - bit)

E. Web Browsers

- 1) Microsoft Edge
- 2) Google Chrome
- 3) Opera
- 4) Apple Safari
- 5) Mozilla Firefox
- 6) Internet Explorer

F. Challenges

- 1) Huge amount of accident images upload in Firebase Storage so compression techniques is necessary.
- 2) App may crash sometimes due to differ versions of application.
- 3) We can use trust worthy resource for authentication and storage (accidental images upload by user or doctor)

IV. ER MODEL OF EMERGENCY-SOS

A. Authentication

It provides the services i.e. backend .It basically authenticate the users i.e. they either user of this application or not ?

If Yes:- then the user can use the Sign In method.

If No: - then the user will have to go through the process of Sign Up method.

B. Users

Persons that uses the Emergency-SOS Application i.e. Common users, Supporter as well as Doctors. They play very essential role in our application because the user must have Unique ID (ID stands for Identity) . As the name suggest Unique Id must be always unique and different from others and the Unique ID have three fields:- Email , Name and UID (It is randomly generated).

C. Chats

The conversation between doctor or supporter / helper or exchange of information over the internet is known as chats. In the chat Fragment

There are three condition for creation of chat room:-

- 1) If Sender and Receiver both click at same time then:-

Unique ID= Sender UID + Receiver UID

Or

Unique ID= Receiver UID + Sender UID

- 2) If Sender click first then:-

Unique ID= Sender UID + Receiver UID

- 3) If Receiver click first then:-

Unique ID= Receiver UID + Sender UID

At the time of chatting one person with another it first check whether the room is already exists or not ? If already room is available then use that room & if not then we have to create the room based on above three Conditions.

D. Messages

The piece of information that is send or receive by another person known as messages. Each message contain the randomly generated UID (Unique ID) which is of 20 words(includes character, numbers , special character). And Each UID container the two fields:-

- 1) **Actual Message:** It contain the actual message which user want to send to another user.
- 2) **Sender ID:** It contain the Sender UID so every receiver know the person who send the message or any important life saver .

E. Posts

Any certain piece of information that show in one fragment . In the Post Fragment we use the custom Recyclerview so that we can arrange all our post in order. Each post contain one unique ID and Each Unique ID contain ImageURL, Location, Name.

In the posts fragment we have one Button for uploading the new post. So it contain the three fields Image, Location and Name. All the necessary information is uploaded to the Firebase Storage. when we upload our image from local application to Cloud based Architecture.

Then at the time of upload of image it will get the URL of particular image. At the time of GET POSTS this ImageURL help for getting the Image ready in Picasso GLIDE.

If any user wants to get the exact route from their location to Hospital location so he/she will get the location by clicking the location Text which is inside the POSTS Fragment inside every custom Post. Below is the image of Firebase Storage and ImageURL for copy to clipboard.

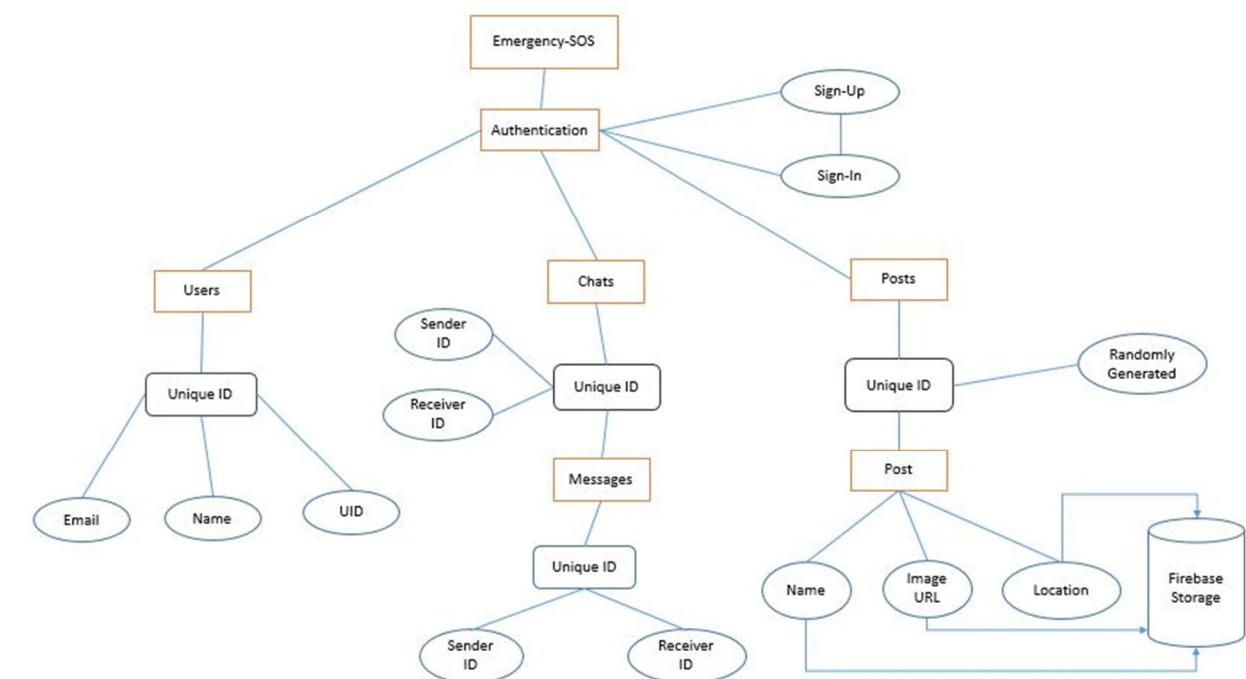
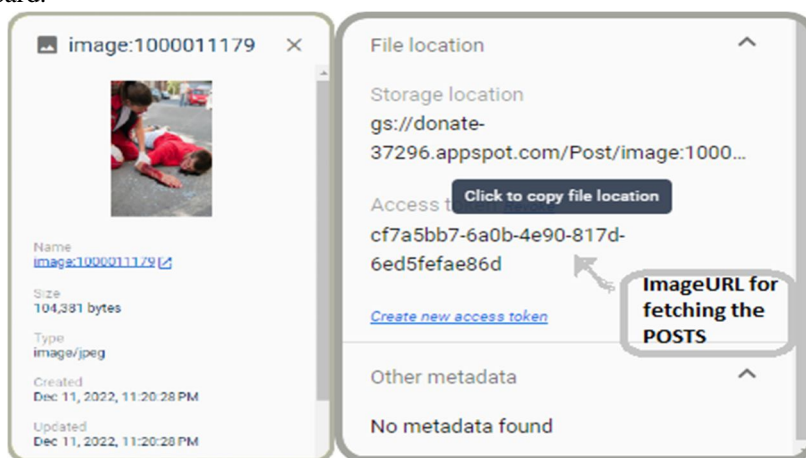
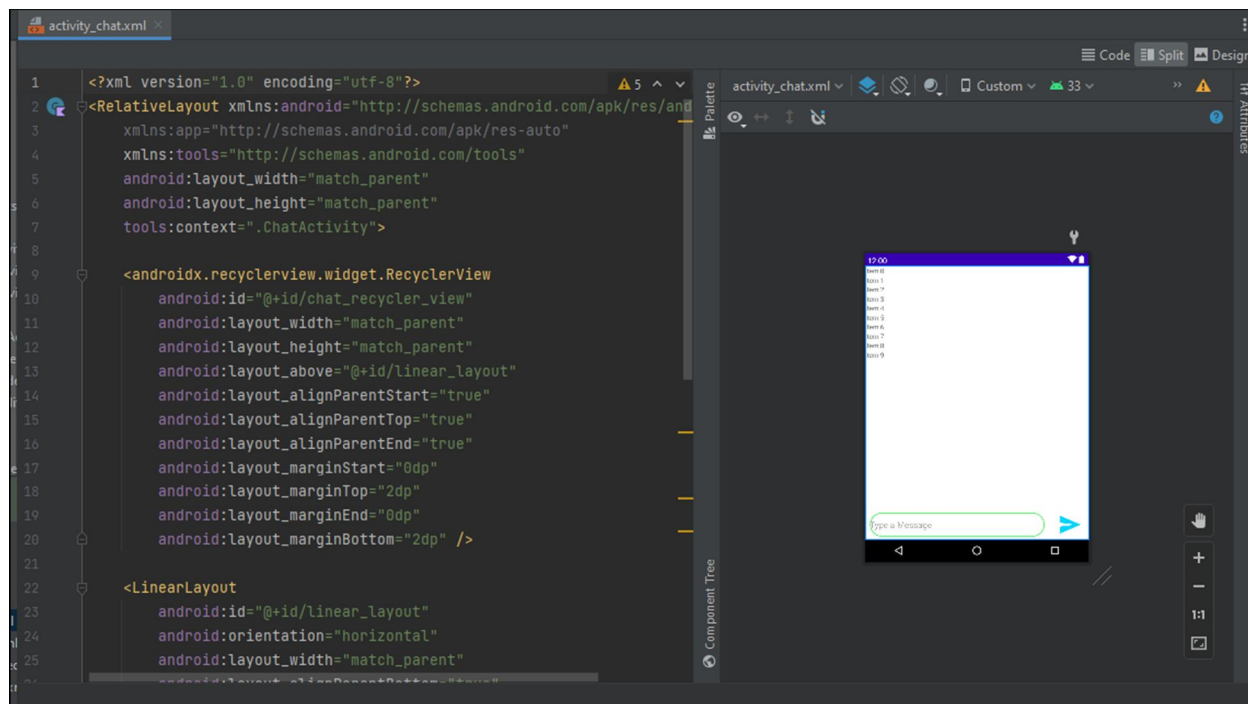


Figure: -I Emergency-SOS (ER Model)

V. IMPLEMENTATION

A. Chat Fragment Layout



B. Chat Fragment code

```

1 package com.example.donate
2
3 import ...
4
5 class ChatActivity : AppCompatActivity() {
6     private lateinit var messageRecyclerView: RecyclerView
7     private lateinit var messageBox: EditText
8     private lateinit var sendButton: ImageView
9     private lateinit var mAdapter: MessageAdapter
10    private lateinit var databaseReference: DatabaseReference
11
12    private var mReceiverUID: String? = null
13    private var mSenderId: String? = null
14    private lateinit var mChatRoomID: String
15
16    private var name: String? = null
17
18    override fun onCreate(savedInstanceState: Bundle?) {
19        super.onCreate(savedInstanceState)
20        setContentView(R.layout.activity_chat)
21
22        name = intent.getStringExtra("name")
23        mReceiverUID = intent.getStringExtra("uid")
24        mSenderId = FirebaseAuth.getInstance().currentUser?.uid
25        messageRecyclerView = findViewById(R.id.chat_recycler_view)
26        databaseReference = FirebaseDatabase.getInstance().reference
27        messageBox = findViewById(R.id.message_box)
28        sendButton = findViewById(R.id.send_by)
29    }
30
31 }

```

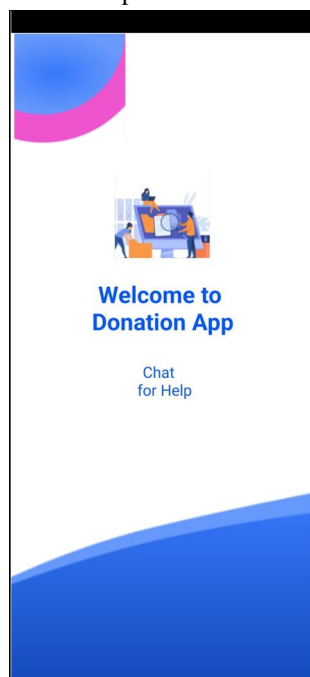
```

38
39     if (mSenderId.isNullOrBlank() || mReceiverUID.isNullOrBlank()) {
40         Toast.makeText(context: this, text: "Failed to send message", Toast.LENGTH_SHORT).show()
41         Timber.e( message: "Failed to send message because either senderID is null or ReceiverID is null")
42     } else {
43         mChatRoomID = getChatRoomID(mSenderId.toString(), mReceiverUID.toString())
44     }
45 }
46
47 initAdapter()
48
49 // Listen for new message
50 listenMessage()
51
52 // Send new message
53 sendButton.setOnClickListener { it: View!
54     if (messageBox.text.toString() != null) {
55         Toast.makeText(context: this@ChatActivity, text: "Not send message", Toast.LENGTH_SHORT).show()
56     }
57     else {
58         if (mChatRoomID.isNotEmpty()) {
59             val message = messageBox.text.toString()
60             sendMessage(message)
61         } else {
62             Toast.makeText(context: this, text: "Failed to send message!", Toast.LENGTH_SHORT).show()
63             Timber.e( message: "Failed to send message because chat roomID is null.")
64         }
65     }
66 }

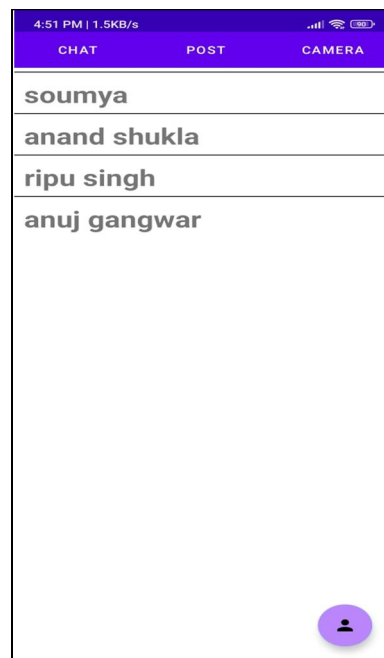
```

VI. RESULT

Splash Screen



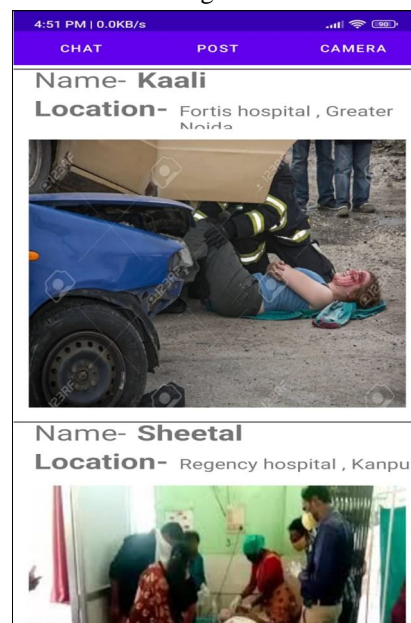
Chat1st Screen



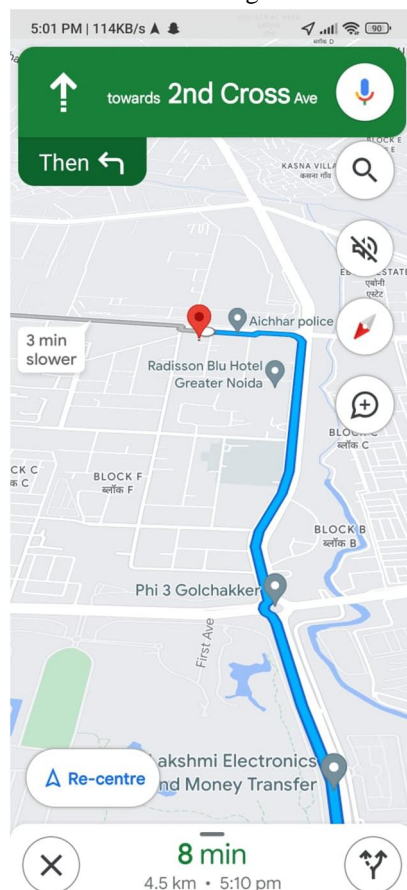
Chat 2nd Image



Post Fragment



Location Integration



VII. CONCLUSION

This Emergency-SOS application for Android as well as Web Users (Website Users) so supporter can easily communicate with doctor. The main goal was met as well as functional and non-functional requirement also met. This software quickly improves application design, fix bugs in future.

In our project we make the Real-time Chat application that supporter person can talk with doctor and ask about complications, blood group of admitted person. So supporter person can help or arrange anyone who has same Blood Group and help those persons who need. This idea can improve the health sector as well if any blood bank hasn't any particular so they can arrange Blood Group. The testing of application proven satisfactory. The Application is very simple and easy to use and implemented some necessary features Chat, Post and Location .Its Main objective is to reduce the timing as well as Paperwork .

VIII. FUTURE WORK

- 1) Extending in Apple IOS.
- 2) Implementation of Encryption Algorithm in Chat Section.
- 3) Implementation of OTP Authentication.
- 4) Implementation of Encryption of Location Coordinates

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