

GUARDIAN ALERT-The SOS App

A MINI PROJECT REPORT

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BONAFIDE CERTIFICATE

Certified that this project report **GUARDIAN ALERT-The SOS App**” is the bonafide work of “ **SADHANA A (220701235)**” who carried out the project work (CS19611-Mobile Application Development Laboratory) under my supervision.

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ABSTRACT

In today's fast-paced and unpredictable world, ensuring personal safety has become a crucial concern, particularly for vulnerable groups such as women, children, and the elderly. The SOS App for Personal Safety is a mobile-based application designed to provide users with immediate access to emergency support in times of distress. The primary goal of this project is to develop a simple, intuitive, and effective safety solution that can alert trusted contacts and authorities with the user's live location at the press of a button.

The application features a user-friendly interface that allows quick registration and the addition of emergency contacts. When the SOS button is pressed, it sends an alert message along with real-time GPS coordinates via SMS or internet-based communication to the registered contacts. Additional features include a voice alert system, silent mode activation, fake call simulation, and integration with emergency services, depending on network availability.

Developed using modern mobile technologies, the app ensures high availability, location accuracy, and quick responsiveness. The project also emphasizes data privacy and minimal user interaction during panic situations.

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LIST OF ABBREVIATIONS

ABBREVIATION	EXPANSION
SOS	Save Our Souls / Emergency Distress Call
SMS	Short Message Service
UI	User Interface
API	Application Programming Interface
SDK	Software Development Kit

CHAPTER 1

INTRODUCTION

1.1 GENERAL

In today's world, personal safety has become a growing concern, particularly in urban areas and during travel. With the rise in cases of emergency situations such as accidents, harassment, or sudden health issues, there is a growing need for quick, reliable, and automated ways to seek help. Mobile technology, with its rapid advancements, presents an effective platform for real-time emergency communication. This project presents an **SOS Android application** designed to offer immediate help to users in distress by notifying trusted contacts and activating protective mechanisms at the press of a button.

The application leverages key smartphone functionalities including the **camera**, **messaging services**, **email**, and **alarm** system, to ensure that a user's emergency is communicated swiftly and effectively. It serves as a simple yet powerful tool to enhance user safety, particularly when they are unable to manually explain or communicate their situation.

1.2 OBJECTIVE

The primary objectives of this project are:

- To provide an easy-to-use emergency support application with a single large SOS button.

- To automatically capture an image using the device camera when the SOS button is pressed.
- To send a predefined SMS and Email containing the user's message and possibly location to trusted contacts.
- To trigger an alarm sound, drawing attention from nearby individuals.
- To provide an additional call button that lets the user immediately place a call to a trusted contact or emergency number.
- To ensure fast and minimal-interaction response during emergencies.

The ultimate goal is to maximize user safety with minimal effort, enabling quick, automated alerts to be sent out even when the user is panicked or unable to communicate properly.

1.3 EXISTING SYSTEM

Many existing safety applications offer various features like location sharing, emergency calling, or manual messaging. However, they often suffer from the following limitations:

- Complex interfaces: Multiple steps before sending an alert.
- Lack of automation: Users must type messages or select contacts in real-time.
- Dependence on internet: Many require active internet access for alerts.

- Limited functionality: Most apps only support either SMS or calls, and not a combination of emergency features.

1.4 PROPOSED SYSTEM

The proposed SOS application is designed to offer a rapid and integrated emergency response through a centralized red SOS button, which, upon a single tap, activates multiple safety features

Key features of the proposed system include:

- Camera Activation: Instantly captures an image using the device's rear camera.
- Automated SMS: Sends a predefined emergency message to trusted contacts via SMS. This works without internet connectivity, ensuring reach in areas with limited data access.
- Email Notification: Sends the same alert message (optionally with the captured image) through email to a set of predefined recipients. This feature requires an active internet connection.
- Alarm Activation: A loud siren-like alarm is triggered to alert nearby people and possibly intimidate threats.

Emergency Call Button: An additional button enables the user to initiate an immediate voice call to a trusted contact or emergency number.

CHAPTER 2

LITERATURE REVIEW

2.1 GENERAL

In recent years, mobile applications aimed at ensuring user safety in emergency situations have gained prominence. With increasing concerns about personal safety, especially in urban environments, there is a growing need for technology-driven solutions that provide real-time assistance and alert mechanisms.

Several applications have attempted to address this challenge by offering single-function solutions such as emergency calling, location sharing, or panic buttons. However, many of these applications depend heavily on internet availability, making them less reliable in areas with poor connectivity.

Additionally, most require multiple steps or user interactions, which is impractical during a real emergency.

Studies and reviews of emergency applications like bSafe, Life360, and My Safetipin highlight both the potential and limitations of mobile safety tools. These apps often feature location tracking, alarm triggering, and messaging.

However, they either lack automation or fail to integrate offline functionalities effectively.

The reviewed literature shows that the effectiveness of an emergency app increases significantly when:

- Multiple alert mechanisms are triggered simultaneously.
- User interaction is minimized during the emergency.
- The app supports offline capabilities, such as SMS and calls, which are essential in real-world use cases.

Based on this understanding, our proposed SOS application has been designed with a focus on integrating core emergency actions — image capture, SMS, email, alarm, and calling — into a single, user-friendly interface, while ensuring that only email relies on internet connectivity. This makes the app both practical and reliable in various environments.

CHAPTER 3

SYSTEM DESIGN

3.1 GENERAL

The system design of the SOS Android application is focused on providing a swift and efficient response during emergency situations. The primary goal is to minimize the time taken to alert trusted contacts and authorities by combining multiple emergency functionalities into a single interface.

The design follows a modular and event-driven approach. Each feature — image capture, SMS alert, email notification, alarm triggering, and emergency calling — is initiated with minimal user interaction through a central emergency button. This ensures that even in high-stress conditions, the user can quickly access all critical safety mechanisms.

The system ensures:

- Modular structure for scalability and easy updates.
- Minimal UI interaction during emergencies.
- Concurrent execution of safety features (e.g., SMS, email, camera, and alarm triggered simultaneously).
- Selective use of internet — only for email — making it usable in limited connectivity scenarios.

3.1.1 SYSTEM FLOW DIAGRAM

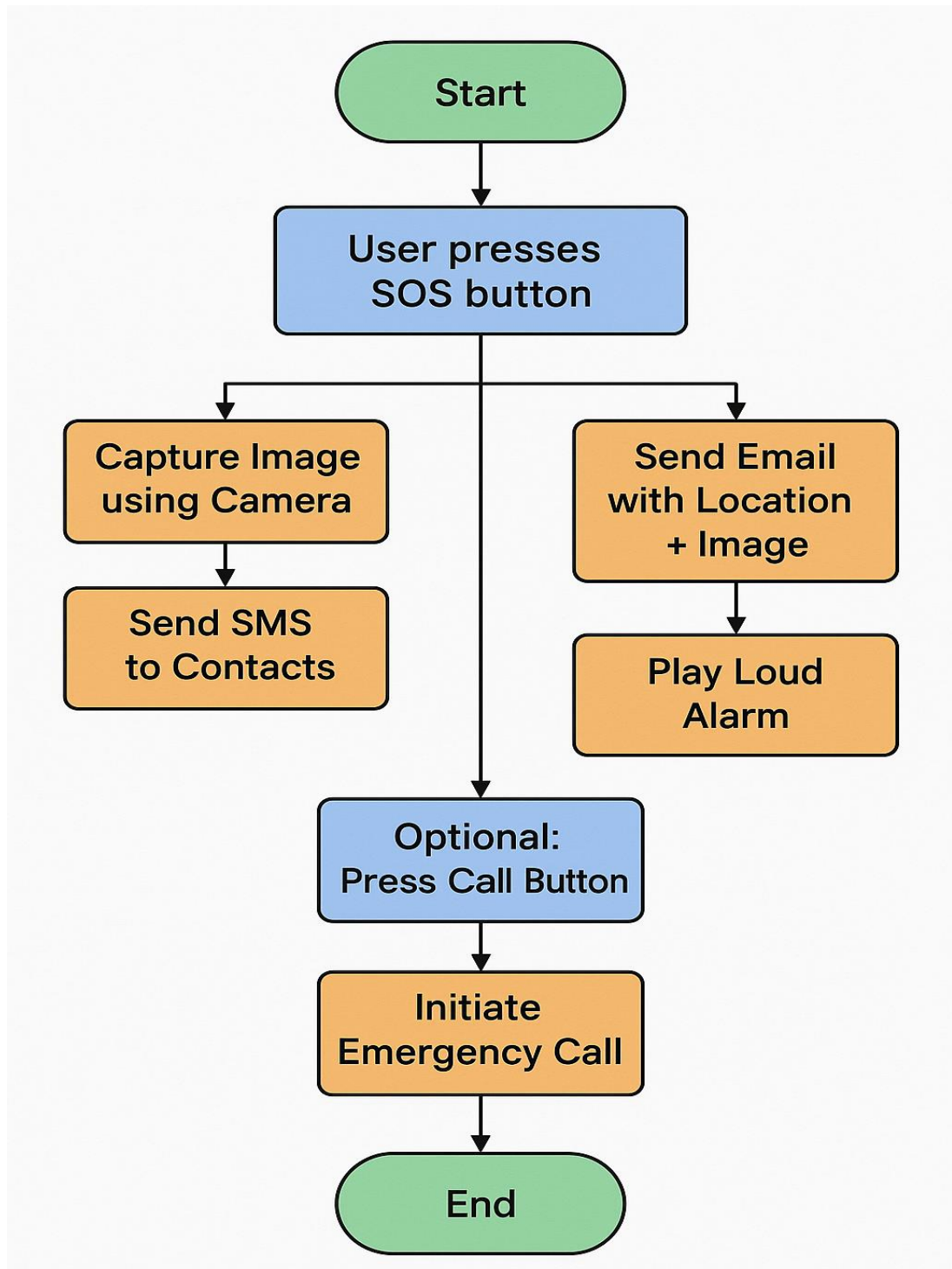


Fig 3.1

3.1.2 ARCHITECTURE DIAGRAM

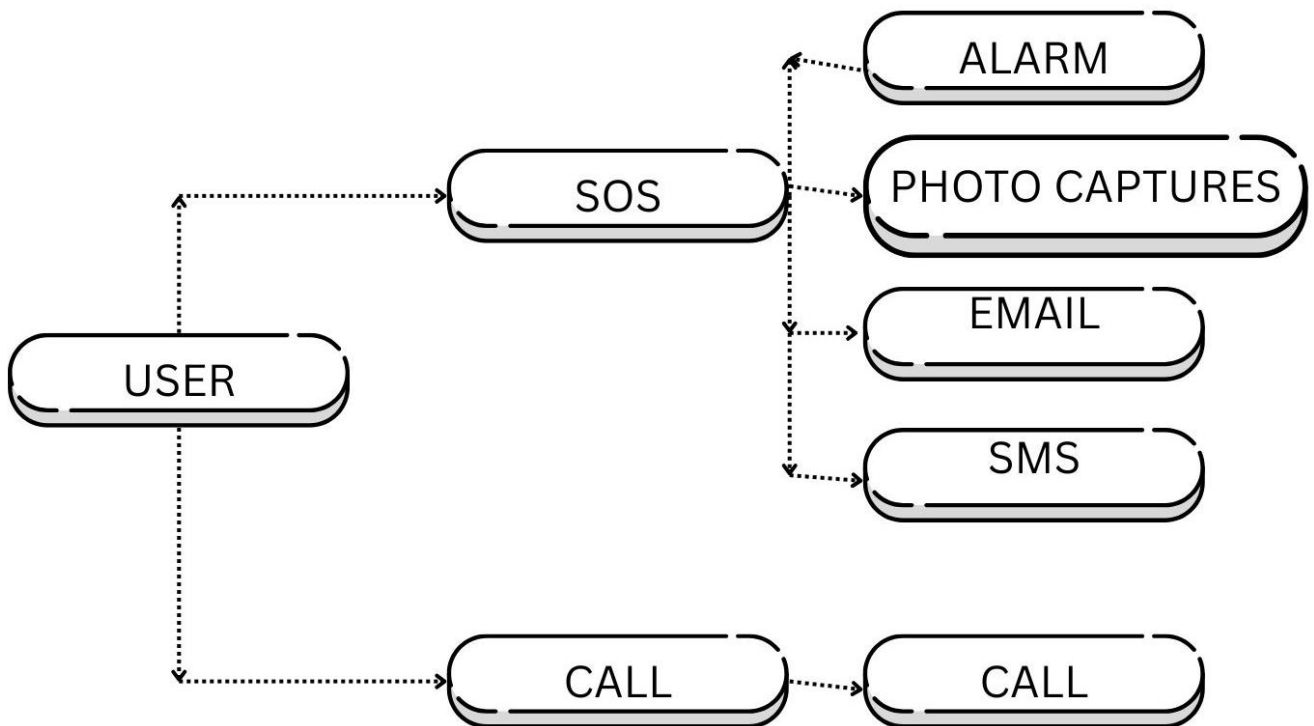


Fig 3.2

3.1.3 USECASE DIAGRAM

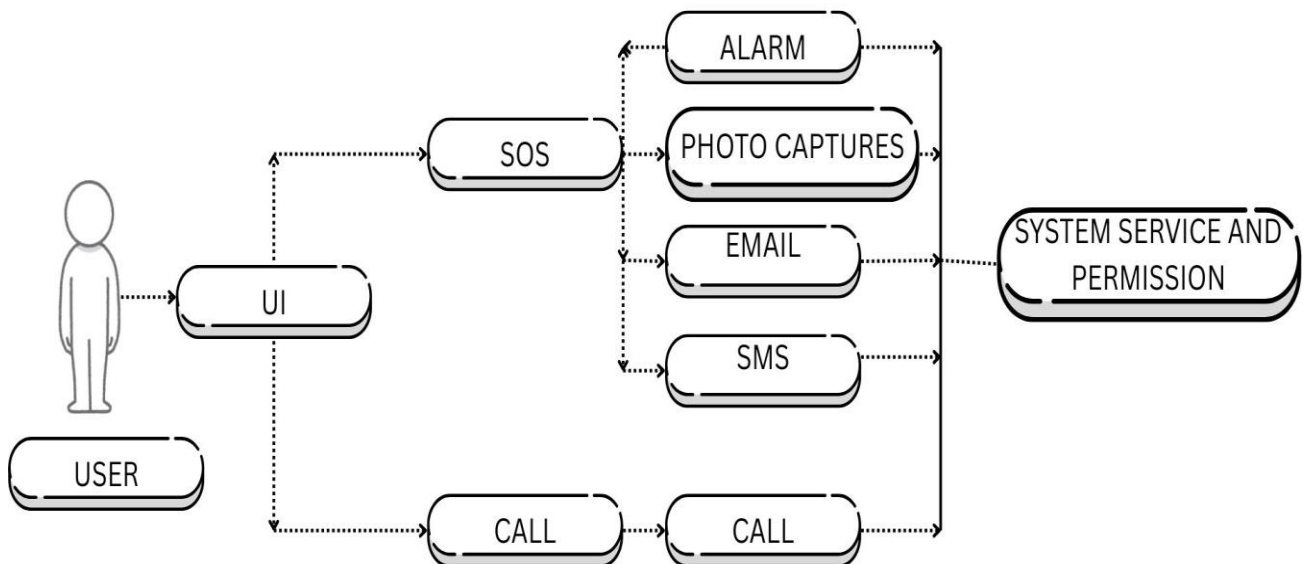


Fig3.3

CHAPTER 4

PROJECT DESCRIPTION

4.1 METHODOLOGY

The development of the SOS Emergency Alert Application follows the Waterfall Model, a linear and sequential approach where each phase depends on the deliverables of the previous one and corresponds to a specialization of tasks. This methodology was chosen for its simplicity and effectiveness in well-defined and straightforward applications such as this one.

Phases Followed:

1. RequirementAnalysis:

Gathering essential functionalities like SMS alert, email alert, camera activation, alarm, and emergency call features.

2. Design:

Designing the user interface and system architecture to ensure all emergency functionalities are easily accessible with minimal navigation.

3. Implementation:

Coding the application using Android SDK and integrating necessary APIs like SMSManager, Intent for call, Camera API, and Gmail SMTP (via Firebase or third-party libraries).

4. Testing:

Manual testing on multiple devices and scenarios to verify image capture, message/email delivery, alarm trigger, and call initiation.

5. Deployment:

Installing and testing on Android devices. Since this is a prototype, deployment was done locally.

6. Maintenance:

Iterative improvements based on user feedback, especially focusing on UI refinement and performance tuning.

4.1.1 MODULES

The application is divided into the following major modules:

1. Main SOS Module:

- On single tap, it simultaneously:
 - Captures an image using the device camera.
 - Sends a predefined SMS to emergency contacts.
 - Sends an email and message.
 - Triggers a loud alarm sound.

2. Camera Module:

- Invoked on button tap.
- Captures the current scene and stores the image temporarily for emailing.

3. SMS Alert Module:

- Uses Android's SmsManager to send a distress message to selected emergency contacts.

4. Email Module:

- Configured using Gmail SMTP or Firebase functions.
- Sends the captured image and a predefined message to an email ID.

5. Alarm Module:

- Plays a loud siren to attract attention nearby.

6. Call Module (Optional):

- Additional button provided to make a direct call to an emergency contact using Android's Intent.ACTION_CALL.

CHAPTER 5

CONCLUSION

5.1 GENERAL

The SOS Emergency Alert Application successfully demonstrates a simple yet powerful tool for personal safety. Designed with a user-friendly interface and minimal interactions, the application is capable of sending immediate alerts via SMS and email, capturing a real-time image, triggering an audible alarm, and optionally placing an emergency call — all with a single tap on a prominent red SOS button.

This project fulfills its objective of acting as a real-time mobile emergency support system. It leverages native Android functionalities like SMS, calling, and camera along with internet-based email services, ensuring critical actions are executed promptly in emergencies. The modular design enables easy enhancement, such as adding GPS-based location sharing, cloud image backup, or offline capabilities in the future. The project also offers a foundation to explore advanced safety technologies like panic detection using sensors or wearable integrations.

In conclusion, the SOS app stands as a practical, deployable solution for enhancing individual safety, especially for vulnerable groups such as children, women, and the elderly.

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4. Android CameraX API – <https://developer.android.com/training/camerax>
5. Android Intents and Broadcasts –
<https://developer.android.com/reference/android/content/Intent>
6. Stack Overflow – <https://stackoverflow.com> – Used for debugging and code-specific clarifications.

APPENDICES

Appendix A: Source Code Snippets

1. SMS Sending Function using SmsManager

kotlin

CopyEdit

```
val phoneNumber = "1234567890"
```

```
val message = "Emergency! I need help. Please check my location."
```

```
val smsManager = SmsManager.getDefault()
```

```
smsManager.sendTextMessage(phoneNumber, null, message, null, null)
```

2. Email Trigger using SMTP API (e.g., JavaMail / SendGrid via HTTP)

kotlin

```

GlobalScope.launch(Dispatchers.IO) {

    val url = URL("https://api.sendgrid.com/v3/mail/send")

    val connection = url.openConnection() as HttpURLConnection

    connection.requestMethod = "POST"

    connection.setRequestProperty("Authorization", "Bearer YOUR_API_KEY")

    connection.setRequestProperty("Content-Type", "application/json")


    val payload = """

        {

            "personalizations": [{"to": [{"email": "example@example.com"}]}],

            "from": {"email": "sender@example.com"},

            "subject": "Emergency Alert",

            "content": [{"type": "text/plain", "value": "Emergency! Check
location."}]

        }

    """.trimIndent()

```

```
connection.doOutput = true

connection.outputStream.write(payload.toByteArray())

val responseCode = connection.responseCode

}
```

3. Camera Image Capture Intent Setup

kotlin

CopyEdit

```
val takePictureIntent = Intent(MediaStore.ACTION_IMAGE_CAPTURE)

if (takePictureIntent.resolveActivity(packageManager) != null) {

    startActivityForResult(takePictureIntent, REQUEST_IMAGE_CAPTURE)

}
```

4. Alarm Sound Trigger Code

kotlin

CopyEdit

```
val mediaPlayer = MediaPlayer.create(this, R.raw.sos_alarm)
```

```
mediaPlayer.start()
```

5. Emergency Call Intent

kotlin

CopyEdit

```
val emergencyNumber = "112"
```

```
val callIntent = Intent(Intent.ACTION_CALL)
```

```
callIntent.data = Uri.parse("tel:$emergencyNumber")
```

```
if (ActivityCompat.checkSelfPermission(this,
```

```
Manifest.permission.CALL_PHONE) ==
```

```
PackageManager.PERMISSION_GRANTED) {
```

```
    startActivity(callIntent)
```

```
}
```


Appendix B: Tools and Technologies Used

Tool / Technology	Purpose
Android Studio	Integrated development environment
Kotlin	Programming language used
XML	UI design layout
Emulator / Device	Testing the app
JavaMail API / SendGrid	Sending email alerts (via internet)

Appendix C: Application Screenshots

1. Home Screen with SOS Button

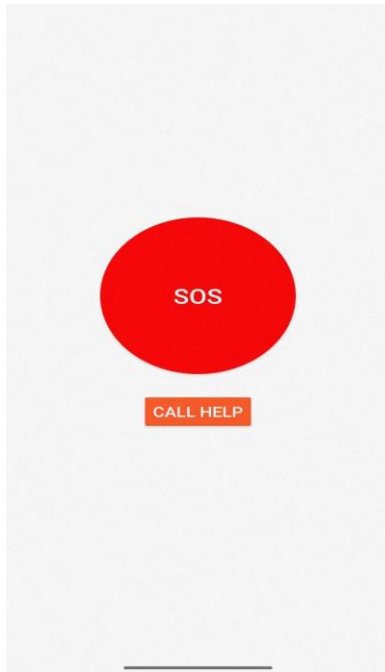


Fig 3.4

2. Call Trigger UI

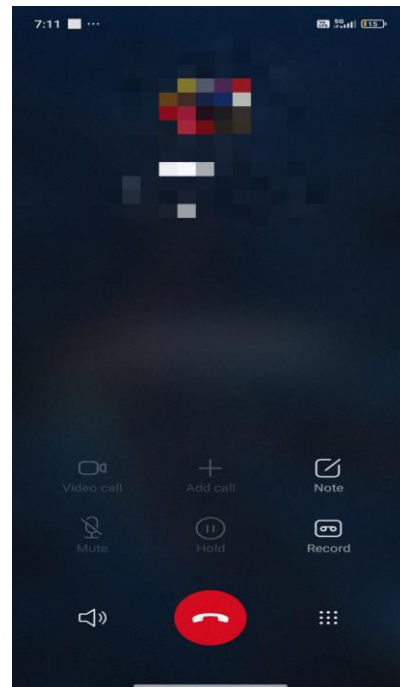


Fig 3.5

3. Photo Capturing-Using Camera

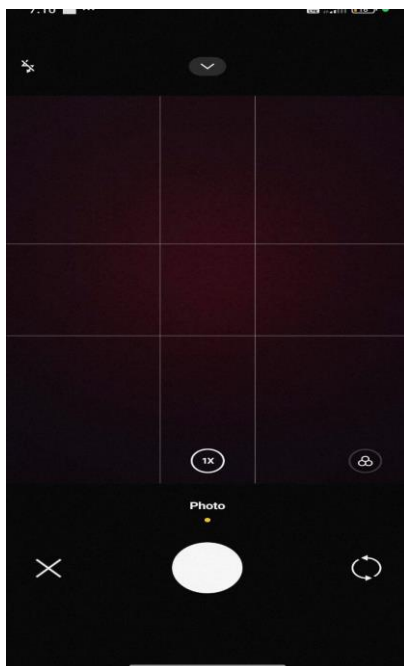


Fig 3.6

4.Sent Email UI

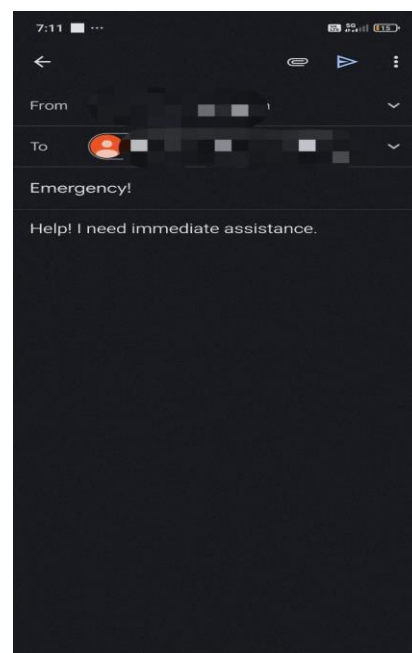


Fig 3.7

