Madadgar(Anti theft-SOS) Android App

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***Abstract*-This paper presents an anti-theft application for android based devices to find stolen or lost vehicles, child, and report of crime, mobile snatching, lost of person, vehicle verification and Emergency SOS button. As we all know after mobile snatching people faced a lot of difficulty in Blocking of sim, and lodging mobile theft complains, but with this app user will be able to lodge complains in just few minutes and the client will moreover be able to call for offer assistance in case of crisis by squeezing S0S button at which exact location of the user will send to response center without consuming time.Now this application work as once this application installed in user's android mobile device,it will stored user's email id,mobile phone number,and CNIC number ,collect the data from the sensors and keep running in the background by using services.Example:1 If the user is in emergency situation he/she just trigger the SOS button for help then location of the victim will go to response center and they will trace the location and take immediate action .Example :2 If user see any robbery nearby his area he can easily make video and take pictures of that incident then simply upload it in this application through form filling.Example:3 If user's vehicle or child is lost then he can upload vehicle or child pictures with detailed information by filling form.The purpose of this application is to bring Citizens of Pakistan and CPLC on one platform .This app will end the hassle to visit or call police station/CPLC and will allow the user to lodge complains, call for help through user friendly forms instantly. This collaboration will allow Citizens of Pakistan and security forces to associate with each other more efficiently. It will become an important part of people's everyday lives as it combines simplicity and usefulness and brings Pakistani Forces and citizens on one single platform.**

I- Introduction

MADADGAR is a mobile app for citizens of Pakistan. It is a project in collaboration with CPLC which stands for Citizens-Police Liaison Committee ,which is a nonprofit government agency for public security. The purpose is to bring Citizens of Pakistan and CPLC on one platform. This app end the hassle to visit or call police station/CPLC and will allow the user to lodge complains, call for help through user friendly forms immediately.

The Citizens-Police Liaison Committee, or CPLC, was established by Fakhruddin Ibrahim [1]. It is a non-political constitutional entity that is autonomous while maintained via committed citizens who volunteer. CPLC is a one-of-a-kind public-private collaboration in which citizens volunteered and helped.CPLC is a one-of-a-kind public-private partnership in which citizens stepped forward as volunteers, assumed responsibility for improving the deteriorating law and order situation in collaboration with law enforcement agencies, and worked tirelessly to achieve its noble goals.

Its services include

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Figure-1

- Report of mobile theft
- Report of child lost
- Report of vehicle robbery
- Sim blocking
- Verify while buying a car or bike

Figure-2

II- Background

The latest android based mobile phones has become a very important part of our life[2]. It provides helps in communicating with anyone virtually through videoconferencing, email, etc or GPS.But with technological advancement the users have started to use android phones for storing private and confidential information like atm pin, video ,documents etc[3]. This factor has increase the mobile snatching across Pakistan.The Karachi is the biggest populated city of Pakistan[4]. The crime rate is very high in Karachi especially mobile snatching. The Fig (1)[1] shows the crime rate of mobile theft in Karachi published by CPLC.

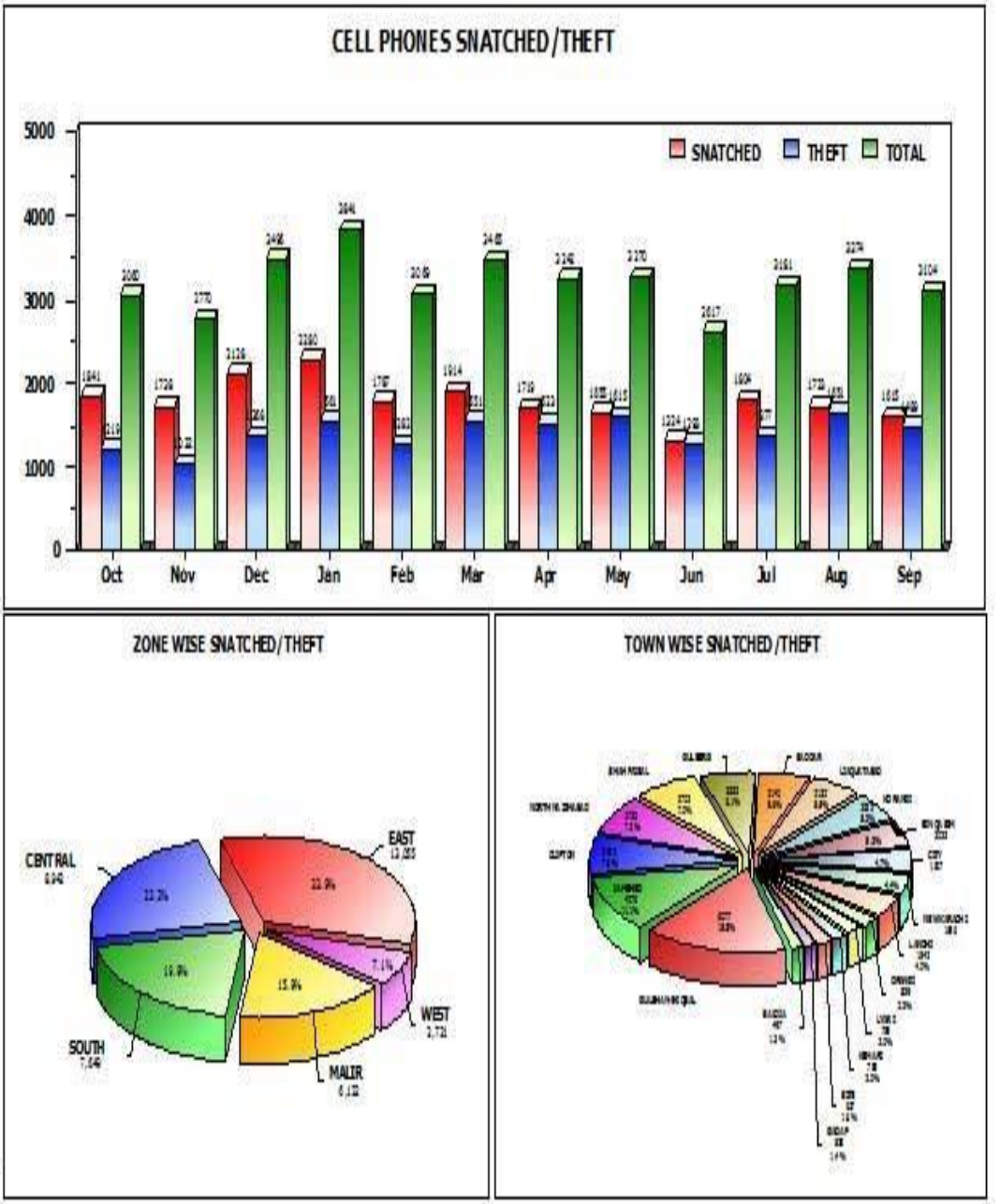

CELL PHONES SNATCHED/THEFT
SNATCHED
THEFT
TOTAL
5000
4000
3000
2000
1000
0
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
ZONE WISE SNATCHED/THEFT
CENTRAL
EAST
WEST
SOUTH
MALIR
TOWN WISE SNATCHED/THEFT

Figure-3

Not only mobile snatching is a problem of Karachi but other crimes have also increased. According to CPLC ,in year 2020 Karachi witnessed a rise in car lifting, snatching of motorbikes and mobile phones and theft of two-wheelers compared to 2019 as shown in table (2).

Type	2019	2020
Car stolen	1452	1527
Mobile Snatched	19,862	21,578
Motorbikes Stolen	28,609	34908

Table(1)

The fig (3) shows the vehicle snatching rate per hour in Karachi. Once the phone or vehicle is snatched, users may face a severe risk of loss of privacy, may not only cause loss of property but also have a negative impact on the their family life. However Now a days people find it really difficult to report these increasing due to visiting police station for reporting crime takes a lot of time and specially for females it is very difficult to go to police station for reporting so by using. In order to solve these problem this paper proposed an android app called "MADADGAR"

MADADGAR is a mobile app for citizens of Pakistan. It will be a project in collaboration with CPLC. The Citizens-Police Liaison Committee commonly known as CPLC, is a nonprofit government agency for public security [6]. The purpose is to bring Citizens of Pakistan and CPLC on one platform. This app will end the hassle to visit or call police station/CPLC and will allow the user to lodge complains call for help through user friendly forms immediately.

III- Literature Review

(1)User Login: The application ask user to login/register when the app is first time initialized. It will protect user's identification and data[5]. Then user uses application properly. User registration form honestly saves data of user and reduces risk of security[6]. **SOS Button:** When user is in emergency, they can trigger the SOS button display on the interface, or widget to instant request for help in fastest and convenient way[7]. This emergency function will send victim's current location to control tower of organization[8]. **Lodge complain**: User can make video or picture of any snatching ,kidnapping or robbery etc[9]. and upload in this application through form filling. After this user's location will trace by organization in a very short time .User can lodge any kind of complain like mobile, child or vehicle etc. lost by just filling form.
Following table shows the brief literature review of different applications which are similar to Madadgar application but they have lack in features:

Paper name	**Author name**	**Problem address**	**Limitation**
Anti-Theft Application for android based devices [2]	Azeem Ush shan Khan,Mohammad Naved Quershi,Mohammad Abdul Qadeer	This paper puts a technique through which the thief,who steal mobile phone with application ,get captured and user can stop him for misusing.	This application is only for mobile stealing.

ThiefTrap – An Anti-theft Framework for Android[10]	Sascha Groß, Abhishek Tiwari, and Christian Hammer	This ThiefTrap, using a honeypot account for the purpose of theft protection.	It has only a feature for mobile stealing.
Android Based Emergency Alert Button[11]	Dhrubajyoti Gogoi, Rupam Kumar Sharma	*This application is used for immense help by SOS button.*	The location of user will go to family not to center.
Design and implementation of anti- theft tracking system based on Android platform[12]	Yonghong Luo, Jian Wang, and Chao Feng	Android handset anti-theft tracking system which would automatically destroy private information and track cellphone location to protect user privacy and property security after the phone lost.	This application is only for mobile lost.
Position Detection and Tracking System[13]	Mahesh Kadibagil,Dr.H S Guruprasad	Application used to find location and send a Popup SMS to user when his/her friends or family members come around the user‟s area of direction.	In this android application location of the user will go to his family members not to organization.
A Low-Cost Vehicle Anti-Theft System Using Obsolete Smartphone[14]	Bang Liu, Nianbo Liu, Guihai Chen, Xili Dai, and Ming Liu	After being fixed in vehicle body, the smartphone can detect vehicle movement and adaptively use GPS.	This application is for vehicle tracking.
Anti -Theft Application for Lost or Misplaced Android Phones[3]	Sayali Deore, Karishma Khodade, Shweta Patil	This application provide the user to track their lost or misplace device.	This application only trace the lost android mobile device.

Table(2): (Brief literature review of Madadgar app to other similar application

IV- Methodology

The major tools that were used to develop and their description are provided below.

A) Software development tools:

Android studio: The most well-known IDE (integrated development environment) for developing Android apps is Android Studio[15]. It enables developers to design apps from the ground up. It may run on a variety of operating systems, including Windows, macOS and Linux based operating systems or as a subscription-based service in 2020 [15].The minimum requirement are: 1) 2 GB RAM minimum, 4 GB RAM recommended. 2) 400 MB hard disk space.3) Java Development Kit (JDK) 7.4)64-bit processor.
Activities and Services in android:

In this application we use activities to draw the user interface, which collects all the user related information like mobile number, email id, password, etc which will be used to send videos or pictures. services is used to run the application in the background that is without user interaction, once a user submits all the related information, services get started in the background[16].

Activity : An activity is a component of an application which gives an interface to the user to communicate with the application like taking pictures, submitting forms and making videos. Android gives a screen to each activity to draw the GUI. Android uses stack to manage the activities, when an activity is created it is placed on the top of the stack and the previous activities remain below it. Internet is very important in this case because we need to track location and we can found location of crime reporter because internet is connected with multiple routers through routing protocols[17].

Services :A services is a component of an application which performs an operation in the background without user interaction, it does not have any user interaction so it is not included in activity life cycle. A service can be started by any other component of an application by creating intent or it can be started by its own. Once a service is began, user can switch to another application, It will remain running continuously.

Firebase: Firebase is a Google platform that makes it simple for developers to create, manage, and scale their projects. It enables developers to create apps more quickly and securely[18]. On the Firebase side, no programming is necessary, making it simple to take advantage of its features. It works with Android, iOS, the web, and Unity. It gives you access to cloud storage[19]. It makes advantage of NoSQL for the database. Realtime Database: The Firebase Realtime Database is a cloud-based NoSQL database that allows you to manage your data in milliseconds. In the simplest terms, it can be thought of as a large JSON file. It's the database that allows you to store and sync data in real time between your users. Real-time syncing allows your users to view their data from any device, including the web and mobile, and it allows them to collaborate. Real-time Database comes with mobile and web SDKs, allowing you to create apps without using servers. The Real-time Database interfaces with Firebase Authentication to give developers a quick and straightforward way to log in. Our declarative security paradigm can be used to provide access based on user identity or data pattern matching[20].

Java: Java is the innovation of choice for building applications utilizing overseen code that can execute on mobile devices. A Java coordinates improvement environment for computer program, and consolidates its

code altering and developer tools. To support application advancement inside the Android operating system.

B) Requirements Analysis

Domain Requirements

The projects aim to build a mobile app. It will be connected with Firebase realtime database. There are 2 major functioning parts to this project functional requirement and non-functional requirement[21]. Firstly user friendly forms for data entry that will be design on the Android studio. Android Studio is the official Integrated Development Environment (IDE) for Android app development, based on IntelliJ IDEA . It allow you to use Code templates and GitHub integration to help you build common app features and import sample code. Secondly Firebase realtime database which is the main part of the app. It will be to collect and save information submitted by user.For tracing the exact location Google API will be used in the backend of SOS button.

- **Functional Requirements**
  - User friendly form will develop separately for each service the app offer.
  - User registration and its authentication will be a must to use app
  - The elements and formats should be defined for each field in form as it is necessary for storing data in correct format in database
  - User must allow the app to track its location
  - The mobile data or wifi should be on before using the app.
- **Non-Functional Requirements**
  - The app will be highly mobile friendly.
  - User can use app from any part of the world
  - Small popup message on top of screen when user is offline.
  - Login to app through GMAIL or mobile number
  - Registration through personal email (requiring email verification)

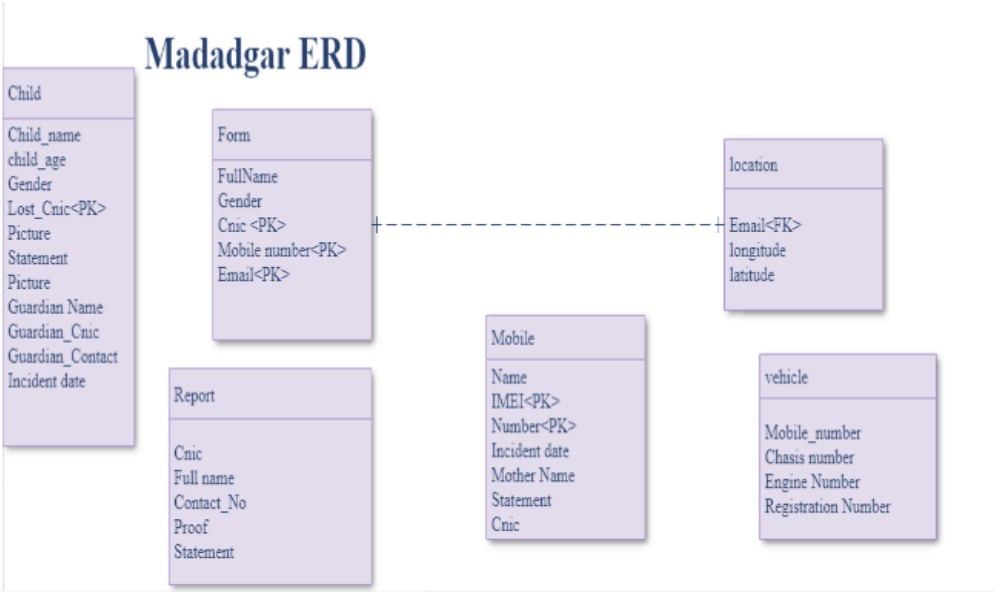
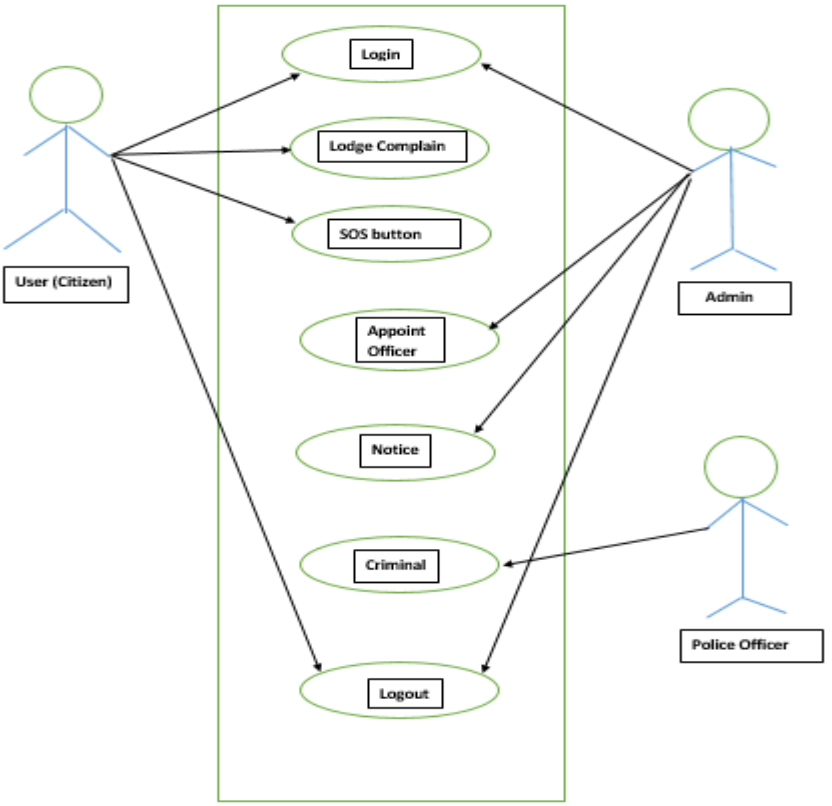


Figure-4

C) Design and implementation:

- ERD Diagram: The entity relationship diagram shows in figure identifies the entity. The database is divided into 6 tables child, Forms, Location, Report, Mobile and Vehicle..For every functionality there is seperate table to store data.Each table contains revelant fields and primary key to store data.

- **Use case diagram:**Following use case diagram shows the details of requirements.It focuses on three actors and seven use cases that are related to actions.The procedure to use Madadgar Application is as follows: (1)User can login and register himself ,lodge complain , Press SOS Button in emergency and logout. (2)Admin can login ,see the information about who have submitted complains,and Appoint officer to take action for emergency user. (3)Officer help the citizen and investigate for crime.



Use Case diagram

Figure-5

- **Architectural Design** To develop this app we have chose 3 layer architecture.The figure showes the architectural design of Madadgar app.Here the implementation is divided into 3 main layers i.e presentation layer,bussiness logic ,backend layer. (1)**Presentation layer**:The front end of the app is map as presentation layer.It contains the GUI() for end user.It is basically made of android 's activity.xml.The work of this layer is have interaction with user through user friendly forms and to send/recieve to bussiness logic layer for further processing. (2) **Business logic layer**:This second layer is the most important layer of the app.It takes data from.presentation layer and do some processing on data.It also recieve/send to data layer and interact with google api if needed.(3)**Data layer**:This layer contain firebase database.It store entire data of the app.It is divided into two sub part.First one is realtime database of firebase which store text data of the app.Firebase storage is another part which stores pictures ,videos recieved from user.

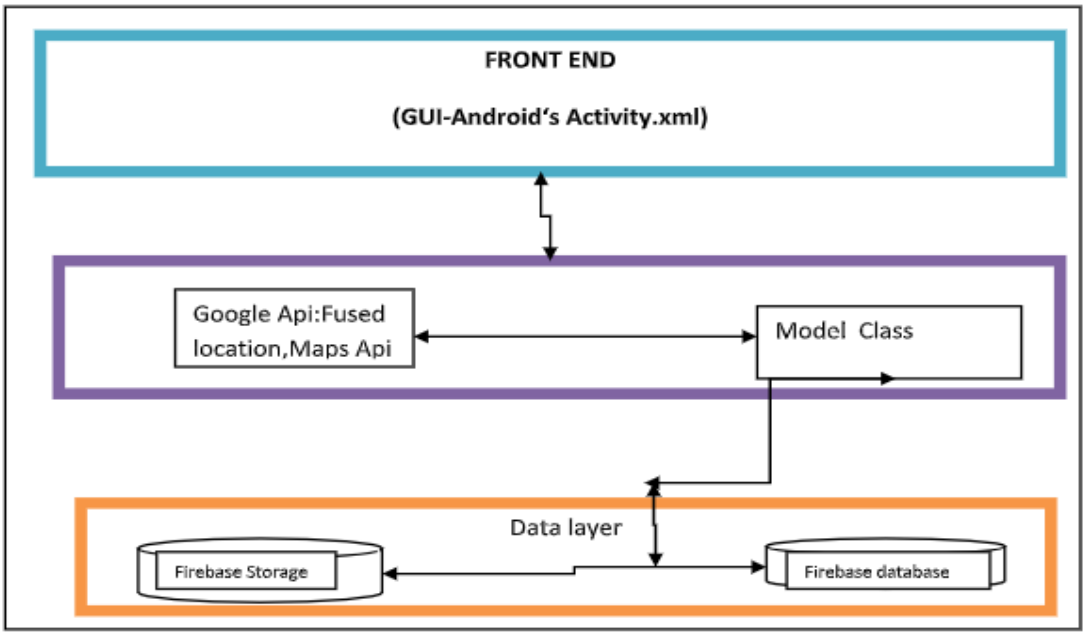


Figure-5

Architectural Design

Process Flow Diagram: Below is the process flow diagram of Madadgar application,which shows the whole application's features,forms and storage of data in Firebase database

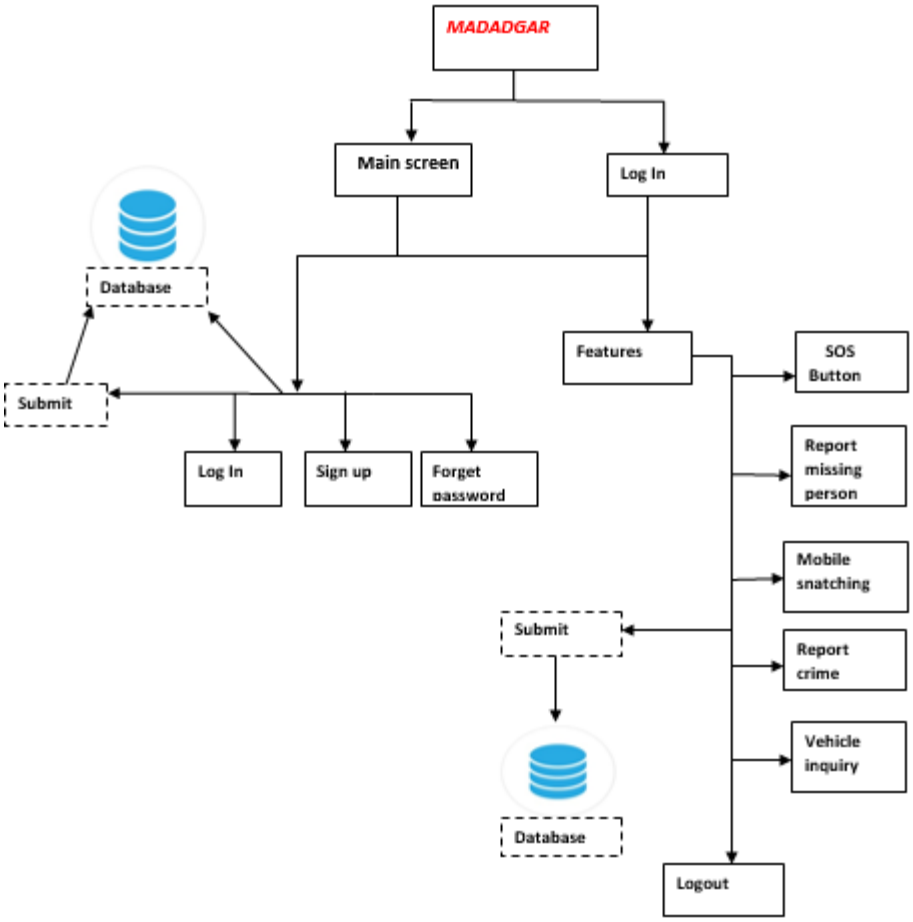


Figure-7

V- Implementation

The app is divided into three sub-modules. The first module is GUI of app which stand for graphical user interface which is frontend of app .This include designing user friendly form for user login ,registration and different complain lodge forms . Whenever user install the app for first time it will required to register himself by providing some specific fields. Through login page user can enter his username and password and can use desired services .Figure shows the registration and login page of Madadgar app. The second module include server which are the front technologies by which whenever user install the app can registered himself by providing essential details. Third module is database in backend. The essential detail like id, password is saved in database. The complain lodge forms will also be connected with database. After submitting the form all details will be first saved in database which will help CPLC to take action.

a) Function of the app

MADADGAR (Anti theft-SOS) is a mobile app for citizen of Pakistan. In this project the user without dialing CPLC helpline will be able to register complains through user friendly forms by

any part of the world. It will be a single platform that will be a gateway to lodge any type of complains whether it is child lost, robbery, or any conflict in families. It will become an important part of people‟s everyday lives as it combines simplicity and usefulness and brings Pakistani Forces and citizens on one single platform .The most highlighted feature is SOS button.

b) Features:

- **Report of robbery(mobile):**Through user friendly ,victim will be able to file a complain in few minutes regarding any snatching he faced. The hassle of making phone call to CPLC will be eliminated.
- **Report of child lost:** A child lost/runaway can be report to cplc.Through forms user will be to upload picture of lost person and can provide other important details [6]. The require details of reporting child are mention in fig-(a)
- **Report of vehicle robbery**: A report of vehicle lost/snatch can be lodged through app.A user will be able to provide detail of the car (number plate, car color, engine number).For reference see Fig-(a)
- **Verify while buying a car or bike**: By app user can easily verify the particulars of the vehicle he intend to buy through Stolen / Snatched Vehicles Database of CPLC
- **Sos-button**: The user will also be able to call for help in case of emergency by pressing SOS button by which exact location of the user will send to response center [8].

Report any crime: people can upload the video, picture on app to report the proof of any illegal activities [3] .

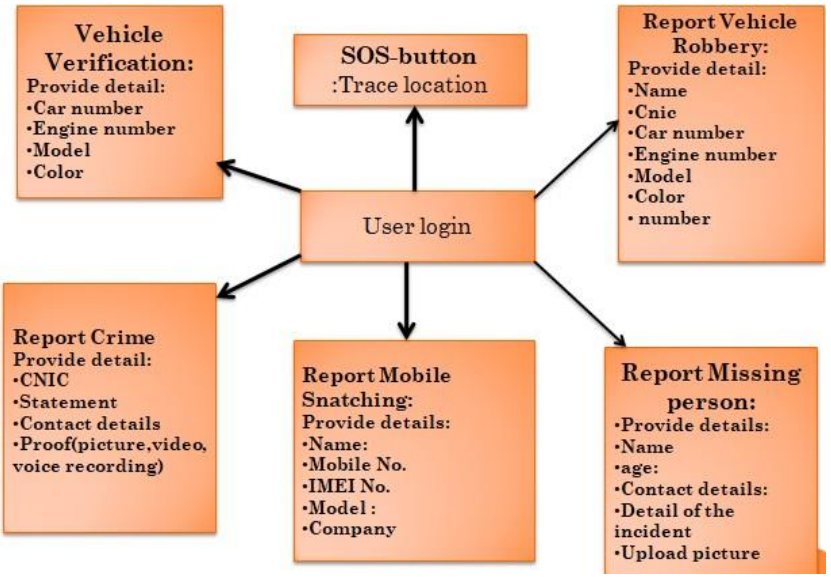


Figure-8(a)-block diagram of app

c) PROPOSED MODEL:

The proposed model in fig(b) explains the flow of the app. When user installs this application in user installs this app in the device it is required to register himself by providing necessary detail like the e-mail id and mobile numbers .The Second step will be email/mobile verification by system .A code will be sent to User email/mobile for verifying the source of registration. After Successful registration the user can select the type of his service he required and can call for help by providing necessary details for required service as explained in fig(a).After submitting information the national security force will take required action.

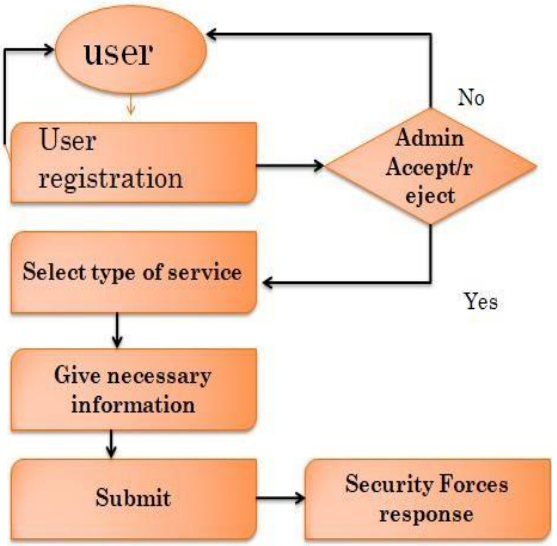
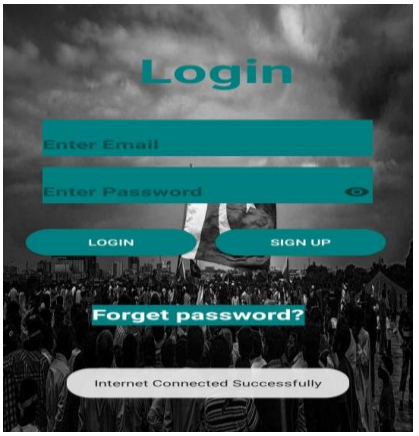


Figure-8 (b)

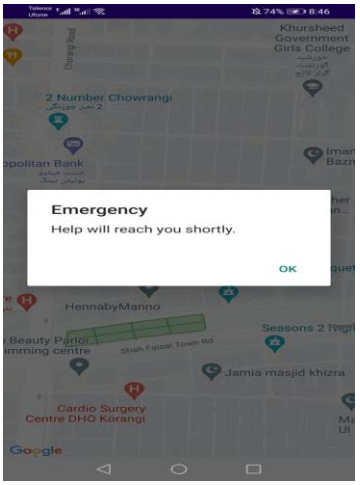


Login Form
Figure-9

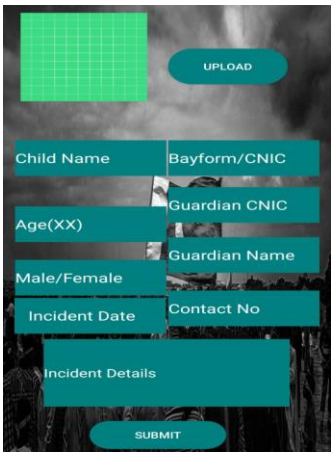
Dashboard **Registration Form**

Figure-10

Google Map API: Google Maps is an online mapping service application and technology that supports a number of map-based services, including the Google Maps website, Google Ride Finder, Google Transit, and maps integrated on third-party websites via the Google Maps API. You can embed Google Maps in your own web sites using the Google Maps JavaScript API. It is possible to embed Google Maps using the Google Maps API. When user press the SOS button, his location will be trace by using Google Map API.



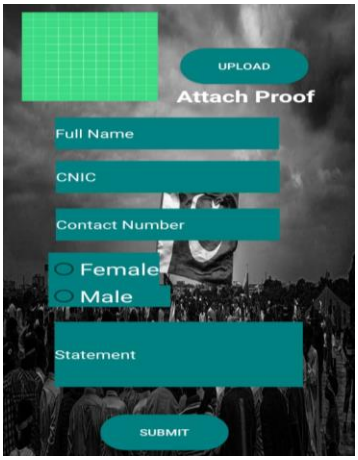
After SOS Button press
Figure-11



Person missing form

Mobile lost Report Form

Figure-12



Report crime form

Verify Vehicle Form

Figure-13

Internet Connection **Logout**

Figure-14

d) Testing:

Testing any app is a fundamental part of the app development process. By running tests against your app you'll be able confirm your app's functionality, performance, and ease of use before you launched it. Following tests were performed on Madadgar app different interfaces with the help of firebase automated tester [10].(1) Unit testing: Each Functionality was tested separately to confirm that they are fit to use. The main goal was to check individual functionality and responsiveness.(2) Integration Testing: After unit testing some of modules were joint as one part. The tests were performed to know how each module react when its combine with other module.(3)System Testing: In this testing all modules was combine as a whole system and help to check the app overall functionality and performance.

VI- Conclusion

This paper presents novel of MADADGAR(anti–theft) app for android devices.This mobile app is specially for Security Forces. For first time initialization the app will ask user to login/register so his essential information is saved in security forces database. The app will allow the user to lodge complains, call for help through user friendly forms immediately and also track his location whenever the user call for help through SOS-button.

VII- Future scope

In future we would like to increase our domain by implementing this app with sensors.The user will be able to call for help ,by pressing the SOS-button in his locket or ring.The sensor in locket or ring will help security forces to trace his current location.

VIII- Acknowlogdement

The authors would like to acknowledge to all those who guided us for MADADGAR APP. We express our deep sense of gratitude to our Project Supervisor Sir Muhammad Ayoub Kamal and institution IoBM.

IX- REFERENCES

[1] H. Abbas, "Role of Pakistan Police in Counterinsurgency," no. 5, 2008, [Online]. Available: http://www.brookings.edu/~/media/Files/rc/papers/2009/06_counterinsurgency_abbas/06_counterinsurgency_abbas.pdf.

[2] A. Ush, S. Kha, and Z. Aliga, "Anti-Theft Applic," pp. 365–369, 2014.

[3] H. Garg, "Anti -The Application for Lost or Misplaced Android Phones Anti -Theft Application for Lost or Misplaced Android Phones."

[4] A. Salahuddin, "Crime and Institutional Response : A Study of Mobile Snatching and Street Assaults in Pakistan Proposed Framework of Analysis , Review of Literature and," vol. 6, no. 2, pp. 43–52, 2014.

[5] J. Fu, Y. Zhou, and X. Wang, "Component-based permission management of Android applications," *Softw. - Pract. Exp.*, vol. 49, no. 9, pp. 1402–1418, 2019, doi: 10.1002/spe.2734.

[6] K. Xu, W. Zhang, and Z. Yan, "A privacy-preserving mobile application recommender system based on trust evaluation," *J. Comput. Sci.*, vol. 26, pp. 87–107, 2018, doi: 10.1016/j.jocs.2018.04.001.

[7] U. Tunku and A. Rahman, "App To Assist in Emergency Situations Using Best Time," 2019.

[8] H. Maryam, M. Ali, Q. Javaid, and M. Kamran, "A Survey on Smartphones Systems for Emergency Management (SPSEM)," *Int. J. Adv. Comput. Sci. Appl.*, vol. 7, no. 6, pp. 301–311, 2016, doi: 10.14569/ijacsa.2016.070639.

[9] D. A. Alexander and S. Klein, "Kidnapping and hostage-taking: A review of effects, coping and resilience," *J. R. Soc. Med.*, vol. 102, no. 1, pp. 16–21, 2009, doi: 10.1258/jrsm.2008.080347.

[10] S. Groß, A. Tiwari, and C. Hammer, "ThiefTrap -- An Anti-theft Framework for Android," in *Security and Privacy in Communication Networks*, 2018, pp. 167–184.

[11] D. Gogoi and R. K. Sharma, "Android based emergency alert button," *Int. J. Innov. Technol. Explor. Eng.*, vol. 2, no. 4, pp. 26–27, 2013, [Online]. Available: http://goo.gl/V7L6X6.

[12] A. Mohammed, A. Ali, and A. A. Awooda, "Design and Implementation of Anti-Theft Vehicle Tracking System with Android App A Research Submitted in Partial Fulfillment for The تصميم وتنفيذ نظام مضاد للسرقه لتعقب المركبات ب تطبيق اندرويد .Requirement of The Degree of M.Sc. in Electronic Engineering Department of Computer and Network Engineering," 2019

[13] M. Kadibagil, "Position Detection and Tracking System," *IRACST -International J. Comput. Sci. Inf. Technol. Secur.*, vol. 4, no. 3, pp. 67–73, 2014.

[14] B. Liu, N. Liu, G. Chen, X. Dai, and M. Liu, "A Low-Cost Vehicle Anti-Theft System Using Obsolete Smartphone," *Mob. Inf. Syst.*, vol. 2018, 2018, doi: 10.1155/2018/6569826.

[15] Y. Cheon, "Multiplatform application development for android and Java," *Proc. - 2019 IEEE/ACIS 17th Int. Conf. Softw. Eng. Res. Manag. Appl. SERA 2019*, pp. 99–103, 2019, doi: 10.1109/SERA.2019.8886800.

[16] E. Chin, A. P. Felt, K. Greenwood, and D. Wagner, "Analyzing inter-application communication in Android," *MobiSys'11 - Compil. Proc. 9th Int. Conf. Mob. Syst. Appl. Serv. Co-located Work.*, pp. 239–252, 2011, doi: 10.1145/1999995.2000018.

[17] M. A. Kamal, M. M. Alam, and M. S. Mazliham, "Routers Perspective Simulation-Based Analysis of EIGRP and OSPF

Routing Protocol for an Organizational Model," *Int. J. Innov. Technol. Explor. Eng.*, vol. 9, no. 4, pp. 2013–2019, 2020, doi: 10.35940/ijitee.b6509.029420.

[18] M. Kumar, "Serverless Architectures Review, Future Trend and the Solutions to Open Problems," *Am. J. Softw. Eng.*, vol. 6, no. 1, pp. 1–10, 2019, doi: 10.12691/ajse-6-1-1.

[19] M. A. Kamal, H. W. Raza, M. M. Alam, and M. Mohd, "Highlight the Features of AWS, GCP and Microsoft Azure that Have an Impact when Choosing a Cloud Service Provider," *Int. J. Recent Technol. Eng.*, vol. 8, no. 5, pp. 4124–4232, 2020, doi: 10.35940/ijrte.d8573.018520.

[20] I. -, S. M. Ali, M. Alam, and M. M. Suud, "Review Of Security Issues In Internet Of Things (IoT)," *J. Indep. Stud. Res. Comput.*, pp. 1–14, 2020, doi: 10.31645/20.

[21] M. A. Kamal and M. Maknojia, "Camera With live Streaming," vol. 13, no. May 2019, pp. 6–9, 2020.