Authentication Aura to Secure Graphical Password: The Case of Android Unlock Pattern

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Abstract: Multi-Level Lock Application: Privacy Manager using Android Techniques is a concept of Android Application development using which device's security is provided to all the Android users. The term Multi-level means multiple level of security (Type of lock) out of which any one can be activated according to user's choice. Android is a forefront adaptable stage that was planned to be extremely open. Android applications make use of bleeding edge gear and programming, and also adjacent and served data, revealed through the phase to pass on progression and motivating force to buyers. Also there is default inbuilt security system that is provided by Android itself such as Pin password, Pattern password, picture password, etc. These all types of security passwords are very good in their work that is to protect the valuable data of customer. The First level is Touch Pattern, in this level user will select one or several points in some particular manner as a password. In Second level there is Pin password which is also derived from existing application but the algorithm behind this is way more different than that. In this password we use some digits as a password and certain indexes for all those digits given by the user.
Keywords– Security, Usability, Lock, Authentication, Pattern, Architecture

I.   INTRODUCTION

Privacy Manager using Android Techniques is a concept of Android Application development using which device's security is provided to all the Android users [1]. The term Multi-level means multiple level of security (Type of lock) out of which any one can be activated according to user's choice.

Multi-Level Lock means having different layers of locking types that is used to protect the direct access of the Smartphone by an unknown user. The basic concept behind this Paper was to provide security as well as new techniques of lock that cannot be easily cracked down by any unknown user [2].

Android is a propelled versatile stage that was planned to be really open. Android applications make usage of front line hardware and programming, and close-by and served data, revealed through the phase to pass on progression and impetus to clients [3]. To anchor that regard, the stage offers an application circumstance that ensures the security of customers, data, applications, the contraption, and the framework [4].

Tying down an open stage requires incredible security building and careful security programs. Android was arranged with multi-layered security that gives the versatility required to an open stage, while offering affirmation to all customers of the stage. Till now there are several applications that are already built for the security of android device. Also there is default inbuilt security system that is provided by Android itself such as Pin password, Pattern password, picture password, etc. These all types of security passwords are very good in their work that is to protect the valuable data of customer [5].

This Paper is totally based on the existing security apps but with the new algorithms and techniques. By this Paper we try to overcome the disadvantage that we have discussed in above paragraph. We design 3 levels out of which user can use any one of its choice. The First level is Touch Pattern, in this level user will select one or several points in some particular manner as a password. It is not like existing pattern password [6] in which user draw the gesture using those points because that gesture is easy to learn at once by the one who sees you drawing that at the time of unlock. But if you touch several points in some sequence it is difficult to notice all the points and in a correct sequence. In Second level there is Pin password which is also derived from existing application but the algorithm behind this is way more different than that. In this password we use some digits as a password and certain indexes for all those digits given by the user. After that what user has to do is that they have to type a password in which only some digits are checked for the confirmation by checking their respective positions/indexes and rest all other digits can be randomly typed by the user and those random digits can be as long as user wants them. By this way except some digits all the other digits are different every time that make it very difficult for the defaulter to crack it. In third level we create picture password in which we have to choose the correct image among four other pictures [7] [8] [10].

There are many application in the android market which provide security to the mobile i.e. the lock application which provide security to our devices through Pattern lock in which we have drawn a pattern to unlock the phone and there is also number password in which we have to enter the code to unlock devices. All of these provide security until no one seen you entering the pattern or the code in the phone if they see you entering the code then it is very easy for them to unlock your phone in your absence and steal your private information and misuse that information [11].
The application to be made is especially secure from existing application [8] as the application made outfits with various security features, which lets the customer to end up free from strain about their phone's security [10].
Various other new features of application to be developed are
To provide different level of security.
Creative and user friendly interface.
Very difficult to unlock the phone by others.
Best performance.

II.   LITERATURE REVIEW

As per reference [1], the paper "Issues and Security Measures of Mobile Banking Apps" described the various issues and security measures in order to protect the Mobile Apps related to Banking sector. This paper inspects issues on the design, and some security issues of portable web managing an account applications. And afterward this will investigate some safety efforts to manage the related security challenges.

As per reference [2], the research 'Android Application Development & its Security' described the android security framework and concluded that increased exposure of mobile phones is increasing the security risk. This paper analyzes the Android Platform and Android based portable applications advancement and its security. Further this will hope to investigate an Android application accessible in Google play store My Notepad. This application is utilized to spare notes by utilizing simple direct control.

As per reference [3], the research "Shoulder shuffling free graphical locker for Android Graphics Pattern Lock with Text Support for Android Devices" proposed a secure application Android Graphics Pattern Lock which is an improved infrastructure. This paper worked on Android devices which is a graphical pattern lock with text support. This paper will explore the making of more secured touch screen lock for android based systems by means of which user will get the facility to protect their password pattern guess by other people if the people monitoring while user unlocking their device in public place too.

As per reference [4], the paper "A study of Android application security" and introduced the ded decompiler, which generates the android application source code directly from the installation image. This paper looks to more readily comprehend advanced mobile phones application security by concentrate 1100 well known free Android Applications. This paper presents the ded decompiler which recoups Android application source code specifically from its establishment picture. They structure and execute a flat investigation of advanced cell applications dependent on static examination of 21 million lines of recouped code.

As per reference [5], the research "Image Password Based Authentication in an Android System" presented a list of most common behaviour patterns and investigated the possibilities to exploit the standard functionalities. This paper proposes picture secret word or graphical secret word based confirmation framework for android mobiles. Graphical passwords are acquainted as elective methods with printed passwords. This paper joins pictures with hues so as to produce session passwords for confirmation. This is the most essential component of picture secret phrase for example the secret phrase is set through a lot of different pictures.

As per reference [6], the paper "A Secure Screen Lock System for Android Smart Phone using Accelerometer Sensor" in which they showed that how to secure your screen using accelerometer sensor. This paper will give a basic and compelling method of security bolt for the android advanced cells. This paper will makes security bolt and open of an android portable is by shaking cell phones by utilizing Accelerometer sensor which is available in the cell phones.

As per reference [7], The paper on "Recovering Data from Password Protected Data Security Applications in Android Based Mobile Phones" in which they showed how to recover data from the password protected security apps using different methodologies. This paper implies that rather than simply handling the cell phones utilizing Standard Mobile crime scene investigation computerized devices it is constantly critical to perform manual Forensic examination. Standard versatile scientific instruments extricate a colossal measure of information however there is dependably a space for development. Regardless of whether a solitary essential record isn't removed this can demonstrate the culpability or guiltlessness of someone. The exploration inspects the examination of criminological pictures of the memory of cell phone gave striking yield.

As per reference [12], the research paper on "Secret Lock Anti Theft: Integration of App Locker & Detection of Theft using User Pattern" in which they showed that how the security in android based systems can be increased. This paper introduces the different techniques to anchor or bolt the portable utilizing client validation. Client will include various applications into the application for the anchored access. This paper proposes another way to deal with the burglary identification with the utilization of client designs with a Global Positioning System alongside the Short Message Service properties which helps in following the grabbed portable. The technique utilized is the Support Vector machine for User recognizable proof Property.

As per reference [13], the paper "Lockme - Android Security Application" described a number of attacks on Web View, either by malicious apps or against non-malicious apps. This paper builds up an application which will help client of android to make Admin and Guest accounts like other PC based working framework. Security gaps in Android Operating System happen because of the authorization based security demonstrate which isn't appropriately upheld amid framework plan.

III. METHODOLOGY

Product Definition

An application needs a character: a personality that people review and relate to security. A thing with a character transforms into a brand. It causes it rise up out of the untidiness of things and names. A thing should be adaptable: with examples, time and changes in segment, the thing should fit acclimation to make it more relevant.

The application Multi level lock offers property for the user to easily understand the application and enjoy it. Unlock your phone in front of others and yet confident that no one can use my phone in my absence. Since it gives highlights which are straightforward by the client and benefit as much as possible from those highlights to get out the best security framework.

This item guarantees to change with time, inclines and receive new innovations to make it more pertinent and secure. The new innovations which come into the market, our item will without a doubt attempt to adjust to new condition and make it more secure for the client.
This Multilevel lock gives different highlights, which makes it simple to characterize the task in a basic way and make it simple for the client to get it.
To provide multilevel of security,

To provide creative user friendly interface.
Difficult to unlock the phone by others
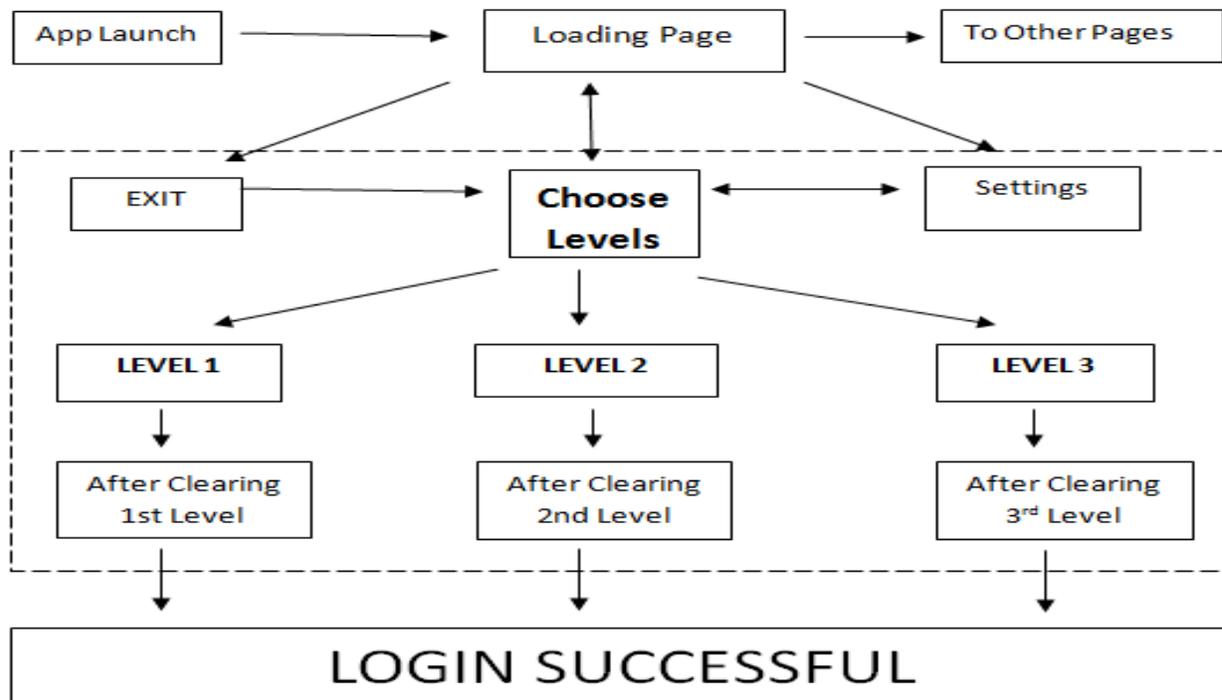Active client bolster.

Fig 1 – Flowchart of Mobile App Lock System

Performance
Since amazing execution is the thing that each undertaking requests, so improvement was finished utilizing the best programming and equipment. Utilizing this entire task could give the best support of clients, make the interface easy to understand, less tedious and no hang up issue.

Cost
Task was sent on android OS so there was no expense for the equivalent.

IV. OBSERVATION

Application Design is the procedure through which the necessities are converted into a portrayal of programming. When the application prerequisites have been examined and indicated, the product configuration incorporates three specialized exercises: structure, coding age and testing. The structure of framework is in particular shape i.e., venture is intelligently parcelled into different segments that perform different capacities and sub capacities. The plan stage prompts modules that show free practical attributes.

Current Status of the Project
We have already hosted our project/app on Google play store. Our Paper consists of lock application. This application contains three levels: touch pattern, pin password and picture password. Currently locking process for all above is in working condition. User only needs to follow the instructions to activate the lock.

A user also doesn't need any type of internet relation to sprint this development once the application is downloaded from Google Play Store. Currently this application is filled of astonishing characteristics listed below:

A simple transparent plan.

Quick overhaul as the size is very small.

Instructions to use with example.

Three type of locking methods.

Interface is straightforward and utilize. It is easy to the point that a beginner can explore effortlessly and utilize our application.

Facility of Security Question in case user forget password.

New techniques are used in this lock app derived from the existing once.

Remaining Areas of Concern

Regardless of the way that we have done our dimension best to make this endeavour as incredible and as screw up free as could be normal considering the present situation. Nevertheless, since there is constantly an expansion for more features, more redesigns, et cetera. There are as yet a couple of regions of concern which can be upgraded in the coming future. We can add boundless features to our undertaking.

Some of the areas of concern on which we can work upon are

We can increase more levels so that user can have more choices to choose from.

We can make our application more adjustable by presenting new alternatives, for example, picture chooser for picture secret word later on. The more option the customer has, the better will be the yield of the application.

More beautiful interface can be built in future which at present is not possible because of lack of proper knowledge of Android programming.

There are some issues related to security of the app when the device is unlocked like this app can be uninstalled directly from the phone like other normal apps.

We can have our application for various OS i.e. right now it underpins Android OS. In coming future we can grow its use by supporting more number of OS like Windows, IOS and so on.

Technical and Managerial lessons learnt

While building up this venture we took in a ton. We got the chance to work upon and learn different new things in various advances. Chipping away at this venture reviewed our specialized aptitudes as well as shown us administrative abilities. The specialized gaining from this undertaking can be condensed in the accompanying focuses:

This venture helped us in reviewing our Java abilities as every one of the rationales are coded in JAVA. In this way we came to think about numerous capacities which we didn't know as of now.

For a UI plan, we have made utilization of XML which is utilized to structure design of the exercises in the task. It has therefore enhanced our insight on the employments of XML. We presently know broad favourable circumstances of XML and that it is so natural to utilize.

Besides utilizing XML we have additionally made utilization of Android parts for planning our application. Along these lines simultaneously, we found out about Android and the tremendous

measure of usefulness that it has. We figured out how much imagination can be connected with the assistance of Android Components utilizing Android SDK.

Specialized learning was by all account not the only result of this task. There was an extensive number of other administrative discovering that turned out amid this venture. Making this task shown us numerous things which will remain with us for the duration of our lives. A portion of the exercises scholarly are as per the following:

The best piece of a gathering venture is that we figure out how to function in a gathering. By dealing with this venture we figured out how to cooperate as a group. This not just made us prepared for our future when we will work in associations yet additionally helped us supplement one another. We took in the significance of solidarity. We additionally figured out how helping each other can improve us and how we can beat an issue effectively being joined together. Sharing our abilities and learning causes we enhance them.

This venture helped us in realizing how minute data winds up valuable for undertaking. On the off chance that we overlook any moment data that can prompt a major blunder in the undertaking.

We likewise figured out how to unhesitatingly confront any issue doesn't make a difference how enormous it is. We discovered that we should remain centred and we can without a doubt discover an answer for every issue.

V. PROJECT ROLES AND RESPONSIBILITIES

TABLE 1: INDIVIDUAL PROJECT ROLES AND RESPONSIBILITIES

Role	Responsibilities	Participant(s)
Collection	Collecting Information regarding the topic.	Pushpender Sharma
Report	Making project report. Responsible for making introduction, project objective, draw figures and tables.	Pushpender Sharma
Testing	Testing of Code	Pushpender Sharma

TABLE 2: INDIVIDUAL PROJECT ROLES AND RESPONSIBILITIES

Role	Responsibilities	Participant(s)
Collection	Collecting information regarding the topic	Tamajit Bhattacharya

Analysis	Analysis of the collected data.	Tamajit Bhattacharya
Report	Making project report. Responsibility of making abstract, review of related works, literature review.	Tamajit Bhattacharya
Testing	Testing of Code	Tamajit Bhattacharya

TABLE 3: TEAM PROJECT ROLES AND RESPONSIBILITIES

Role	Responsibilities	Participant(s)
Report	Made conclusion, future scope, project budget, analyze risk assessment. Made research paper on study and analysis of security algorithms.	Pushpender Sharma and Tamajit Bhattacharya
Implementation	Implementation of code and GUI.	Pushpender Sharma and Tamajit Bhattacharya

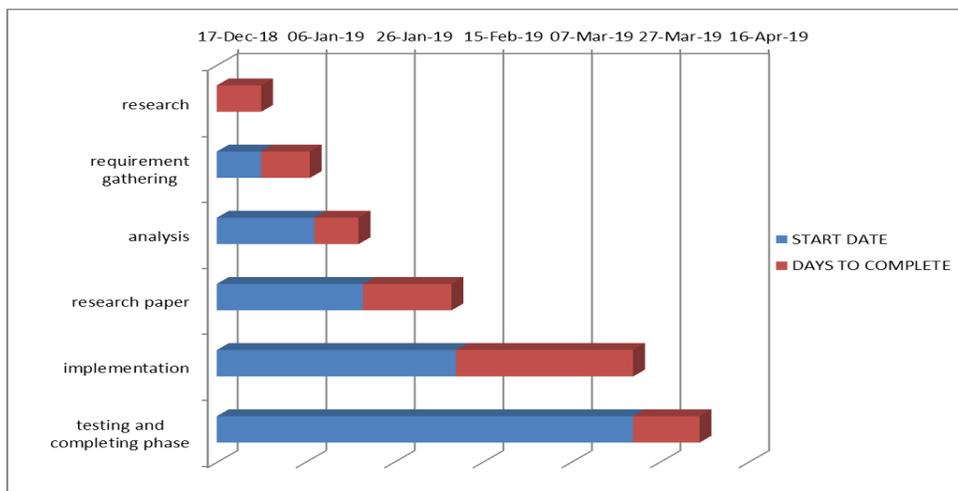## VI. GANTT CHART
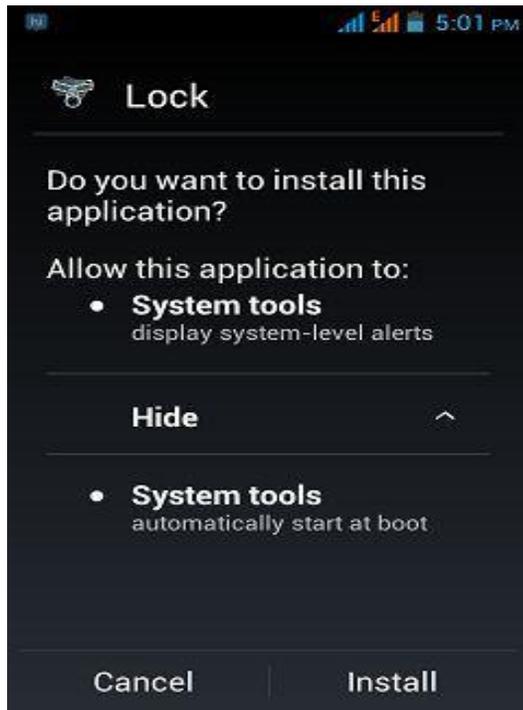

Fig 2 – Gantt Chart

VII. IMPLEMENTATION

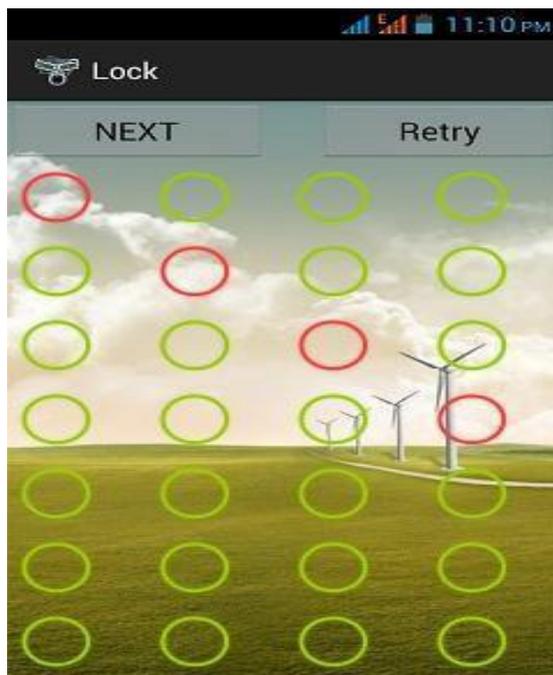Fig 3 - During installation of our Application on android devices

Fig 4 -When you switch ON Level 1 lock   Fig 5 –Confirmation Screen for Level 1

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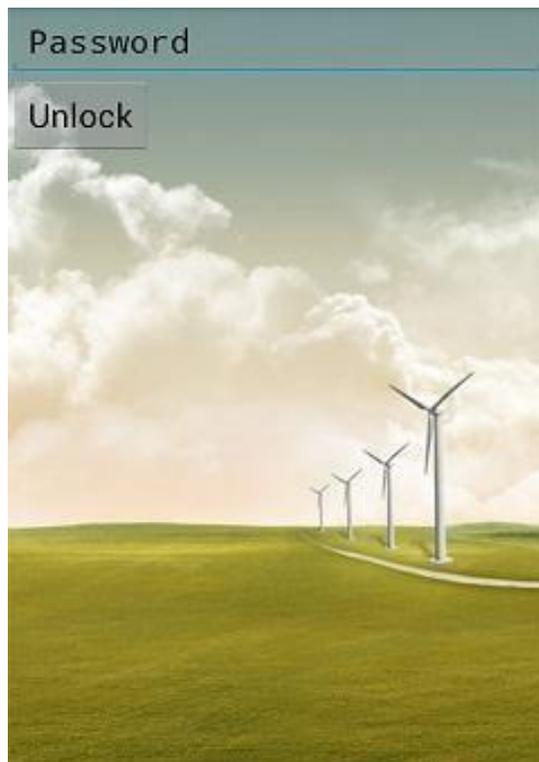Fig 6 - When user switch on the level 2 lock   Fig 7 – After locking Level 2 Lock

VIII. RESULT

This will control you through the use of our android application. It contains all the data about how to utilize Multi-level Locking Application. We have partitioned the assistance manual into 3 sections dependent on 3 modules of our task i.e. Level 1, Level 2 and Level 3. At the point when the application is first introduced and opened then it demonstrate an underlying screen on which there are 3 switches that actuate each level separately.

Testing the Project

1. Level 1

Description: When the user switches on the lock level 1. The appearing screen has circles in it. In which user have to circles and then go to the next activity. So the user cannot go to the next activity without selecting any point and then on confirming page if the user doesn't enter the same password again then user will automatically transfer to the previous page where user have to select the point again.

Tab 4: Testing Results of Level 1

Test Conditions	Expected Result	Actual Result	Status
Doesn't select any point in level first activity	Doesn't Proceed	Doesn't Proceed	Pass
Doesn't match the password on confirm screen	Automatically Transfer to select the points again	Automatically Transfer to select the points again	Pass
Pressing Retry button	User again select the points	User again select the points	Pass
Activation of Lock	Lock is activated through toggle button	Lock is activated	Pass
Exit button	Exit from the App	Exit from the App	Pass

2. Level 2

Description: - When the user switch on the lock level 2. The appearing screen has text bar where user has entered his/her password. The user cannot leave that space blank after click next the user again get a text field where user have to enter the position(the digit of password and the position giving should be equal) and after that the test appears where user have test the password without testing the password user cannot move forward.

Tab 5: Testing Results of Level 2

Test condition	Expected result	Actual result	Status
Password text field cannot be leaved Blank	Not move forward and show error	Not move forward and show error	Pass
Position text field cannot be leaved Blank	Not move forward and show error	Not move forward and show error	Pass
If Digits in password and number of position should not be same	Not move forward and show error	Show error	Pass
Enter wrong password in test Condition	Doesn't move Forward	Doesn't move Forward	Pass

3. Level 3

Description: - When the user switch on the lock level 3. The appearing screen has text bar where user has entered total number of touches user cannot leave the text field blank and after click on the next button the user has to choose a point on image. User cannot leave without selecting any point and then user have to test the password.

Tab 6: Testing Results of Level 3

Test condition	Actual result	Expected result	Status
Position text field cannot be leaved Blank	Not move forward and show error	Not move forward and show error	Pass
Doesn't select any point on image	Doesn't move to next step	Doesn't move to next step	Pass
Enter wrong password in test Condition	Doesn't move Forward	Doesn't move Forward	Pass

IX. CONCLUSION

This will control you through the use of our android application. It contains all the data about how to utilize Multi-level Locking Application. We have partitioned the assistance manual into 3 sections dependent on 3 modules of our task i.e. Level 1, Level 2 and Level 3. At the point when the application is first introduced and opened then it demonstrate an underlying screen on which there are 3 switches that actuate each level separately.

Level 1: Switch ON Level 1
The screen consists of several circles. User has to touch some of the circles and click on Next button and then user have to confirm the circle by again touching the same circles in the same sequence and click Next and now user can activate the Level 1 lock through the Toggle button on the screen and then exit.

Level 2: Switch ON Level 2
The screen consists of text bar written enter your password there you have to enter your password and click next on the next screen you get another text bar written enter position for password digit i.e. on which position you have to enter your password digit (if password is of three digit then there are three position for each of digit of the password) and click next button on the next screen you have to test your password. After successfully tested the password you automatically transfer to the next screen where you have to activate the lock through toggle button and then press exit button.

Level 3: Switch ON Level 3
The screen consists of image where you have to touch and click on the next button. A text bar written enter number of touch there you have to enter number of touches for unlocking the phone and click next on the next screen there is a test screen where you have to test your password. You have to touch randomly on the screen number of times that you give on previous screen and out of those touch one touch should be correct which you choose on the previous screen. After successfully tested the password you have to activate the lock through toggle button and then press exit button.

X. FUTURE SCOPE

The future scope of this Paper "Privacy Manager using Android Techniques" application is very wide. There are many features which are planned to be incorporated during the future enhancement of this project.

Although all the main objectives according to SRS document have been achieved but still there is room for enhancement.

This application can be easily update in the future. And also include many more features for existing system.

We can enhance the multiple picture lock.

In future we enhance security to at least 8 digits lock.

We are also working for voice based lock.

In near future we make it internet connectivity.

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