



Implementation of Color based Android Shuffling Pattern Lock

**Adarsh Singh¹, Ankit M. Dighraskar², Krutika R. Fulkar³,
Megha B. Murkute⁴, Nikunj A. Prajapati⁵, Mr. S.B. Lanjewar⁶**

¹UG Student, B.E., Computer Science and Engineering, DBACER, Nagpur, Maharashtra, India

²UG Student, B.E., Computer Science and Engineering, DBACER, Nagpur, Maharashtra, India

³UG Student, B.E., Computer Science and Engineering, DBACER, Nagpur, Maharashtra, India

⁴UG Student, B.E., Computer Science and Engineering, DBACER, Nagpur, Maharashtra, India

⁵UG Student, B.E., Computer Science and Engineering, DBACER, Nagpur, Maharashtra, India

⁶Assistant Professor, Computer Science and Engineering, DBACER, Nagpur, Maharashtra, India

¹ adarsh0502singh@gmail.com; ² ankit.dig1993@gmail.com; ³ krutikaf19@gmail.com;

⁴ megha.murkute3@gmail.com; ⁵ prajapati.nikunj.123@gmail.com; ⁶ sangharsh.123@gmail.com

Abstract— *To increase convenience and portability, the devices used for IT services have changed from big immovable machines to mobile devices such as smartphones and tablets. Due to increased use of smartphones for every purpose including storing important personal data, they require a better security. Belonging to the twenty first century, the era of data security where new security schemes are being developed by scientists and engineers every day. Currently we are using pin lock, alphanumeric lock, pattern lock and some other locking applications.*

These days when talking about data security the applications currently being used somewhere lag to fulfil the requirement to some extents.

This idea introduces a new innovation in the field of data security that is an application with improved features such as locking with the help of some colors arranged in the circular pattern and shuffling every time when applied. The applications which use number based authentication scheme or a fixed point based android like pattern scheme are prone to the shoulder surfing attacks, which is a type of password guessing using social engineering as a hacking tool'. [2]

Keywords— *“Android, Security, Shuffling, Smartphone, Authentication, Pattern Lock”*

I. INTRODUCTION

These days we can find many cases of data stealing by the attackers for making their own profit by using the hacked (stolen) data. When talking about different types of attacks on personal data of users and precautions against them, there are many possible ways for both. Manually input passwords are the most commonly used security schemes in daily use applications. It has been scientifically proven that human brain chooses a psychologically weak password, as they face problem remembering strong ones, which can easily be guessed by shoulder surfers. Then came the pattern scheme in existence which is the most used security scheme till the date for security in mobile devices. Also the bio-metrics are being used on a large scale level such as banks, defence etc. but when it comes to personal use, it cannot be preferred due to its very high cost. Apps related to networking services (i.e. chatting, social-networking, e-mailing, net-banking etc.) are more prone to attacks as

they contain more important information. In this we propose an upgraded (innovative) idea related to android app locking with the help of 6 color block pattern arranged in circular user interface. The color sequence of the pattern gets shuffled every time when the locked application is given an attempt to open.

II. RELATED WORKS

A. PIN Lock

It is most basic idea of security application. A PIN generally consist of a combination of 4-digit (from 0-9999) strong enough not to be guessed by anyone. It is very commonly used in smartphones to lock applications and even the screen of the phone. In order to unlock a locked application, the user applies the same no. sequence (4-digit PIN) which can easily be remembered by someone if once noticed. [4]

B. Alphanumeric lock

Alphanumeric password is somehow similar to PIN but provides a higher level of security with a combination of numbers and alphabets and hence the name given to it. But when technically speaking it becomes more risky as the users apply the passwords related to their real lives such as their date of birth, pet name, name and many more which becomes very easy for the shoulder surfers or someone known to the user to guess the password. [1]

C. Pattern lock

After finding the vulnerabilities of Pin and Alphanumeric locking scheme, an advanced scheme was introduced for security in smart- phones. Pattern security scheme gives a facility of complex formation or pattern to the user. It consist a User Interface having 9 dots arranged in 3*3 matrix. Instead of remembering passwords the user just have to remember the formation applied to lock the application.

Even by using a 3*3 matrix of 9 blocks (dots) which gives a complex formation for higher security, It becomes very easy for the attackers (or the people around the user) to guess the pattern formation by continuously noticing the hand gestures when the user is applying the pattern to the locked application.

D. Bio-metric lock

Biometrics need the biological information of the user such as thumb-finger impression, face structure, voice pitch and toning and retina size and color. All these need an external hardware and a big database to manage a successful secure application. The hardware needed is very costly and needs a very high maintenance. [3]

III. PROPOSED PLAN

After referring various studies and implementations related to data security application, we found certain limitations. So to resolve the previous issues, we bring out an idea related to pattern locks. At the initial stage, we tried to apply it on the basic 3*3 matrix, each block having different color. But, when we came to the next stage i.e. shuffling we encountered to a problem of bypassing the block that comes in between the application of fixed color sequence, which cannot be practically implemented. Further studies brought up the solution, in which we will use six color block arranged in a form of circle instead of a 3*3 matrix. The basic idea of the circular UI is that, after the formation of the color sequence applied while locking the application, when the application is opened next time the position of colors will be changed but the same sequence of the color must be applied which becomes easy in the circular arrangement of the colors. The shuffling of colors gives a new formation every time it is applied, which provides better security to data.

IV. WORK FLOW

The work flow diagram shows the two processes:

A. Save the pattern and lock applications

First flow describes the initialization of the locking applications for the first time the user have to create the pattern and go through conformation of that pattern and then select the applications which needs security. The sequence will be saved.

B. Opening of the locked applications

In the second flow, when the locked application will be opened the same UI of six color blocks will appear to apply the formation but this time the colors will be shuffled which will create a new pattern having the same sequence of colors. This sequence will be then compared with the sequence saved, if the pattern does not match the position of the colors will be shuffled again and user will have to input the pattern. If the pattern matches, the application will be unlocked.

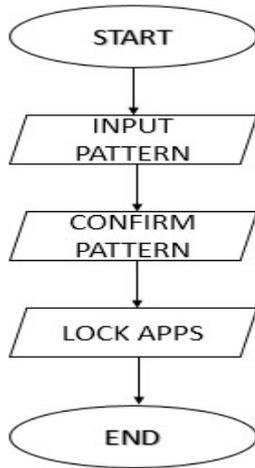


Fig -A: Save the pattern and lock applications

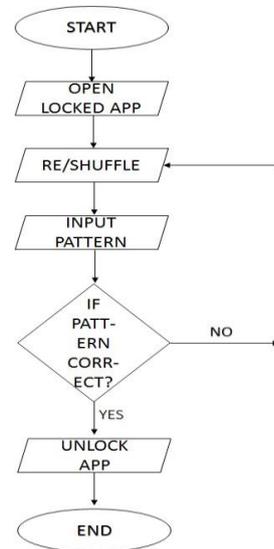


Fig -B: Opening of the locked applications

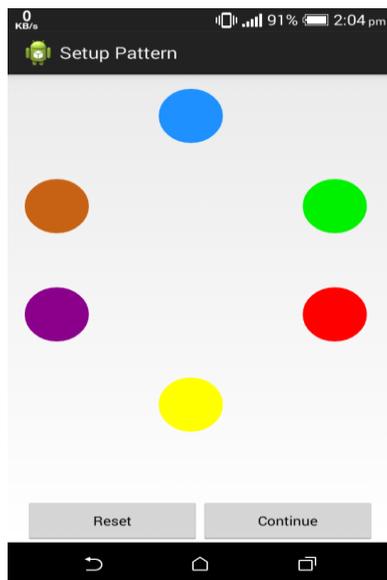
V. IMPLEMENTATION

A. Lock Setup and Security Questions:

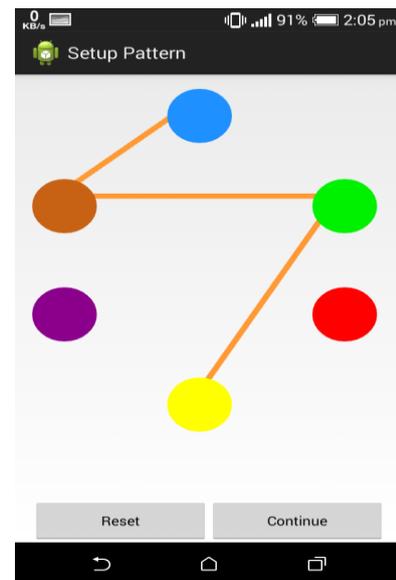
1) Lock Setup

After the installation of the application, it will first ask for the setup of the lock screen. The setup of the locking include two steps that are:

- a) Lock (Color Sequence) creation
- b) Lock (Color Sequence) confirmation.



(a)

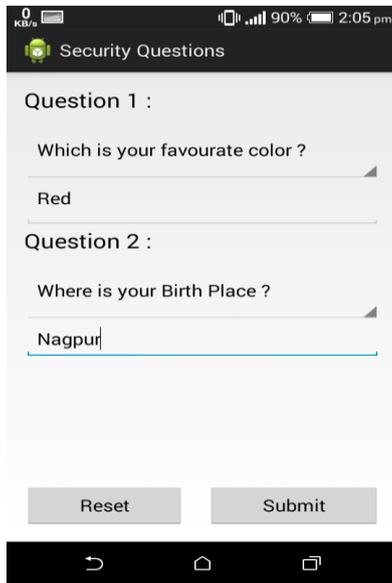


(b)

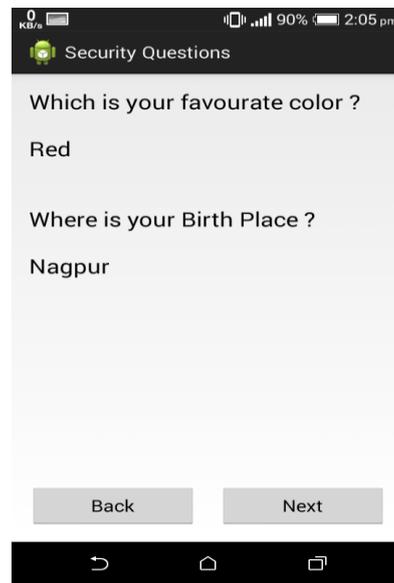
2) *Security Questions*

After confirmation of the color sequence, security questions will be asked for the future use. Security question setup includes the following two steps:

- a) Selection of security question from drop down list and manual input of the answers.
- b) Display of the selected security question and its answer.



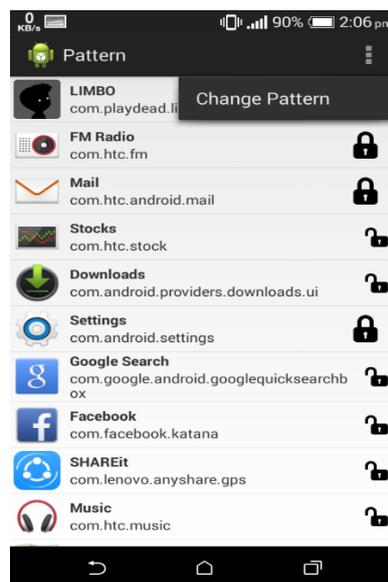
(a)



(b)

B. *Selection of applications for locking with change pattern option*

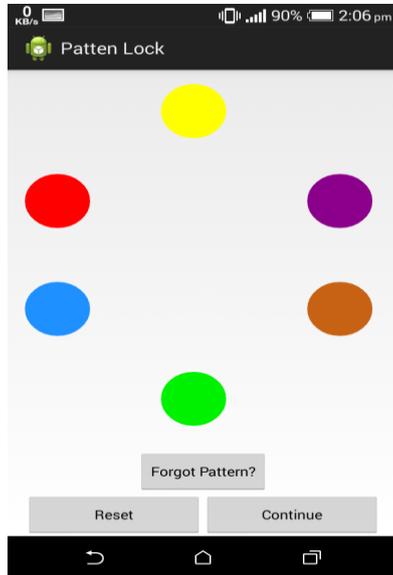
This section list out the all the applications installed on the device on which this application is installed. User needs to select the applications which he wish to lock. The applications can easily be locked by just initializing the lock/unlock button given in front of the name of applications.



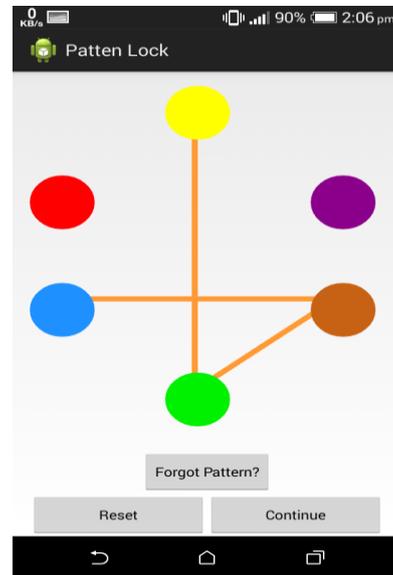
C. Unlocking the locked applications

Whenever a locked application is given an attempt to unlock, the pattern lock screen appears with a shuffled positions of the colors.

- a) Shuffled positions of the colors
- b) Pattern formed after shuffling of colors (having same sequence as saved while lock setup).



(a)

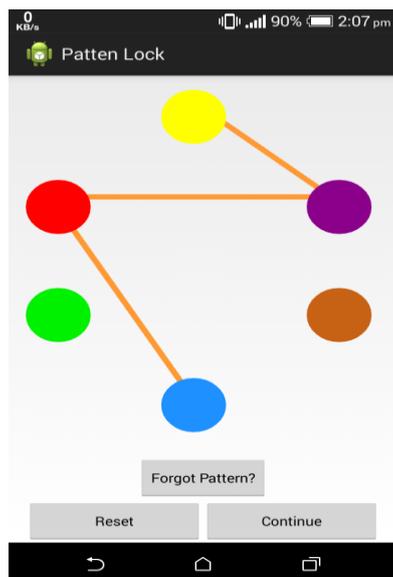


(b)

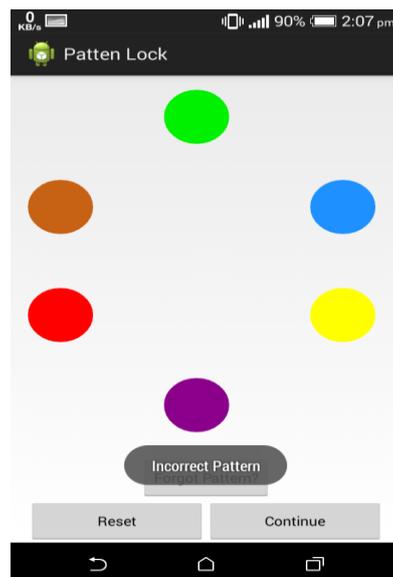
D. Incorrect Pattern

This section includes the condition of incorrect pattern, if the color sequence applied by the user is incorrect, the position of colors again get shuffled and gives a toast of incorrect pattern.

- a) Incorrect pattern as input
- b) Re-shuffled color position having toast of invalid pattern.



(a)



(b)

VI. CONCLUSION

In this work, we analyzed the problems in current locking schemes and suggested improvement of the authentication systems for Android smartphones. By using the concept of pattern locks, we implemented the system having circular UI of color blocks for pattern formation. This scheme provides a higher level security with the help of random shuffling of the color blocks whenever the locked application is given an attempt to open. The use of this advanced locking scheme provides better security to information.

REFERENCES

- [1] Prof. V.J. Kadam, Taj Mohammad A. Raheman, Ajinkya Ajagekar and Sushant B. Patil, “*Shoulder shuffling free graphical locker for android graphical pattern lock with text support for android devices*”, IJARCH, Volume 4, Issue 3. 2013.
- [2] Deepika Jyoti and Dr. Amandeep Verma, “*Enhancement of the security of pass-go pattern password using shuffling grid-shapes*”, IJIRCCE, Volume 2, Issue 11. 2014.
- [3] Kwang Il Shin, Ji Soo Park, Jae Yong Lee and Jong Hyuk Park. “*Design and implementation of improved authentication system for android smartphone users*”, 26th International Conference on Advanced Information Networking and Applications Workshops. 2012.
- [4] Ms. R. Srilekha and Mr. D. Jayakumar, “*A secure screen lock system for android smart phones using accelerometer sensor*”, IJSTE, Volume 1, Issue10, 2015.