

AUTHENTICATION TECHNIQUES FOR ENGENDERING SESSION PASSWORDS WITH COLORS AND TEXT

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Abstract – A highly severe menace to any computing device is the impersonation of an authenticate user. The most frequent computer authentication scheme is to use alphanumerical usernames and passwords. But the textual passwords are prone to dictionary attacks, eaves dropping, shoulder surfing and social engineering. As such, graphical passwords have been introduced as an alternative to the traditional authentication process. Though the graphical password schemes provide a way of making more user-friendly passwords, while increasing the level of security, they are vulnerable to shoulder surfing. To address this problem, text can be used in combination with the colours and images to generate the session passwords, thereby making a stronger authentication means. In general, session passwords are those that can be used only once and for every new session, a new password is engendered. In this paper, we have proposed two authentication schemes for generating the session passwords which is identified as the primary level of authentication. Once the user has cleared the primary level, he is then allowed to deal with the secondary level of authentication involving a graphical password scheme. This method is most apposite to the PDAs besides other computing devices, as it is resistant to shoulder surfing.

Keywords – Authentication; dictionary attack; shoulder surfing; session passwords; pair-based authentication scheme; hybrid textual authentication scheme; draw-a- secret.

I. INTRODUCTION

The most popular user authentication approach is the text-based password scheme in which a user enters a login name and password. Despite of its wide usage, the textual passwords have a number of short comes. The simple and straightforward textual passwords are easy to remember, but they are more vulnerable for attackers to break. Whereas the complex and arbitrary passwords makes the system more secure, resisting the brute force search and dictionary attacks, but the difficulty lies in retaining them [1]. Besides this, textual passwords are liable to the shoulder-surfing, hidden cameras, and spy-ware attacks.

Consequently, graphical password strategies have been introduced as a substitute for textual passwords schemes, as pictures can be easily remembered when compared with words. Furthermore, it is difficult to formulate automated attacks for graphical passwords. Moreover the password space of the graphical password scheme may extend that of the textual based password schemes and hence probably providing a higher level of security means [2]. On the account of these reasons, there is an intensifying interest in the graphical password methods.

However, most of the existing graphical password authentication methods suffer from shoulder-surfing, a known hazard where an intruder can scrutinize the password by recording the authentication session or through direct surveillance. In addition, setting up a system that offers the graphical authentication schemes is substantially costlier than the text based password methods. Even though some of the graphical password

procedures resistant to the shoulder surfing are proposed, yet they have their own downside like usability issues or consuming additional time for user to login or having tolerance levels [3].

Based on these various reasons pointed out, session passwords are instigated. Session passwords are those that can be used only at that particular instant. As soon as the session expires, the password is no longer valid. As such the user, keys in distinct passwords each time he logs into the session.

In this paper, we have designed a project whose objective is to provide security to the confidential files residing in system. Here, any user who needs to the access those files has to first get registered by the administrator (admin) of that particular organisation. The registered user is then allowed to login using session passwords through either of the two authentication techniques that have been proposed in the forthcoming sections [4]. Subsequently, the user is allowed for graphical authentication scheme. If the user is ascertained as the genuine person then he is given the rights to access the confidential files or else he is regarded as malefactor.

The rest of the paper is organized as follows. Section II describes about various existing graphical authentication schemes. Proposed project work is depicted in Section III. Section IV gives conclusion to the paper. Future Scope is pointed out in Section V.

II. RELATED WORK

Word-based passwords introduced in the early years are subjected to various attacks as mentioned in the former section. Besides this, many graphical

authentication schemes have been evolved based on the requirements and the pitfalls associated with the prior existing authentication methods. Let us have a brief description of the various prevailing and proposed graphical authentication methods.

Blonder [5] proposed a graphical password technique, in which the password is generated by allowing the user to click on different positions on an image. During authentication, the user has to click on the estimated areas of those locations. Later, this idea was prolonged by 'pass-point system' where the predefined boundaries are excluded and arbitrary images are supported. Consequently, for constructing password, the user can click over any region on the image. A tolerance around each chosen pixel is evaluated. To be authenticated, the user has to click within the tolerance level of the pixels chosen.

Syukri [6] designed a scheme in which authentication is carried out by sketching out the user signature with mouse. This scheme involves two levels, registration and verification. While registering, the user draws his signature using mouse, the system then extracts the signature area. During the verification level, it acquires the user signature as input, performs normalization and finally extracts the parameters of the signature. But this scheme is associated with several disadvantages such as forgery of signatures, inconvenience while drawing with mouse, difficulty in sketching the signature in the same perimeters at the time of registration. Besides this, a new graphical authentication method has been designed by Dhamija and Perrig[1]. This method, while creating the password allows the user to select certain number of pictures from a set of random images. Then, during login, the user has to recognize the preselected portraits from the set of images. But this method is liable to shoulder-surfing.

Passface[7] is an approach proposed by the Real User Corporation in which the user is allowed to choose four images of human faces from the face database as their password. During the verification phase, the user is provided with a grid of nine faces, one already chosen during the registration and eight decoy faces. The user

identifies the selected face and clicks anywhere over it. This course of action is repeated for four times, and the user is ascertained as genuine if he recognizes all faces accurately.

A new innovative authentication scheme is proposed by Jansen [8, 9] for mobile devices. While creating the password, the user chooses a theme of snapshots in thumbnail size and the sequence of those snapshots is fixed as password. As each thumbnail is associated with numerical value, the sequence of images form numerical password. The only drawback with this method is that the password space is not large, as no of images is limited to 30.

To overcome shoulder-surfing challenge, many methods have been proposed. One of such technique is designed by Man, et al[10]. In this system, the user selects many portraits as the pass objects. Each pass object is allotted an inimitable code. During the verification process, the user has to input those unique codes of the pass objects in the login interfaces presented by the system. Though the scheme resists the hidden camera, the user has to memorize all pass object codes. In this way, many other graphical authentication schemes and their drawbacks are presented in a latest survey paper [11].

III. PROJECT WORK

The project illustrated in this paper is entirely based on the idea of session passwords. Here, the main objective of this project is to provide security to the confidential files, folders in computing devices through session passwords. It includes 3 phases: registration, primary level authentication, secondary level authentication (draw-a-secret). The process of figuring out the validate person is accomplished in the following manner:

3.1 Registration

When we run the application, a login form turn up, allowing the user to enter the username. The form appeared consists of three buttons-register, login, close.



Figure1: Login Screen

If the user is already a registered one, then clicking on the “login” button would advance him to the second phase of the application. If the user is not a registered member, then on doing the above action would generate a message box conveying “username doesn’t exist”. Thus,

in order to make use of the application, the person must get registered by the admin.

Consequently, on clicking the “register” button on the login form would display a window allowing the user to enter his mobile number. On submitting the mobile number, a password is directed to his mobile by the admin.



Figure 2: Form for entering password directed to mobile

Then, the user has to write down the password in the interface shown subsequently, and has to click on the “register” button below that interface. On doing so, registration form appears.

Thereafter, the user enters textual password whose minimum length is 8 and it contains even number of characters. If the user violates this protocol, then a message box expressing the fault with the textual password is displayed. This password is to be

remembered as pair-based password, also known as secret pass. Besides this, the user has to rank the colors portrayed as color grid of 8 colors in the registration form. The rank (from 1 to 8) associated with each color has to be remembered as the hybrid textual password. Along with these, graphical password (draw-a-secret) using the 3X3 grid is sketched. Moreover, basic details like first name, last name, mobile number and email-id are submitted by the user.

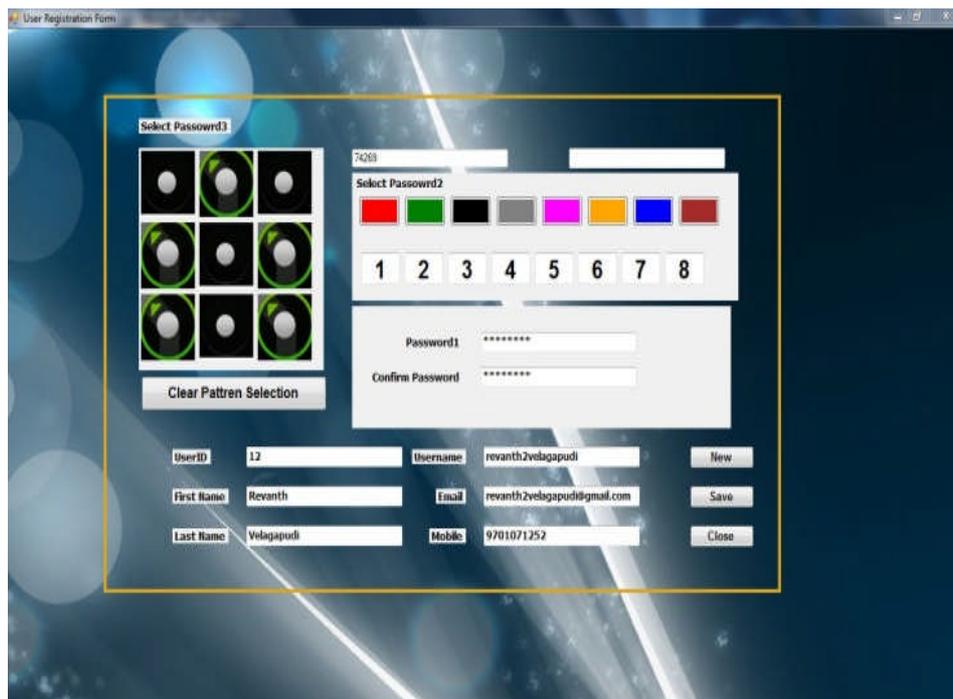


Figure 3: Registration Form

Clicking the “new” button in the registration form would automatically generate the user-id based on the existing users. On ticking the “save” button, all the information inserted by the user is stored on to the database. Thereby, again the login form is displayed, where the user now clicks on “login” button advancing him to the second phase of the application.

The users who are allowed to proceed to the primary level authentication are generally of two types: admin and users registered by the admin. Both are permitted to follow the same approach for the primary level authentication. Ticking the “login button”, a window is displayed presenting the two modes namely, pair-based authentication scheme and hybrid textual authentication scheme for validating the primary level.

3.2 Primary Level Authentication



Figure 4: Login Selection Window

The user can then select any one of the methods that is convenient for him in order to clear the primary level authentication. There is “return to login” button which on clicking would move back to the login screen. The “close application” on the top right corner is used for closing the application.

In the course of registration, the user submits the secret pass. The minimum length of the secret pass is 8 and it should contain even number of characters. During the primary level authentication, when the user chooses the pair-based authentication scheme, an interface consisting of 6X6 grid is displayed. The grid contains both alphabets and numbers which are placed at random and the interface changes every time.

3.3 Pair-based Authentication Scheme

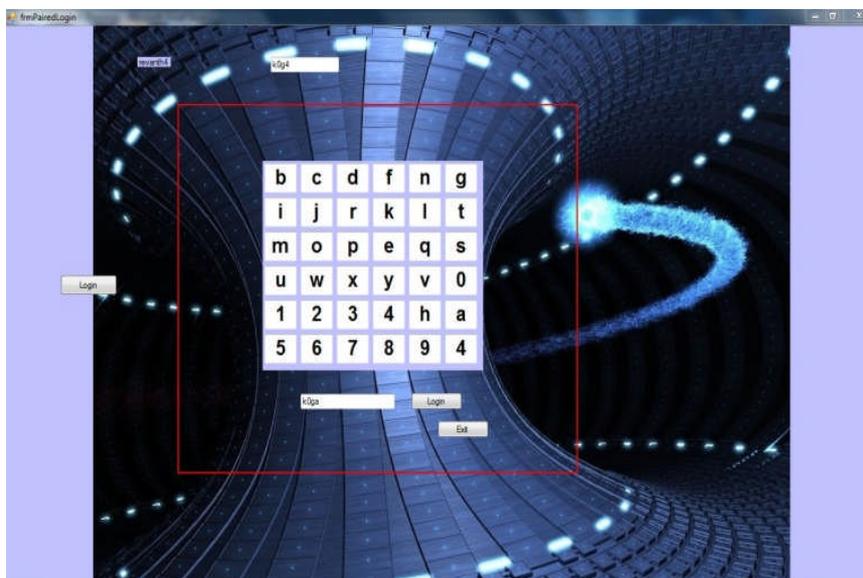


Figure 5: Pair-based Login Screen

The mechanism involved in the pair-based authentication scheme is as follows: Firstly, the user has to consider the secret pass in terms of pairs. The first letter in the pair is used to select the row and the second letter is used to select the column in the 6X6 grid. The intersection letter of the selected row and column generates the character which is a part of the session password. In this way, the logic is reiterated for all other pairs in the secret pass [4]. Thereafter, the password inputted by the user i.e. the session password is now verified by the server to authenticate the user.

3.4 Hybrid Textual Authentication Scheme

During registration, the user gives rankings (1to8) to colors in the color grid which is considered as the hybrid textual password.

In primary level authentication, when the user selects the hybrid textual authentication scheme, an interface is displayed. The interface consists of 8X8 number grid in which numbers from 1 to 8 are placed haphazardly. In addition to this, a color grid is also displayed containing 4 pairs of colors. Both these grids changes for every session.

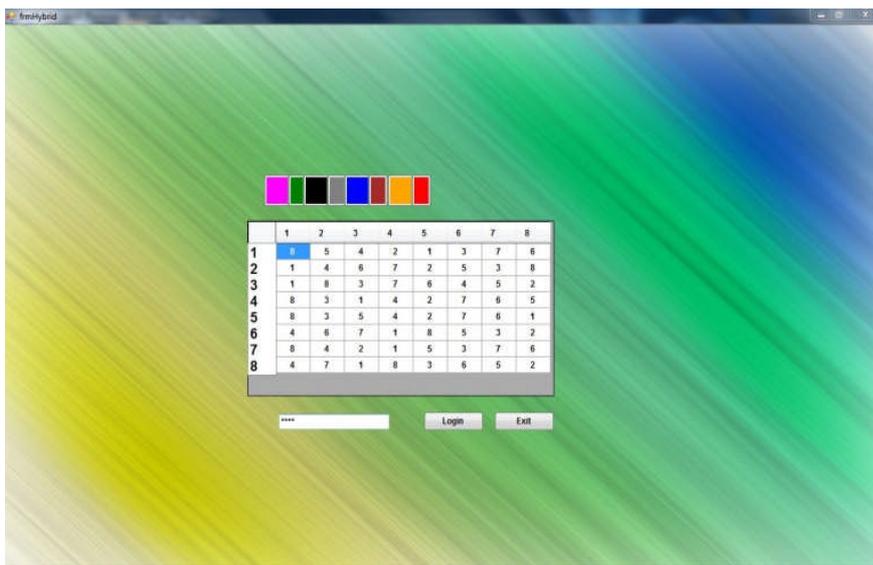


Figure 6: Hybrid Textual Login Screen

The logic involved in this scheme is that the rating given to the first color of every pair represents a row and the rating given the second color in that pair represents a column of the 8X8 number grid. The number in the intersection of the row and column of the grid is the part of session password. This procedure is repeated for the remaining color pairs in the color grid [4].

In both the cases, if the session password entered by the user is correct, then he is permitted to face the

secondary level authentication. Otherwise, the user is prompted to re-enter the session password according to the secret pass and hybrid textual password.

3.5 Secondary Level Authentication (Draw-a-secret)

In this phase, the process of authentication is different for admin and the registered users. Initially, for both the types of users, a 3X3 grid consisting of dots is shown.



Figure 7: Draw-a-Secret Login Screen

The user has to draw a sequence, known as draw-a-secret joining the dots [12]. In case of a normal registered user, if the sequence drawn during authentication matches with the sequence drawn during the registration phase,

then the user is given the permission to access the confidential files. He can even change the passwords if he wants to do so.



Figure 8: User Privileges to Confidential Files

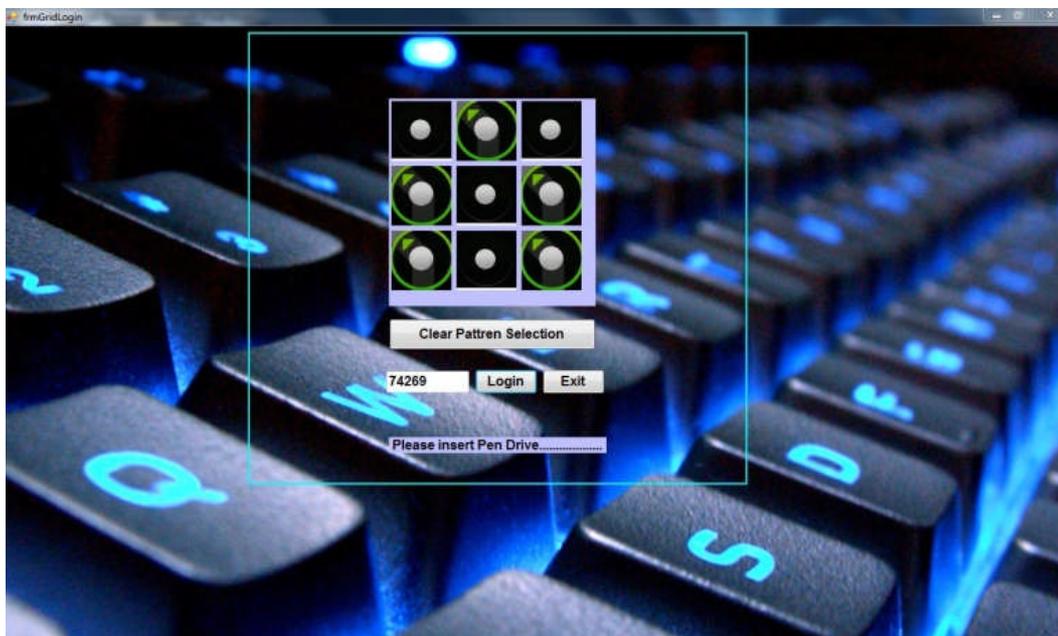


Figure 9: Message showing admin to insert Pen Drive

Whereas in case of the admin, once the sequence matches, then a message is shown requesting to insert the pen drive to the system.

A file containing the password is made hidden in that drive. If that password is identical to that written in the back-end instructions, the admin is given the privilege to view, update and perform various operations on the files as shown in the above figure. In case, if the pen drive is lost, then clicking on the “lost drive” button, the

password is sent to the admin mobile phone. Now the admin can use a new pen drive having the file with the password sent to mobile, again in hidden mode.

For both the types of users, if the draw-a-secret is wrong, then a message “sequence doesn’t match” is indicated to the user. Thereby, the user would click on “clear the selection” button and would make another try.

In this way, security is given to confidential data in an organization, thereby giving the access rights only to the certain set of employees in it.



Figure10: Admin Privileges for Accessing Files

IV. CONCLUSION

Generally, there are many drawbacks associated with the textual passwords such as brute-force and dictionary attacks. Similar is the case with the graphical passwords which includes shoulder-surfing and are very expensive to implement. As such, we have proposed the idea of utilizing session passwords for authentication. For this purpose, we had made use of both the textual and graphical password techniques. In this paper, we have implemented two authentication techniques (pair-based authentication scheme and hybrid textual authentication scheme) for engendering the session passwords. Associated with these techniques is the draw-a-secret graphical method employed for security issues.

V. FUTURE SCOPE

In this paper, two authentication techniques based on text and colours are proposed for PDAs. These techniques generate session passwords and are resistant to dictionary attack, brute force attack and shoulder-surfing. Both the techniques use grid for session passwords generation. However these schemes are completely new to the users and the proposed authentication techniques should be verified extensively for usability and effectiveness. These techniques can also be developed as windows application such as a folder locker or an external gateway authentication to connect the application to a database or an external embedded device.

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