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Research paper

Internal scrambled virtual keyboard for password protection

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Abstract

Due to the Wide Growth of Internet the Electronic Commerce and Transactions is also Increasing. Numerous Companies have built up their web based exchanging stages Such as Banking Portals, Online Shopping, Ticket Booking and so forth. Many of these platforms are Providing Virtual Keyboard for making the Authentication of user more Secure. But the Virtual Keyboard is also having some drawbacks which the attackers make take as an advantage. A few of these consolidate Click based Screenshot Capturing and shoulder Surfing. To Maintain a strategic distance from these disadvantages, we require to outline Virtual Console which will change the Position of Keys on console for each on click activity and each key will have a fallacy value through a Rotation Pattern i.e the key which is pressed is not the actual key value, the user only knows the Actual Position of the key. So, the Screen Captures or Screen Recordings will not have the capacity to discover the Actual key. Our Proposed Framework makes the utilization of virtual console more Secured for clients through Key Rotation Technique.

Keywords: *Authentication; Key Logging; Screenshot Capturing; Security.*

1. Introduction

At present internet has become a part of our Daily life because many Services are being offered Online. We need not bother about some activities like reading newspaper and information related searching etc. But we are making many Transactions Related to Payments like Banking, Bill Payments, and Shopping through our cards. Sometimes Sensitive information like user Credentials may be Stolen as many keyloggers and Trojan Horses are being Developed and being as a huge threat to the security which may result in huge economic losses of the customer or may be the service provider.

To avoid such problems many banks are providing virtual keyboard for protecting the credentials of the user. But these virtual keyboards will not be resist to screen capturing etc. Hence a Key scrambling Technique is proposed in the paper to enhance the protection for the user from Screen Capturing. [1].

2. Password stealing methods

There are many ways of Password Stealing Techniques like Phishing attack, Key loggers etc. Keylogging is Recording of Computers keystrokes. In this section we are describing possible ways in detail.

2.1. Kernel/driver key loggers

Kernel keyloggers will be at kernel level to receive the data directly from an input device (typically, a keyboard). After that it will Replace the core software for interpreting keystrokes. It can be programmed in such a way that it is virtually undetectable by taking advantage of the fact that it is executed during boot, before start of any user-level applications. As the program runs at the kernel level, one disadvantage in this approach is it fails to capture the autocomplete passwords (i.e which are already stored in system cache), as this information is passed in the application layer.

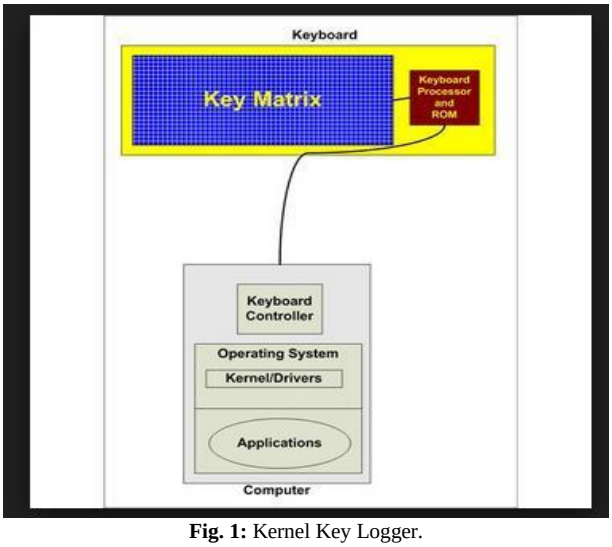


Fig. 1: Kernel Key Logger.

2.2. Hardware key logger

Hardware Key loggers are small circuit devices which are connected between the computer and keyboard. All keystrokes are Recorded and stored in its internal memory. It is having an advantage that they need not be installed on the system, but it is easy to detect their presence by observing.

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Fig. 2: Hardware Key Loggercaptured Data Will Be Sent to the Hacker's Mail or Database. So We Can Observe That the Virtual Keyboard Is Also Not Sustainable for Such Attacks.

2.3. Trojan horse

Trojan is a malicious computer program which will mislead users for its true intent. Trojans will capture the Keystrokes and store them somewhere in the System and send them back to the attacker. As they work on the background it is difficult for the user to detect their presence. The Trojan Horse generally consist of two files EXE file to install and trigger the DLL file to work and DLL file for recording some files in the computer.

2.4. Phishing

Phishing is a sort of deception aiming to take your imperative person data, for case, charge card numbers, passwords, account data, or other information. It depends on the way that drawing closer a broad number of people for this information, will dependably trap no less than few people. In a phishing try, the attacker would regularly make a circumstance where people believe that they are overseeing an affirmed gathering, for case, their bank. The attacker will at that point approach the casualty for sensitive information, for case, charge card information. Very a bit of this development is robotized, and the objective is commonly endless clients.

3. Virtual console

Virtual Console is a Program Innovation which is developed to sidestep secret word taking assaults which are done through key loggers and Trojans and so on.
The input of keys can be done through using a touch screen or by using mouse on click events. Then the keys will be entered in the text area. This is how a normal traditional Virtual Keyboard works for the protection of Sensitive information. [2].

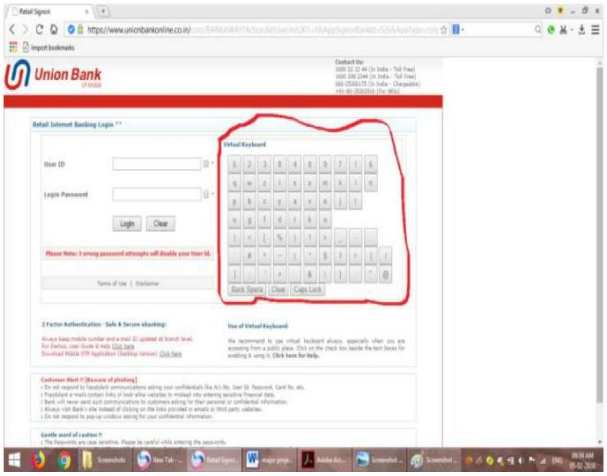


Fig. 3: Existing Virtual Console on Banking System.

3.1 Drawbacks of virtual console

But the Virtual Keyboard is also having some drawbacks which the attackers make take as an Advantage. Some of these include click-based screenshot capturing and Shoulder Surfing. All the Fig. 2 Hardware Key logger captured data will be sent to the hacker's mail or database. So we can observe that the virtual keyboard is also not sustainable for such attacks.

4. Scrambeld virtual keyboard

To avoid the disadvantages of a traditional virtual keyboard such as Screen capturing Scrambled Virtual Keyboard is proposed in this paper.
All the keys will be generate dynamically when the page is loaded and for every onclick action. Users have to press a fallicy value for every required keystroke. Suppose if the key is say "m", user has to press second key to the left of m when the rotational value is fixed as two. We have built a prototype of such proposed keyboard which is shown in the below figure.



Fig. 4.1: Virtual Keyboard.



Fig. 4.2: Virtual Keyboard.

Here we can see the key pressed is P but the value enter is L. In the above for explaining we have kept the type of input as text instead of password for better understanding. As the user only knows the actual key value of every key the hacker will not be able to known the Credentials of the user though he may be having

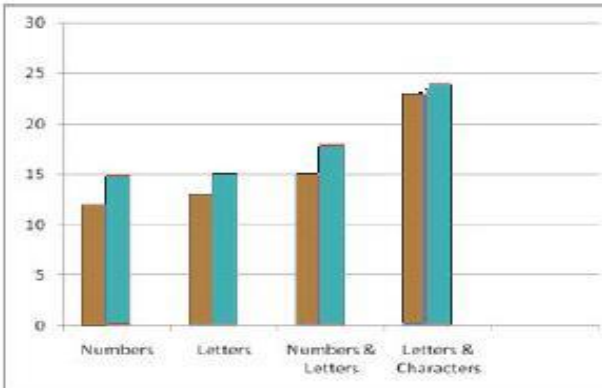
the Screenshots as well as Screen Recording. For user simplicity the division of keyboard will be further made into five divisions so that each row will be having same as in the normal keyboard but in a random order.
In the above mentioned figure's the input type is defined as text for better understanding but This is how the actual virtual key-board will look like, the input type will be password instead of text.



Fig. 4.3: Virtual Keyboard.

5. Analysis of scrambeld virtual con-sole

The Scrambeld Virtual Keyboard Requires some additional time for performing the required action as the actual key value will be presented beside of another key during the event is going on. So it is obvious that the efficiency of a Scrambeld Keyboard is less because of the additional internal functions which are used to ex-tract the actual key values from the inserted keys.
Though it is less efficient than the traditional keyboard it is feasi-ble because that efficiency will be very minute when compared in terms of time say approximately 0.2 seconds delay.[5]



Fallouts demonstrate that proficiency of virtual consoles is 10.6% not as much as the conventional consoles. At the point when the clients input their records and passwords, the ordinary time used is 20 seconds at that point 10.6% implies 2 seconds slower than standard comfort. This 2 second deferral won't have much effect to the clients since it is at the cost of security of record.

6. Advantages of scrambled virtual console

The virtual console with scrambled keys is able to solve the prob-lem of screenshot capturing(i.e the attacker may be having the captured screenshots but he will not be able to detect actual key as he is not aware of the rotation pattern and rotation key), screen capturing and also advanced key loggers which a normal virtual keyboard can't provide. The implementation of the scrambled virtual keyboard will be done making some simple functions in JavaScript.

7. Disadvantages of scrambeld virtual key-board

The Efficiency time of the mixed virtual console will be to some degree less when contrasted with the ordinary customary console. It requires some additional time for completing the internal logical functions. But still it is preferable because of the security feature it is providing.

8. Future work

The Division of the keys in the keyboard will be arranged ina simplified manner for ease of the user and the verification of in-ternal Rotation functions will be done on server side so as to de-crease the Response time.

9. Conclusion

The new strategy for scrambled virtual console which is displayed in this paper will improve the security for the Credentials and it will resist not only to the Trojan horses but also to hardware or Software keylogger's as well and make the online transaction safer.

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