Algorithm and Implementation in the domain of System Security
A Software Engineering Experiment

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ABSTRACT: This research features the execution of security program utilizing the USB program to secure and discover entrance program. This allows using USB to discover and secure the entrance or anything that requires locking mechanism. Right now considering door (door can be of any room or cupboard or bank safe) as an example having a code number along with a number of mathematical expressions. This study mainly focuses on the mathematical algorithm running behind that system. Unlike mechanical locks, which use keys that are prone to duplication. This characteristic ensures the reliability of USB door locks, providing a secure access control.

Keywords: Security System algorithm, USB Lock, Door Security, USB Key, USB System Security

INTRODUCTION

I. INTRODUCTION

It is well known that data protection will play a central role in the design of future IT techniques. Many of those IT programs will be noticed as included techniques, which depend intensely on protection systems. For example protection for wi-fi mobile phones, wi-fi processing, pay-TV, and copy protection techniques for audio/video customer products and digital theatres. Note that a large share of those included programs will be wi-fi, which makes the interaction route especially insecure.

USB is the most popular and highly used data storage device in our office life. But now USB can be used for different purposes. Use your USB to unlock and lock the door (or anything that requires lock system right now we are taking door as an example) by code number along with a number of mathematical expressions. The door contains a display matrix screen and USB port. The display matrix screen contains a program that helps to create a mathematical expression in the USB and create a stack of the code number in the display matrix, which helps to compare in different way. It takes a sequence of number to open the door along the number to select the mathematical expression to be used in opening the door. So you have only one way to lock or unlock the door by the USB. But remember you have only one chance to open the door before the alarm bell rings. The most challenging thing in this system is to produce Random Expression per digit. Like digit 2 can have many Random Expression e.g.

\[ 2 = 1 + 1 \]
\[ 2 = 2(2.5) - 2(1.5) \]

... The result is same on both sides, but we want to make a system that creates these random expressions. Once it created the expression then that expression will never come again. Like you saw a random number in all scientific calculators, but once that number appears on screen, it never appears again. The paper is divided into a few sections, Section two gives a complete overview of a system, Section three providing detail of the algorithm in the USB, Section four providing detail of experiment and it will end with a conclusion.

II. SYSTEM OVERVIEW

As I mentioned above that you can use a USB to lock and unlock the door. But before discussing how it works, first look at the display matrix screen. The screen contains a keypad and a text box. This text box will take code number and the number of mathematical expressions as show in the figure.
III. USB MODE

In USB mode, your display matrix system will create files that contain a few mathematical expressions to create that sequence of digits you entered. Suppose that your sequence is 2 5 6 7 in the new code text box. Now 2 can be produced by many mathematical expressions that our system will create randomly.

1. \[2 = 0.5 + 0.5\]
2. \[2 = 5 - 3\]
3. \[2 = 2(2.5) - 2(1.5)\]
4. .
5. .
6. .

You can have more than one mathematical expression but you can set only one at a time. Actually your system has a structure of every number to create that number in multiple ways. Right now we are using stack in this structure.

\[2 = 2(2.5) - 2(1.5)\]

Now 2 has a stack structure hidden in the display matrix system. We can also write as

\[2 = 2(2.5) - 2(1.5)\]
\[2(0.5+0.5) \times (2+0.5) = 2(2.5) - 2(1.5)\]

Now you see that first term i.e. \(2(2.5)\) on the right side is equal to the first few term before minus sign on the left hand side i.e.

\[2(0.5+0.5) \times (2+0.5) = 2(2.5) - 2(1.5)\]

Similarly the second term on the right hand side is equal to the second term on the left hand side (after minus sign) and so on...

If we put the left hand side math expression in the stack

\[1.5 \times (1.0 + 21.0) - (0.5 + 2.52) \times (0.5 + 0.5) / 2\]

We see the stack also produces the same mathematical expression that is on the right hand side.

Let us suppose a person with fake USB that contains mathematical expression in different order or it contains different mathematical expression e.g

\[(2)^3 - 11 + 2(2.5) = 2\]

Although the result is correct but the expression is not as same as in display screen or may be the expression number is not valid. So this will not open the door in case of invalid result and might cause to the alarm bell rings.

IV. DOOR LOCKED BY USB

Your display matrix contains a programming code to lock the door. Plug your USB when the door is unlocked. After inserting USB the display matrix will show you a screen of following type
Figure 2. Display Matrix Screen 2

After putting a new code number in the new code text box e.g. 8 4 1 2 6. The system will produce a new stack in the behind and also creates few mathematical expressions per digit along with their sequence number. Like 8 can have few mathematical expressions.
1. \( \sqrt{16} + \sqrt{16} \).
2. \( 4 + \tan(82.874983) - \cos(0) \).
3. \( 1 + 1 + 2 + 3 + 1 \).
4. \( \ln(403.4287) + \ln(7.3890560) \).

Above are few mathematical expressions of only digit 8 and 1, 2, 3, 4 are the sequence number of these mathematical expressions. Similarly 4, 1, 2, 6 can have four or five mathematical expressions along with their sequence number. Now you can see that these mathematical expressions of a certain digit produce the same result. But when you plug in your USB to unlock the door. It will ask the code number then it will ask the desired sequence number of the mathematical expression.

Suppose for the code number 8 4 1 2 6 we select 2 3 1 4 5 sequence number of mathematical expressions for 8 4 1 2 6. This means that digit 8 can use mathematical expression 2; digit 4 can have mathematical expression of number 2 and so on.

**CONCLUSION**

This is any easy way to lock/ unlock your door by USB. You can apply different code and sequence number to different door in your house or anywhere by one USB. You can lock / unlock door or any other thing by one USB instead of carrying a big bunch of keys. But keep remembering your sequence number while locking your door. And I think this is a much safest way to make your own key in the form of a file that cannot be made by anyone.

**REFERENCES**


