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Smart Locker System to Crack Shoulder Surfing Techniques

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Abstract: Authentication based on passwords is used largely in applications for computer security and privacy. The password is generated for each and every time a new color code is generated for the user. The user can open the locking system based on the color displayed in the matrix display. The colors are varied by using various color led and they can be randomly varied according to the user.

Keywords: Shoulder surfing, Boot loader, GPIO, Arduino UNO board.

I. INTRODUCTION

Traditionally, picture-based password color coding systems employ password objects (pictures/icons/symbols) as input during an authentication session, thus making them vulnerable to “shoulder-surfing” attack because the visual interface by function is easily observed by others. Recent software-based approaches attempt to minimize this threat by requiring users to enter their passwords indirectly by performing certain mental tasks to derive the indirect password, thus concealing the user’s actual password. However, weaknesses in the positioning of distracter and password objects introduce usability and security issues. In this paper, a new method, which conceals information about the password objects as much as possible, is proposed. Besides concealing the password objects and the number of password objects, the proposed method allows both password and distracter objects to be used as the challenge set’s input. The correctly entered password appears to be random and can only be derived with the knowledge of the full set of password objects. Therefore, it would be difficult for a shoulder-surfing adversary to identify the user’s actual password. Simulation results indicate that the correct input object and its location are random for each challenge set, thus preventing frequency of occurrence analysis attack. User study results show that the proposed method is able to prevent shoulder-surfing attack.

II. PROPOSED BLOCK DIAGRAM

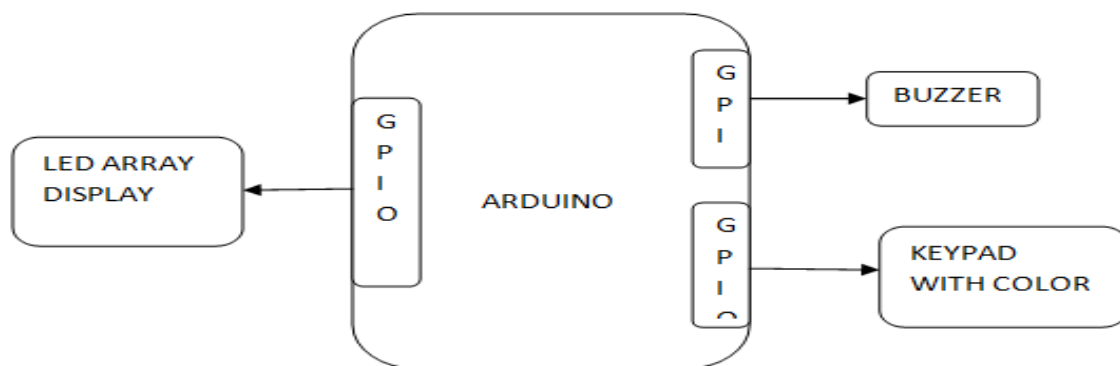


Fig 1 : Proposed block diagram

III. PROPOSED METHOD

There are two phases in the proposed method: Registration Phase and Authentication Phase. During the Registration Phase, users are required to select multiple images as his or her password. Users are also required to remember the sequence in which the password images were selected. During the password selection process, an image can only be used once. Duplication of images in the password selection is not allowed because it decreases the randomness of the proposed system.

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A. Arduino Microcontroller

A micro-controller is a small computer on a single integrated circuit containing a processor core, memory, and programmable input/output peripherals. The important part for us is that a micro-controller contains the processor (which all computers have) and memory, and some input/output pins that you can control. (often called GPIO - General Purpose Input Output Pins).

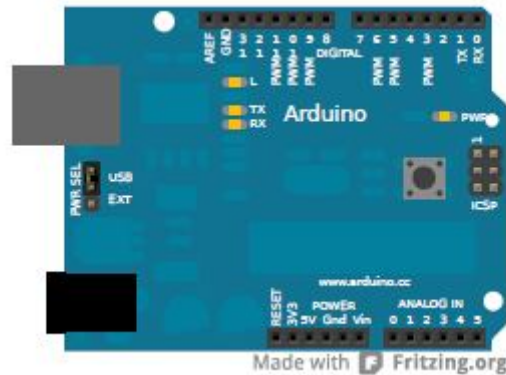


Fig 2 : Arduino Microcontroller

This is a relatively easy way to make circuits quickly. Breadboards are made for doing quick experiments. They are not known for keeping circuits together for a long time. When you are ready to make a project that you want to stay around for a while, you should consider an alternative method such as wire-wrapping or soldering or even making a printed circuit board (PCB). The first thing you should notice about the breadboard is all of the holes.

IV. PROGRAMMING

The Uno can be programmed with the Arduino Software (IDE). For details, see the reference and tutorials. The ATmega328 on the Uno comes preprogrammed with a boot loader that allows you to upload new code to it without the use of an external hardware programmer. It communicates using the original STK500 protocol (reference, C header files). On Rev1 boards: connecting the solder jumper on the back of the board (near the map of Italy) and then reset in the 8U2.

On Rev2 or later boards: there is a resistor that pulling the 8U2/16U2 HWB line to ground, making it easier to put into DFU mode. You can then use Atmel's FLIP software (Windows) or the DFU programmer (Mac OS X and Linux) to load a new firmware. Or you can use the ISP header with an external programmer (overwriting the DFU boot loader). See this user-contributed tutorial for more information.

A. Warnings

The Uno has a resettable polyswitch that protects your computer's USB ports from shorts and overcurrent. Although most computers provide their own internal protection, the fuse provides an extra layer of protection. If more than 500 mA is applied to the USB port, the fuse will automatically break the connection until the short or overload is removed.

B. Differences with Other Boards

The Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the Atmega16U2 (Atmega8U2 up to version R2) programmed as a USB-to-serial converter.

C. Power

The Uno board can be powered via the USB connection or with an external power supply. The power source is selected automatically. External (non-USB) power can come either from an AC-to-DC adapter (wall-wart) or battery. The adapter can be connected by plugging a Leads from a battery can be inserted in the GND and Vin pin headers of the POWER connector. The board can operate on an external supply from 6 to 20 volts. If supplied with less than 7V, however, the 5V pin may supply less than five volts and the board may become unstable. If using more than 12V, the voltage regulator may overheat and damage the board. The recommended range is 7 to 12 volts.

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D. Memory

The ATmega328 has 32 KB (with 0.5 KB occupied by the boot loader). It also has 2 KB of SRAM and 1 KB of EEPROM (which can be read and written with the EEPROM library).

E. Input and Output

See the mapping between Arduino pins and ATmega328P ports. The mapping for the Atmega8, 168, and 328 is identical. Each of the 14 digital pins on the Uno can be used as an input or output, using pin Mode (), digital Write (), and digital Read () functions. They operate at 5 volts. Each pin can provide or receive 20 mA as recommended operating condition and has an internal pull-up resistor (disconnected by default) of 20-50k ohm. A maximum of 40mA is the value that must not be exceeded on any I/O pin to avoid permanent damage to the microcontroller. In addition, some pins have specialized functions:

- 1) *Serial*: 0 (RX) and 1 (TX). Used to receive (RX) and transmit (TX) TTL serial data. These pins are connected to the corresponding pins of the ATmega8U2 USB-to-TTL Serial chip.
- 2) *External Interrupts*: 2 and 3. These pins can be configured to trigger an interrupt on a low value, a rising or falling edge, or a change in value. See the attach Interrupt () function for details.
- 3) *PWM*: 3, 5, 6, 9, 10, and 11. Provide 8-bit PWM output with the analog Write () function.
- 4) *SPI*: 10 (SS), 11 (MOSI), 12 (MISO), 13 (SCK). These pins support SPI communication using the SPI library.
- 5) *LED*: 13. There is a built-in LED driven by digital pin 13. When the pin is HIGH value, the LED is on, when the pin is LOW, it's off.
- 6) *TWI*: A4 or SDA pin and A5 or SCL pin. Support TWI communication using the Wire library. The Uno has 6 analog inputs, labeled A0 through A5, each of which provide 10 bits of resolution (i.e. 1024 different values). By default they measure from ground to 5 volts, though is it possible to change the upper end of their range using the AREF pin and the analog Reference () function. There are a couple of other pins on the board:
- 7) *AREF*: Reference voltage for the analog inputs. Used with analog Reference ().
- 8) *Reset*: Bring this line LOW to reset the microcontroller. Typically used to add a reset button to shields which block the one on the board.

F. Communication

The Uno has a number of facilities for communicating with a computer, another Uno board, or other microcontrollers. The ATmega328 provides UART TTL (5V) serial communication, which is available on digital pins 0 (RX) and 1 (TX). An ATmega16U2 on the board channels this serial communication over USB and appears as a virtual com port to software on the computer. The 16U2 firmware uses the standard USB COM drivers, and no external driver is needed. However, on Windows, a .inf file is required. The Arduino Software (IDE) includes a serial monitor which allows simple textual data to be sent to and from the board. The RX and TX LEDs on the board will flash when data is being transmitted via the USB-to-serial chip and USB connection to the computer (but not for serial communication on pins 0 and 1. A Software Serial library allows serial communication on any of the Uno's digital pins. The ATmega328 also supports I2C (TWI) and SPI communication. The Arduino Software (IDE) includes a Wire library to simplify use of the I2C bus; see the documentation for details. For SPI communication, use the SPI library.

G. Automatic (Software) Reset

Rather than requiring a physical press of the reset button before an upload, the Uno board is designed in a way that allows it to be reset by software running on a connected computer. One of the hardware flow control lines (DTR) of the ATmega8U2/16U2 is connected to the reset line of the ATmega328 via a 100 nan farad capacitor. When this line is asserted (taken low), the reset line drops long enough to reset the chip. The Arduino Software (IDE) uses this capability to allow you to upload code by simply pressing the upload button in the interface toolbar. This means that the boot loader can have a shorter timeout, as the lowering of DTR can be well-coordinated with the start of the upload. This setup has other implications. When the Uno is connected to either a computer running Mac OS X or Linux, it resets each time a connection is made to it from software (via USB). For the following half-second or so, the boot loader is running on the Uno. While it is programmed to ignore malformed data (i.e. anything besides an upload of new code), it will intercept the first few bytes of data sent to the board after a connection is opened. If a sketch running on the board receives one-time configuration or other data when it first starts, make sure that the software with which it communicates waits a second after opening the connection and before sending this data. The Uno board contains a trace that can be cut to disable

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the auto-reset. The pads on either side of the trace can be soldered together to re-enable it. It's labeled "RESET-EN". You may also be able to disable the auto-reset by connecting a 110 ohm resistor from 5V to the reset line; see this forum thread for details.

H. Revisions

Revision 3 of the board has the following new features

- 1) *Pin Out*: added SDA and SCL pins that are near to the AREF pin and two other new pins placed near to the RESET pin, the IOREF that allow the shields to adapt to the voltage provided from the board. In future, shields will be compatible with both the board that uses the AVR, which operates with 5V and with the Arduino Due that operates with 3.3V. The second one is a not connected pin that is reserved for future purposes.
- 2) Stronger RESET circuit.
- 3) Atmega 16U2 replace the 8U2.

I. Pattern Lock

After finding the vulnerabilities and weaknesses of Pin and Alphanumeric locking scheme, an advanced 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, I 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.

V. CONCLUSION

Typically the inbuilt features and various locking systems are providing security to the applications in the smartphones, but they are not up to the mark. They are vulnerable to smudge attacks and shoulder surfing, where the passwords can be easily determined. In this paper, we analyzed the problem in the current locking schemes used in the smartphones. By providing shuffling of the colored blocks in a circular form, it improves security and users convenience.

VI. ACKNOWLEDGEMENT

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