



ARDUINO UTILIZED FOR DYNAMIC AUTOMATIC SECURITY LOCKER SYSTEM

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ABSTRACT

Benefit Due to the pressing demand for safe storage in public areas, Increase the number of people applying these services in substantial life, such as the Holy shrines, Institutions, Airports and building office, In view of the traditional methods of the lockers to save a package, which relies on regular keys that can be stolen or lost, the higher cost is also used specifically for one user only, This work to solve problems from regular keys and gives a dynamically works multiple usages at the different times, includes electronic locks depends on, a password that create by a user with a lower cost, flexible and easiness, the idea of splitting the password into two parts gives a strong protection in this application, the simulation using some of the electronic parts of the Arduino device to design a dynamic automated digital security system to Apply for Multi cabinet's lockers. It can accept multi-users each period of time while there are some of the cabinets are empty, The cabinet will only unlock if the password matches, and will be erased from the memory automatically to use again; otherwise, the alarm is on.

Keywords: dynamic digital lock, microcontroller, password management, arduino, security system.

INTRODUCTION

In older days, as thefts increased, people tended to move away from the non-productive traditional protection methods used in mechanical locks. As well as the hardness of opening in case of lost keys to those locks in addition to the high cost and period of time for the purpose of breaking padlocks when losing keys. Consequently, there is a need for other types of padlock especially electronic ones that recently shown it, the Culture Changes have been faster by using Application technology to help the people to perform some activities through easy ways.

Some sophisticated automation; materials have been established in order to set some works automatically such as ArduinoTM microprocessor, which enables to control the electrical circuits logically [1]. To ensure higher reliability, lower cost and less time in cases of losing keys without break it, As long as technology applications contribute to solving the problem. The design system can be applied in different environments to achieve productive efficiency.

Most compact systems are self-contained protocol devices, running on different environment applications; it's designed for high performance, Digital security, ease of use, storage space, and conservation. There are many embedded devices such as Mobile, Computer, Electronic Gadgets, and So on. Most of the embedded systems hold Microprocessor and Microcontroller inside it. This project was designed to close or open multi cabinet's locker though using three options show in the LCD Display Interface to interact with users, (checking empty to use, back to get restore the package and administrator of wrong cases) first for user to check which cabinet is empty, Second option to administrator that monitor case wrong for example when the user forgot the password or Maybe think about fraud to

open the locker. It, therefore, can provide a solution and ensure stability by Monitor of the system. The third option is to verify the user or administrator password. The idea behind this project is

Dynamic action to create a user password when one of the cabinets is empty. The system does not allow the same password for more than one user at the same time and does not allow others to know the password used. For interaction between all parts of the system with the user, the distance should be comfortable and appropriate by selecting the nearest fund for the user, taking into consideration the selection of the empty cabinet.

ARDUINO COMPONENT

Arduino is an open-source electronics platform based on the ease of use of hardware and software [2]. Arduino scripts are written in simple language with Arduino integrated development environment (IDE) software. The Arduino bootloader allows users to upload sketches from a computer via a universal serial bus (USB). In addition, there are many publicly available libraries, open source, which are a set of programs that define common tasks [3].

Libraries allow users to execute complex commands more easily, thereby increasing the capabilities of Arduino programming language. The Arduino panel is designed to interact with different environments, taking input and output from sensors, controlling keys, devices that use software or human interaction

Arduino mega board

The Arduino family have many models and options available in the various applications. Mega Arduino has been selected for this application because of its built-in specification of the system design. The microcontroller of Mega Arduino is a board based on

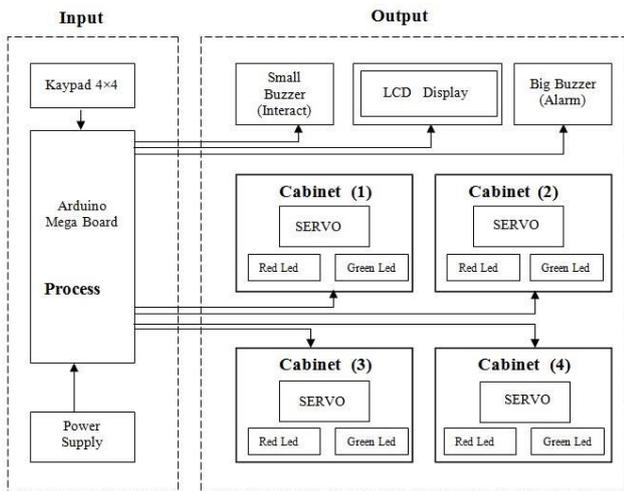


Figure-2. Block diagram of arduino components.

SYSTEM PROCEDURE

The keypad module provides secret password protection. The 4x4 keypad has numbers, alphabets (A, B, C, D), and special characters (*, #). Therefore password can be a combination of numbers, alphabets, and special characters. This combination makes a complex password, which is very hard to imagine.

LED Green and Red both use 5V, red color indicates to the busy cabinet and the green led means the cabinet is empty and ready to apply. LEDs, Servos, buzzer and I2C LCD display working together in the instruction. The algorithm is described in Figure-3.

The flow chart of design this system in the Figure-3, Initialize LCD display interface to show three Options two for user and one to monitor of the system (do check to select an empty cabinet, pick up the parcel then closes the door and Monitor system for verification) to select option by 4x4 keypad matrix, basically the user starts with the first option.

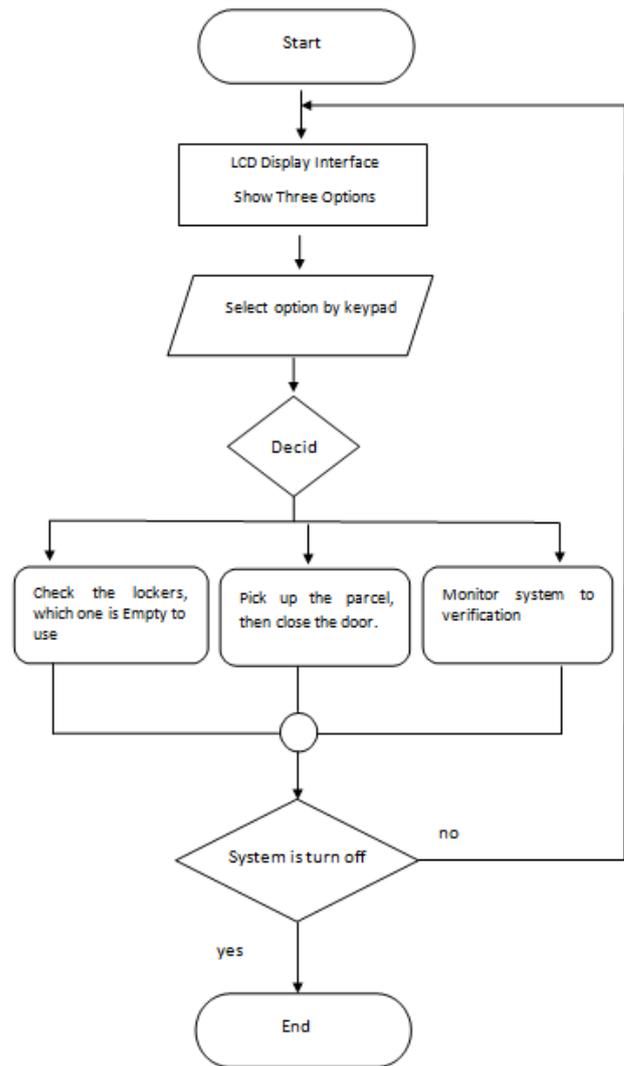


Figure-3. Flowchart of system strategy.

SOFTWARE IMPLEMENTATION

Design issues Arduino central programming are making full compatibility of possible interconnected parts, Provide the system with a high degree of intelligence always by enabling it to adapt and deal independently with ensuring confidentiality, privacy, and security. Good performance in the system when protect the passwords from fraud and theft.

Here Arduino mege Board, LCD display interface and C++ programming playing a major role. In this paper, the schemes of the design and implementation of the dynamic system for safe locker shown in Figure-4, Figure-5, and Figure-6

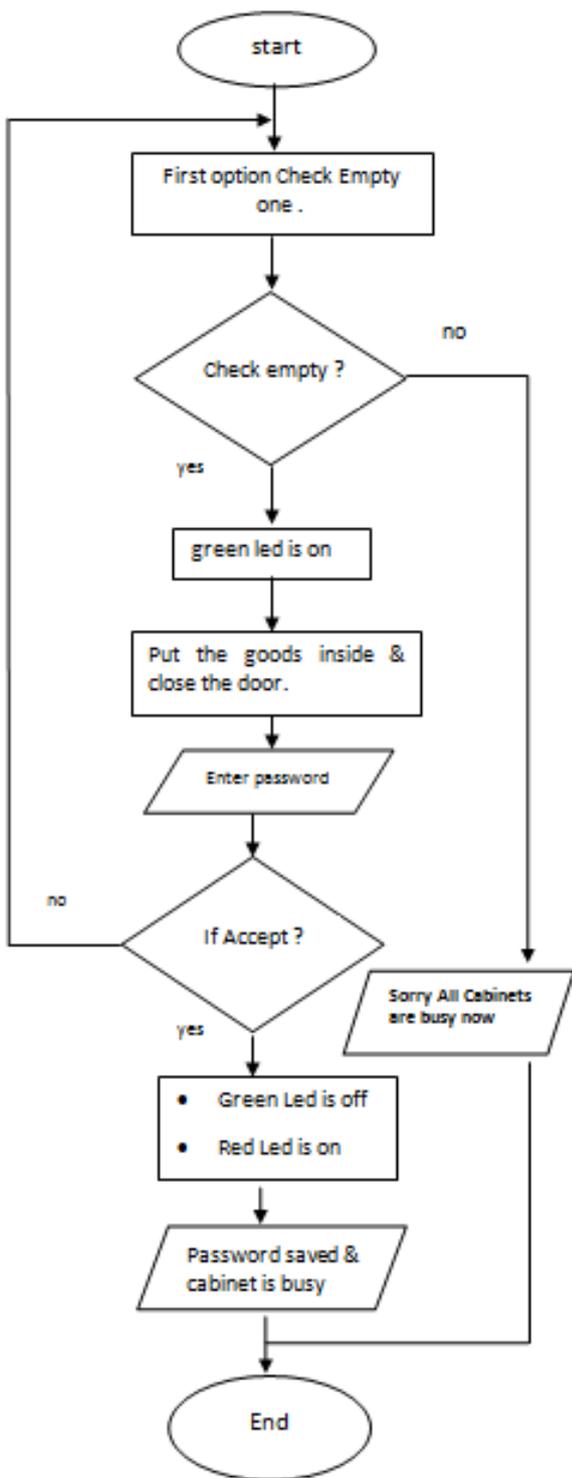


Figure-4. Flowchart of the first option.

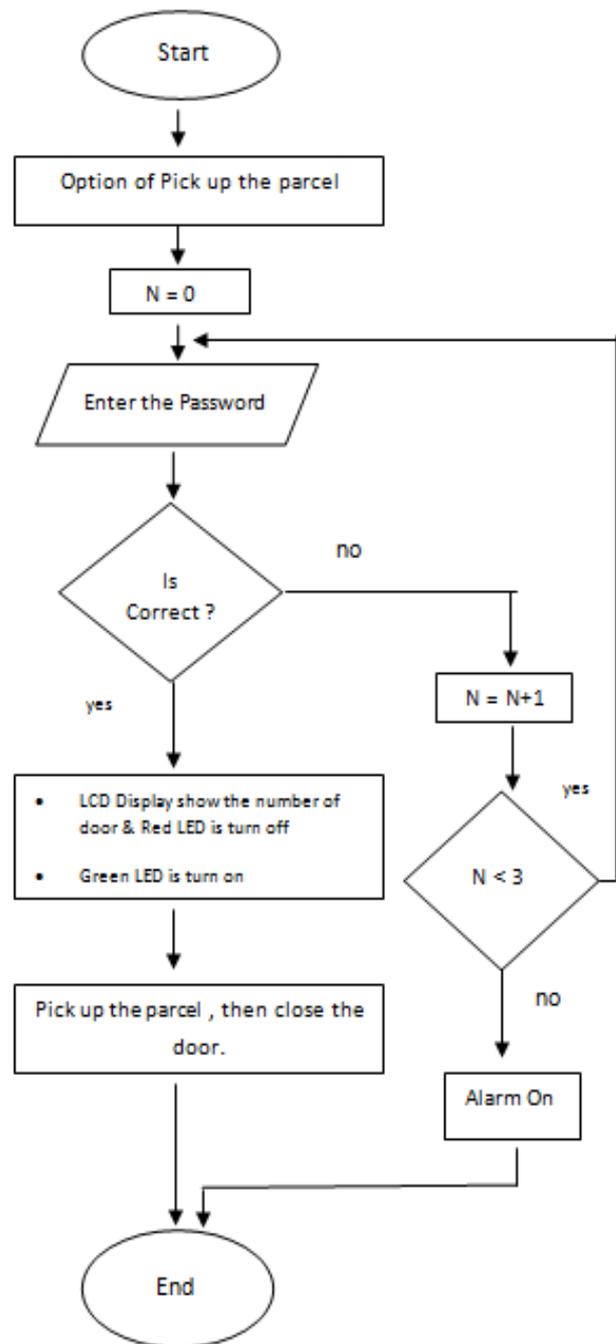


Figure-5. Flow chart of the second option.

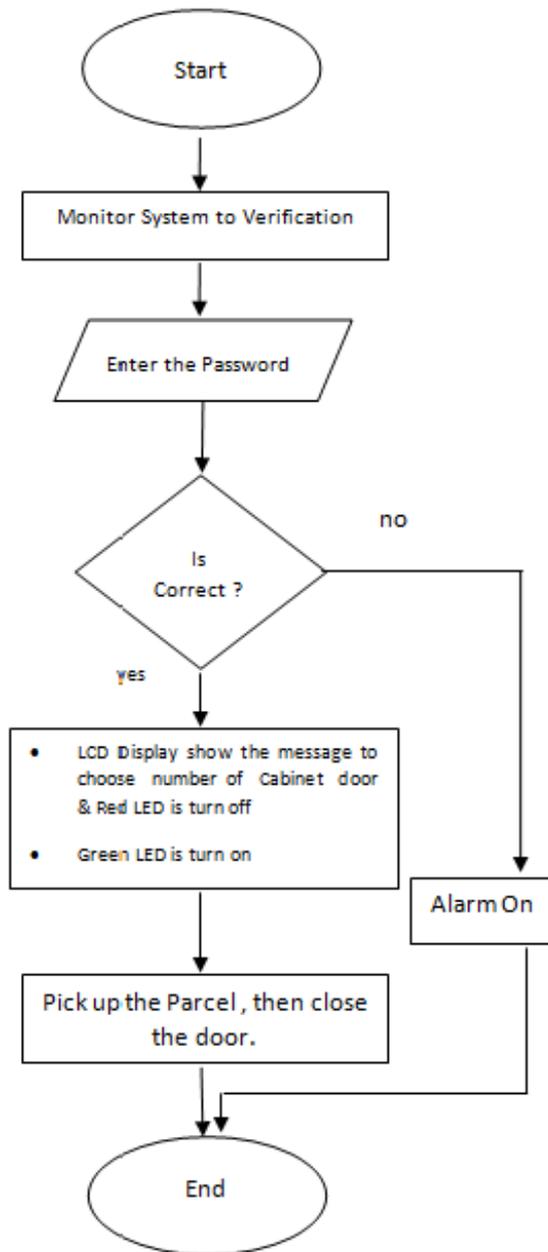


Figure-6. Flow chart of the third option.

RESULTS AND DISCUSSIONS

In the First Option start to do check the locker to get which one is empty to use so if not, the LCD Display interface show a dialog message (Sorry the cabinets are busy now), if there is at least one free cabinet, the LCD Display shows the number of the cabinet door & LED Green on to see quick access to the location of the cabinet door, then put the package inside & Close the door.

The LCD display shows a dialog message to, enter the password, So if the password is accepted, the Green LED is turned off and Red LED is turned on, the LCD shows the password is saved and the servo move to lock the door.

The search algorithm for locker empty is executed by first using the shortest track to select the

nearest cabinet to the user, considering not using the occupied by others [6].

The Combinations of passwords can be created according to the system requirements of the beneficiary of the work, in this application system the code has 8 Characters in a specific order from these 16 Characters (0-9, A-D, *, #), The general formula for the possible passwords that can generate from these 16 characters is: $16^8 = 4,294,967,296$ Words, it's nice to use for 12 cabinets in the locker or less, Currently, due to the low cost of Arduino components, the transfer, password-based security system has become more important to increase reliability, When generating a specific password, the system will split the word into two parts, each part have four Characters could be anything 16^4 with a different permutations, hence there are 65,536 Combinations.

The system will compare the first part of the word entered with each first part of the words used by others. If the chance exists, it is not allowed iterating (without allowing completing writing the second part of the word: the system never allows the user to type the second part of the password). Automatically returns to system start that shown options by the LCD display.

This work that one word only may be used once it limits our number of combinations. If someone boosts the Items numbers in the basic character set, the number of all the combinations can be calculated through the power function (x^a , When x is the number of characters possible, it is the length of the password) [7]. Instead of this application can increase the length password of our work, which means that determined of the combinations number would be by an exponential function (a^x).

Exponential functions are known to accelerate faster than power functions. The length of the word is, therefore, more significant than the basic character set, Figure-7 and Figure-8 illustrate how the system results.



Figure-7. The external shape of the system.



The second option in the system for the user to Pick up the package outside, the LCD Display shows a dialog message require to enter password ,When the user enters a password via keypad, the door of the cabinet can be opened via Servo ,If the user enters the correct password, then it will display that “ The Password is Correct-Access allowed ” and Red LED is switched off, therefore the LCD Display shows the number of cabinet’s locker door, LED Green is switch on for a suitable period of time to see quick access to location of locker door that would open, Finally pick up the package and close the door.

In case forget the password, mistake or fraud, there are only three tries to re-enter the user's password and once to the system monitor, and if it is not a match, Alarm (buzzer) is activated for the intent of resolving the problem. If the user's password correct or the system monitor helped the user to pick up the package and take it out, Password will be deleted from the memory automatically.

The cabinet will be empty for use again. Thus, it will use the closet as long as there is at least one is empty; this system works dynamically to give more flexibility to use with high reliability in this application.

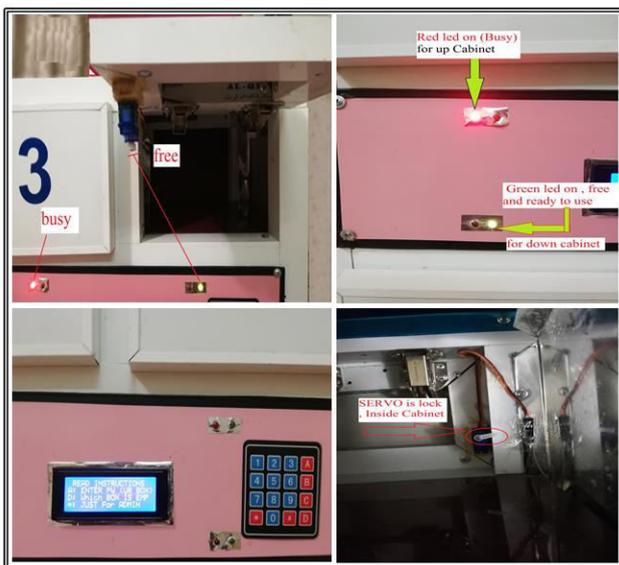


Figure-8. The internal and external shape of the system.

The third option for the system monitor to check, if the user fails to re-enter the password or try fraud, the Monitor of the system performs the investigation through the surveillance cameras with user information about the package, If correct, it will provide help to the user. Initially this option, the system via LCD a require to enter the password for the Monitor, so there is no mistake should happen with only one try, if match it, The LCD will display a dialog message to select the cabinet number that wants to access, When the system monitor was entered the correct cabinet number, the Red LED is switched off, the servo will move to unlock and Green LED is switched ON

for a period of time to notice quick access to the cabinet location. Otherwise, an alarm is activated.

Several experiments have ensured that the system works correctly, reliably and with high flexibility in usage. Suitable for a supermarket, shopping mall, gym, hotel, hospital, home, office building, etc. Figure- 6 illustrates the entire operation of the third option.

CONCLUSIONS

Smart System of the locker Series is a pliable and secure solution that provides greater control over the application. In this study, an Automated Security Locker System technique has been utilized to perform as required. We were able to proceed with all the functions specified in our motion. The LCD display to interact with a user and keypad comes to support a good overview and easy scheduling.

Compare with two parts for the Combination length of the password given us strong security. It is highly marketable because it is comfortable to use, comparatively inexpensive, low cost, low in power conception and highly dependable. All cabinets can be increased using the expansion series, yet the figure of the cabinets that want to get, with care to consider the external energy saving.

Several Experiments that make certain the arrangement is functioning properly, reliable and high flexibility in usage. Suited for a supermarket, shopping mall, Holy places, gym, hotel, hospital, house, office, building, etc. These automated cabinets save time, the cost for the owners and managers, and can get rid of the demand for multiple deliveries and re-saving efforts. The Arduino system processing is cost-effective and soft to apply. With the basic control method, after Arduino operation, it is input to the host computer after Arduino operation.

Arduino's open source devices have low hardware cost advantages, A good performance and stability of the open source software design instrument slightly processing, Friendly interactive interface, high-efficiency development. The cost of the product is low.

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