System Design on Door Locks Using Arduino Based Passwords

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Article Info	ABSTRACT
	The use of manual locks such as keys, this type of locking is easy to duplicate, prone to loss if taken on a trip and if you forget to close the door, it will provide an opportunity for other people to enter the house or to a private room, for that a door locking device is needed that can provide ease of use from conventional locking, namely using automatic locking using a knock pattern. This research aims to design a door security system. Based on the results of the design and testing of the Arduino-based automatic door locking system using passwords that have been carried out by researchers, it can be concluded that the automatic door locking system using this password can be made and operated using the ATMega328 microcontroller as a control center and circuit and programmed using Arduino IDE software. The Arduino Uno microcontroller can control the automatic door locking working system according to the instruction sequence. The research method used in this research is the field research method. The field research method aims to directly observe the object being studied to obtain the necessary information. System Design and Implementation uses Block Diagram design to describe the activities that exist in the system. In order to know more about the system to be created. *This is an open access article under a CC BY-SA license.*

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1. Introduction

The world of technology today inspires many producers to be able to produce and apply innovative technology, the impact of targeted changes makes their production widely known by the public. The influence of these technological developments tends to facilitate human activities, be it in the fields of offices, housing, education and the world [1].

Conventional door locking systems typically consist of a house lock and a saddle mechanism to open the door. Although it is easy to use, it has several drawbacks such as difficulty in opening doors, the need to carry multiple keys while traveling, the risk of duplicate keys, being vulnerable to break-in attempts, and possible key damage are some of the problems that are often faced. To overcome these challenges and reduce the risk of unwanted crimes against homes and offices, a more sophisticated approach to security is needed by taking advantage of current technological advances [2].

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The need for security is important in daily life. Home security such as doors, cabinets, lockers and so on is currently still using the system manually, namely by using conventional keys. Conventional door locks typically consist of a lock housing and a saddle to open it. Conventional door locks are very easy to use, but there are several drawbacks to this system that are often found including difficulties when opening doors, homeowners having to carry a lot of keys when traveling, keys are easy to duplicate, keys are easy to break into and keys are easily damaged. To reduce unwanted crimes against the house, an automatic door locking system is needed by taking advantage of the current developments [3].

The use of manual locking such as keys, this type of locking is easy to duplicate, prone to loss if taken on a trip and if you forget to close the door, it will provide an opportunity for other people to enter the house or into a private room, for that a door locking device is needed that can provide ease of use from conventional locking, namely using automatic locking using a knock pattern [4].

The security system of the door and other problems are also sometimes because conventional locks are often left behind and even easily lost. In today's technological advancements, new innovations have emerged to create a sophisticated security tool or system. The design of this system uses a password key connected to a 4x4 keypad and Arduino UNO as a microcontroller with door security like this, of course, there will be no more cases of losing the key and it is also expected to maximize security protection and minimize crime [5].

2. Research Methods

2.1 System Design and Implementation

Block Diagrams are used to describe the activities that exist on the system. In order to know more about the system to be created, it is necessary to make an overview of the system that is running. The following Block Diagram image can be seen in figure 3.1
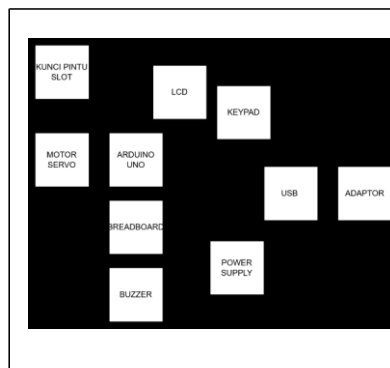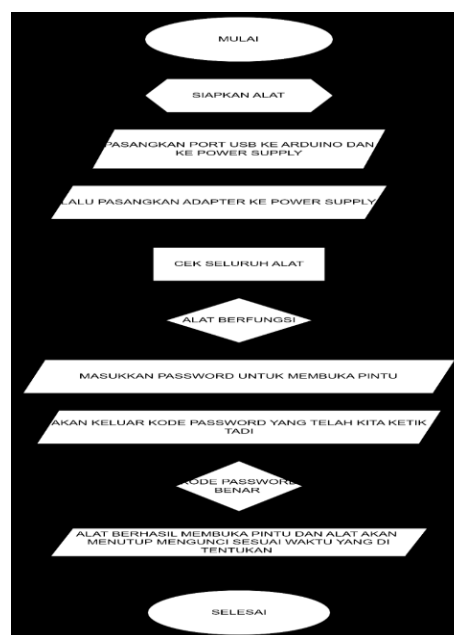

Figure 1. Block Diagram

Figure 2. Flowchat Research

2.2 Research FlowChart

The following are the steps that must be done if you want to use a door lock control system

  a. The first stage the user needs to prepare the tool
  b. The second stage connects the usb cable from the power supply to the Arduino
  c. The third stage of the user connects the power supply to another electrical current using an adapter
  d. The fourth stage of the user turns on all the tools
  e. The fifth stage of door lock control by entering the password to unlock the lock, after opening it will emit a sound from the buzzer, wait a while to lock it again and When the password entered is wrong there will be no opening
  f. The sixth stage when three attempts of the tool are temporarily blocked and the user has to wait for 1 minute

2.3 Research Methods

The research method used in this research is the field research method. The field research method aims to directly observe the object being studied to obtain the necessary information

3. Results and Discussion

3.1 Discussion of the process of making door locks using Arduino-based passwords

There are several steps and processes of making the project consist of:

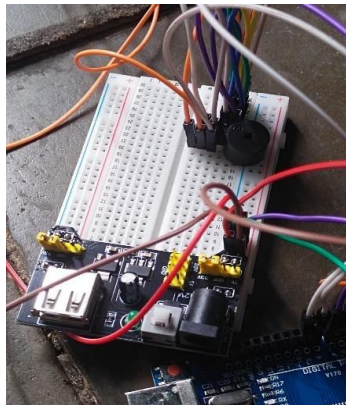1. Insert power supplay to the pin on the board

Figure 3. Power supply to the board

2. Insert the jumper (male to male) cable to Arduino (male) on the pin
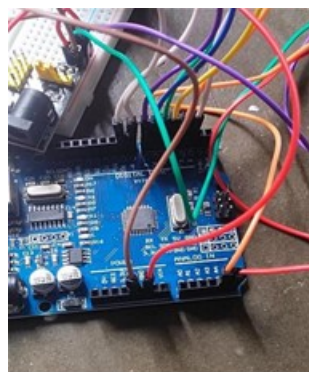5V and GND, then want the cable also to the board (male), namely on the 5V (+) and GND(-) pins.

Figure 4. Arduino to board

3. Insert the jumper cable (female to male) to the lcd that (female) to gnd, vcc, sda and scl then insert the one (male) to the board gnd (-) vcc (+) while sda to the Arduino on pins (a4) and (a5).
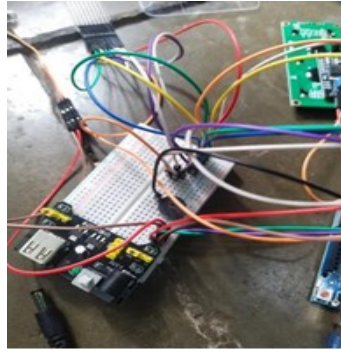
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Figure 5. lcd to board

4. Insert the jumper cable (male to male) into the keypad (male) starting from pin R1 to C4 then insert the cable (male) into the board then after that we jump or channel the signal to the Arduino by inserting the cable (male to male) to the board next to the cable that we inserted earlier, if it is then inserted the cable (male) into the Arduino starting from pin 2 to pin 9.
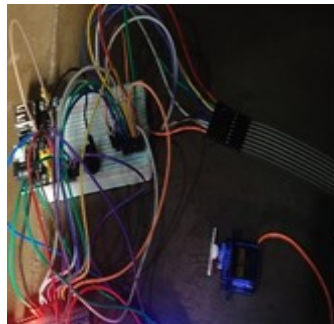

Figure 6. Servo motor to arduino

5. Put the buzzer on the board the part that (-) goes into (-) and (+) goes into positive and don't let us jump (male to male) part (male) into the board and the (male) part goes into the Arduino at pin 10.

Figure 7. Buzzer to Arduino

6. The end of the wire iron is inserted into the Arduino and wrapped it around the slot lock.

Figure 8. Servo motor to lock slot

7. When all the tools have been assembled, then we will use the C++ language When the tool after we have coded and correctly eaten the tool is active and ready to use.
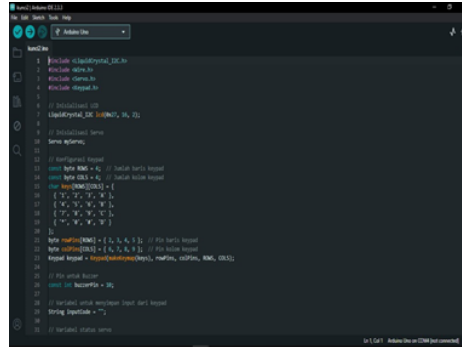

Figure 9. Coding

8. The process of coding using C++ for the system on the door lock uses an Arduino-based password. And this is the end of the tool When everything has been assembled and has been successful When tested.
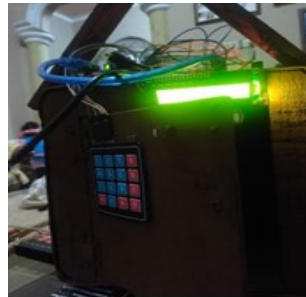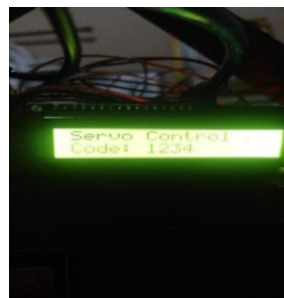

Figure 10. The tool has succeeded

3.2 The results of the system on the door lock before and after the password is entered

Figure 11. Locked tool

Furthermore, the door lock system will be entered with a password if the system is working, the key will be opened as shown below.

Gamabr 12. Tools when entering passwords

Figure 13. The tool opens after entering the password

4.   Conclusion

Based on the results of the design and testing of the Arduino-based automatic door locking system using passwords that have been carried out by researchers, it can be concluded that the automatic door locking system using this password can be made and operated using the ATMega328 microcontroller as a control center and circuit and programmed using Arduino IDE software. Arduino Uno microcontroller can control the automatic door locking working system according to the instruction sequence

Acknowledgments

The next proposed study uses sound signature extraction for the accuracy of the application in recognizing sounds and comparing the differences in each individual's voice data with the extraction of other sound features.

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