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Security Door System Using Knock Sensor Based On Arduino Uno

Yuli Fitriyani
Jurusan Sistem Komputer Fakultas Ilmu Komputer dan Teknologi Informasi
Universitas Gunadarma
Email: yulifitriyani11@gmail.com

Keywords

Ardunio Uno,Piezoelektrik, Solenoid

Abstract. This research is expected to increase the convenience for users of the design of a door security system using a knock sensor based on Arduino Uno. The analog signal generated from the sensor when given a knock will enter through the Arduino minimum system ADC (analog to digital converter) pin with the ATMega328P microcontroller IC. The test results show that the knock code given to this system is related to the number of beats and the value of the time interval or distance between each beat and is stored in the Array data type which forms a certain beat pattern used in the program. This knock interval value (knock password) will be stored first in the flash memory of the microcontroller. The knock system will start working by performing the accuracy of the interval between knocks, if the knock pattern matches the one previously stored, the door lock/unlock system and the LED will be active.

1. INTRODUCTION

Based on the existing facts, it shows that the security level of a room is determined from various aspects and one of them is the door. The door is the main access to enter or exit a person to enter a room. And a room that has special interests or a room that is private must have a good level of security and be maintained. There are so many cases of important rooms in a company or house in which valuable objects have been broken into by irresponsible people, this happens because of the lack of security from the room.

Over time, technology has also advanced and developed, in this sophisticated era, to minimize a break in a room by irresponsible people, advanced technology is needed to access a room with good security. Therefore, a "Door Security System Using a Knock Sensor Based on Arduino Uno" was made.

2. METHOD

In compiling scientific writing, the author uses three methods of writing, including the following:

Literature study, namely by looking for some data from various sources such as books, journals and the internet where the contents of these sources are used as references in scientific writing, as well as analyzing the design of this tool, so as to obtain an initial picture of the working principles that the author can use. as a basis for understanding.

Field Study, namely by making direct observations of the workings of this tool after the author has assembled it into a tool. As well as asking several questions to several people who are experts in their fields, to get references related to making these tools.

Making tools, namely making tools directly in order to know firsthand what the workings and principles of the tool are in practice.

3. RESEARCH RESULTS AND DISCUSSION

3.1 Block Diagram

Block diagrams are an important part of designing a tool, because from a block diagram you can see how the tool works. According to its function, Arduino Uno-Based Automatic Cat Feeder can be divided into several blocks, namely voltage source block, input block, process block, and output block. The following is an explanation of each block.

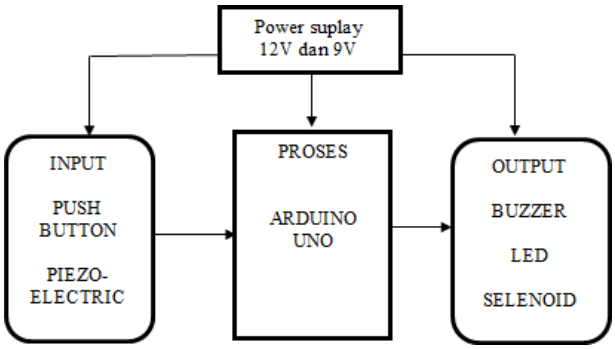


Figure 1: Block Diagram

3.2 Overall Circuit Analysis

After all the circuits are connected, the next step is to connect the Arduino Uno with DC power to obtain a voltage source, then the relay, Piezoelectric sensor, Push Button and LED will be active. If the Push Button is pressed and the tap is made in the Piezoelectric Sensor area, the LED flashes following the tapping pattern that enters the Piezoelectric sensor. If the pattern has been recorded, then do the knocking pattern that was made previously, if the knock pattern received by the Piezoelectric sensor is correct then the LED will flash and the relay will be active followed by the Selenoid Door Lock opening. If the beat pattern is wrong then the Buzzer will output sound 3 times.

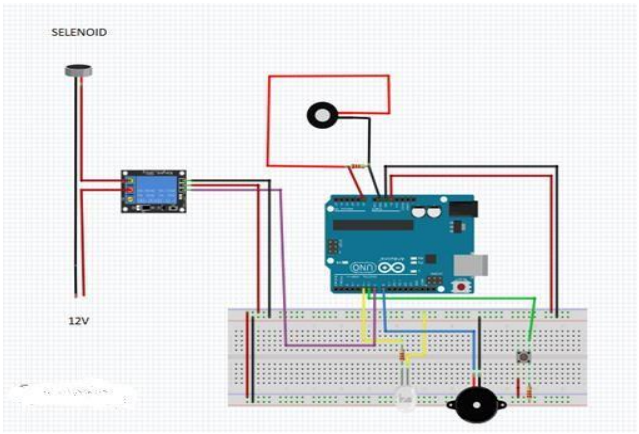
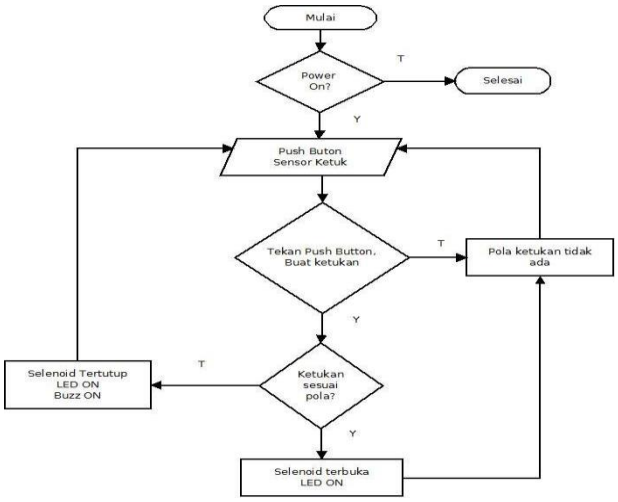


Figure 2. Overall Circuit

3.3 Flowchart

In making this tool, a structured and clear design is needed. Therefore, in this paper, a flowchart is also made which explains how the system works of this tool in simple logic and an explanation of the flow. Before this tool is assembled, a flowchart is made to make it easier for readers to understand how this tool works. Below is a flowchart of a Door Security System Design Tool Using a Knock Sensor Based on Arduino Uno.

Figure 3. Circuit Flowchart



3.4 Program Analysis

So that Arduino can be used, what needs to be done is to enter the Arduino program using the Arduino IDE software. The scripts used for the Arduino board program are listed in the appendix.

3.5 Tool Trial

The accuracy of the knock pattern using piezoelectric is done using a stopwatch which is useful as a measure of the time between knocks and the piezoelectric sensor is on the right side of the door. If the knock pattern matches the initial interval value, the solenoid will open, and vice versa if the knock pattern does not match the solenoid will not open.

3.6 Tool Trial Results

Table 1. Knocking Interval Data Retrieval Using a Stopwatch

Interval Ketukan	1 ke 2 (ms)	2 ke 3 (ms)	3 ke 4 (ms)	4 ke 5 (ms)	5 ke 6 (ms)	6 ke 7 (ms)	Hasil
Nilai Awal	50	25	25	50	100	50	-
Nilai Pengujian 1	50	26	24	50	93	44	Ketukan Diterima
Nilai Pengujian 2	51	24	24	50	99	49	Ketukan Diterima
Nilai Pengujian 3	44	18	18	40	93	43	Ketukan Diterima
Nilai Pengujian 4	43	18	13	40	90	50	Ketukan Diterima
Nilai Pengujian 5	51	24	28	50	118	49	Ketukan Ditolak
Nilai Pengujian 6	51	24	24	50	126	68	Ketukan Ditolak

Table 1: Description:

1. Initial value = Pre-programmed beat interval value.
2. Test Values 1 and 2 = Beat Interval Value when giving a beat to the sensor according to the cadence based on the initial value.
3. Test Interval Values 3 and 4 = Interval value of beats according to the rhythm based on the "initial value" where the tempo of the beat is accelerated by not exceeding the tolerance value limit of 15 ms.
4. Test Interval Values 5 and 6 = with “knock interval value” which has a difference exceeding the interval tolerance value, namely the interval value between beats 5 to beats 6 (5 to 6), note that the “initial value” is 100 ms while the “knock interval value” ” is 118 ms. The interval tolerance value for the same distance is 15, so 100 + 15 = 115, while the knock input value is 118 ms, this value has exceeded the interval tolerance value, so it is certain that the beat is not read. Meanwhile, in the 6 beats test, the same problem occurred at intervals (5 to 6) past the tolerance limit of 115ms, which is 118ms.

4. CONCLUSION

Automatic door safety devices using a piezoelectric sensor knock pattern can be made and operated with Arduino uno as a circuit control center and programmed using Arduino IDE software. generated from a beat of 1 volt (threshold). If the interval exceeds the specified tolerance limit then the knock pattern will fail and the lock will not open.

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