

Design and Build Door Security System Using AT89S51 Microcontroller Based Wireless

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Abstract— Security on a door is needed by everyone. Not a few people are less satisfied with a security system that has been supplied by the manufacturer which tends to unusual and extremely vulnerable to the forced opening of the door. One way is to create an additional security system which is called a variation to strengthen the security system of a security system. Security system variation is given in the form of locking using the remote control, which would be automatically set by a tool. The method used in this final project is the descriptive method. Overall this tool is divided into a series of blocks, i.e. input, unit processes, and outputs. Input consists of remote control and receiver module is as giving the orders on / off, which then pass on the instructions to the processing unit. And which acts as a unit process is AT89S51. Block output in the form of sending SMS to a specific number. With the door using a wireless security system is expected to be a solution for people who are very afraid of the forced opening action and destruction door.

Keywords: Security Door far, Automatic, Wireless, Microcontroller AT89S51.

I. INTRODUCTION

In this globalization era, everything related to security cannot be separated from technology. Knowledge of the development of security systems is an important means of preparing for the era of globalization. This can be seen from the very rapid development of security devices because now a more complex security system is an absolute necessity for users. The higher level of consumer satisfaction in terms of security has an impact on the increasing number of security technology-based hardware circulating in the market at a lower price. The number of owners of this device, either by an agency or by each individual, has become commonplace to support a security system.

Door security is very important for humans. it is not uncommon for the door to act as access to places or items that are private. Therefore, the key as security plays an important role in the security system. With increasing crime rates and increasingly sophisticated systems in breaking into or destroying security systems in the form of conventional keys, it has become an idea to develop a security system that is more privacy in nature.

The current door security system only has a factory default security system. The factory pre-installed door security is simply a manual lock that is very easy to break. However, it is still lacking, because there are still many crimes committed in various modes, one of which is using duplicate keys.

With the reasons of various door security gaps with security facilities only from this factory, then the idea emerged

to develop and design a security door using radio waves, SMS Gateway. With this tool, it is hoped that door security gaps can be overcome to create a feeling of security against the crime of tampering with doors. This tool is also an example of the development of technology-based security that is growing rapidly to meet the needs of consumer satisfaction levels in everyday life.

The way this tool works is a security system tool that uses a radio wave remote as a means of opening and locking a door. If the remote is pressed the ON button, the door will be locked and vice versa if the remote is pressed OFF the door can open. And if the door indicates a forced opening, the sensor will detect it as a breach and the device will immediately send a warning to the owner in the form of an SMS.

The number of gaps to improve a door security system is what sparked an idea to research the design and implementation of security systems on doors, to provide solutions and cover the security gaps that factory-made doors have. This tool can also be applied to a car, safe, and others, but of course with different applications and ways of installing tools.

A. Formulation of the Problem

How to design and manufacture a door security system using AT89S51 microcontroller-based wireless by sending SMS gateway to a certain number as a warning of door tampering.

B. Scope of Problem

The author limits the scope of discussion of this study, among others

- The range of radio waves is + 10 meters.
- The tool used is only a simulation or prototype.
- The condition for receiving SMS depends on the cellphone signal and the place where the cellphone is located.
- The software used to create the program source code is M-IDE Studio for MCS 51 to embed the program into the AT89S51 microcontroller.

C. Research Purposes

Creating a better door security system to increase the level of door security to minimize door tampering crimes.

II. LITERATURE REVIEW

A. Previous Research

A home security system, by placing sensors on the front door of the house, so that if a guest is not invited to open the door / pry the door by force or without using a key that is equipped with a database, the system will send an SMS to the owner of the house [7].

The program begins with a start which means that the tool is turned on, then the program will wait for pressing the password button after the correct password button is pressed, the alarm will turn off the door is opened and turn off the sensor and if the password button is incorrect (wrong) then the alarm will turn on. If yes, then press the reset button and turn off the sounding alarm. Then the door will close again as before. And all sensors will be active and the program returns to the beginning and so on [3].

An electronic key device based on a microcontroller that can read sound input signals and store them in a module, namely Easy VR, Easy VR will be connected to a microcontroller which will process sound logic with a programming language which will become a password to logically open it can be imagined if not necessary when you are carrying a lot of groceries, you only need to say "password", the door will open automatically [13].

So, the conclusion from previous research researched by Katankar is that there is no alarm in the event of a break in the house door, while the previous research from Abdul Gayung used an infrared sensor which can only be used at close range and Ashar Seppiawan previous research was less stable. in receiving voice input from the same person and also in a condition Easy VR can still capture or receive voice input from different people.

From the results of previous research above, the author wants to develop a tool that has been made by making a prototype design of a door security system using a wireless AT89S51 microcontroller based. This is where the device is equipped with an SMS gateway as a notification in case of the forced opening of the door.

B. Security Systems Theory

The security system is an effort made to secure the performance and function of a device. The security system is also useful for keeping the thieves safe, but it's like a lock in a house that keeps the house from entering. But no matter how good your door security system is, there must be a way to break the door. And why a door security system is needed because of the increasing development of security system technology in this era.

The function of the security system is to secure someone's valuables so that there is no theft of these valuables.

C. Types of Door Security Systems

There are two types of door security systems, namely original security systems and variation security systems. The original security system is a system made in the factory and is a one-package security system that has become the factory door security standard. While the variation security system is an additional security system that is installed on one of the doors, to add to a door security system they already have (factory security system). Variation security systems are also

divided into two types, namely active and passive. The active security system is a security system that uses remote settings, which causes two conditions, namely ON and OFF. Meanwhile, the passive security system is a security system that is attached to the door in the form of an additional key such as a secret key attached to the door.

D. AT89S51 Microcontroller

The AT89S51 microcontroller is a microcontroller manufactured by Atmel with 4 Kbyte Flash memory "Erasable and Programmable Read-Only Memory" (EPROM) with non-volatile technology (memory data will not be lost when the power supply voltage is turned off) the contents of this memory can be programmed and deleted repeatedly time. The AT89S51 microcontroller has MCS-51 code standard memory, making it possible for this microcontroller to work in single-chip operation mode which does not require external memory to store the source code. MCS-51 is an 8 bit microcontroller family [10].

The AT89S51 microcontroller consists of a Central Processing Unit (CPU), 2 types of memory, namely data memory (RAM) and program memory (ROM), input/output ports with programmable pins independently, and mode registers, status, internal timers, and counters, serial communication and random logic required by various peripheral functions.

The AT89S51 microcontroller is one type of microcontroller in the MCS-51 family which is in the 40 pin DIP (Dual Inline Package) standard which has its configuration.

E. Resistors

Resistors are electronic components that have 2 legs and are designed to regulate electric voltage and electric current. With a certain resistance, the resistor can produce an electric voltage between the two pins, the value of the voltage to resistance is directly proportional to the current flowing based on the law of ohms.

Resistors have various types and shapes, including cylindrical resistors, SMD (Surface Mount Device), and wire-wound. While the types of resistors include the composition of carbon, metal film, wire wound, SMS, and resistors with thick film technology. The most resistors circulating in the general market are resistors made of carbon and metal film. This resistor is usually a cylindrical shape with colored bands around the body of the resistor. Color bands are known as resistor codes. Knowing the resistor code can determine the value of the resistor's resistance, tolerance, temperature coefficient, and reliability of the resistor.

F. Diodes

A diode is an electro component that has two active channels, anode, and a cathode, but sometimes has three channels where the other channel only functions as a heater, where an electric current can flow in it and is usually used because of its nature that allows current to flow in only one direction, against the current other.

An applied voltage can cause electrons to flow in only one direction, from cathode to anode, and then back to the cathode via an external circuit. The best-known diodes are vacuum tubes and semiconductor diodes. Semiconductor diodes, the simplest of semiconductor devices, consist of two electrodes and two different semiconducting substances. These diodes form the basis for more complex semiconductor equipment (including transistors) used in computers and other electronic equipment. Semiconductor diodes include light-emitting diodes and laser diodes, the latter emitting laser light, useful for telecommunications via optical fibers and for reading Compact Disks.

G. LED

LED (Light Emitting Diode) is a semiconductor electronic component that emits incoherent monochromatic light when a voltage is applied. The colors produced by LEDs have a variety of colors, namely red, white, green, blue, yellow, etc. The resulting color depends on the semiconductor material used and it can be ultraviolet or near-infrared. The LED here functions to show the status of the condition of the tool. LEDs are made of mica plastic and semiconductor diodes and can light up if they are supplied with a low voltage of about 1.5 volts DC. In this tool, 3 LED lights are used, namely Yellow, Red, and Green which have the same function on different indications.

H. 2.8 IC 555

IC Timer 555 is an integrated circuit that is used for various timers and multivibrators. The original name of this IC is SE555 / NE555, 555 itself is taken because this IC has 3 5K resistors used in the initial circuit. This IC has 8 pins/legs which have specific functions. This IC can be used as a Time Delay Regulator and Sequential Timing.

I. Capacitor

A capacitor or often referred to as a capacitor is an electronic component that functions to store electric charge temporarily. Capacitors store this electric charge by collecting an internal imbalance of the electric charge. Capacitors have units in the form of Farads. Capacitors have 2 legs, namely a positive pole and a negative pole, and have electrolytic fluid, and are usually tubular.

J. Wavecom M1306B Q2406B modem

Wavecom M1306B Q2406B Modem for Credit Server and SMS Gateway This modem is very reliable and can be used 24 hours non-stop. Many credit server entrepreneurs use this modem for SMS centers, most dial, STK SEV, and others. The Wavecom M1306B Q2406B modem is a modem that is also widely used by SMS gateway players, for broadcasting SMS, sending mass SMS and is compatible with SMS engines such as Gammu and Quik Gateway. The Wavecom M1306B Q2406B modem is equipped with AT Command so it is very easy for you to integrate with your application (VB6, Delphi, and others).

Wavecom M1306B Q2406B is a GSM / GPRS modem that is ready to be used as a modem for voice, data, fax, and

SMS. This class also supports 10 levels of data transfer rates. Wavecom M1306B 2406B is easily controlled by using AT commands for all types of operations because it supports RS232 connection facilities and also facilities. Can be quickly connected to the serial port of a desktop or notebook computer. metal casing Wavecom M1306B 2406B is the perfect solution for tough applications such as telemetry or Wireless Local Loop (PLN metering & Public Telephone). Its very small size makes it easy to place it in various areas, indoor/outdoor.

III. ANALYSIS AND DESIGN

Circuit Schematic Drawing

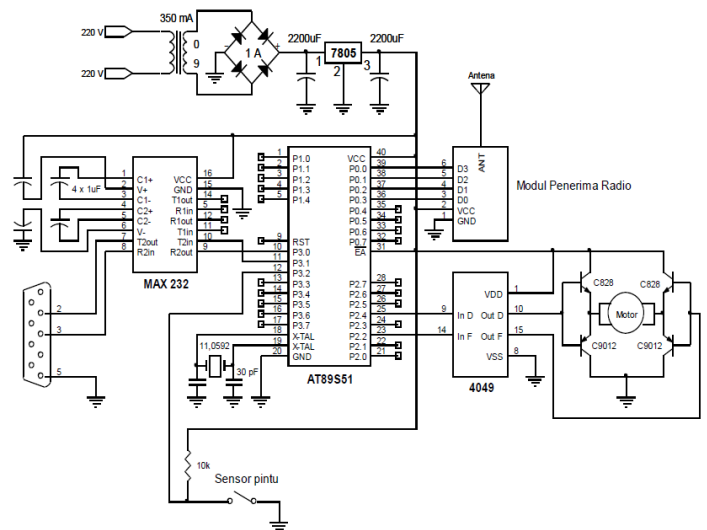


Fig. 1. Circuit Schematic Drawing

IV. IMPLEMENTATION AND DISCUSSION

A. Tool Assembly

The tool assembly process, it begins with preparing a design sketch with the aim of not using excess PCB boards and making the tool more minimalist and concise in shape. Assembling and soldering all the electronic components that have been prepared is the next step, including the AT89S51 microcontroller, resistors, capacitors, diodes, LEDs, and other components on the PCB board. When assembling the components, first preheat the solder to melt the tenol. The soldering step must be carried out cleanly, thoroughly, and neatly because the tenol here functions as a link between the circuits.

B. Tension Testing of Each Block

After the assembly of the tool has been completed and it has been confirmed that it is following the circuit scheme, the next step is to test the voltage of each circuit block. This test aims to determine the output voltage of each component.

The test was carried out by several trials under different conditions. If the output voltage is appropriate, the test for each block is stopped and that part of the block is declared to be functioning properly and continues to the next block test. If there is an error during testing of each block, then the first step

is to analyze and then correct the error, even if the component turns out to be damaged and the tool does not work properly, it is possible to replace the component. Several stages of testing are as follows:

Power Supply Circuit Testing

The purpose of testing in this section is to determine the value of the power supply by connecting the device to a voltage source in the form of a battery.



Fig. 2. Test power supply circuit

TABLE 1. Power supply test table

Test Points	Rated Voltage	Information
A	10,38 V	Output rectifier diode
B	4,82 V	Exodus from 7805

Conclusion: Based on the table above, the voltage generated by the power supply circuit is 5V which will be used to supply all circuits.

TABLE 2. Remote Control Module Test Results

Information	D0		D1	
	Button Pressed	Voltage	Logic	Voltage
A	5 V	1	0 V	0
B	0 V	0	5 V	1
All buttons are not pressed	0 V	0	0 V	0

Conclusion: AB is a button on the remote control. If button A is pressed, then D0 will have logic 1, if button B is pressed then D1 will have logic 1, if no button is pressed then logic 0. If there is a button press, logic 1 is pressed, with a button press there will be different conditions and input be a microcontroller control.

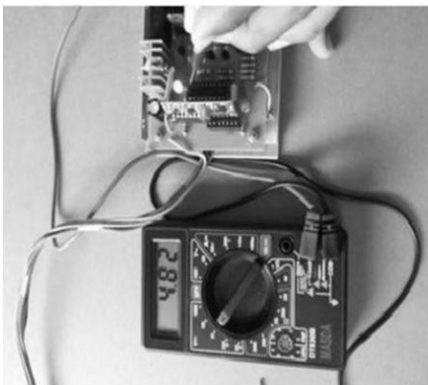


Fig. 3. Testing the remote control module circuit

Note: If logic is given zero, the avometer will show the number 0.02V and if given logic 1, the avometer will show the number 4.82 V.

Explanation of the Physical Form of the Tool

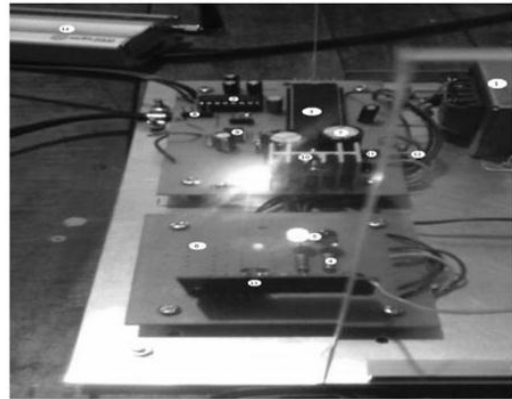


Fig. 4. Physical Form of the Tool

The following is a list of components and their functions:

1. Travo: The function of the transformer here is to reduce the voltage.
2. IC MAX232: As an interface to the Wavecom modem.
3. AT89S51 microcontroller: To enter a program so that the tool can run.
4. Resistor: As a current limiter in the tool.
5. LED: As an indicator of whether the tool is ON or OFF.
6. PCB board: A place to install component assemblies.
7. Capacitor: as a filter against alternating voltage.
8. PCB pin: For programming when connected to a PC.
9. IC 555: As a pause regulator SMS gateway.
10. Voltage Regulator: as a lowering voltage.
11. Radio Wave Receiver Module: As a radio wave signal receiver on the remote control.
12. Pelangi Cable: as a liaison between components.
13. Diode: To rectify the voltage.
14. Wavecom M1306B Q2406B Modem: as an SMS sender to a certain number when the door security system is forced to open or break the door



Fig. 5. Remote control image

- a. The remote control function is here to operate the door security device via button A to unlock and button B to lock the door
- b. After the series is finished, the next step is to do a demo of the tool and run the tool whether the tool can run smoothly and there are no disturbances or errors. And after testing, it can be concluded that the tool can run smoothly as expected.

Note: If logic is given zero, the avometer will show the number 0.02V and if given logic 1, the avometer will show the number 4.82 V.

V. CONCLUSIONS AND SUGGESTIONS

A. Conclusion

The results of the design, testing, and analysis of the tools that have been made, the following conclusions can be drawn:

- a. In the process of making the tool, a design scheme is made, among others, a power supply design scheme, door sensor design, radio wave receiver circuit module design, AT89S51 microcontroller design, M-IDE for MCS-51 program display, software design, design, flow diagrams, and circuit block diagrams have been created.
- b. Power supply assembly, microcontroller assembly, wave receiver module soldering, LED soldering, and other supporting components assembly have been completed and tested.
- c. From the test results, it can be concluded that each component has worked well and the tool can work optimally.

B. Suggestion

The tools that have been made have several shortcomings, for further development of the tools that have been made, the authors suggest:

- a. Using other types of remote control, for example, Infrared remote control.
- b. Using other series microcontrollers for example the Atmega 16 and PIC16f84 series.
- c. The longer range of radio waves.

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