Designand Creation of a Lighting Lamp Control Program d an Residential Door Security System Using SMS Based Microcontroller Atmega 8535

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Abstract: The design of this tool can help people to check the condition of the home, especially for conditions where the lighting and home security home security door of the house there is a condition that opens the door when the homeowner is not in the house. The design of lighting control devices, security doors using the Short Message Service (SMS) is a microcontroller-based design tool to automatically send commands turn on the lights and door security system, if there are approaching the door and open the door. In the design of this tool are, Infrared Sensors installed in front of the door. Used for detecting door Limit Switch. LDR is used for the detection of light where the dark area will automatically send a command to turn on the lights. Software control lighting and door security system using SMS-based microcontroller ATmega8535 made using Bascom language. Which will be controlled by the central pengrim wavecom as an SMS to the owner home. And as information will show on the LCD (Liquid Cristal Display).

Keyword: ATMega 8535 Microcontroller, Infrared Sensor, Limit Switch, LDR, Wavecom, Buzzer, Mobile, LCD

INTRODUCTION

When the house isuninhabited (empty), it is when this is when the homeowner has difficulty in controlling the house. Such as turning on the lights, turning off the lights, knowing the state of the house is safe or not. Along with the busyness of someone's activities outside the home, many events cause the house to be uninhabited, it will make it difficult for someone to interact or communicate with electronic equipment at home. For example, if you leave the house for a few days, of course, you must first prepare some things during your departure. One of them is to turn on the lighting before leaving. Of course, this is a waste of electricity use, fire due to short circuits. In addition, there are also frequent thefts due to uninhabited houses or in an empty state.

LITERATURE REVIEW

Different working systems of tools, also have an impact on the tools used. On the door control devices and lamps are used:

1. Atmega 8535

According to Afrie Setiawan (2011:1) "ATMEL production microcontrollers have released the latest AVR (*Alf and Vegard's Risc Processor*) microcontroller technology that uses RISC *(Reduce Instruction Set Computer)* technology with more advantages than its predecessor, namely the MCS type microcontroller". The physical form of ATMega 8535 is shown (Manengal, Lumenta, & Rumagit, 2014).

The ATMega 8535 microcontroller is an 8-bit microcontroller of CMOS technology with low power consumption based on the RISC (*Reduced Instruction Set Computer*) architecture. The RISC architecture is an architecture in which the instruction set is reduced in terms of its size and the complexity of its addressing mode. At the beginning of the computer industry era, programming languages still used machine code and assembly languages. To make programming easier, programmers then developed a high-level programming language that is easy for humans to understand (Sumardi, Bahri, & Nurseha, 2016).

Figure 1. Physical form ATMega8535
(Source: Afrie Setiawan.2011)

2. *AT-Command(Attention command)*

According to Khang, Bustam (2002) *The Hayes AT Command* plays a role behind the display of the messages menu of a mobile phone in charge of sending/receiving data from the SMS-Centre. One of the software that can be used to test this AT Command is Windows HyperTerminal. One of the things that needs to be considered in this test is the value of properties that must be filled in which depends on the type of communication tool used, for example the bit size per secondrate of the sms device used (Syamsul Syamsul, 2016). The AT Command for sms is usually followed by the I/O data represented by the PDU units. AT Command can be used among others to instruct command commands as follows:

1) Send and receive SMS or fax messages.
2) Get information about the device, such as the manufacturing name, IMEI number, and others.
3) Get device status, such as activity status, network registration status, signal strength, or battery status.
4) Phonebook writing and search.
5) From the security side, you can activate the lock facility and change the password
6) Save and restore kinfiguration.

The commands to be used are as follows:

Table 1. Perintah AT Command

AT Command	Information
AT	Check whether the mobile phone is connected
AT+CMGF	To set the format mode of the terminal

AT+CSCS	To set the encoding type
AT+CNMI	To automatically detect incoming new SMS messages
AT+CMGL	Open the SMS list on the SIM card
AT+CMGS	Send SMS messages
AT+CMGR	Read SMS messages
AT+CMGD	Delete SMS messages
ATE1	Setting the ECHO
ATV1	Setting inputs and outputs in the form of scripts
AT+CGMI	Checking hp brand
AT+CGMM	Checking the HP series
AT+CGMR	Check the output version of HP
AT+CBC	Checking the battery
AT+CSQ	Checking signal quality
AT+CCLK?	Checking the clock (time) on the cellphone
AT+CALM=<n>	Picking up HP Noise/ringing while on the phone (there's an incoming call) 'n' is a number indicating the type of ringing 0 = ringing 1 and 2 = silent(silent)
AT^SCID	Checking SIM Card ID

3. SMS keyword commands

According to Khang, Bustam (2002) This creation is done to sample PDU data as SMS commands that will be used as keywords. There are several commands that will be able to be done by this tool so that each command has a different keyword. The sampling method is as follows:

1. Previously the program To stamp the contents of the SMS has been inserted into the Microcontroller.
2. Send SMS to the Hand Phone with the content of the message has been set as a keyword for certain commands such as "On" to turn on the lights.
3. Command results for programs or *keywords* .

The results of the sampling can be seen in the table below:

Table 2. Keyword commands

SMS KEYWORDS	COMMAND TO
ON	Squinting the Lights
OFF	Turn Off the Light

METHOD
Software Design and Creation Methodology
a) Block diagram system

Block diagrams are very important, because they can clarify the parts that exist in the system that are created. Determining the block diagram is the most important thing at the stage of designing the tool in question (Herry Sufyan Hadi, Arief Abdurrakhman, & Bambang Sampurno, 2021). If the block diagram of the tool work in general has been compiled, then the steps at the next stage can be directed according to the block diagram. The block diagram in question can be seen in the figure below:
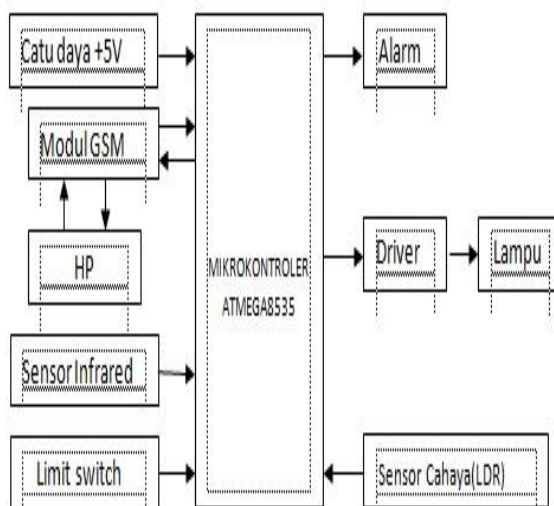
Figure 1. Light and Security Control Diagram Block

Home with SMS-Based Alarm System

Each part of the system block diagram above can be explained as follows:

a. Microcontroller At8535

The At8535 microcontroller functions as the brain or central controller of the tool, the microcontroller will execute commands according to those commanded by the computer that have been read by sensors (Riyadi & Eka Purnama, 2013).

b. LDR

Is one type of resistor that can experience a change in its resistance when it undergoes a change in light reception. The magnitude of the resistance value on the Light Sensor

c. Alarm

An alarm is as a warning or notification sound.

d. Limit switch

Limit switch is a tool that functions to disconnect and connect electric current in a circuit, based on the mechanical structure of the limit switch itself.

e. GSM Module

A tool used for communication with mobile phones over long distances.

f. Infra Red (IR) Sensor

It is a very common device used in a mobile instrumentation system in the form of light that has a sharp wavelength and radiation for measuring the speed of objects Defined as a signaling device on the sensor.

g. Lamp

is indoor lighting.

h. Power Supply

Power for running equipment obtained from a source of electric current

2. Flowchart

In the design of this software, it consists of a flowchart (flowchart). The flowchart serves as a reference in creating program listings. The flowchart contains the determination of the instructions of the program to be created. Flowchart can clearly show the flow of algorithm control, namely how the series of implementation of Flowchart activities for Program Design and Creation. **Figure 2.** Flowchart

RESULTS AND DISCUSSION
Implementation and Testing
1. AT8535 Microcontroller Testing
This microcontroller circuit is a data processing center and a tool control center. This process of setting ports and working modes is referred to as the *initialization* process.
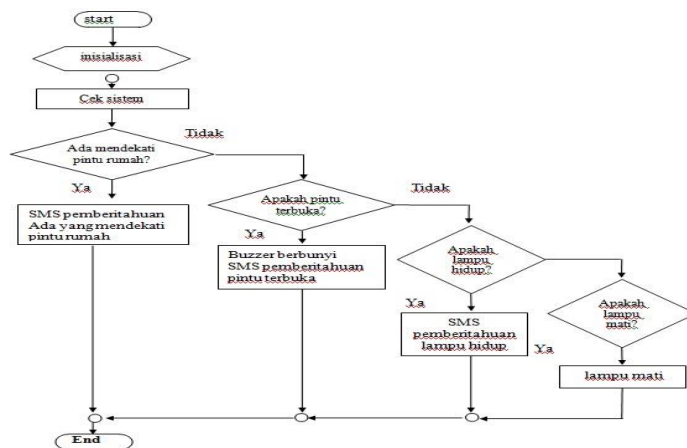

Figure 2. AT8535 Microcontroller Testing

Table 3. Measurement of Microcontroller Parameters AT8535

Port Logic	Voltage On I/O Pins of each port (PA,PB,PC,PD)
Low (0)	0.00 Volts DC
High (1)	4.80 Volts DC

From the measurement conditions above, the AT8535 microcontroller circuit has been able to work properly. This AT8535 minimum system test aims to find out whether the microcontroller is working properly, or there is still an error in the AT8535 IC I/O port. The port ports used are as follows:
a. PortB0 is used for bazzer input as an indicator
b. PortA0 is used for *infrared* sensor input near door detection
c. PortA1 is used for LDR sensor input as a command to turn on the light
d. PortA2 is used for *swicth limit* input as a door opening detector
e. PortD5 is used for home light output
In the program listing below is the Pin or Port Port used as input and output.

```
'--------------------------
Sensor1 aka Pina.0
Ldr Alias Pina.1
Switch Alias Pina.2
Pina Alias button.3
Buzzer aka Portd.7
Lamp aka Portd.5
```

In Table 3, it is concluded that the AT8535 minimum system works well, according to the planning that has been made, because when the port logic is *in a low* condition (Logic 0) the rated voltage on the I/O pin is equal to 0 Volts, and when the   *port* logic is in *high* conditions (Logic 1) the rated voltage on the I/O pins is equal to 4.8 Volts and the output output *output* from each *port* according to the input given.

2. Infrared Sensor

Infrared sensors are sensors that detect motion

Program Listing :

```
'------------------------

    Call Cek_sms
        If Sensor1 = 1 Then
           Incr Stat1
           If Stat1 = 1 Then
         Detection = "There are Guests"
              Locate 2 , 9
              LCD Detection
              Call Send2
```

If sensor 1 = where when the sensor is 1 it will appear in LCD detection = in LCD locate 2, 9 = row 2 column 0 call send 2 = send sms to the homeowner in the program listing above when the infrared sensor has 1 logo then appears on LCD detection = "THERE ARE GUESTS".

```
'===========================
' MESSAGING
'===========================
    Sub Send2()
        Print "AT+CMGS=+" ; Number
        Wait 1
        Print  "SOMEONE  IS  APPROACHING  THE  DOOR  OF  YOUR
    HOUSE...!!!"
        Print Chr(26)
        Wait 1
        Gosub Hapus_sms
    End Sub Send2()
```

Sub send 2 () = SMS command to be sent print "AT+CMGS= is as sender or command number = homeowner's number that has been assigned wait 1 = wait for one milli secan print = sms to be sent to the homeowner gosub = SMS removal end end and send SMS. In the condition of the program listing above is a program listing to send SMS to the homeowner when there is movement approaching the door of the house (Nainggolan & Yusfi, 2013).

3. LDR (Light Dependent Resistor) Sensor

The LDR sensor circuit functions to convert any change in light into an analog voltage magnitude.

Program Listings:

```
If Ldr = 1 Then
     Incr Conditions
     If condition = 1 then
        Light = "Night"
        Locate 1 , 9
        Bright LCD
        Call Aktif_lampu
     Elseif Conditions > 1 Then
        Condition = 1
```

```
        End If
    Else
        Condition = 0
        Light = "Day"
        Locate 1 , 9
        Bright LCD
    End If
```

If ldr 1 = if it is 1

lncr = check condition

Locate 1.9 = location of row 1 column 9

Lcd = appears bright

And if or if condition 0

Then it will appear the other way around

When the LDR is 1 or when dark conditions are detected, the next step is to send a command whether the light will be turned on or not with a predetermined format.

```
    '============================
    ' MESSAGING
    '============================
  Sub Aktif_lampu()
    Print "AT+CMGS=+" ; Number
     'Wait 1
     Print "WILL THE LIGHTS IN YOUR HOME BE TURNED ON ???"
     Print "WITH SMS FORMAT: ON OR ON..."
     Print Chr(26)
     Wait 2
     Gosub Hapus_sms
```

For sending SMS when print "AT= CMGS= SMS sending command to homeowner number print chr= is the character wait 2 = wait 2 seconds gosub = sms delete command. Next is sending SMS to homeowners to turn the lights ON or on (Setiadi, 2015).

```
'-------------------------------
'READ INCOMING SMS
'-------------------------------
Sub Showsms(x As String)
   Length = Len(sms_masuk)
   Stemp = Left(sms_masuk , 4)
   Wait 2
   If Hp <> Number Then
       Call Send3
       Gosub Hapus_sms
       Wait 1
   Elseif Hp = Number Then
       If Sms_masuk = "ON" Or Sms_masuk = "on" Then
           Cls
           Locate 1 , 1
           Lcd Sms_masuk
           Locate 2 , 1 : Lcd " LAMP ON "
           Light Set
           Call On_lampu
           Gosub Hapus_sms
```

After the light is on, a display will appear on the LCD and an SMS "THE LIGHT IN YOUR HOUSE HAS BEEN TURNED ON" as proof that the lamp has turned on.

```
'============================
' MESSAGING
'============================
Sub On_lampu()
 Print "AT+CMGS=+" ; Number
   'Wait 1
   Print "THE LIGHTS IN YOUR HOME HAVE BEEN TURNED ON"
   Print Chr(26)
   Wait 2

Gosub Hapus_sms
End Sub On_lampu()
```

And then notify the homeowner via SMS when the light is on. Listing of programs for turning off the light

```
Elseif Sms_masuk = "OFF" Or Sms_masuk = "off" Then
       Cls
       Locate 1 , 1
       Lcd Sms_masuk
       Locate 2 , 1 : Lcd " Light OFF "
       Lamp Reset
       Gosub Hapus_sms
```

Listing the program to turn off the lights with the command OFF and the homeowner will receive an SMS "THE LIGHTS IN YOUR HOME HAVE BEEN TURNED OFF" and appear on the LCD.

```
'============================
' MESSAGING
'============================
Sub Off_lampu()
  Print "AT+CMGS=+" ; Number
   'Wait 1
   Print "THE LIGHTS IN YOUR HOME HAVE BEEN TURNED OFF"
   Print Chr(26)
   Wait 2
   Gosub Hapus_sms
End Sub Off_lampu()
```

Sub off lights

Print AT=CMGS= is a command to send sms to a predetermined number
Wait 2 is wait 2 seconds
Gosub is the command to delete sms
End end and send sms
Program listing as a notification to homeowners by sending an SMS if the light is OFF

1. **Limit Switch on SMS**
   Program Listing

```
'=================================
If Switch=0 Then
     Gosub Alarm
   Else
       Set Buzzer
   End If
Loop
End' end program
'=================================
Alarm:
   Call Danger
   Wait 1
   Cls
   Locate 1 , 1
   Lcd "ATTENTION... YOU"
   Locate 2 , 1
   Lcd "CAN'T ENTER!"
   Wait 2
   For A = 1 To 100
      Reset Buzzer
      Waitms 50
      Set Buzzer
      Waitms 100
```

If switch 0 = if it is 0
Gosub alarm = alarm call
Set buzzer = sound abuzzer
Call danger = appear on lcd
Wait 1 – wait 1 second
It will be displayed on the LCD when the door of the house opens. And homeowners will receive an SMS "DANGER... YOUR HOUSE IS ENTERED BY PEOPLE..."
       Print "PLEASE CHECK THE CONDITION OF YOUR HOME...."

```
'=======================
' MESSAGING
'=======================
Sub Danger()
   Print "AT+CMGS=+" ; Number
   'Wait 1
   Print "DANGER... YOUR HOUSE IS ENTERED BY PEOPLE..."
   Print "PLEASE CHECK THE CONDITION OF YOUR HOME...."
   Print Chr(26)
   Wait 1
   Gosub Hapus_sms
End Sub Hazard()
```

Discussion
       After the creation of the tool is completed, the designed tool is tested from *both hadware* and *sofware.* The purpose of this test is to find out the extent of the success of the

designed tool as well as compare with the desired specifications. From the test results on the Atmega8535 microcontroller, infrared sensor, LDR sensor, Limit Switch as a whole the system can work according to the established design (Zain, 2013).

CONCLUSION

After carrying out the design stage, manufacturing and testing process as well as analyzing the *software*, there are several things that can be concluded, including:

a) The purpose of *Software* is to find out the extent of the success of the program tools for controlling lighting lights and residential door security systems using sms and *designed software* and comparing with the desired specifications.

b) Topview simulator is a *Bascom* application for microcontrollers with *basic* languages. From this basic, a .hex file will be obtained which is used to be downloaded to the microcontroller in question, so that the microcontroller can be run or operated. *Software* used to create and fill programs into microcontroller chips

c) This tool can design and make arrangements for light lighting systems and residential door security systems that turn on and off via SMS

d) This tool can design and make arrangements for the SMS notification system for homeowners if someone approaches the pinmtu and opens the door of the house.

e) This tool can be used to provide security to the house when the owner is not at home by using SMS.

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