DESIGN AND CONSTRUCTION OF SECURITY MONITORING SYSTEM COMPUTER INTERFACE

BY

ADEYEMI HABEEB DAYO

97/5906EE

DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING

SCHOOL OF ENGINEERING AND ENGINEERING TECHNOLOGY

FEDERAL UNIVERSITY OF TECHNOLOGY

MINNA

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SEPTEMBER 2003.

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This project is submitted to the department of Electrical /computer Engineering as a partial fulfilment of the requirement for the award of Bachelor of Engineering B.Eng in Electrical & Computer Engineering

SEPTEMBER 2003

DECALARATION

I Adeyemi Habeeb Dayo declare that this project is an original concept of mine and was designed, constructed and tested under the supervision of Engr. Enronu Dept of Electrical &Computer Engineering Federal University of Technology Minna

....

Student's signature

....

Supervisor's signature

CERTIFICATION

I hereby certify that this project was carried out by Mr. Adeyemi Habeeb Dayo of the department of Electrical & Computer Engineering Federal University of Technology Minna

....

Student's signature Date

....

Supervisor's signature Date

....

Head of Department signature Date

....

External Examiner's signature Date

DEDICATION

I dedicate this project to my beloved parent Alhaji & Alhaja Adeyemi

ACKNOWLEDGEMENT

I thank Allah for his infinite mercy, protection, and guidance.

My profound gratitude goes to my parent Alhaji & Alhaja Adeyemi for their financial and moral support.

Also I thank the family of Dr & Mrs Ojegbile ; my uncle Mr.R.G Adeyemi; my loved brothers and sisters Sarafa Mustapha, Banji Adeyemi, Bukola Adeyemi and Yetunde Ojegbile for their support. And not forgetting my friends Tade Durojaiye , Sunday Musa , Tsado Musa , Aliyu Issa and others for their valuable advice during construction of this project.

Lastly I thank my supervisor Engr. Enronu for his guidance and contribution to the actualization of this project.

ABSTRACT

This project is done with the aim of reducing the present state of criminal activities, thus this project work is based on the use of computer to monitor perimeter area of a building .Intrusion of the volumetric space of the building is being indicated by the Light Emitting Diode.

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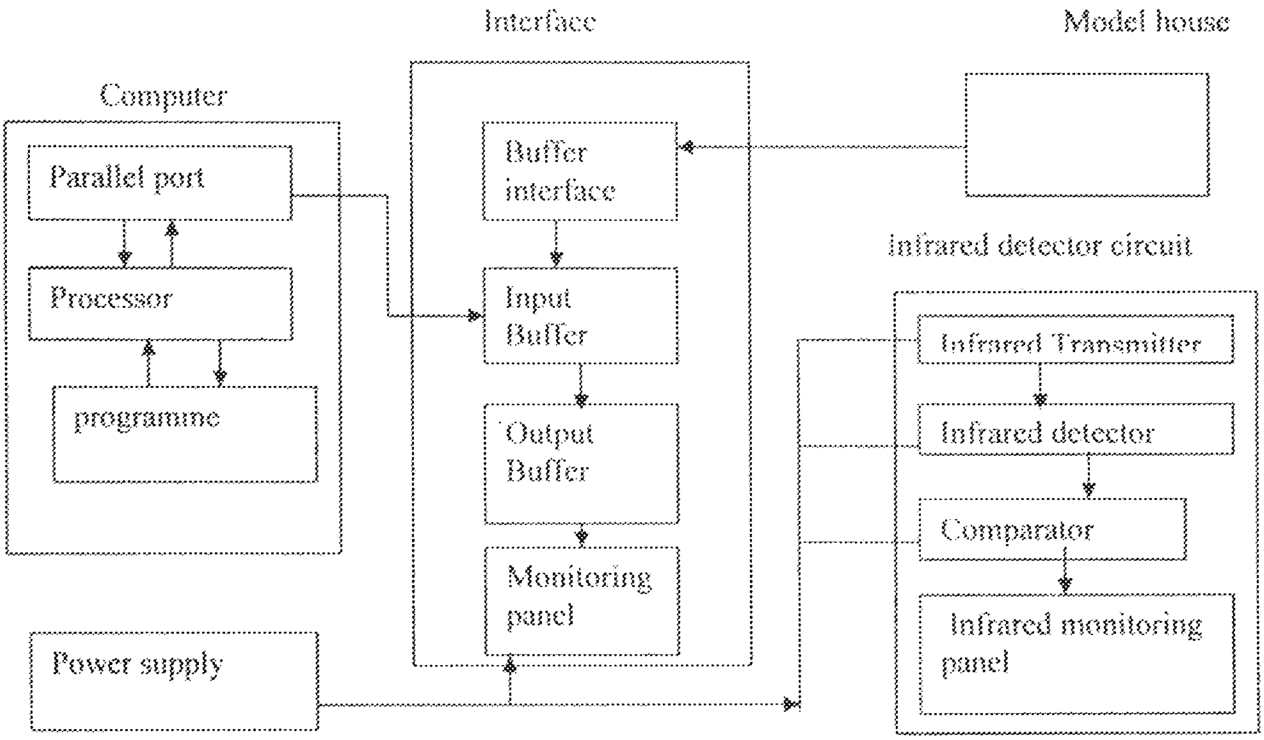


Fig 1

SMSCI comprises two major subsystems: Hardware and Software.

A. HARDWARE SECTION

This is made up of personal computer, power supply unit, interface circuit, model building, sensory unit, buffer/sensor interface, infrared transmitter, infrared detector, and comparator.

i. PERSONAL COMPUTER

This accepts data from the external device, which it process, and store as dictated by the programme. It displays the output, which is the status of the door and window.

ii. POWER SUPPLY UNIT

This unit supplies 5VDC to the external device.

iii. INTERFACE CIRCUIT

This consists of the input and output buffer, the input buffer stores the digital data representing status of door and window until the computer is ready to read. It also provide electrical isolation between the computer 's parallel port and the external hardware i.e. prevent damage of port by sourcing more current.

The output buffer stores the data representing status of door, window for display on the panel and on the monitor.

iv. SENSOR INTERFACE

These are the pull up resistor and the wiring between the input buffer and sensor installed on the model building.

v. MODEL BUILDING

This is a building constructed with plywood, it has micro-switch sensor installed on the frame of the door and window, also it has infrared proximity detector been mounted at the base of the roof

vi. SENSORY UNIT

This unit detects when external device is not powered or connected to computer.

vii. INFRARED TRANSMITTER

This produces infrared beam, which are invisible to human eye.

viii. INFRARED RECEIVER

This receives the infrared beam being emitted by the infrared diode

ix. COMPARATOR

This compares the voltage to a fixed voltage thus it indicates the high or low state

B. SOFTWARE SECTION

These are programme that directs the external device, it was written in Visual Basic an upgrade of BASIC .The programming language was use in order to make use of it's interactive, Graphic User Interface (GUI), and object oriented applications.

The program has 3 major subsections.

1. Input section: Reading data from the external device

Alarm is activated e.g infrared light. Thus my security employs the use of space and perimeter detection. (The illustrated Science and invention Encyclopedia volume 15 page 2061, volume 3 page 397 – 400)

1.2 AIMS AND OBJECTIVES

- To be able to interface external hardware to computer via the parallel port
- Monitoring door, window and volumetric space of a building from a far place.
- Masking off alarm when the need arises
- Monitoring of a building while the night watchman goes to rest.

1.3 PROJECT OUTLINE

Chapter One Introduction

This chapter deals with the description of functional unit of the project; Literature Review, Aims, and Objective are discussed in this chapter

Chapter Two System design

This chapter gives the detail of the system design including the hardware and software design where each of the hardware was explained and the step-by-step design of the software including the flowchart was explained.

Chapter Three Construction Testing and Results

This chapter deals with the step-by-step details of how the hardware was constructed it explains how test was carried out at each stage of the design.

Chapter Four Conclusion, Recommendation, Reference And Appendix

This chapter deals with the conclusion of the project with reference to the aims and objectives of this project. Recommendation on improvement of this project was explained, materials consulted were listed while the program, circuit diagram are contained in this chapter

CHAPTER TWO

SYSTEM DESIGN

The Security Monitoring System Computer interface design is divided into two major sections: Hardware and Software section

2.1 SOFTWARE DESIGN

This is the stored programme that controls the microprocessor. SMSCI has to be interactive thus Visual Basic an upgrade of BASIC was used to write the program.

Software design is subdivided into 2 modules

2.1.1 GRAPHIC USER INTERFACE

GUI is the graphics generated by the software when it is run. it is made up of the following window: welcome window, introduction window, and monitoring window SMSCI Help window, Alarm checkbox window and two dialogue boxes.

FORM1 SMSCI WELCOME WINDOW

This appears firstly when the software is run, it displays welcome message to SMSCI, name of the designer, supervisor of the project, and date project was carried out.

It has two command button NEXT and EXIT.

NEXT button: it displays Form 2 when clicked.

Exit button: it quit SMSCI environment when clicked

FORM 2 SMSCI INTRODUCTION WINDOWS.

This displays what SMSCI is made up of, it has two-command button: NEXT and BACK

NEXT button: it displays Form 3 window when clicked.

BACK button: it displays form1 window when clicked the data port acquiring of sensory signals from the status port and sending control signal to enable input and output buffer.

Steps on how Inpout dll was used.

- It was copied to windows/system directory
- It was registered among windows activex component by run dialog box
- It was added to project through add component to form a tool which was finally dragged and dropped on Form 3 Monitoring panel

Port address for data port, status port and control port are 378H, 379H, 37AH respectively while pin 2 to 9 were used as input (data) pins, pin 10,11,12,13,15 were used to input sensory signals from status port.

Output of input buffer gives the 8 data bits (byte) for input to computer as well as output buffer, the byte represent the status of door and window.

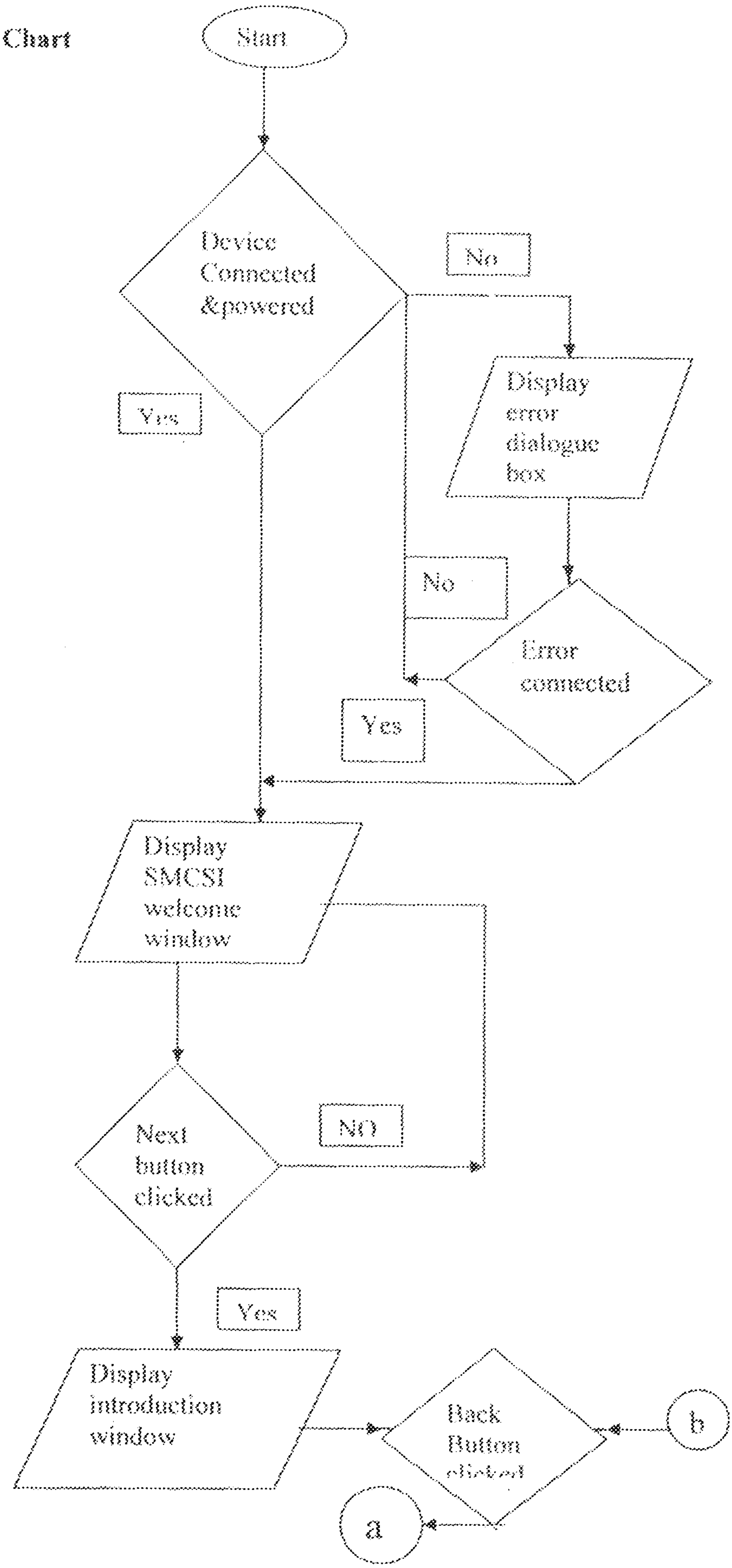
Each input line has its corresponding weight as follows

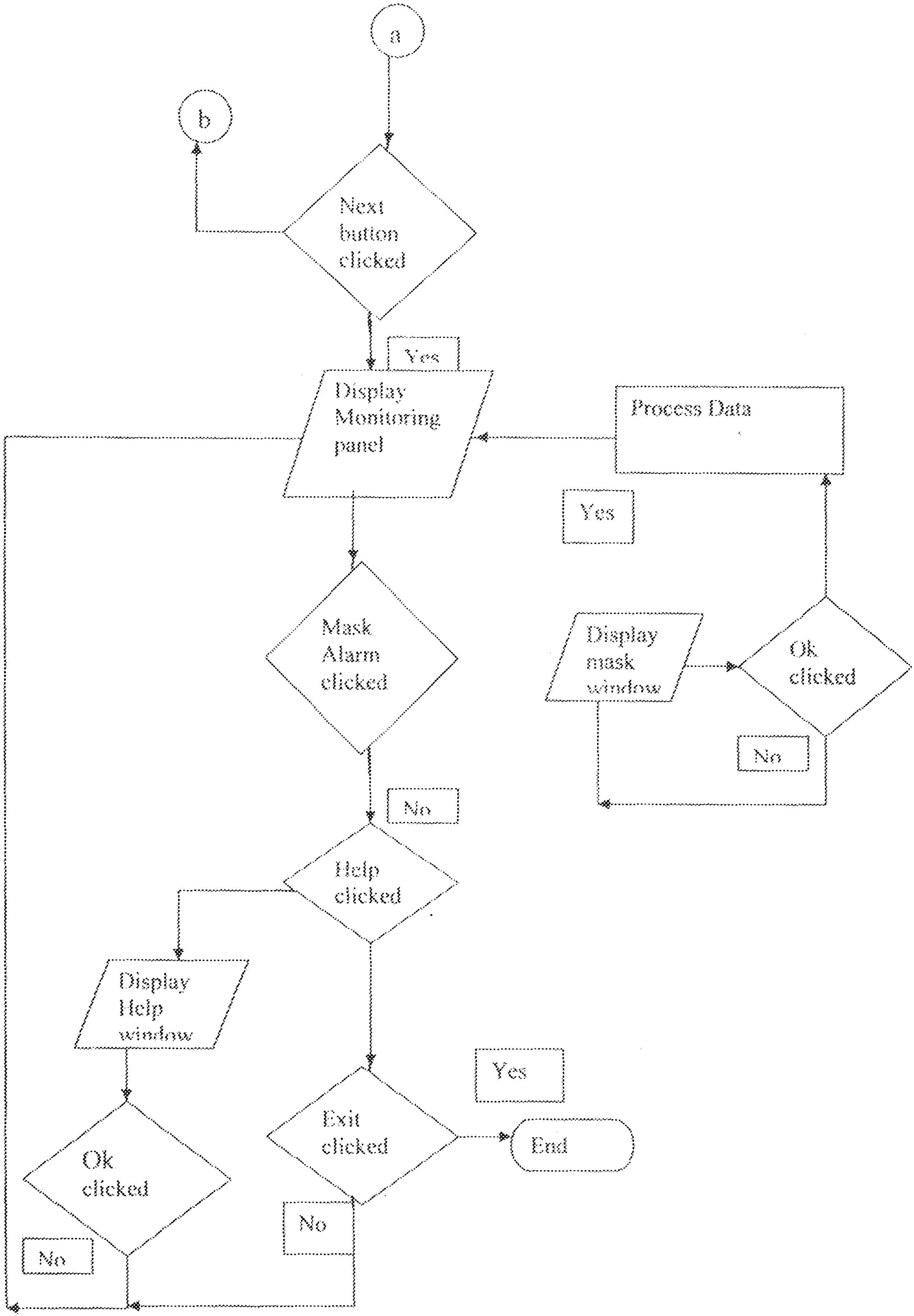
D0 = 2^O = 1	D1 = 2 ^1 = 2	D2 = 2^2 = 4
D3 = 2 ^3 = 8	D4= 2^4 = 16	D5 = 2^5 = 32
D6 = 2^6 = 64	D7= 2^7 =128	

Input lines are either logical one or zero thus the logical state of each input data pin can be determined by subtracting it's weight from the input data, if the result is less than zero then weight subtracted was not used while if greater than zero then it was used.

Each of the door and window needs to be monitored continuously thus a timer control is dragged and dropped on form 3 monitoring panel, timer interval was set to 0.01sec in order to detect any changes in the external hardware.

2.1.3 Flow Chart





a
b
Next
button
clicked
Yes
Display
Monitoring
panel
Process Data
Yes
Mask
Alarm
clicked
Display
mask
window
Ok
clicked
No
No
Help
clicked
Display
Help
window
Yes
Exit
clicked
End
Ok
clicked
No
No

2.2 HARDWARE DESIGN

Hardware design is made up of all physical components that make up SMSCI. The hardware is subdivided into the following module.

1.Personal computer	6. Buffer interface
2.Interface circuit	7. Model building
3.Monitoring panel	8. Infrared transmitter
4. Power supply	9. Infrared receiver
5. Sensory unit	10. Comparator

2.2.1Personal computer

This is the control unit of the SMSCI, data from the input buffer were interfaced to the microcomputer via the parallel port .The micro processor process the data under the control of software herby producing an output on the monitor indicating the status of door and windows, alarm on the system board is triggered if there is intrusion via the door or window. The computer communicates with the external device via the parallel port if external device it is not connected to parallel port or when not powered it is detected by the computer.

Parallel port

Port are of three types serial, parallel and universal serial port, serial port allows transfer of data sequentially one bit at a time while parallel port allows a byte of data to be sent into the computer at a time

Parallel port on the microcomputer is a 25-pin connector often referred to as DB-25 connector fig 2.0 shows the pin out for the connector.

The original IBM-PC's Parallel Printer Port had a total of 12 digital outputs and 5 digital inputs accessed via 3 consecutive 8-bit ports in the processor's I/O space.

- 8 output pins accessed via the DATA Port
- 5 input pins (one inverted) accessed via the STATUS Port
- 4 output pins (three inverted) accessed via the CONTROL Port
- The remaining 8 pins are grounded

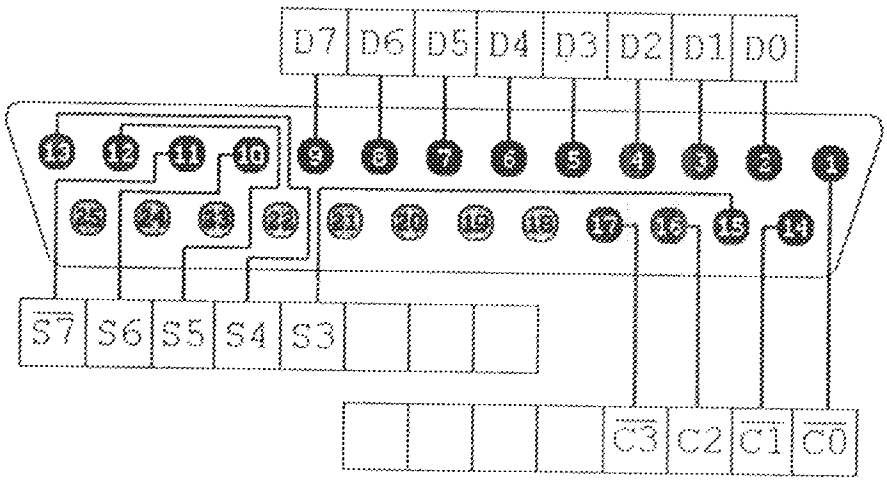


FIG 2.O

C0, C1, C3, S7 are active low i.e. signal is in it's active state when electrically low (0 volts).

Signal name	Register bit	D-SUB	Centronics	Hardware inverted
		Pin	Pin	
Data bit 0	D0	2	2	
Data bit 1	D1	3	3	
Data bit 2	D2	4	4	
Data bit 3	D3	5	5	
Data bit 4	D4	6	6	
Data bit 5	D5	7	7	
Data bit 6	D6	8	8	
Data bit 7	D7	9	9	
nError (nFault)	S3	15	32	
Select	S4	13	13	
PaperEnd	S5	12	12	
nAck	S6	10	10	
Busy	S7	11	11	Yes
NStrobe	C0	1	1	Yes
nAutoLF	C1	14	14	
nInit	C2	16	31	
nSelectIn	C3	17	36	Yes
Ground	GND	18-25	19-30	

Pin assignments:

Hardware inverted means the signal is inverted by the Parallel card's hardware. Such an example is the Busy line. If +5v (Logic 1) was applied to this pin and the status register read, it would return back a 0 in Bit 7 of the Status Register.

The base address, usually called the Data Port or Data Register is simply used for outputting data on the Parallel Port's data lines (*Pins 2-9*). This register is normally a write only port. If you read from the port, you should get the last byte sent. However if your port is bi-directional, you can receive data on this address.

The Status Port (base address + 1) is a read only port. Any data written to this port will be ignored. The Status Port is made up of 5 input lines (Pins 10,11,12,13 & 15), an IRQ status register and two reserved bits.

The Control Port (base address + 2) was intended as a write only port. (0v) The Control Port must be set to xxxx0100 to be able to read data. Bits 4 & 5 are internal controls. Bit four will enable the IRQ and Bit 5 will enable the bi-directional port meaning that you can input 8 bits using (DATA0-7). This bit is enabled by SMSCI software i.e. the program must make C5 high In order to initiate a read C5 must be brought high and. This would require a decimal value of 33.

Pins 18 through 25 on the port are internally connected together to ground

Port address:

The most parallel ports are located at a base address of 378h, 278h, or 3BCh (h denote hexadecimal), the base address of a parallel port used in this deign is 378h

The following is typical.

Printer	Data Port	Status	Control	Address
LPT1	0x03bc	0x03bd	0x03be	378h
LPT2	0x0378	0x0379	0x037a	278h
LPT3	0x0278	0x0279	0x027a	3BCh

Parallel port mode of operation

Parallel Port's are standardized under the IEEE 1284 standard first released in 1994. This standard defines 5 modes of operation, which are as follows,

1. Compatibility Mode.
2. Nibble Mode
3. Byte Mode.
4. EPP Mode
5. ECP Mode

Compatibility, Nibble & Byte modes use just the standard hardware available on the original Parallel Port cards while EPP & ECP modes require additional hardware, which can run at faster speeds, while still being downwards compatible with the Standard Parallel Port. Compatibility mode or "Centronics Mode" as it is commonly known, can only send data in the forward direction at a typical speed of 50 Kbytes per second but can be as high as 150+ Kbytes a second. In order to receive data, you must change the mode to either Nibble or Byte mode. Nibble mode can input a nibble (4 bits) in the reverse direction. e.g. from device to computer. Byte mode uses the Parallel's bi-directional feature to input a byte (8 bits) of data in the reverse direction this mode was used in this design of this project whereby *Read and Write Operations can be performed on the Data Register*. this was achieved by setting bit 5 of control port. This enables the bi-directional port of the Parallel Port. . Other ports may require setting bit 6 of the Control Port to enable Bi-directional mode and setting of Bit 5 to disenable Bi-directional mode. Different manufacturers implement their bi-directional ports in different ways. Thus Bi-directional port was tested with multimeter first to make sure it is in bi-directional mode. When bit 5 is set to one, pins 2 to 9 go into high impedance state. Once in this state data can be written on these lines and retrieved from the Data Port (base address). Any data, which is written to the data port, will be stored but will not be available at the data pins. To turn off bi-directional mode, set bit 5 of the Control Port to '0'

2.2.2. INTERFACE CIRCIUT

The circuit for interface It contains the following sections:

A 74LS244 octal bi-directional transceiver to provide an 8-bit digital input port, which input data from 8 switches i.e., Input buffer.

A 74ALS373 transparent octal D Latch to provide an 8-bit digital output port, which will be used to light 8 LEDs i.e., Output buffer

2.2.2.1 INPUT BUFFER

This protect parallel port from being damaged i.e. they control amount of current and voltage going into the computer. Each door and window is connected to the input pins of the buffer. The buffer is enabled and disabled by passing it through not gate (74LS04). The output of the buffer is connected to the output buffer and the data port.

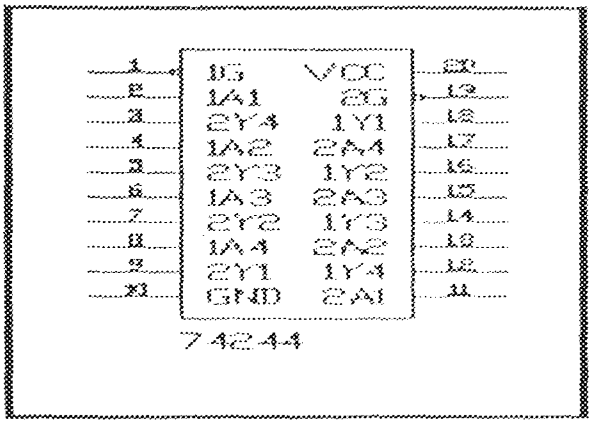


FIG 2.1

Octal buffer truth table

G	A1	A2	A3	A4	Y1	Y2	Y3	Y4
1	X	X	X	X	Z	Z	Z	Z
0	X	X	X	X	A1	A2	A3	A4

G is inverted, A1 - A4 input, Y1 - Y4 output, Z = High impedance (off)

2.2.2.2. OUTPUT BUFFER

74LS373 (OCT- D- Latch) was used as output buffer, signals from the output pins of the buffer are connected to light emitting diode.

If door or window is opened the light emitting diode turns on otherwise it remains off indicating door or window is closed.

Oct.- D- Latch truth table.

down mains supply voltage to 9 volts. Full bridge rectifier converted the ac voltage to DC voltage, which is then filtered by the capacitor (2200μF). 7805 regulator regulate the output voltage from the capacitor to 5 volt which is then filtered to produce a constant smooth 5 DCvolt

2.2.4 SENSORY UNIT

This is made up of a 10kohm resistor and 74LS04 it senses if the computer is connected or not powered. If the device is not connected to the parallel port or the device is not powered the corresponding bit weight will be different when device is powered or when connected. Hence in the design of SMSCI pin 10,12,13,15 of the status port were grounded and used to detect when the device is connected while pin 11 is connected to pin 12 of 74LS04

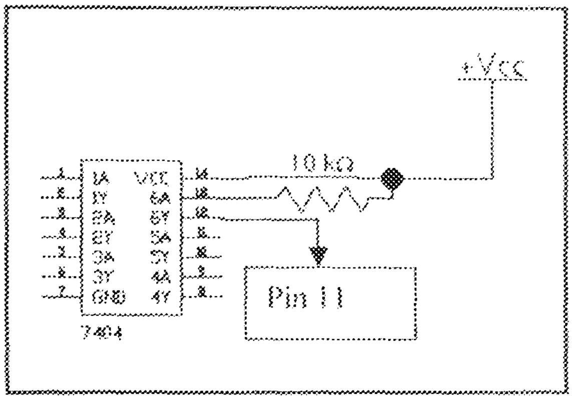


Fig 2.4 sensory unit diagram

2.2.5 SENSOR INTERFACE

SMSCI made use of a sensor as transducer through which the state of the door or window is transferred to the electronic circuit for analysis. Micro switch was used as sensor it has three pair of legs of which a pair was connected to input buffer, it breaks contact internally when pressed by the door or window and makes contact when the door or window is closed

Micro switch acts as transducer as it make and break electric path, telephone cable was used to connect the buffer to the micro switch.

2.2.6 MODEL BUILDING

The building has four door and four window with sensor installed on the frame of each door and window. Infrared proximity detector is mounted at the base of the roof to monitor intruder

2.2.7 INFRARED TRANSMITTER

Infrared is produced by the infrared diode by feeding it with pulse being generated from a transmitter. The transmitter is a 555 timer, which operates in astable operation; it operates with a dc supply of 5Vto 18V.The diagram below shows a 555 timer

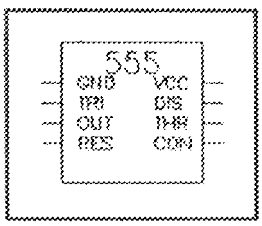


Fig 2.5

Astable operation: This a free running mode circuit of the 555 timer R1 $_{R2}$, C are the frequency determining components

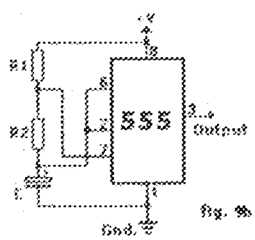


FIG 2.6

Pin1 – ground	Pin2 – Trigger input
Pin3 – Output	Pin 4- Reset
Pin5 – Control voltage	Pin 6- Threshold
Pin 7- Discharge	Pin 8 – Supply voltage

2.2.7.1 Design calculation for infrared transmitter

$$RA = \frac{Vcc - V_{led}}{34mA}$$

$$= \frac{5 - 1.6}{34mA}$$

$$= 100\Omega$$

Vled of infrared is 1.6 volts for a forward current of 34 mA at 5volts

Th = Th ln2 = 0.693Th

Th = (R1 +R2) C; Th represents high state time

Tl = Tl ln2 = 0.693Tl = R2C

Total period = Th + Tl

= 0.693(R1+2R2) C

$$\text{Frequency} = \frac{1.44}{(R1 + 2R2)\,C}$$

$$\text{Duty cycle} = \frac{R2}{R1 + 2R2}$$

C = 0.1 µf R1 = 330Ω f = 28khz

$$R2 = \left(\frac{1.44}{F \times C} - R1\right) \times 0.5$$

$$= \left(\frac{1.4}{28\times10^3} - 330\right) \times 0.5 = 92\Omega$$

R2 = 100 (working value)

2.2.8 INFRARED RECEIVER

Infrared beam being emitted by the diode is being received with the aid of a photodiode, by positioning in front of the infrared diode.

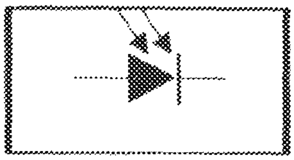


Fig 2.7

2.2.9 COMPARATOR/OUTPUT

I made use of the inverting comparator in which the signal was fed into the negative terminal of op-amp while the reference voltage was applied to the positive terminal of the op- amp.

If voltage at the positive terminal exceeds that of the input signal there will be low state at the output of the amplifier while if the voltage is less than the incoming voltage then there will be a high state .the reference voltage which is the threshold is gotten from calculation. Output of the comparator is fed into the base of the transistor for switching an external device e.g. alarm speaker, beeper e.t.c

2.2.9.1 Design calculation for comparator

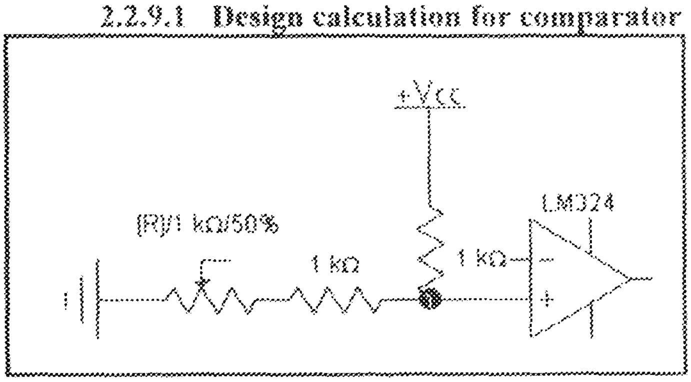


Fig 2.8 Comparator circuit

Applying voltage divider $V_{ref} = \frac{(1 + Rx)\ k\Omega}{(1+1+1)\ k\Omega} \times 5v$; Rx is the variable resistance

CHAPTER THREE

CONSTRUCTION, TESTING, RESULT

3.1 SMSCI was constructed as it has been designed and tested to ensure desired results were obtained. Materials used to construct are as follows:

1. Soldering iron 2. Breadboard 3. Vero board 4. Multimeter

5.lead sucker 6. Lead 7. Saw 8. Planes

9.plywood 10.screws 11. Wood glue.

Construction of the circuit was first done on the breadboard, after it has been tested to ensure desired results it was then transferred to Vero board.

3.1.1 CONSTRUCTION OF POWER SUPPLY

This unit was constructed as shown in the circuit diagram of fig 2.3

3.1.2 CONSTRUCTION OF INTERFACE CIRCIUT

Input and Output buffer are made up of two Ics74LS244 and 74LS373 respectively. Each IC was mounted on an IC socket of 20 pins input and output wires were connected to each pin based on its data sheet. LED was connected to the output pin of 74LS 373 while current limiting resistor was connected in series to each LED before it is finally grounded.

3.1.3 CONSTRUCTION OF SENSORY UNIT

This was constructed based on the circuit diagram in fig 2.4

3.1.3. CONSTRUCTION OF SMSCI CASING

The whole circuit was housed in a plywood casing; the casing was designed in such a way that the LED can be easily seen at any angle of the building. Holes were drilled for components that needs to be accessed or viewed, the casing is made up of plywood ¾" thick. Power supply and sensory unit are screwed to the base while the input and output buffer unit are screwed to the top of the casing.

3.1.5. CONSTRUCTION OF THE MODEL BUILDING.

The prototype building is made up of ¾' plywood each side of the building has a door and window, each door and window are fastened to the building with hinges sensors were installed at the top of the door and window frame. The eight sensors has a pair of connecting wires hidden from view by tape, each wire of the sensor are connected together while other wire is ran to the edge of the house from where it is connected to input buffer

3. 1.6. CONSTRUCTION OF INFRARED TRANSMITER

This was constructed as shown in the circuit diagram of fig 2.6 pin 3 which is the output is used in driving the infrared led

3.1.7 CONSTRUCTION OF COMPARATOR /OUTPUT UNIT

Lm324 was mounted on IC socket after which the input voltage was connected to pin 2 of the IC while pin 3 was connected to the reference voltage pin 1 of the IC was fed into the base of a transformer whose emitter is grounded output is tapped from the collector of the transistor, in this design LED was connected to indicate there is intrusion.

3.1.8. CONSTRUCTION PRECAUTION

1. The interface circuit was soldered neatly to prevent short-circuiting of components.
2. Excess lead was removed with lead sucker during soldering
3. IC socket was soldered to the board in order to prevent the IC from being damaged by heat.
4. Soldered points were tested to ensure continuity.

3.2. TESTING

SMSCI was tested at each stage of the design to ensure desired results was obtained, it is subdivided into four modules

Power supply

Power supply voltage was tested

Monitoring display

Installed sensors were tested as the doors and window were opened and closed, in response the LED blinks. Input and Output buffer was connected to the computer and model building and the corresponding LED and textbox was noted as the door and window were opened and closed.

Computer

The stored program was run to ensure each form works according to its design, external device was not connected and the power supply was switched off while the program was running. External speaker of the system was switched on to ensure the alarm is being heard as the computer beeps.

Each command on the form were clicked and its response noted

Model building

Installed sensors were pressed whenever the door or window opens and closes.

Infrared transmitter was connected to oscilloscope to ensure pulses were been generated.

Whenever the photodiode is blocked of the infrared beam the LED at the collector of the transistor goes off.

3.3. RESULTS

The output voltage of the power supply unit was measured to be 5volt.

When all door and window were closed the LED remain off and the corresponding text box displays it is closed, textbox colour also remains white.

If any door or window is opened without permit the corresponding LED turns on while the it's text box flashes different colour displaying "door or window is opened" coupled with the alarm on the system board triggered on.

If the door and window is opened with permit i.e. alarm masked off the corresponding LED turns on while the textbox flashes different colour displaying "door or window is opened"

IF there is intrusion via the roof the LED turns off if otherwise the LED remains on

3.4. PROBLEM ENCOUNTERED

Problems encountered during the course of the project are:

1.Erratic power supply delayed the pace of the project.

2. ASUU strike delayed the pace of the project.

3. In availability of sensors led to the modification of the design.

CHAPTER FOUR

4.1. Conclusion

From the results of the test obtained it can be deduced that the aim of the project which is to mask alarm when the need arises, monitor a building from intrusion via the door, window or roof is achieved.

Thus the security men can know the exact door or window that was intruded on the monitor and monitoring panel. Also, the light emitting diode indicates if there was intrusion of the volumetric space of the building.

4.2 Recommendation

Interfacing of the infrared proximity detector circuit

More reliable sensors should be used in place of the micro switch sensor installed

Incorporate telephone service to dial police number automatically.

Security Officers are employed to use this methodology to protect either residential home or offices

4.3 . Reference

1.www.ioport.com

2. www.lvr.com/parport.htm.com

2. www. Softcircuit/programming parallel port in visual basic .com

3. www.upper Canada technologies

4. The illustrated Science &Invention Encyclopaedia

H.S Stuliman Co.Inc.

Vol 15 page 2061,vol 3 page 397- 400

APPENDIX

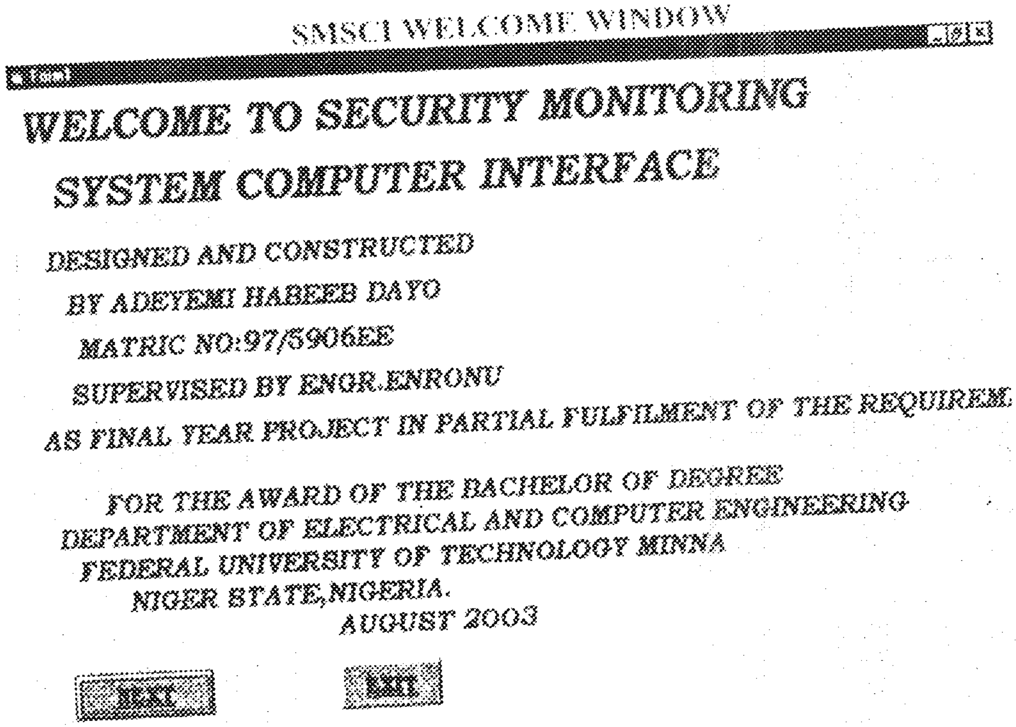
```
Option Explicit

Dim a, baseadress, baseadress1, base1, base2, statusport, baseadress2 As Integer

Dim door1isopen, door2isopen, door3isopen , door4isopen, door5isopen  As String

Dim  window1isopen, window2isopen window3isopen, window4isopen, As String

'Inp and Out declarations for direct port I/O

'in 32-bit Visual Basic 4 programs.

Public Declare Function Inp Lib "inpout32.dll" _

Alias "Inp32" (ByVal PortAddress As Integer) As Integer

Public Declare Sub Out Lib "inpout32.dll" _

Alias "Out32" (ByVal PortAddress As Integer, ByVal Value As Integer)

Private Sub Cmdexit_Click()

End

End Sub

Private Sub Cmdhelp_Click()

FHELP.Show

End Sub

Private Sub Cmdmask_Click()

MASK.Show

End Sub

Private Sub Form_Load()

Timer1.Interval = 100

End Sub

Private Sub Timer1_Timer()

Dim msg1, style1, title1, response1
```

```
msg1 = "The SCMSI device power switch is OFF,switch it on and click ok"
style1 = vbOKCancel + vbDefaultButton1
title1 = "SCMSI POWER CHECK"
statusport = Inp(889)
base1 = statusport
If base1 <> 7 Then GoTo 2
response1 = MsgBox(msg1, style1, title1)
Beep
If response1 = vbCancel Then End
End
Dim msg2, style2, title2, response2
2 msg2 = "The SCMSI device is not connected ,connect and click ok"
style2 = vbOKCancel + vbDefaultButton1
title2 = "SCMSI CONNECTION CHECK"
statusport = Inp(889)
base2 = statusport
If base2 = 135 Then GoTo 5
response2 = MsgBox(msg1, style1, title1)
Beep
If response2 = vbCancel Then End
 End
baseadress = 888
baseadress1 = 889
baseadress2 = 890
Out 890, 48
```

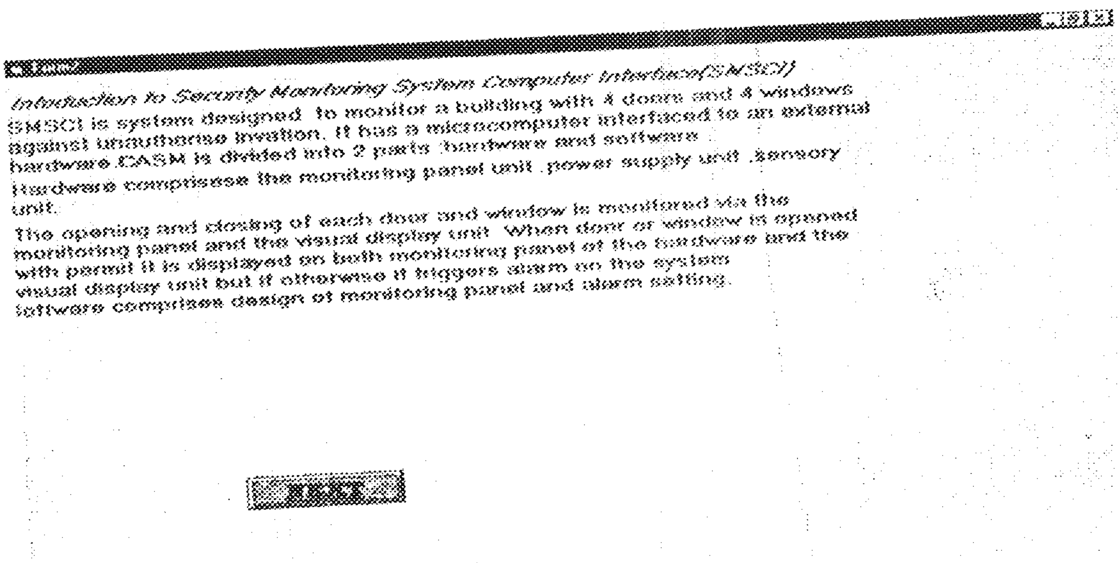
```
a = Inp(888)
If a - 128 < 0 Then GoTo 20
If MASK.Check1.Value = 1 Then GoTo 5
Beep
5 DOOR1 = "door1isopen"
DOOR1.BackColor = QBColor(Rnd * 15)
a = a - 128
20 If a - 64 < 0 Then GoTo 40
If MASK.Check2.Value = 1 Then GoTo 25
Beep
25 DOOR2 = "door2isopen"
DOOR2.BackColor = QBColor(Rnd * 15)
a = a - 64
40 If a - 32 < 0 Then GoTo 60
If MASK.Check3.Value = 1 Then GoTo 50
Beep
50 DOOR3 = "door3isopen"
DOOR3.BackColor = QBColor(Rnd * 15)
a = a - 32
60 If a - 16 < 0 Then GoTo 80
If MASK.Check4.Value = 1 Then GoTo 70
Beep
70 DOOR4 = "door4isopen"
DOOR4.BackColor = QBColor(Rnd * 15)
a = a - 16
```

```
80 If a - 8 < 0 Then GoTo 100
If MASK.Check5.Value = 1 Then GoTo 90
Beep
90 W1 = "window1isopen"
W1.BackColor = QBColor(Rnd * 15)
a = a - 8
100 If a - 4 < 0 Then GoTo 120
If MASK.Check6.Value = 1 Then GoTo 110
Beep
110 W2 = "window2isopen"
W2.BackColor = QBColor(Rnd * 15)
a = a - 4
120 If a - 2 < 0 Then GoTo 140
If MASK.Check7.Value = 1 Then GoTo 130
Beep
130 W3 = "window3isopen"
W3.BackColor = QBColor(Rnd * 15)
a = a - 2
140 If a - 1 < 0 Then GoTo 160
If MASK.Check8.Value = 1 Then GoTo 150
Beep
150 W4 = "window4isopen"
W4.BackColor = QBColor(Rnd * 15)
160
End Sub
```

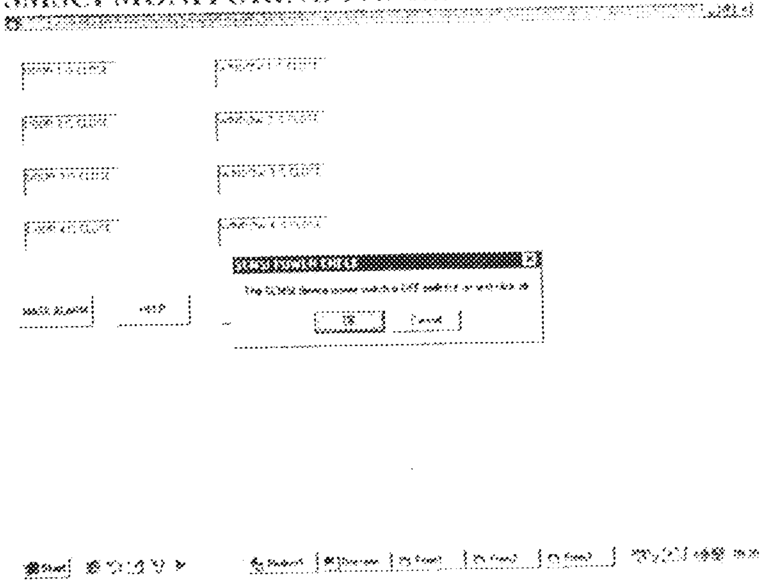
SMSCI WELCOME WINDOW



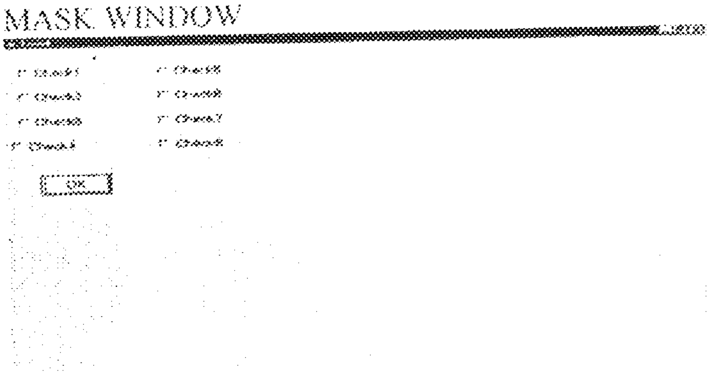
SMSCI INTRODUCTION WINDOW



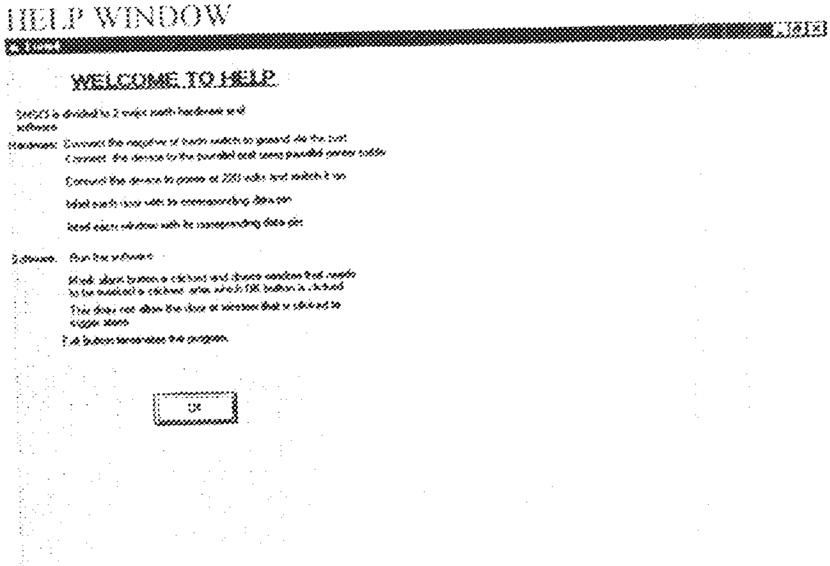
SMSCI MONITORING PANEL



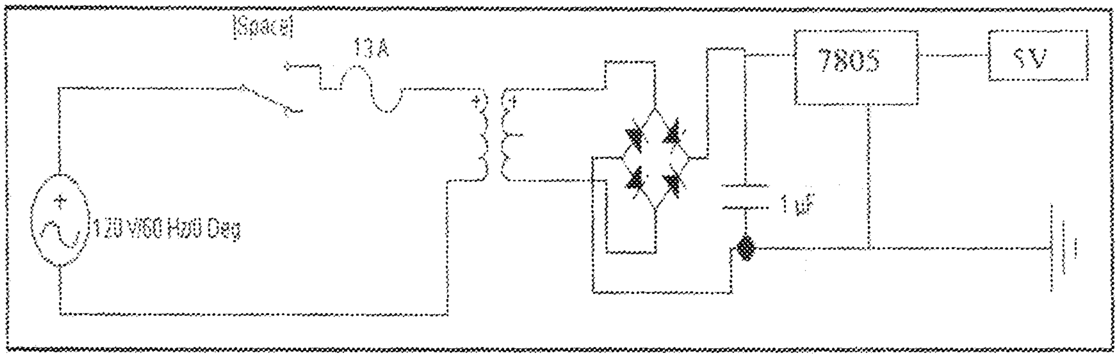
MASK WINDOW



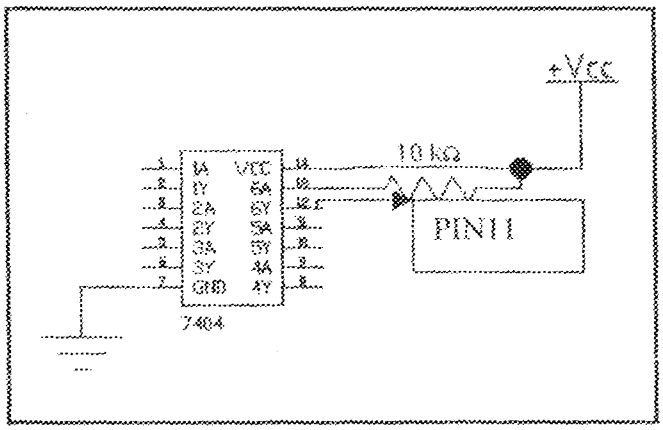
HELP WINDOW



POWER SUPPLY CIRCUIT



SENSORY UNIT



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