

GSM BASED CALL CONFERENCE SYSTEM

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Abstract:

In the present scenario, a business firm can have multiple branches across the country or the world. To communicate with the branches, there are plenty of communication systems available. One such is the GSM based call conference system. A communication link can be established between the central office and its branches using this technology. A hardware circuit has been designed using 8051 microcontroller to connect the sub-branches with its zones. Software has been developed using VB to connect the main office and the branches. The project reduces the effort and time to make announcements and to connect to multiple zones in the sub-branch. Moreover, it is a low cost technology as the components which are required to implement the technology are inexpensive and easily available in the market. Further this technology can be enhanced with more features.

Keywords: Communication system, Embedded System, 8051 Microcontroller, VB software, Advanced technology, Low cost communication device.

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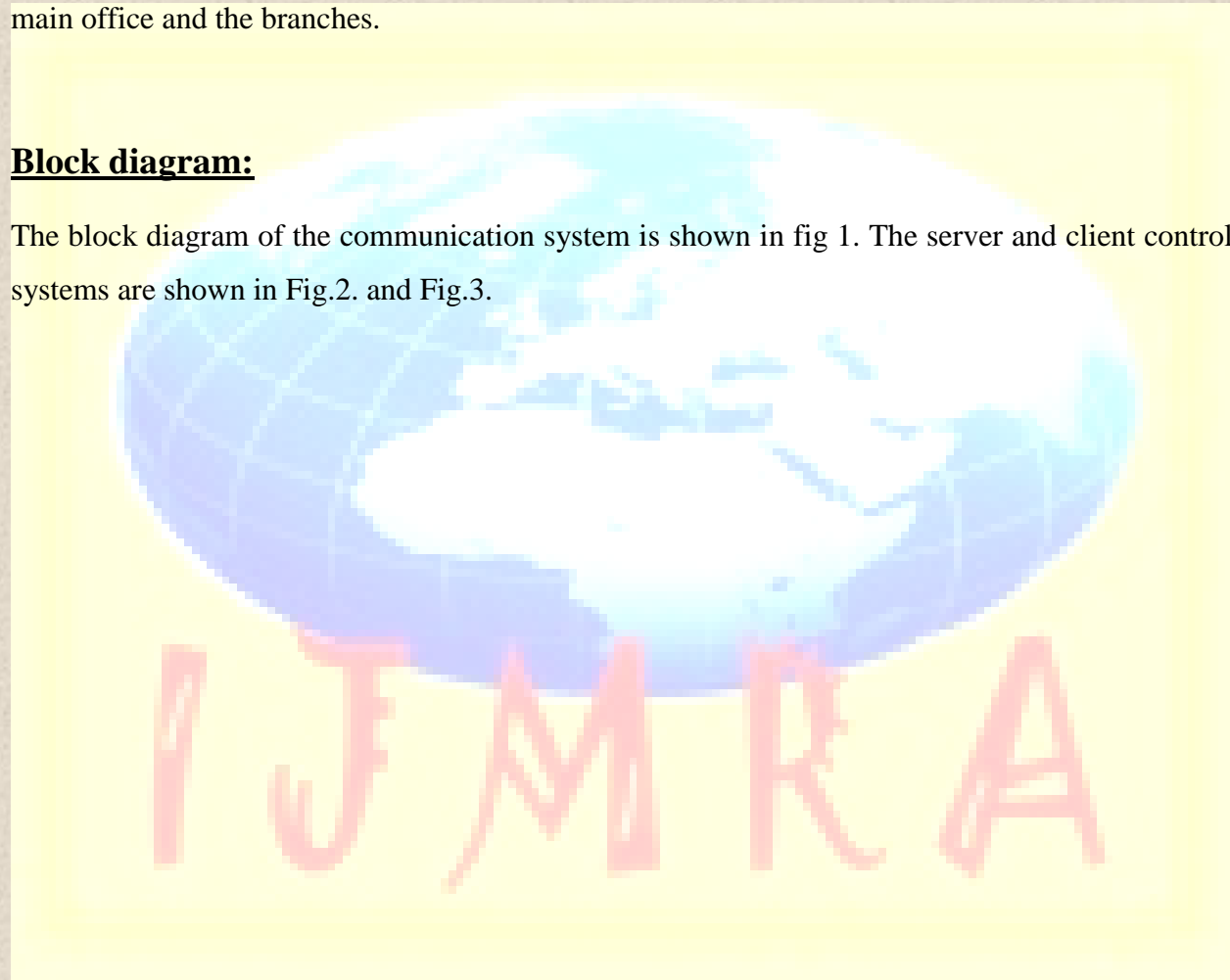
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Introduction:

The focal theme of this paper is to connect the main office with its constituent parts in terms of flexibility and time. This technology uses GSM modems to connect the main office and its units. The main office consists of one GSM unit and the corresponding branches consist of their own GSM units. For this process, a hardware circuit has been designed using 8051 microcontroller to connect the sub-branches with its zones. A software has been developed using VB to connect the main office and the branches.

Block diagram:

The block diagram of the communication system is shown in fig 1. The server and client control systems are shown in Fig.2. and Fig.3.



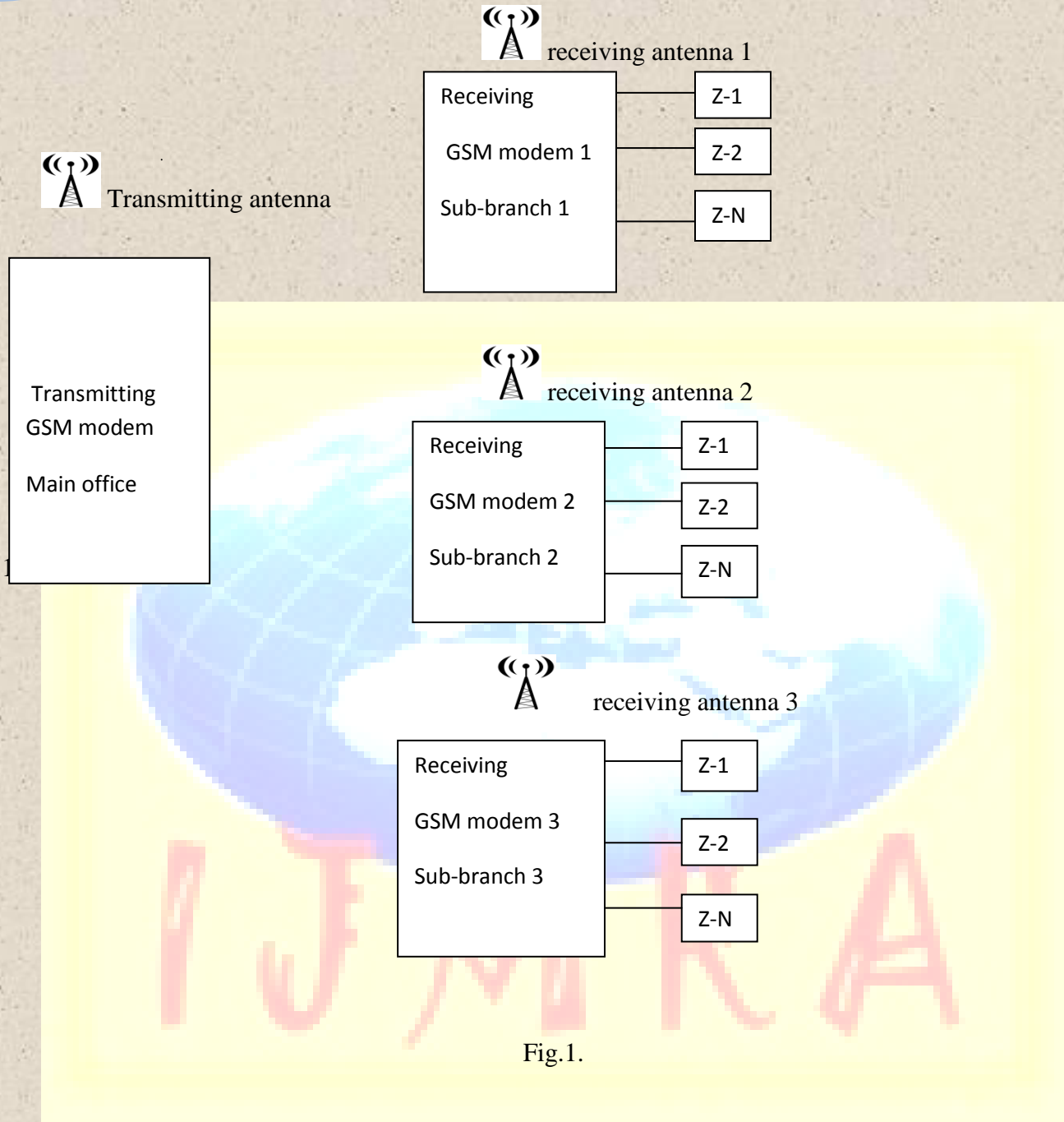


Fig.1.

Z: Zones

Server Control System:

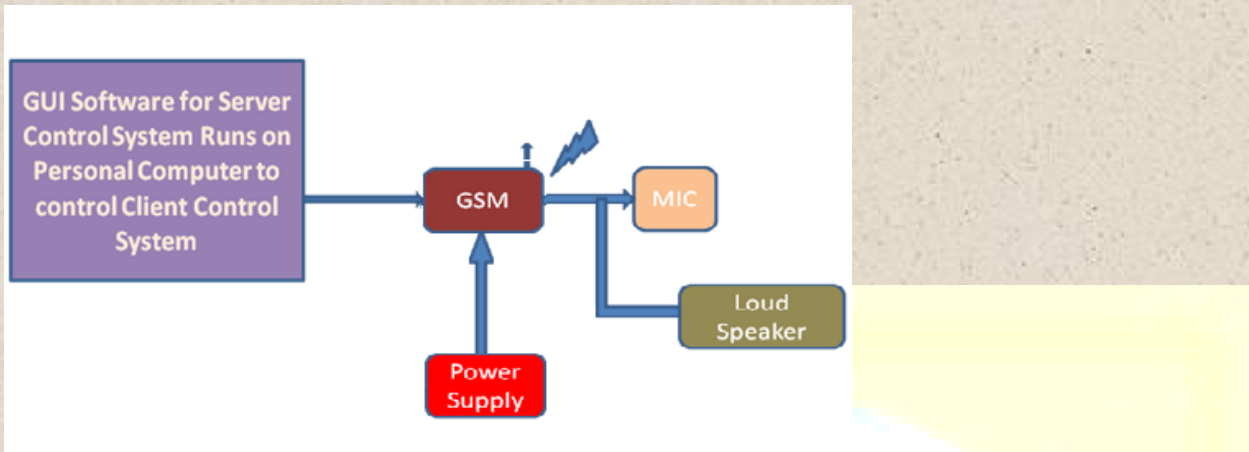


Fig.2.

Client Control System

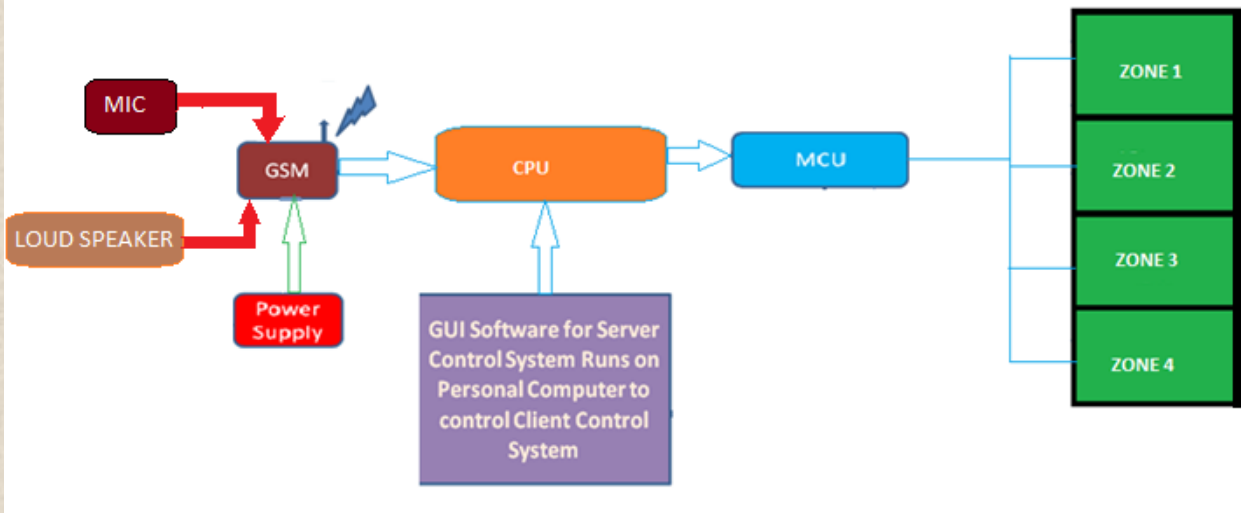


Fig.3.

Explanation:

When the main branch wishes to communicate with a particular sub-branch, it selects the sub-branch by opting for it in the main menu. Once the sub-branch is selected, its branch page is displayed which consists of zone numbers along with call and disconnect buttons. Using the options available on the branch page, one can connect to the multiple zones by selecting the zone numbers. Once the zone is selected, the call button is pressed for connection. On receiving the call, the sub-branch acknowledges it by sending SMS through GSM indicating that it is ready for communication. After the completion of communication, the disconnect button is pressed to end the call. The back button can be used to redirect it to the home page. The above procedure is developed using VB software.

Working procedure:

- When the call button is pressed in VB software at the main office, SMS will be sent to the sub branch modem with appropriate zones to be selected.
- After the message is received by the sub branch modem it is fed to the CPU and microcontroller.
- Microcontroller circuit will activate particular zones through the relays using the SMS which has been read from the GSM modem.
- After enabling the loud speakers, the receiving GSM modem sends an acknowledgement indicating that it is ready for the communication.
- As soon as the main office senses the acknowledgement, call is initiated.
- When the call is received from the main office, the communication path is established between the main office and its respective zones using relays.
- Once the conversation is completed, disconnect button is pressed and is brought into unconnected state. Hence the path is terminated.

AT command for disconnecting the call:

```
Me.Ms comm1. Output="ath"
```

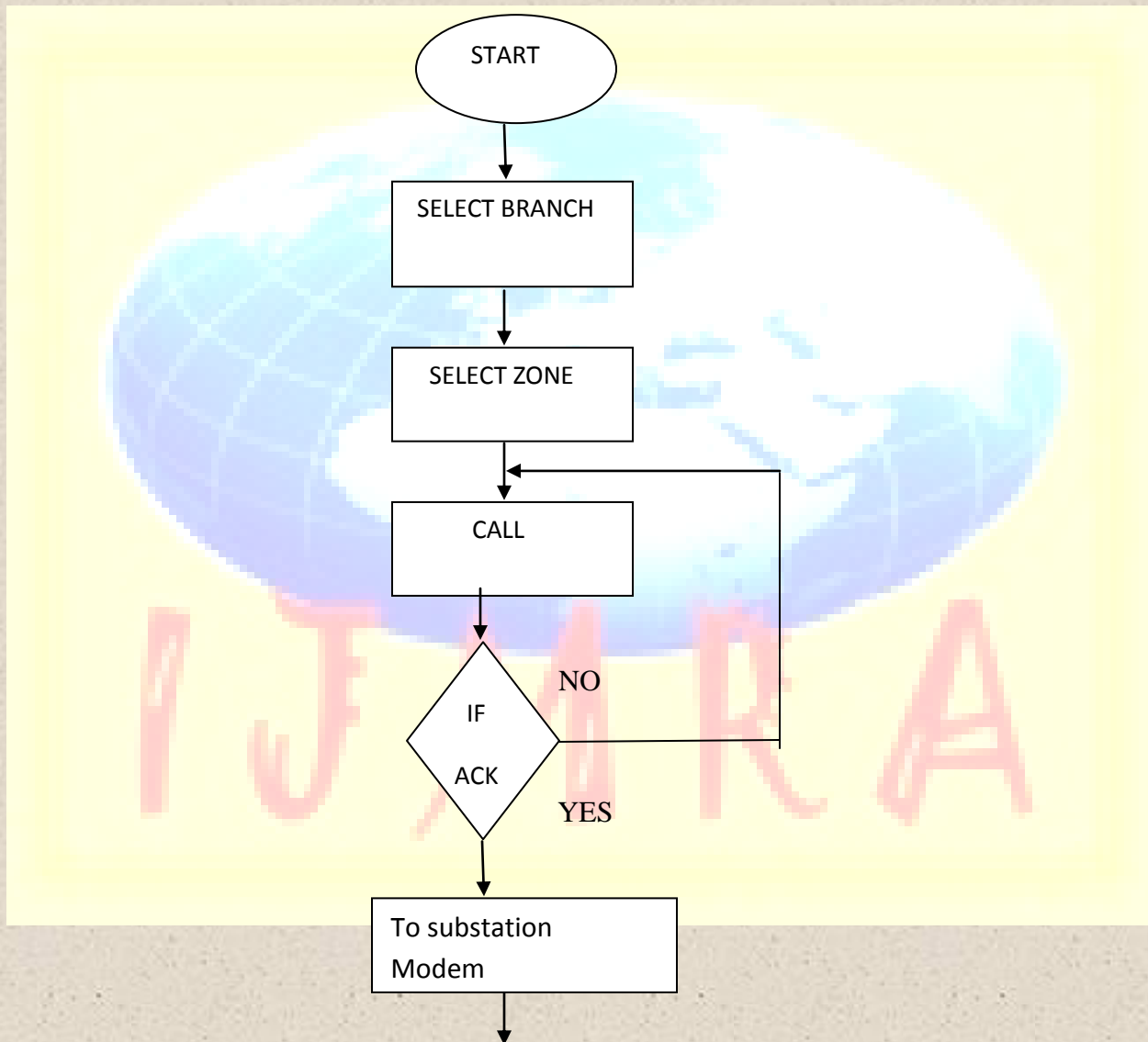
AT command for answering the call:

```
Me.Ms comm1. Output="ata"
```

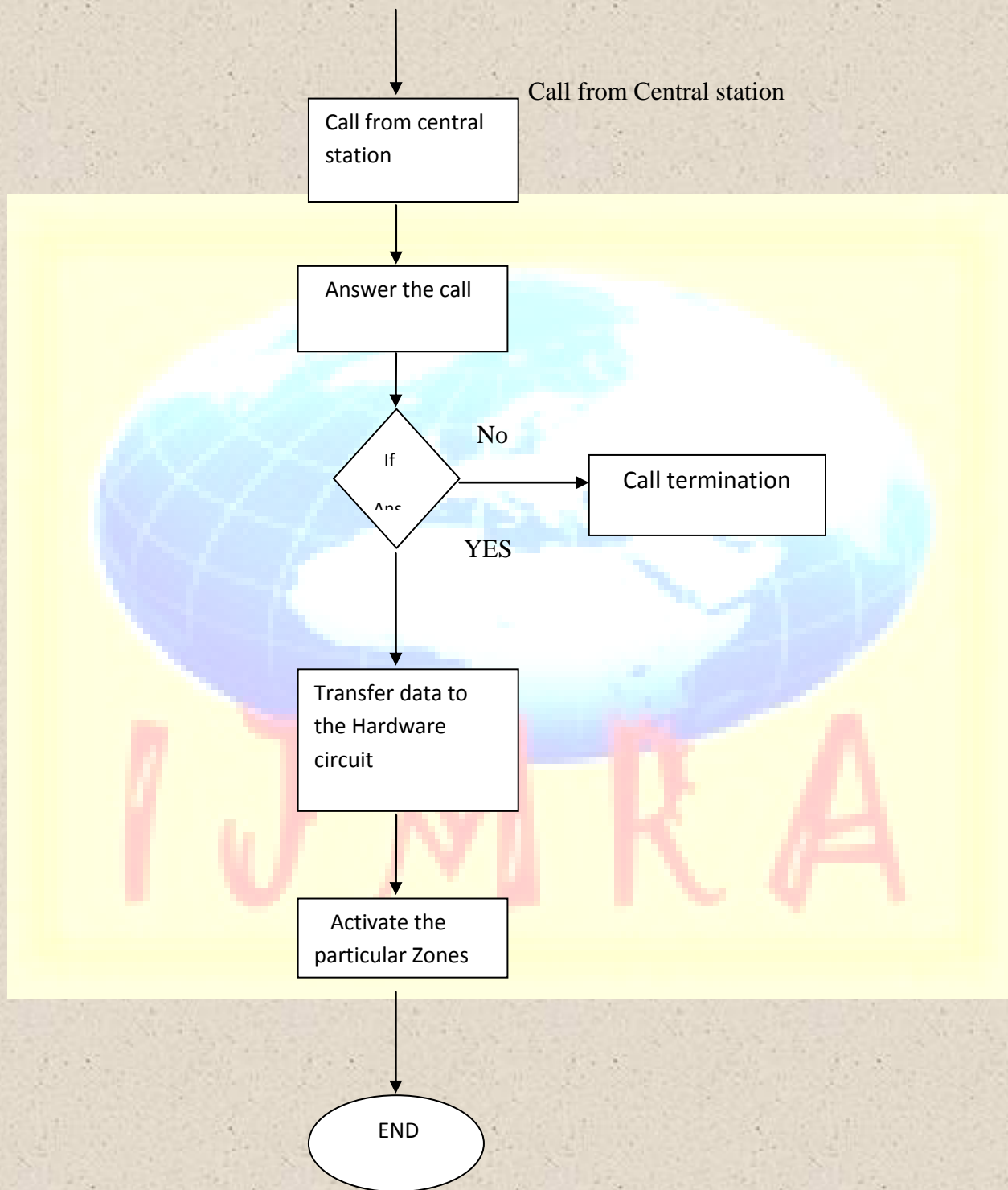
Flowchart:

The flowchart of the communication process is shown below

Central Monitoring System:



Sub-station Modem:



Driver application in VB:

1. The following is the VB program used to control or navigate the application:

```
Private Sub _form load ( )
```

```
Me.Ms comm1.settings = "9600,N,8,1"
```

```
Me.Ms comm1.sthreshold = 0
```

```
Me.Ms comm1.inputmode =com input mode text
```

```
Me.Ms comm1. rthreshold = 1
```

```
Me.Ms comm1.inputlen = 1
```

```
Me.Ms comm1.in buffer size = 400
```

```
Me.Ms comm1.port open = 'true'
```

```
End sub
```

'Code to perform Call function

```
Private sub _form_call( )
```

```
Me.Ms comm1. output="atd8147463389;"
```

```
Me.Ms comm1. output=Chr$(13)
```

```
End sub;
```

'Code to perform Disconnect function

```
Private sub _form_disconnect( )
```

```
Me.Ms comm1. Output="ath"
```

```
Me.Ms comm1. Output=Chr$(13)
```

```
End sub;
```


2. The following code is used to send the SMS to respective zone's GSM modem :

```
Private Function Send_Message(ByVal MobNumber As String, ByVal MsgText As String) As  
Boolean
```

```
Greater_Sign = False
```

```
Comm1.Output = "AT+CMGS=" & Chr(34) & Trim(MobNumber) & Chr(34) & vbCrLf
```

```
While Not Greater_Sign
```

```
DoEvents
```

```
Wait_For_Response
```

```
Wend
```

```
If Greater_Sign Then
```

```
Comm1.Output = Trim(MsgText) & Chr(26) & vbCrLf
```

```
OK = False
```

```
Error = False
```

```
While Not OK Or Error
```

```
DoEvents
```

```
Wait_For_Response
```

```
Wend
```

```
If OK Then
```

```
lblErrors.Caption = "Message Sent"
```

```
Send_Message = True
```

```
Else
```

```
lblErrors.Caption = "Message Not Sent"
```

```
Send_Message = False
```

```
End If
```

Else

```
lblErrors.Caption = "Message cannot be sent"
```

```
Send_Message = False
```

End If

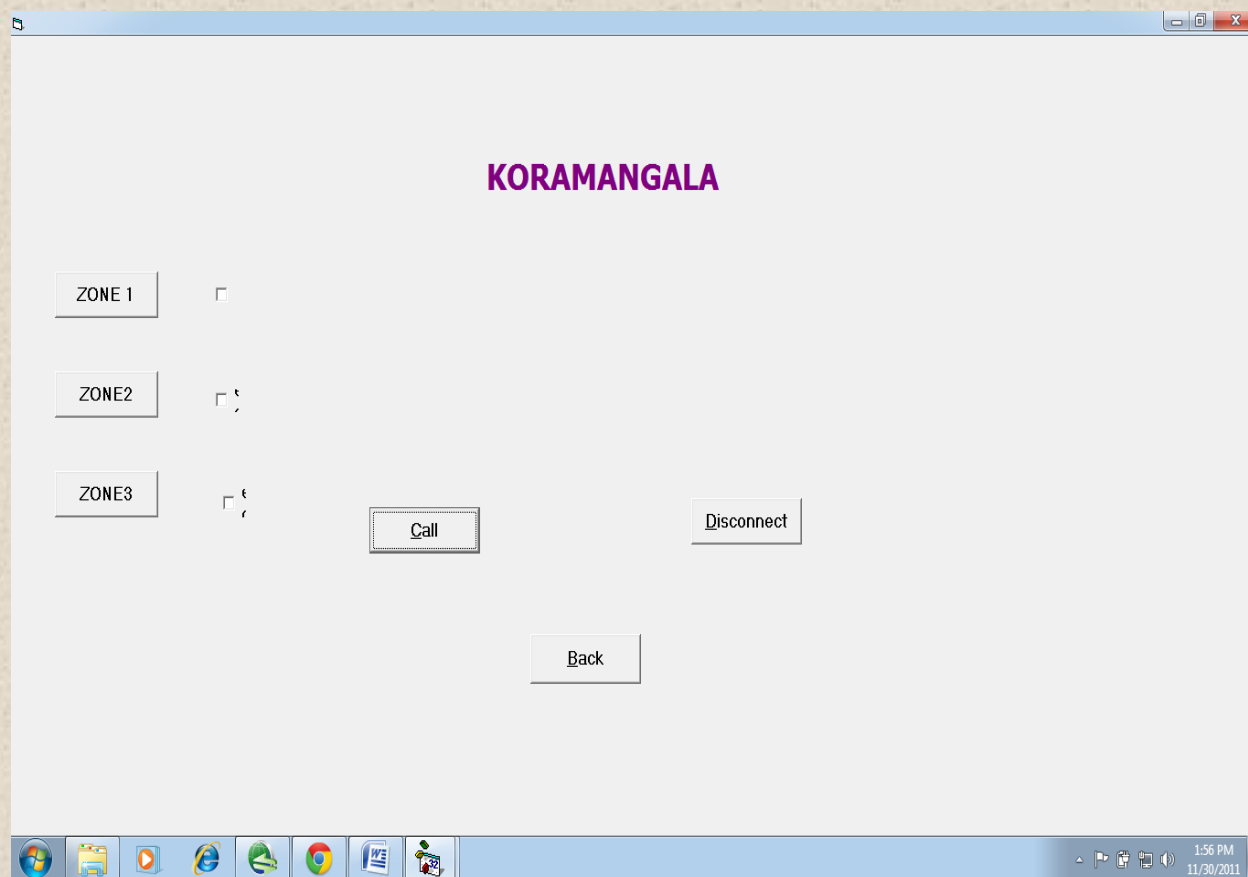
End Function

Snapshots of the procedure:

On opening the application (VB Software) homepage, the page format is shown as in the following snapshot.



From the above page it is evident that the main office can connect to any of the branches using corresponding button on the software.



Once the branch is selected, a particular zone is selected by pressing the appropriate button. The communication process is established between the main office and a particular zone by using call and disconnect buttons.

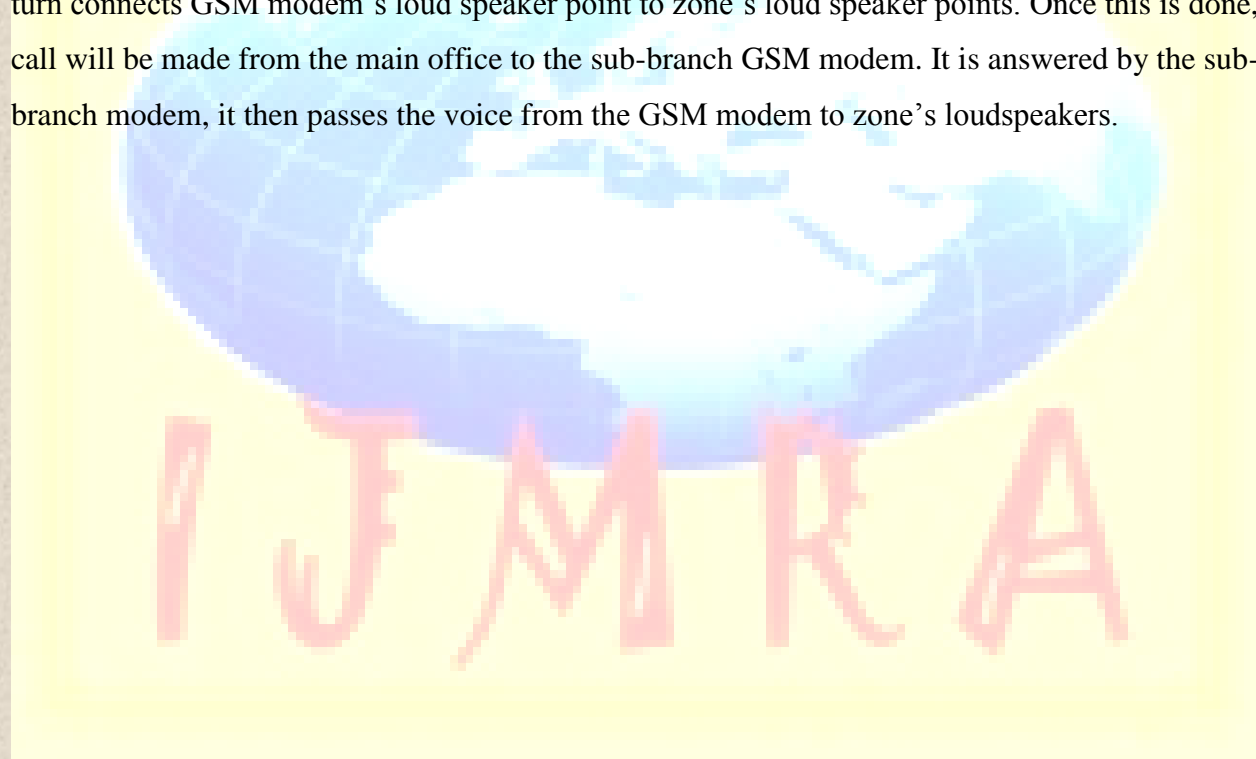
Hardware circuit:

A hardware circuit has been designed using 8051 microcontroller, relays and loud speakers. The circuit is shown in figure 4. When the GSM modem of the sub-branch receives the signal from the main branch, the information is given to the CPU and the hardware circuit of the sub-branch. The VB software which runs on the CPU of the sub-branch uses this information to display the things regarding zone selection and messages to be generated, when a call is made or an

acknowledgement is sent to the main office. The hardware circuit comprises of the serial port, a micro controller and semi conductor relays.

When an SMS is received by sub-branch GSM modem, it is fed to the micro controller using serial port, MAX 232. Based on the SMS format, the micro controller will enable the corresponding loudspeakers through semi conductor relays. As soon as the loud speakers get activated, communication between the main office and respective zones will be enabled.

The GSM modem loud speaker output is connected to zone's loud speakers using relay circuit. Relays will be turned on and off based on the SMS received from the main office. The sub-branch modem is connected to 8051 microcontroller using MAX 232 circuit. The 8051 microcontroller reads the SMS from the GSM modem and enables the zone's relays, which in turn connects GSM modem's loud speaker point to zone's loud speaker points. Once this is done, call will be made from the main office to the sub-branch GSM modem. It is answered by the sub-branch modem, it then passes the voice from the GSM modem to zone's loudspeakers.



Schematic diagram for microcontroller system:

The schematic diagram of the hardware circuit is shown below.

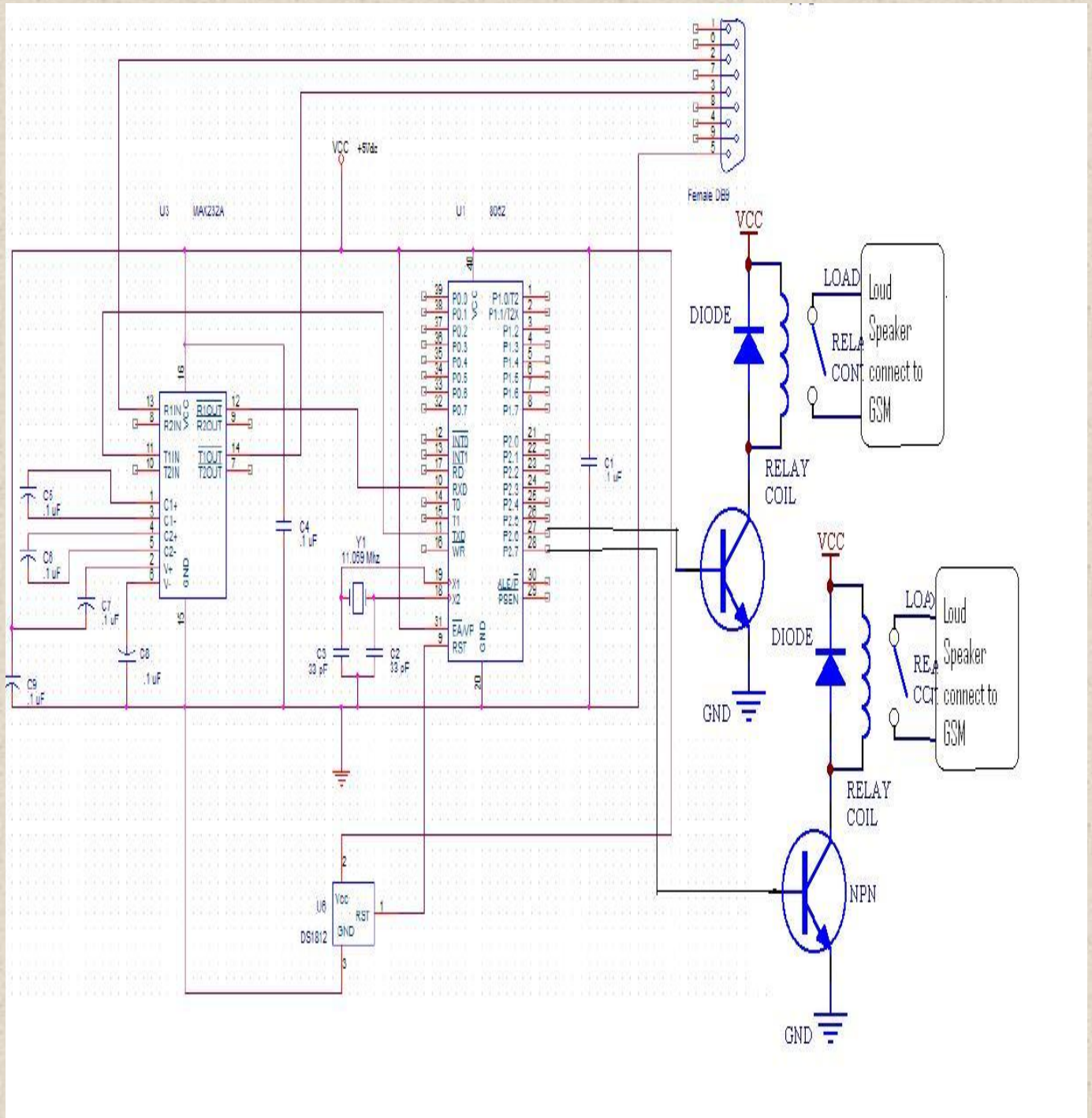
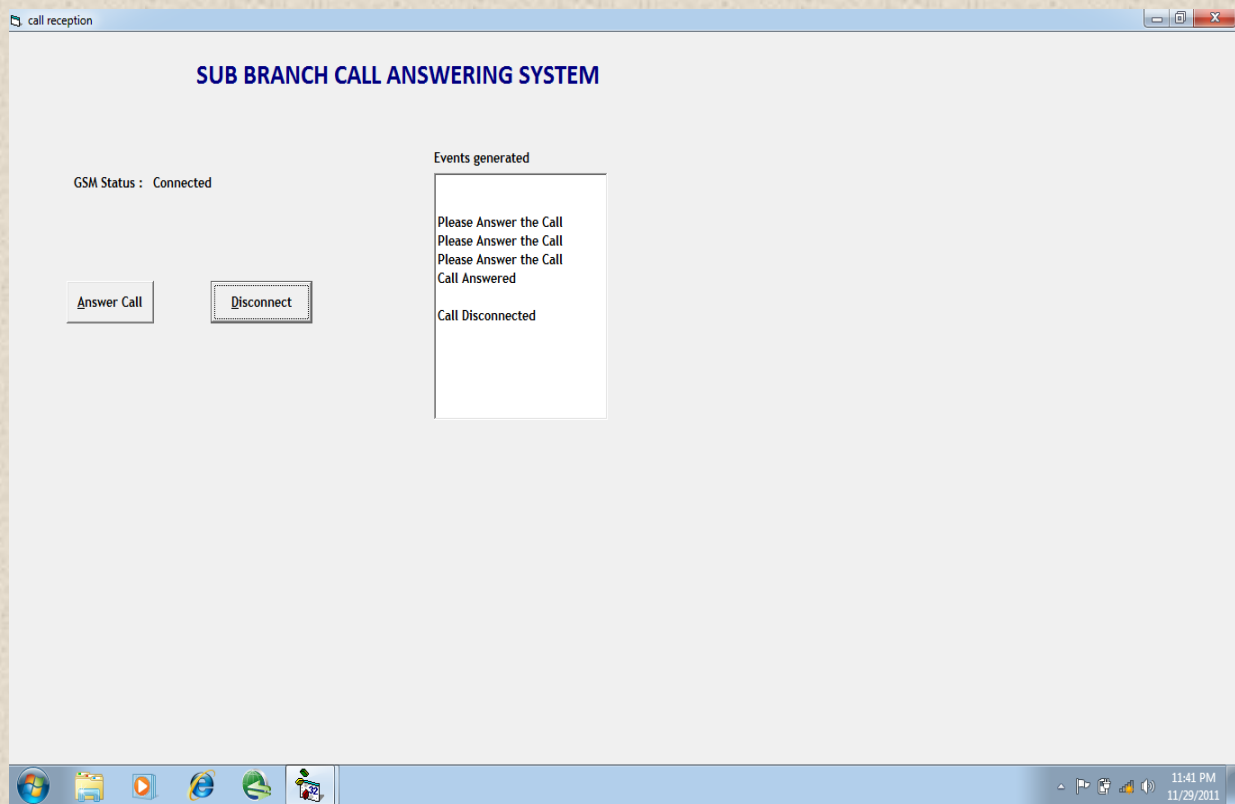


Fig.4.

Snapshot of sub-branch application page:



The above page is displayed at the sub branch station once it receives a call from the main office. On receiving the call a message “Please Answer the Call” is displayed in the “Event Generated” block as shown above.

By using answer call and disconnect button, communication can either be established or terminated.

Results:

The performance of GSM based call conference is studied. A hardware interfacing circuit and a software using VB have been developed and tested successfully. This is a low cost technology system.

An embedded based GSM call conference has been designed and verified. The project reduces the effort and time to make announcements and to connect to multiple zones in the sub-branch. Moreover, it is a low cost technology as the components which are required to implement the technology are inexpensive and easily available in the market. This technology can be enhanced to suit the following features in the future.

- One to One voice Transmission and Reception
- One to Many voice Transmission and Reception
- Enabling Password protected for specific Zones to communicate it
- Listen and Talk Mode facility
- User configurable Zone names
- Handshaking Techniques to know the status of the Zones connected
- BIT –[Optional: Built In Tests to ensure system is working before use]
- Messaging Display Unit at each Zone –[Optional: To leave any Important Message to users]
- Possibility of Call conversation Recording system [Optional: Using Voice recording software]

Conclusion:

A low cost technology conference call system is proposed. It is a quick communication system between the main office and its branches.

References:

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- www.atmel.com, AVR Microcontrollers
- http://wm.sim.com/Sim/FrontShow_en/wireless/detail.aspx?cid=6&nid=770, GSM module