

# **GSM BASED E NOTICE BOARD**

## **1. Introduction**

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Wireless communication has announced its arrival on big stage and the world is going mobile. We want to control everything and without moving an inch. This remote control of appliances is possible through Embedded Systems. The use of “Embedded System in Communication” has given rise to many applications that ensures comfort and safety to human life. An embedded system is a combination of hardware and software and perhaps other mechanical parts designed to perform a specific function. A Notice Board is a very essential device in any institution / organization, Industries or public utility place like bus stations, railway stations and parks. The main aim of the project “**GSM BASED e-NOTICE BOARD**” is to design an SMS driven automatic display which reduces the manual operation. The information can in turn be updated instantly. The message to be displayed on the LCD notice board is sent as an SMS to a GSM receiver module.

### **1.1. Overview Of The Report**

- Chapter 1 contains the introduction to the embedded system and our project.
- Chapter 2 contains the system requirements, required system functionalities, list of criteria defining a successful project, requires system behavior, performance metrics, hardware requirements and software requirements
- Chapter 3 explains the Theoretical foundation like engineering model and the limitations of the system
- Chapter 4 tells system specification like block diagram, flow chart, Use case diagram, state transition diagram, Interface, Failure modes and action on failure
- Chapter 5 contains Task analysis and schedule of activities like task decomposition, project schedule etc...
- Chapter 6 is concluding the project
- Chapter 7 contains the references

## **2. System Requirements**

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The main aim of this project is to design a SMS driven automatic display board which can replace the currently used programmable electronic display. It is proposed to design receiver cum display board which can be programmed from an authorized mobile phone. The message to be displayed is sent through a SMS from an authorized transmitter. The microcontroller receives the SMS, validates the sending Mobile Identification Number (MIN) and displays the desired information.

### **2.1. Required System Functionality**

The system required for the purpose is a Microcontroller based SMS box. The main components of the kit include microcontroller, GSM modem. These components are integrated with the display board and thus incorporate the wireless features. The GSM modem receives the SMS. The AT commands are serially transferred to the modem through RX-TX connection. In return the modem transmits the stored message through the COM port. The microcontroller validates the SMS and then displays the message in the LCD display board. Various time division multiplexing techniques have been suggested to make the display boards functionally efficient. The microcontroller used in this case is AT89S52. Simcom sim300 is used as the GSM modem. In the prototype model, 16x2 character LCD display is used for simulation purpose. While implementation this can be replaced by actually display boards. The data will be displayed only after entering unique pass key. In addition to that address matching is done and data can be received only by the dedicated receiver, and this data is displayed on LCD. The main focus of the project is on displaying information to a dedicated LCD by the any part of world using GSM network, which facilitate to control any message board globally from any location.

### **2.2. List Of Criteria That Define A Successful Project**

#### **2.2.1. Expected Outcomes**

- The messages are received by the GSM receiver. The users are verified.
- Only valid user's information is displayed on the LCD notice board.
- The older message should keep displaying until new valid message arrives from valid senders.
- The messages can be sent remotely.
- Updating the information instantaneously.

### **2.2.2. Required System Behavior**

- The whole system is basically divided into two sections: Transmitting and Receiving. Transmitting section consists of just a mobile.
- Any type of user (sim number) can be used, as users are assigned password for accessing the system.
- Authorized users send the message that they want to display on the notice board to the receiving section's mobile number and the message will be displayed only if the users have the authentication password.
- Receiving section on the other hand consists of a GSM modem to receive message.
- SMS are then sent to microcontroller using MAX232 IC. Microcontroller finally displays it on LCD display.

### **2.2.3. Performance Metrics**

- Quick information updating.
- The main objective of this project is to display information on LCD display through SMS.
- The information should be delivered to the users instantaneously.
- Updating the information instantaneously.
- The messages can be sent remotely.

## **2.3. Hardware Requirements**

Table 1 Hardware Requirements

<b><u>Hardware Components</u></b>	<b><u>Specification</u></b>	<b><u>Price</u></b>
GSM MODEM	Simcom sim300	Rs.1,500/-
SIM	Any SIM	Rs.10 – 50 /-
Microcontroller	AT89S52	Rs.50 – 70 /-
Power supply or Power Adapter	5v – 15v dc power supply	Rs.200 – 400 /- (including transformer)
Transformer	230v AC to 12v DC	
LCD	16x2 character display	Rs.175/-
MAX 232	–	Rs.20/-
Miscellaneous	–	Rs.1000/-

## **2.4. Software Requirements**

Table 2 Software Requirements

<b><u>Software Tools</u></b>	<b><u>Description</u></b>
Embedded C	The functionality of the System is programmed using Embedded C (Microcontroller)
Keil Software	The programmed c file (file.c) is converted to hex file using Keil software
MS Hyper Terminal	To connect GSM

## **3. Theoretical Foundation: The Engineering Model**

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An embedded system is a combination of hardware and software and perhaps other mechanical parts designed to perform a specific function. Theoretically an SMS sent from a mobile phone to GSM modem is received by the GSM and stores it through AT commands. Using microcontroller it is possible to retrieve the stored message in GSM and display it on a LCD display using embedded programming languages. Short information can be sent from a mobile phone as SMS and made display until the next one.

### **3.1. Limitations Of The System**

- Message displayed will be SMS type. Only short messages can be displayed.
- Only one person who is authorized can access the system.
- Failure of any component may lead to failure of the device.
- GSM interferes with some electronics, especially certain audio amplifiers.
- GSM has a fixed maximum cell site range of 35 km, which is imposed by technical limitations.
- Problem with GSM is a network problem rather than a consumer problem, though it is a consumer problem for those who don't want to see a proliferation of cellular towers.
- GSM has some security issues, the problem is based directly on the technology according to this hacker and his solution was to "turn off" the GSM technology (only the older 2G technology though) that is commonly used by people all over the world.

## 4. System Specifications

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### 4.1. Functionality Provided By The System

- Users can send SMS and get acknowledgement for valid user.
- Admin can add new user to authorized user list.
- Admin can change Mobile Identification Number (MIN) of the GSM.
- Admin can delete user from authorized user list.
- System keeps displaying the message.
- System can receive SMS from user
- System verifies MIN for authorization.
- System discards the message with wrong MIN or without MIN.
- System stores the SMS.
- System provides positive acknowledgement to the valid user.
- System displays new message instantaneously when it receives and verifies it.

### 4.2. System Interfaces, Inputs And Outputs

- In the system, GSM acts as the interface between the user and the LCD display.
- GSM receives the SMS from the user and sends back the acknowledgement to the user.
- The received SMS acts as input to the system.
- The microcontroller fetches the SMS from the GSM and sent to the LCD display.
- The SMS displayed on the LCD display is the output of the system

## 4.3. System Models

### 4.3.1. Use Case Diagram

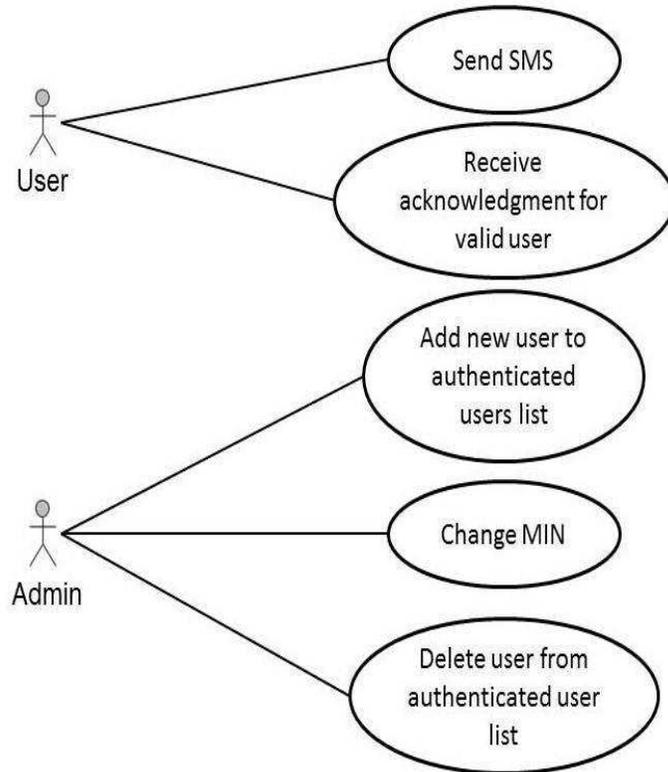


Figure 1 Use case diagram (contd...)

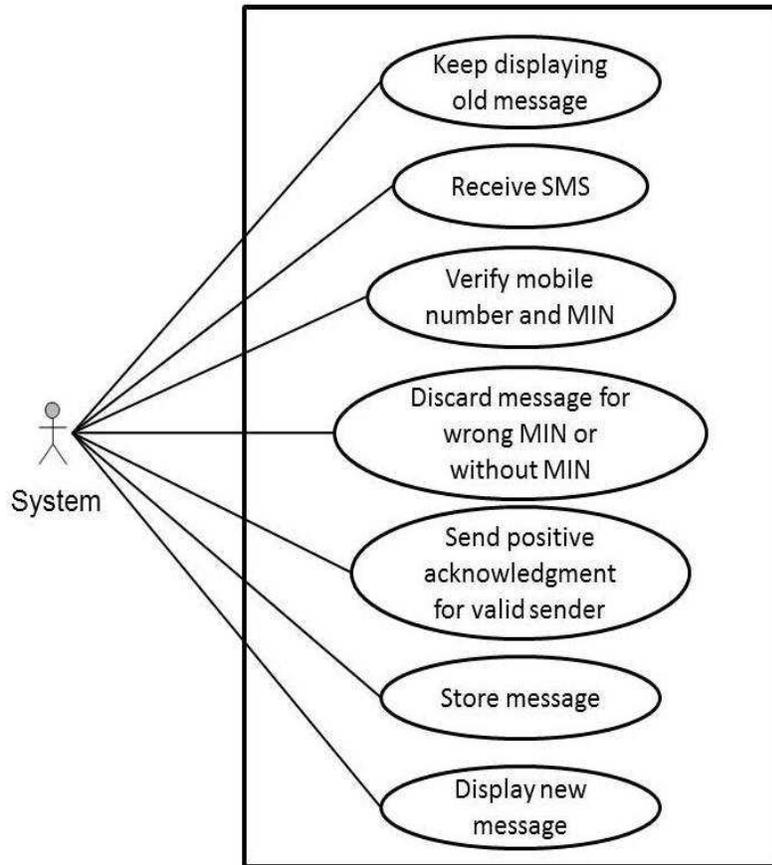


Figure 2 Use case diagram

### 4.3.2. Functional Decomposition

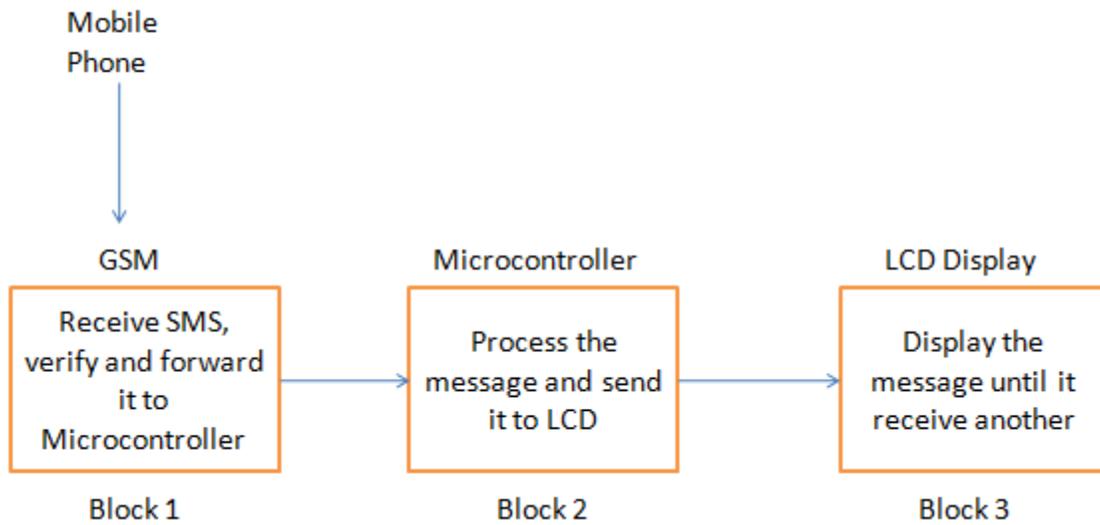


Figure 3 Functional Decomposition diagram

### 4.3.3. Data Flow Diagram

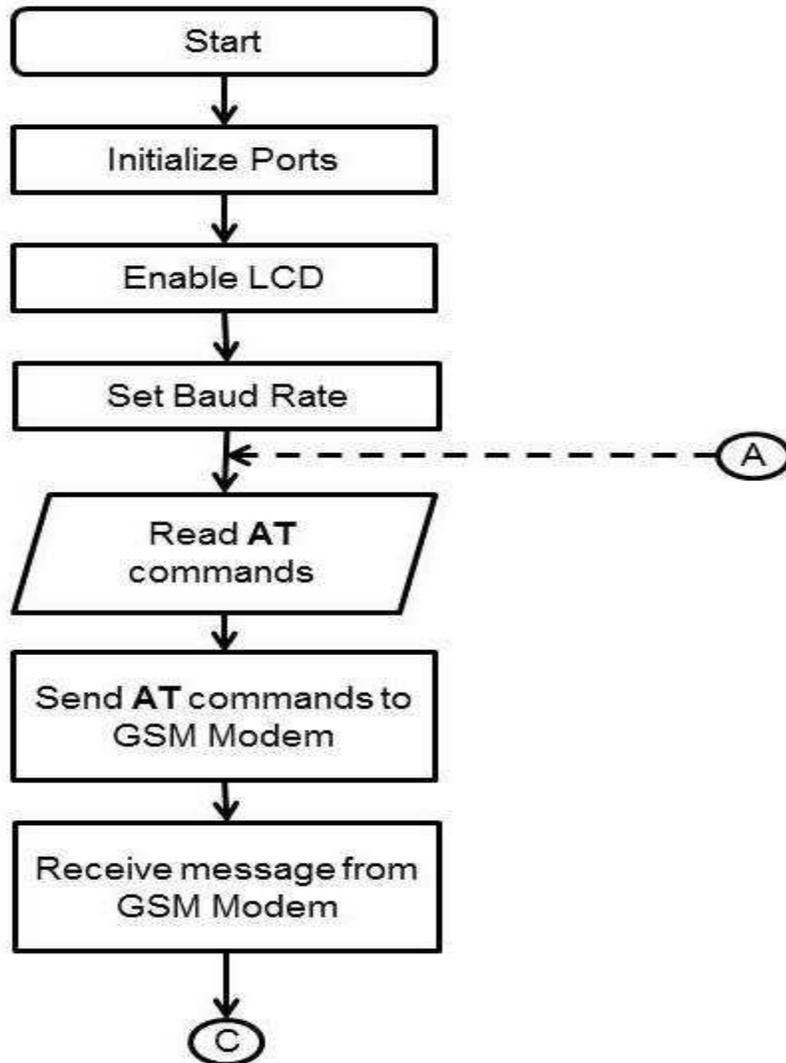


Figure 4 Flow chart of the system (contd...)

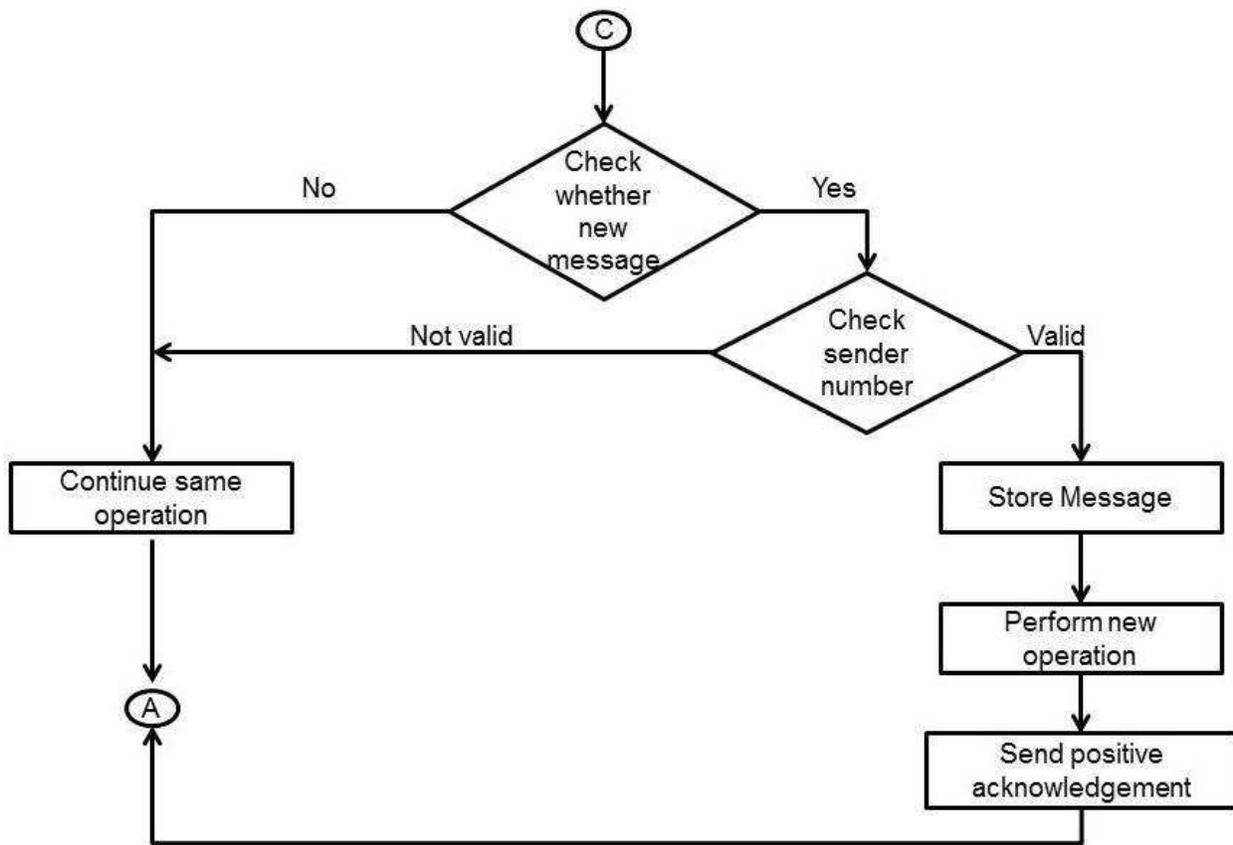


Figure 5 Flow chart diagram

#### 4.3.4. State Transition Diagram

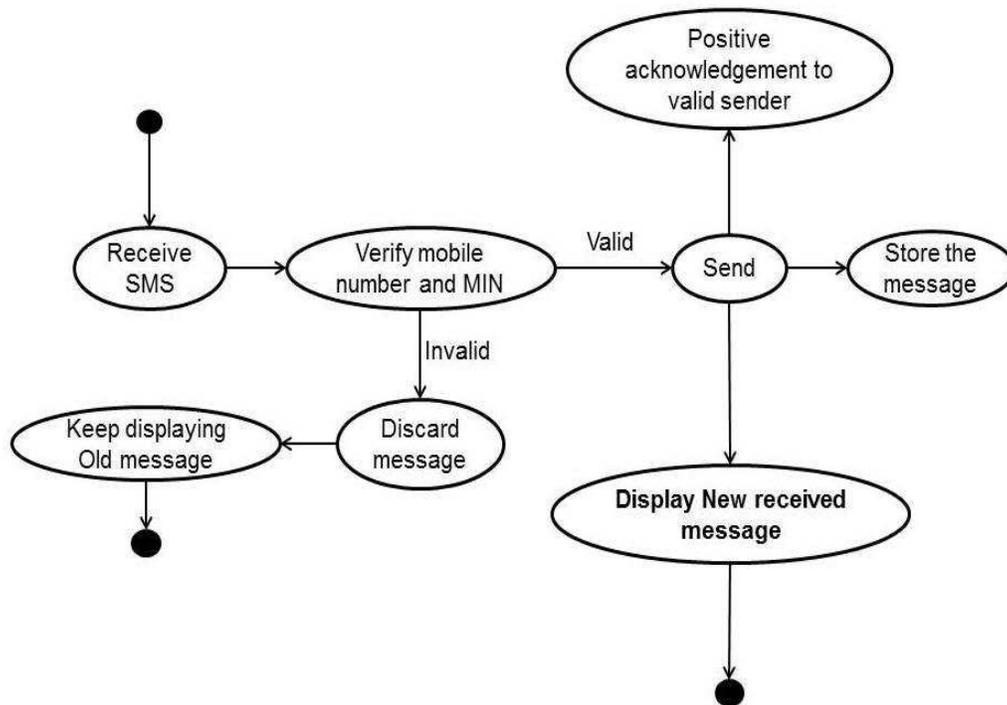


Figure 6 State transition Diagram

#### 4.3.5. Architecture Of The System

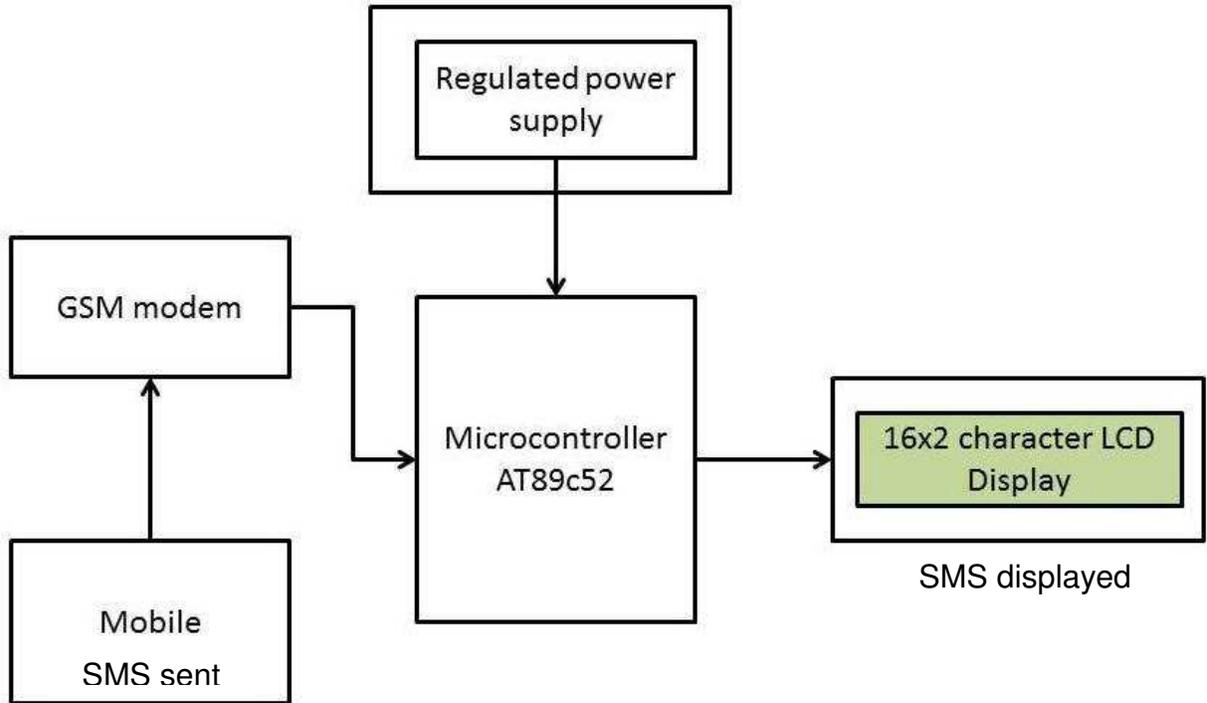


Figure 7 Architecture diagram of the system

## **5. Task Analysis and Schedule of Activities**

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### **5.1. Task Decomposition**

- The whole system is divided into three blocks.
- Block 1 consists of GSM which receives the SMS verifies it, stores it and forwards it to Microcontroller.
- Block 2 consists of microcontroller which accepts the message from the GSM and processes it and sends it to the LCD display
- Block 3 consists of the LCD display which is connected to Microcontroller. It displays the message.
- Finally all the three blocks are integrated.

## 5.2. Project Schedule

Table 3 Project Schedule

Task ID	Task Name	Start Date	Finish Date	Duration(days)
1	selecting domain	20-Jun	24-Aug	65
2	Literature Survey	25-Aug	04-Sep	10
3	Synopsis report	04-Sep	14-Sep	10
4	SRS	15-Sep	29-Nov	75
5	Circuit Design	01-Dec	31-Jan	62
6	GSM utility and interfacing	01-Feb	20-Feb	20
7	Programming	20-Feb	10-Mar	18
8	Implementing Circuit	10-Mar	30-Mar	20
9	Testing	01-Apr	10-Apr	10
10	Documentation and Presentation	10-Apr	15-May	35

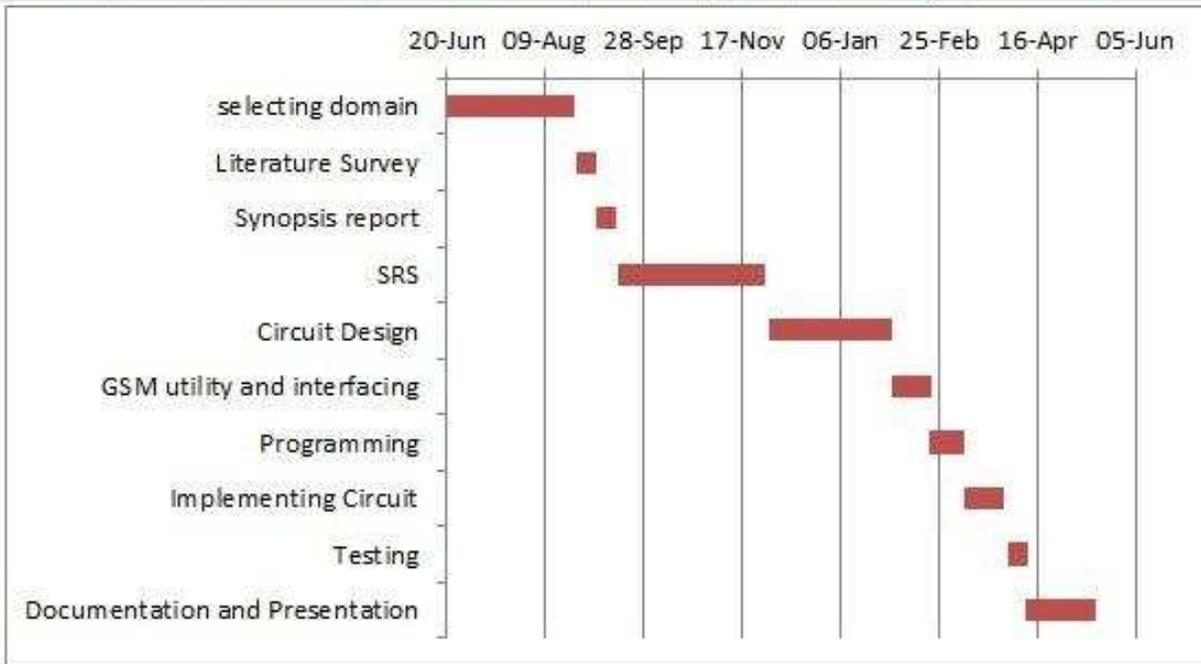


Figure 8 Project schedule- Gantt chart

### 5.3. Task Specification

Table 4 Task specification

<u>Task</u>	<u>Goals</u>	<u>Inputs</u>	<u>Outputs</u>	<u>Estimated effort and duration</u>
GSM Configuration	To Configure GSM and make it enables to receive SMS and store it through AT command.	Sending SMS from a mobile phone to The GSM	Receiving SMS and authenticating the number and store and forward SMS if authorized	Learning At commands takes 15 days
Interfacing GSM and Microcontroller	The GSM is Interfaced with Microcontroller in order send the SMS to Microcontroller received by the GSM	Received SMS is Sent to Microcontroller	Microcontroller receives/ fetches the SMS from GSM	Interfacing GSM and Microcontroller requires 20 days
Interfacing module to the LCD display	The LCD display is then connected to the module	Microcontroller sends the message to LCD display	LCD display displays the Message	Interfacing LCD display requires 20 days
Implementing the PCB	-	-	-	Rigging up the components to PCB requires 20 days
Testing	Checking for the proper working of the PCB / system	--	--	Testing requires 10 days

## 6. Conclusion

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The prototype of GSM based modem has been designed efficiently. This prototype facilitates to be integrated for notice board display which is makes it effectively mobile. The system accepts the message, stores it, validates and displays it on the LCD board. It consists of a remote notice board connected with the modem. It is based on wireless and error free system. The data in the system will be lost only in the power failure condition. This project explains how we can develop as well as modify GSM based e-notice board. In addition to this, for bringing new applications every time we need to only burn the HEX code of the target program. The target program could be GSM based home appliance, GSM based railway reservation, GSM based home security, GSM based robot control, and GSM based stepper motor controller and many more. Make new HEX code and get completely new application without further modifying the hardware. Latency involved in using of papers in displaying of notices is avoided and the information can be updated by the authorized persons. The system provides distinct application in the field of Railway stations, Advertisement in shopping malls, Educational institute and organizations, managing traffic in metropolitan cities and other public utility places.

## 7. References

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