GSM Based Sign Board Display

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***Abstract*: Wireless communication has announced its arrival on big stage and the world isgoing mobile. We want to control everything without moving an inch. This remote Control of appliances is possible through Embedded Systems. The main aim of thispaper is to design a GSM BASED SIGN BOARD DISPLAY. It is proposed to receive SMS and MMS at the same instant which can be programmed from an authorized mobile phone. The message to be displayed is sent in the form ofSMS from an authorized transmitter. The toolkit receives the SMS, validates the sending Mobile Identification Number (MIN) and displays the desired information. We envision a toolkit that will not only display message but also can be used to do some public announcement work. Looking into current trend of information transfer in the campus, it is seen that important notices take time to be displayed in the notice boards. This latency is not expected in most of the cases and must be avoided. This is to be implemented at the institute level and other working places where regular circulars must reach in time. It is desired to place the display boards in major access points. The GSM BASED SIGN BOARD DISPLAY can be used as an add-on to these display boards and can be made truly wireless. The display board programs itself with the help of the incoming SMS with proper validation. Such a system proves to be helpful for immediate information transfer. The system required for this purpose is nothing but a Microcontroller based SMS box.**

Keywords: Driver circuit, GSM modem, LED display and Microcontroller

1. INTRODUCTION

The technological evolution which occurred in digital system favored the appearance of new services in all the fields. Today, interaction with digital display is a deskbound or device-dependent experience. However, developments in display and information sharing technologies may enable a new form of interaction with digital media. Rather, information is made available to the user in a transparent and contextually relevant manner. A single display device restricts the repertoire of interactions between the user and digital media, so ubiquitous computing requires displays wherever the user might need one – in appliances, tabletops public transport, walls, etc.

This paper aims at integrating the expansiveness of a wireless cellular network and the ease of information transfer through the SMS with the coverage of public display boards. It is thereby a modest effort to realize the complete potential of public display boards in instantaneous information broadcast in swift response to events of interest.

The GSM modem receives the SMS. The AT commands are serially transferred to the modem through I2C protocol. In return the modem transmits the incoming message through the COM port. The microcontroller validates the SMS and then displays the message in the LED display board. In the prototype model, LED display is used for displaying of circulars. Here an authorized sender is provided with a MIN and he/she can send the SMS from any locality which has to be conveyed to a larger group and the GSM module interfaced with LED receives the SMS and displays it to the whole group.

The SMS can be delivered from a single authority's mobile phone to multiple LED displays placed in different departments so that the public can receive the circulars without any delay or loss of information. We have also added the memory device like EEPROM so that current message can be saved and withdrawn later for future use. We have also used the driver circuit which drives the LED display. The figure 1 shows the functional block diagram of the proposed system.

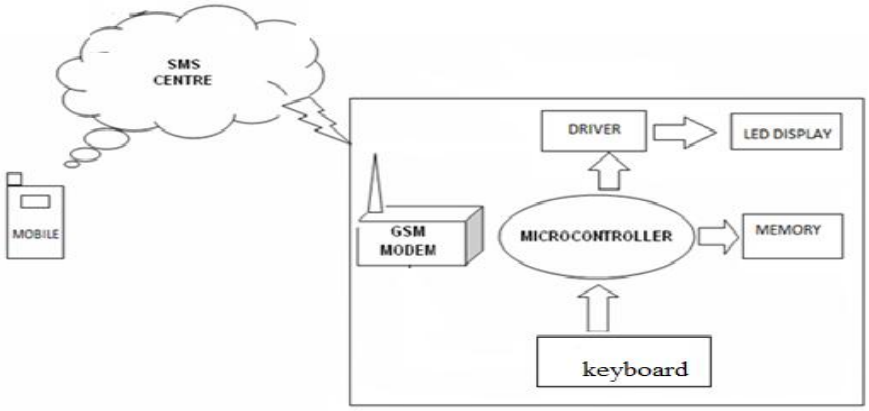

Figure 1.Block Diagram of GSM Based Sign Board Display

As we see in the above figure, there are at least three interfacing circuits, I2C protocol with microcontroller, LED display with microcontroller, and I2C protocol with GSM MODEM. The display boards are usually huge in size and can't be used for simulation purpose. So LED displays are used for testing. It is not a hidden fact that interfacing a MODEM with a normal PC is quite easy with the help of the AT commands sent to it from the Hyper Terminal window. But we must take into account the fact that the MODEM requires a wired connection at one end and wireless at the other. Hence weemploy ATMEL AT89C51 microcontroller with EEPROM storage memory[1].

The complexity of coding substantially increases, but once programmed the module works at its robust best since it is a dedicated embedded system and not a general purpose computer. Then we have the coding process which has to take care of the delays between two successive transmissions and most importantly the validation of the sender's number. The number of valid mobile numbers can be more than one.

2. HARDWARE DESCRIPTION

The main hardware parts used are the GSM modem, LED display, Microcontroller, Memory, driver circuit. Let's see in detail about each of the above.

2.1 Gsm Modem

The GSM net used by cell phones provides a low cost, long range, wireless communication channel for applications that need connectivity rather than high data rates. A GSM modem is a wireless modem that works with a GSM wireless network. A wireless modem behaves like a dial-up modem. The main difference between them is that a dial-up modem sends and receives data through a fixed telephone line while a wireless modem sends and receives data through radio waves. Like a GSM mobile phone, a GSM modem requires a SIM card from a wireless carrier in order to operate. It is a compact and portable terminal that can satisfy various data communication needs over GSM. It can be connected to a computer with the help of a standard RS232C serial port. It offers features like Short Message Services (SMS), Data Services, (sending and receiving data files), Fax Services and Web Browsing. Remote login and data file transfer are also supported. Computers use AT commands to control modems. Both GSM modems and dial-up modems support a common set of standard AT commands. GSM modem can be used just like a dial-up modem. In addition to the standard AT commands, GSM modems support an extended set of AT commands. These extended AT commands are defined in the GSM standards[3,4].

With the extended AT commands, various things can be done as stated below:

- Reading, writing and deleting SMS messages.
- Sending SMS messages.
- Monitoring the signal strength.
- Monitoring the charging status and charge level of the battery.
- Reading, writing and searching phone book entries.

The number of SMS that can be processed by a GSM modem per minute is very low only about six to ten SMS per minute.

2.2 Scrolling Led Display

The heart of scrolling display is dot matrix LED display unit. One or more dot matrix displays are multiplexed to form a display panel. A set of hex values define a character which are send to the dot matrix display. To minimize the pin usage LED matrix is formed having certain number of rows and columns. The LED may be single color,bi-color or RGB. Here we are interfacing 7x8 dot matrix displays with common cathode columns and having bright red LED. The cathodes are shorted along the column and anodes shorted along the row.7x8 dot matrix display needs 7 Row drivers and 8 Column drivers. Figure 2 and 3 Indicates the Led Connection Module and LED with Driver circuit.

LED CONNECTION MODULE:

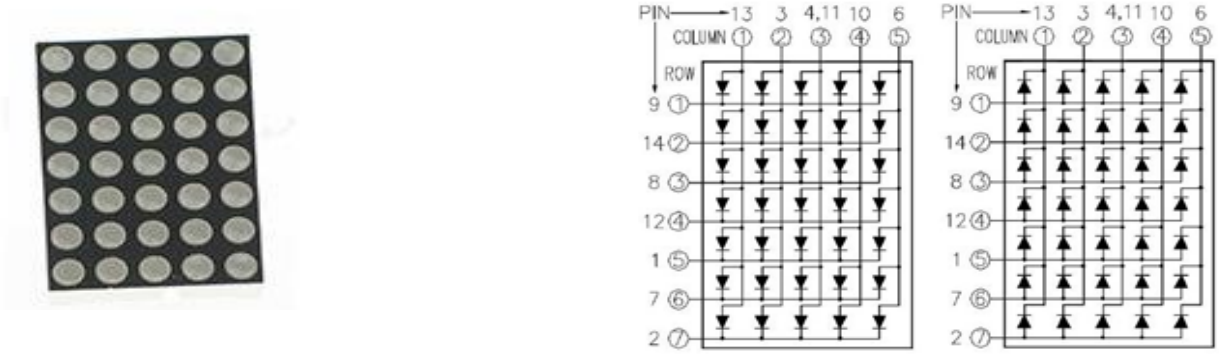

Figure 2. LED connection modules for 5x7

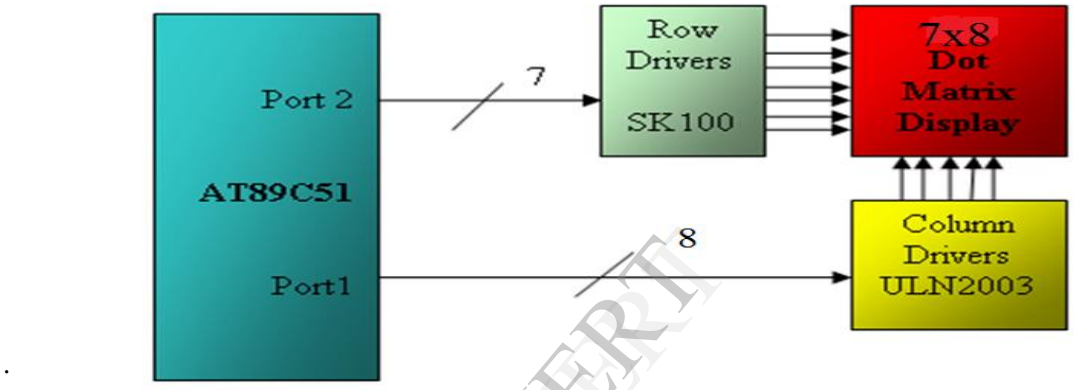

Figure 3. LED display with driver circuit

2.3 MICROCONTROLLER

The AT89C51 is a low-power, high-performance CMOS 8-bit microcomputer with 4K bytes of Flash Programmable and Erasable Read Only Memory (PEROM). Atmel AT89C51 is a powerful microcomputer which provides a highly Flexible and cost effective solution to many embedded control applications.

In addition, the AT89C51 is designed with static logic for operation down to zero frequency and supports two software selectable power saving modes. The Idle Mode stops the CPU while allowing the RAM, timer/counters, serial port and interrupt system to continue functioning. The Power down Mode saves the RAM contents but freezes the oscillator disabling all other chip functions until the next hardware reset. Figure 4 shows interfacing circuit of Microcontroller with LED display**[2]**.

3. AT COMMANDS (Software description)

AT commands, issued from a computer in your application is used to control and implement the functions of the modem. Using AT commands, the following actions are possible:

1. Control of DCE
2. GSM
3. Call control
4. Supplementary Service
5. SIM application tool

This command tells the TA, which input and output format to use for messages. The <mode> parameter indicates the format of messages used with send, list, read and write commands, and unsolicited result codes resulting from received messages. Mode can be either PDU mode(entire TP data units used) or text mode(headers and body of the messages given as separate parameters). Test command returns supported modes as a compound value**[5, 6].**

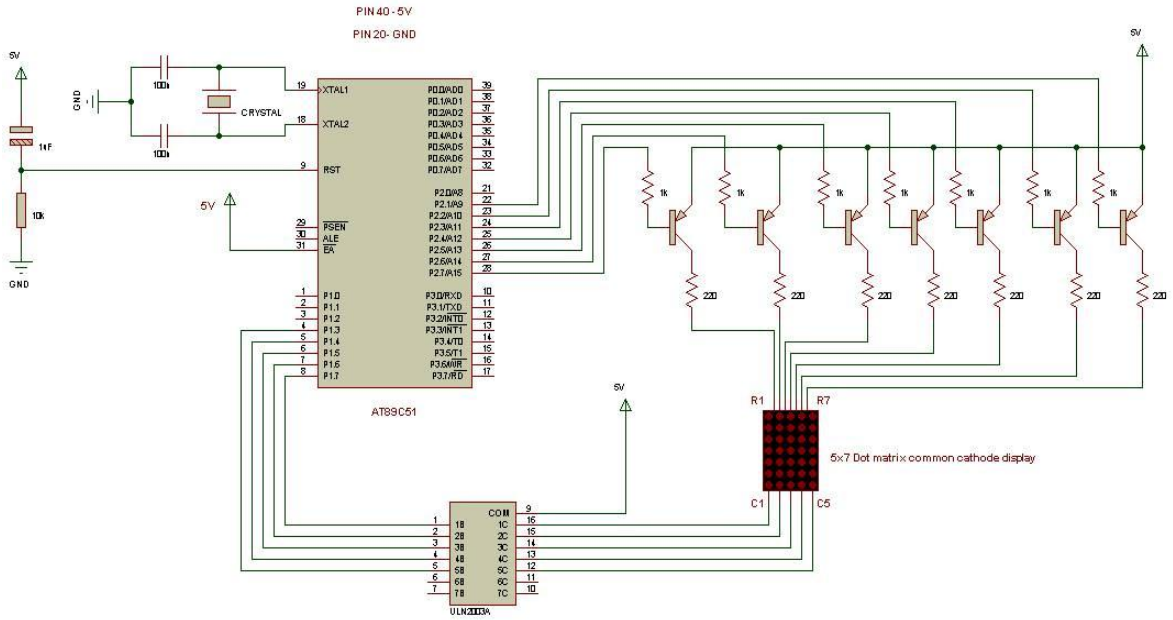

Figure.4.Circuit diagram of interfacing LED with microcontroller

4. RESULTS

The result obtained is sown in figure5. GSM BASED SIGN BOARD DISPLAY thus helps sending of circulars in the form of SMS from any place and receiving it with the help of GSM modem. With the help of programmed microprocessor and interfaced memory its stored and displayed whenever necessary. The scrolling LED display plays a vital role which displays the message with the help of driver circuits. Thus the manual work gets reduced.

5. CONCLUSION

In this digitized world, everything is going mobile but still in places like universities and schools and some other organizations the habit of taking circulars still requires human effort. This project is designed with an idea to remove the human work completely by making use of the GSM based sign board display which displays the SMS from the authorities to the required people.

This toolkit thus enhances mobile way of taking the instant circulars to the wanted places and displays it in the scrolling LED display without the need of the human effort. The memory used here thus helps to display both the past as well as the current notices. The toolkit thus works with a simple mechanism and hence both the economy and the complexity get reduced.

6. FUTURE ENHANCEMENTS

The project can be further enhanced by means of providing good authentication algorithm and also using 3G technology to process sending and receiving of MMS. Instead of GSM the system can be modified using Zigbee technologies.

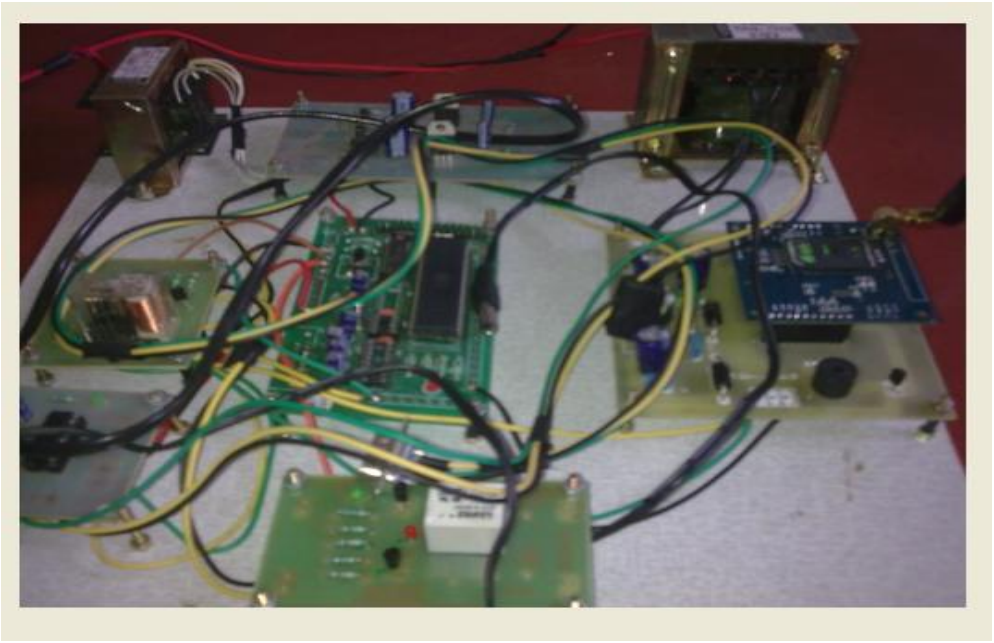

Figure 5. Prototype of GSM based Sign Board display system developed

6. REFERENCES

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