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EMBEDDED SYSTEM IN COMMUNICATION

PODE D.A.[1] AND KALE P.S.[2]

[1]Swapnapurti colony, Azad nagar, Warora, MS, India.
[2]Maa Jijau Colony, Arjun nagar, Amravati, MS, India.
*Corresponding Author: Email- podedakash@gmail.com, kale_sampada@yahoo.in

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Abstract- In today's fast paced world, one seldom has time for his day-to-day chores. Life has become so luxurious to the present man that he has all the comforts right at his fingertips. The new advents in science and technology have revolutionized the very lifestyle of man. Man wants to control everything without moving an inch from his place in other words REMOTE CONTROLLING appliances. Many decades ago an artist named Samuel Morse was the first man to use electricity to send messages from one place to another. Time has seen man grow in stature and now we don't even require a wire to communicate. Wireless communication has announced its arrival on the big stage and the world is going mobile. Embedded System has made its way into almost every electronic device in use today. Right from our watches to Cellular phones they form an integral part of the circuit. Each of these Systems is unique, and the hardware is highly specialized to the application domain. Embedded System in Communication is an emergent field and with the ever increasing mobile bandwagon that day is not far when even a common man could afford this technology and enter into the spiraling moss of Embedded System. This paper discusses the study of Embedded System in Communication namely - "REMOTE PROCESS CONTROL USING SMS" . Here we have given a brief overview of how a simple SMS from a mobile can be used to control a remote appliance. Further the hardware requirements, compatible software and potential applications have also been touched upon.
Keywords- Confusion matrix, Data Mining, Decision tree, Neural Network, stacking ensemble, voted perceptron

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Introduction

Embedded System

An Embedded system is a combination of computer hardware and software, and perhaps additional mechanical or other parts, designed to perform a specific function. It is comprised of computer hardware and software and mechanical components. Frequently, an embedded system is a component within some larger system. For example, modern trucks and cars contain many Embedded Systems. One Embedded system controls the antilock breaks, another monitors and controls the vehicle's emissions, and a third displays information on the desk board.

A general-purpose computer is itself made up of numerous Embedded System. For example, our computer consists of a keyboard, mouse, video card, modem, hard drive, floppy drive and sound card - each of which is an Embedded System. Each of devices contains a processor and software, and is designed to perform a specific function. For example, modem is designed to send and receive digital data over an analog telephone line.

All embedded systems also contain some types of inputs and outputs. For example, in a microwave oven the inputs are the buttons on the front panel and a temperature probe, and the outputs are the human readable displays and the microwave radiations .It is almost always the case that the output of the embedded systems are a function of its input and several other factors (elapsed time, current temperature, etc). The inputs to the system usually take the form of sensors and probes, communication signals, or control knobs and buttons. The outputs are typically displays communication signals or changes to the physical world.

Remote process control using SMS

Description

In this system we are using this SMS facility for controlling overall system. In our system we are designing SMS experimental box to which one mobile (SIEMENS C35i) is permanently connected. This exbo is Micro controller based whose one port is used as output; third port is used for LCD. The second mobile will be with user who will be at remote location.

When the user sends the SMS, this SMS comes on the mobile, which is connected, to the exbo, the exbo will check for new incoming message. If new message is received the exbo will send "AT COMMANDS" to read that message. The micro controller decodes this message and depending upon that message the respective outputs are switched and simultaneously the message will be displayed on LCD. If any error occurs in this procedure error message will be displayed on LCD. The SMS comes in the particular format, which is known as "Protocol Description Unit" (PDU).

Block diagram of system

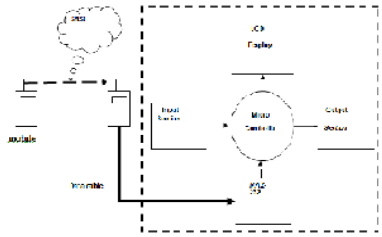

Fig.1-

Center and then it will be sending to destination mobile. The message is in the form of PDU, which contains all the information regarding SMS center, senders' mobile number and message.

At the receiving end all this information is collected by mobile, it is serially passed to the micro controller by the MAX 232 IC via data cable. This IC is used for serial communication as well as voltage converter. The micro controller decodes all the information. If information found valid the necessary action is taken. This SMS is displayed on LCD. Outputs used are LED's, which are used to indicate which system connected at output is ON. Connectors are used at the outputs to which the system controlled is connected through relays. At the input side also LED's connected to indicate which input is activated.

Hardware to be used

MAX 232-MAX 232 is designed for serial communication. It is basically a voltage converter, which converts 5 volts to 12 volts and vice-versa. The MAX 232, which is in the data cable, does the first conversion while the MAX 232, which is on the exbo, does the second. It is having two pairs of transmitters and two pairs of receivers, out of which one pair of transmitter R2IN (pin no. 8) and R2OUT (pin no.9). Other pair of receiver is T2OUT (pin no.7) and T2IN (pin no.10). This IC has four 1uf capacitors connected [2].

Micro Controller-In this we are going to use AT89C52. It has 256 bytes of data memory and 8kB of flash programmable and erasable read only memory. We are using crystal of 11.0592 MHz because since the Siemens C35i operates on baud rate of 19200, only this crystal gives 0% error for this baud rate. Port 1 is used as input from sensors. Port 2 is used as output; Port 0 is used for LCD. Timer 1 is used for baud rate generation; Timer 2 for delay. Output of MAX232 is connected to transmit pin (txd) of Microcontroller. T1 pin is connected to RS pin, WR to RW, RD to EN of LCD.

Mobile-Any mobile which is provided with serial communication pins- one for transmission (TXD) and other for reception (RXD) can be used.

At Command Set

Similar to the modems, GSM cellular phones accepts the AT command set only. European Telecommunications Standard Institute (ETSI) specifies this command set. According to the guideline commands should begin with the character string "AT" and end with "<CR>". The input of a

command is acknowledged by the display "OK" or "ERROR". A command currently in process is interrupted by each additional character entered. This means that the next command should not be entered until we receive the acknowledgement, otherwise the current command will be interrupted. The commands supported are listed in the following tables-[3,5].

Mobile Initialization Commands

ATE0	-	Deactivate command echo.
ATE1	-	Active command echo.
ATQ0	-	Display acknowledgements.
ATQ1	-	Suppress acknowledgements.
ATV0	-	Output acknowledgement as numbers.
ATV1	-	Output acknowledgement as text.
AT+CGMI	-	Issue manufactures ID code.
AT+CGMM	-	Issue model ID code.

SMS Related Commands

AT+CMGF - SMS format.
AT+CMGR - Read in an SMS.
AT+CMGL - Delete an SMS in the SMS memory.
AT+CMGL - List SMS.

Acknowledgements for Normal Data Communication-

Table 1

Response	Numeric	Meaning
Ok	0	Command Executed No Errors.
Ring	2	Ring Detected.
No Carrier	3	Link Not Established Or Disconnected.
Error	4	Invalid Command Or Command Line Too Long.
No Dial Tone	6	No Dial Tone, Dialing Impossible, Wrong Mode.
Busy	7	Remote Station Busy.

Software

We have written all the software in assembly language using instruction set of 8051. Our sequential flow of commands is as follows-

1. To initialize mobile by sending required AT commands through Hyper terminal Software.
2. To continuously loop in the program to check whether any new SMS is received.
3. Then read in the SMS store it in memory, then give command

to delete SMS from SMS memory in mobile to keep index 1 for the next new SMS.

4. Check for the mobile no., incoming SMS. If both are correct display SMS and the time of arrival on the LCD.
5. According to the SMS the respective LED's are made on. If any error occurs in the above procedure then display the error on the LCD and loop back.
6. In this software we have written small subroutines which make programming easy. Using Look up table we have stored all the responses for AT commands. All interrupts except that for serial communication are masked.

Flowchart

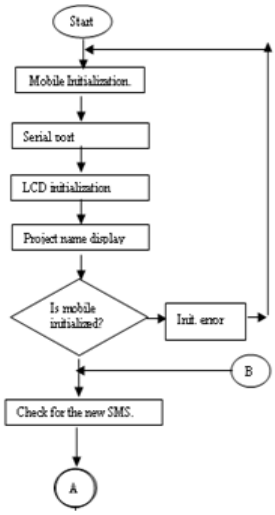

Fig. 2-

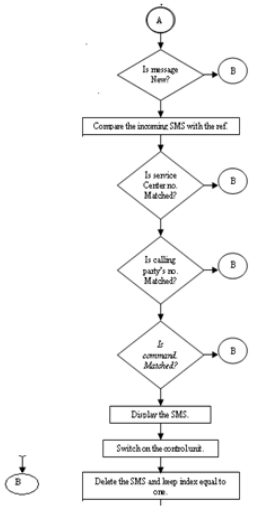

Fig. 3-

Advantages of Remote Process Control Using SMS

To make it more global oriented certain alterations can be made in the software. So by this any user of any mobile handset number can send SMS and that can be accepted and decoded by the kit.

Another advantage it gives is that SMS can be sent through PC's by using INTERNET facilities. So this feature does not require even the remote mobile.

Additional hardware can be added to make it more efficient. RTC 72423 can be connected. This IC keeps track of events timing occurring such as at what time an SMS has come. This time can be seen on the LCD that we are using. Also we can view the current time on the LCD. GAL 16V8 can be used instead of Decoder used to give more flexibility to the kit.

If certain modifications are made in software we can send a reverse SMS on the remote mobile which will confirm that task is successfully done.

We can connect some sensors to port pins of Microcontroller i.e. PORT 1. These sensors can be of any types like Fire sensors, LDR's, LVDT and so on. When these sensors are in working conditions they will make the respective port pins at logic 1. This will call the sub routines for that respective sensor previously fed in memory. Depending on the response of the sub routine the necessary actions such as LED's on/off; relay on etc. can be performed. Simultaneously as said previously a reverse SMS can be sent to tell the remote user of the action occurred.

Application

1. This facility is especially important when any emergency accidents occur. At such times fast actions are to be performed. Here wasting time in sending SMS to remote user and then waiting for his reply is avoided.
2. Home Security-- This application is based on the fact that on the input side we can connect a number of sensors. Based on the response of sensors the output connection can be made. For example by means of input like infrared detectors outputs such as burglar alarm can be activated. Since reverse flow is possible simultaneously SMS on remote mobile can be send about the event.
3. Remote Factory Automation- - Another application is use of relays on the output side. So by using the relays on output side remote mobile can be used as a remote control to operate any equipment. Thus, manual presence is not required and so automation of whole system can be achieved. This application can be used even in labs and offices.
4. Remote Logging System--Since PC interface is possible, any database transfer is possible.
5. Communication Interface for Controllers- - Serial communication is the backbone of the whole system. This kit can be further modified to interface with other IC'

Conclusion

We can conclude from our project that it removes the drawbacks of remote control devices. No physical presence is required at the location where we have to control the device. Also, directivity (i.e. Specific angle) doesn't play any role in this project. SMS can be sent to any location from any where in the world, which makes the project versatile and there is no limitation of range in our project, which is its best quality.

Thus, we can conclude that ever person should have a mobile so that he could easily control remote devices.

References

[1] Raj Kamal Embedded Systems (TMH)
[2] Real Time System Jane Liu (Pearson Publication)
[3] Michael Barr, Programming Embedded System in C and C ++.
[4] *www.elektor-electronics.co.uk*.
[5] *www.riccibitti.com*.