REMOTE CONTROL OF ELECTRICAL APPLIANCES

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1. INTRODUCTION

In the modern busy society, it would be very useful if people can operate their domestic electrical appliances when they are away from home. This can be employed in instances such as, switching on lights in the evening for security reasons, and switching on a water heater from the office so that by the time he arrives home hot water is available readily for a bath.

Our aims are

- to switch ON & OFF a lamp
- to control a lamp using a dimmer circuit
- to control a water heater

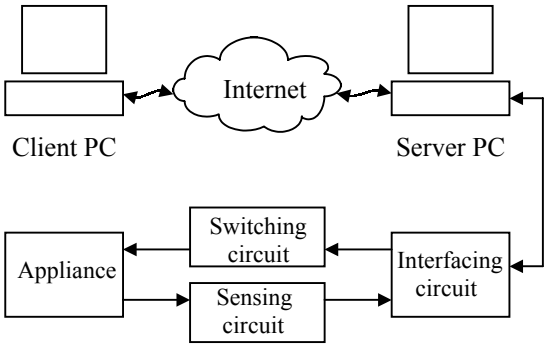


Fig. 1 Basic Block Diagram

The software program at the remote PC (server PC) issue the controlling signals to the serial port depending on the control signal sent through the Internet by the operator (client PC). Serial stream is converted to parallel form using the interfacing circuit. This interfacing circuit drives the appliance switching circuit which switches the electrical appliance. The sensing circuit at the electrical appliance detects the state of the appliance and a feedback signal is given to the interfacing circuit. This is sent to the operator by the reversal process and indicated in the GUI at the client PC.

2. SOFTWARE PROGRAMMING

Server Application

Three threads are running simultaneously.

1. Monitoring GUI events and responding

   Accordingly :

A dialog style interface is provided for the user to interact with the devices. This thread of application is responsible for capturing user events, interpreting the user input and converting it to a word written to the communication port and to the network socket.

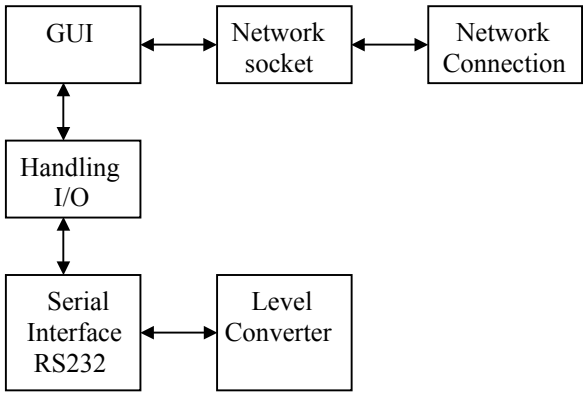


Fig. 2 Server Application

2. Monitoring network Messages and processing the requests :

This thread monitors the specific TCP/IP port allocated to it (4000) for network messages. Upon the reception of a character it interprets it, updates the GUI and writes to the port.

3. A thread to monitor input from the port and to process the feed back :

This thread is blocked until the port receives a character. When the port receives a character it resumes, updates the GUI and writes the character to the socket.

Client Application

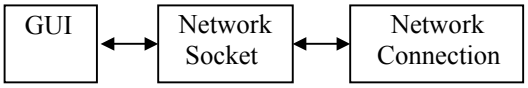


Fig. 3 Client Application

Two threaded application :

1. To monitor GUI events and respond Accordingly.
2. To monitoring network messages and process the requests.

Both threads have the similar functionality as the server application except they will not write to the port.

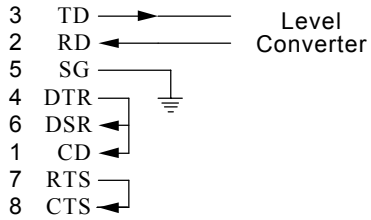
The software provides the following features.

- TCP/IP remote access trough Internet
- Port handling
- Feedback

3. INTERFACING

3.1 RS232 Interface

The RS232 (Com1) is connected with the level converter as shown.



3.2 Level Converter

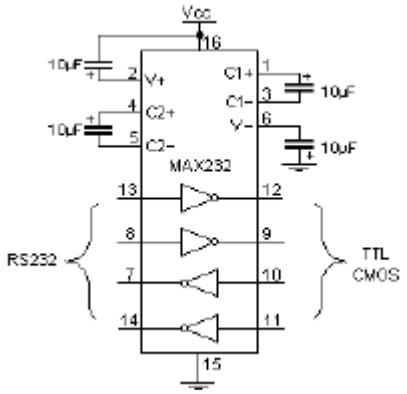


Fig. 4 Circuit Diagram for MAX232

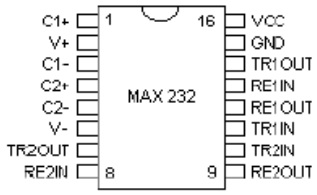


Fig. 5 Pin Layout of MAX232

Level converter is used to convert RS 232 levels to TTL/CMOS levels.

	Logic Level	Voltage
RS 232	0	(-3) – (-25)
RS 232	1	(3) – (25)
TTL/CMOS	0	0.0 - 0.5
TTL/CMOS	1	4.5 – 5.0

The Level converter requires +10 /-10 rail to rail supply and the IC used incorporates a charge pump which produces the required power levels.

3.3 UART

Universal Asynchronous Receiver / Transmitter (UART) is used for converting asynchronous serial data to parallel form. It provides the necessary formatting and control for interfacing between serial and parallel data. The receiver converts serial start, data, parity, and stop bits to parallel data verifying proper code transmission, parity and stop bits. The transmitter converts parallel data into serial form and automatically adds start parity and stop bits.

We employ data word length of 8 bits, Odd parity and 1 Stop bit. The transmitted and received serial data is clocked by and external clock oscillator which is divided through a ripple counter to obtain low baud rates for communication.

4.0 APPLIANCE SWITCHING & SENSING

Output from the interfacing circuit is taken as the input to the appliance switching circuit. Switching signals employed are digital signals indication either ON (5V) or OFF (0V). In the dimmer circuit, the tree levels are implemented using three separate lines, with only one at ON state.

The ac 230V appliance is switched using the digital signal. From the low voltage signal a relay is driven. The relay drives a triac which switches the appliance. The relay ensures the physical isolation between the lower voltage and the higher voltage sides.

The sensing circuit for the lamp is based on a LDR. It gives a digital output to the interfacing circuit, depending on the state of the appliance. For the heater the sensing circuit is based on a temperature sensor. When the water temperature rises above a preset value, the sensing circuit output becomes High. OP amps are used for comparisons in these sensing circuits.

5.0 CONCLUSION

We have carried out this project in a simpler form, but this concept can be extended to utilize many complex appliances. Also it can be extended to multiple units by replacing this UART with an addressable UART such as MC 14469.

A wireless link can be employed between the level converter and the UART which will provide the facility to communicate with destinations difficult to reach.

6.0 REFERENCES

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