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SNMP Protocol Implementation in Inverter for Parameters Monitoring

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ABSTRACT: Today's UPS system without having smart and reliable communication facilities are less effective. In some cases it is entirely not accepted. If UPS gives warnings of its faults like overload or battery low and other conditions before tripping or crashing then user can take necessary action. In other word communication contribute to increase major feature of UPS system.
In this paper we implement the SNMP (Simple Network Management Protocol) to monitor Inverter System remotely. It will helpful for rectifying faults before they can develop into UPS failures.

KEYWORDS: SNMP(Simple Network Management Protocol,uc(Micro-controller).

I. INTRODUCTION

Today's UPS industries are became the Smart UPS industries as they have adapted the embedded system in their manufacturing system.
UPS with additional communications facilities is not considered as a trend but it is need. These parameter monitoring facilities contribute to UPS performance. For example indications of current UPS status can be one way of pre-emptive UPS maintenance since identify faults before they occurs into system failures. In this paper, we look at the operational and maintenance benefits that become possible, together with the SNMP communications technologies currently used to achieve them.
In some cases, especially if the load is not considered to be critical and implementation simplicity is important instead of highly-detailed data. If so, simple potential-free contacts may are enough. These provide 'OK/Not OK' alarms and messages to cover situations such as Mains Failure, Load on Inverter, Battery Low, and Battery Low Pre-alarm or Over temperature. Such contacts can be connected to remote – but on site – alarm panels.If detailed information regarding UPS status or fault is required than just potential -free contacts can deliver, an RS-232 serial communications offers a reasonably simple improvement. It can monitor and exchange analogue data rather than just 'OK/Not OK' signals. For example, a remote RS-232 connected terminal could display Inverter Output Voltage; load Percentage, Battery Capacity, Data and event logs regarding mains failures and UPS operation etc.

II. SYSTEM OVERVIEW WORKING

In this paper, parameters of inverter are monitored, controlled through internet. Fig (1) shows the generalize block diagram of the proposed system.

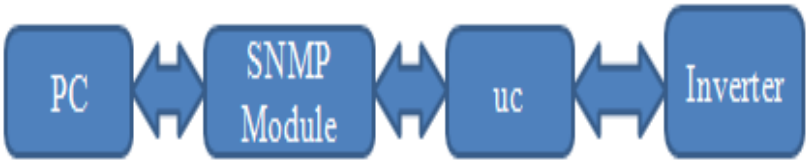

Fig. 1. General Architecture of Proposed System

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A. PC:

By using personal computer user can monitor and log the data received from inverter via SNMP module. As there is no any European standard for UPS RS-232 protocol, each UPS manufacturer offers their own implementation. Additionally, most UPS suppliers offer proprietary software to extract the most useful information from the serial data, although the features offered vary between suppliers. They offers facilities which includes graphic display of UPS status, Inverter Voltage, Load percentage or Current, Battery capacity, Battery Voltage ,also data logging and event logging.

B. SNMP MODULE:

Simple Network Management Protocol (SNMP) is an Internet Standard protocol for collecting and organizing information about managed devices on IP networks and for modifying that information to change device behavior.
Functions:-
-Support network monitoring based on WEB.
-Remotely monitor UPS, including voltage, current, bypass, utility power, etc;
-Record function of history event and history data.
-Support stand-alone monitoring.
-Monitor charger status.
-Monitors battery status and condition.
-Provide the power switch function for computer to turn ON/OFF the utility on schedule for power saving.
-Works with baud rate 2400.

C. Microcontroller:

ARM Cortex M3 LPC1768 is 32bit microcontroller.512kB flash memory, 64kB ROM memory and 4 UARTS. It used for implement SNMP protocol. Its act as a bridge between inverter and SNMP module. It pass the queries from SNMP module to inverter controller and takes response from inverter controller to SNMP module. It communicates in half duplex with baud rate of 2400.

E. Inverter:

Inverter is target product whose parameters have to be monitored. User can monitor, control and update its parameter. The parameters are: - Input and Output voltage, output current battery voltage and capacity, faults and status of inverter.

F. Display:

Liquid crystal display is used to display the parameters of inverter at inverter side. It will show Input and Output voltage, output current battery voltage and capacity, faults and status of inverter.

III. EXPERIMENTAL ANALYSIS AND RESULT

For the experimental analysis, we have used SNMP module DM 520, ARM controller board with SNMP protocol in built, to monitor following inverter parameters-
1. Input and Output voltage,
2. Output current
3. Battery voltage and capacity,
4. Faults and status of inverter.
We observed all parameter on Netility software to monitor the values.

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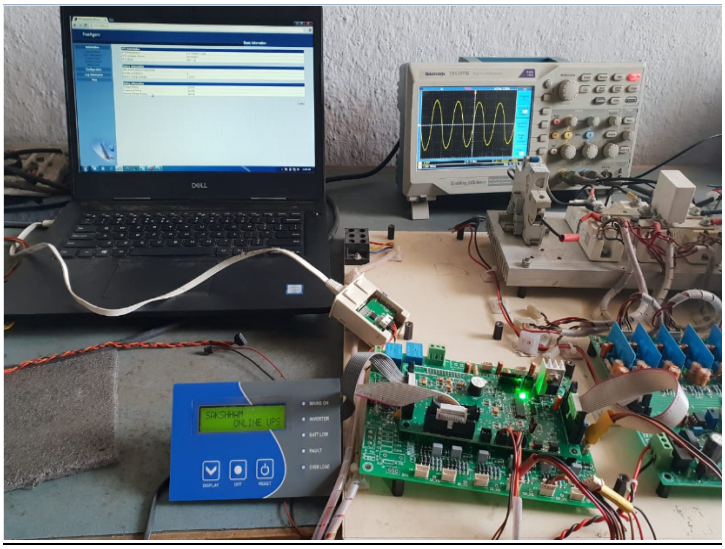

Fig.2. Experimental Setup

Fig.3. Current Status Of UPS.

Table I. Results

Parameter	Actual value	Software value	Inverter status
Output Voltage	230.6V	230V	Inverter ON, Mains ON
Battery Voltage	123 V	123V	Inverter ON, Mains ON
Input Voltage	218V	218V	Inverter ON, Mains ON
UPS Load	74%	74V	Inverter ON, Mains ON.

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IV. CONCLUSION

In this paper, universally accepted SNMP protocol for UPS is implemented using 32 bit ARM Cortex M3 processor. In this, we divided a whole system into Inverter section and SNMP section. In inverter section microcontroller monitors all inverter parameters and controls inverter output parameters according with internal references. In SNMP section user can change inverter parameters (reference as well as feedback) remotely. Hence fast service and cost for service is reduced.

The entire system has been implemented in actual hardware (inverter) platform, using three different microcontrollers. The programming is done in keil uvision 5 & MPLABX.

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