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Monitoring Load Schedule and Fault Detection Using GSM

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Abstract: **Electricity distribution is the final stage in the delivery of electricity from generating power plants to end users. A distribution system's network carries electricity from the transmission system and delivers its load centers. It is the most visible part of the power supply chain, and most exposed to the critical observation of its users. Due to the huge demand for electricity we introduced load shedding, but often inconvenient. The alternative method is load scheduling. The load schedule is usually categorized by local transformer or occasionally by sub-facility / area so that it becomes convenient for the people to overcome their basic needs. In order to have such a system, improvement in identifying the point of fault occurrence, fixing the fault in minimum time, keeping a proper data base of outage and fault occurrence, effectively monitor the voltage, current and temperature variation and other related parameters like preventing oil theft, identifying the voltage drop and keeping the variation within the standard level are essential.**

I. INTRODUCTION

The electrical load schedule is an estimate of the instantaneous electrical loads operating in a facility, in terms of active, reactive and apparent power. One of the biggest issues in such systems is the developments of effective techniques for fault detection in power transmission end and to monitor the consuming ends during load shedding to achieve some performance goals, such as maximizing resource utilization and providing uninterrupted power supply. It should be considered as an important factor during the design phase of power supply.

A. Introduction to the area of work

This project can be implemented in power supplying stations in order to protect the main circuit from current, voltage, temperature variations and "fuse blown" conditions. It is also used to send the fault conditions to the main transformer station and the consuming ends via SMS. Used to reduce energy wastage during load shedding .Thus energy conservation can be achieved.

B. Present day scenario with regard to the work area

As we know electricity is known as one of the basic needs of human beings. It plays an important role in each and every sector. Without it human life is unthinkable. In the absence of electricity country and its people face different difficulties. Most of the work is performed with the help of electricity nowadays. This makes work simpler for people. Thus conserving electricity is essential.

II. MATERIAL AND METHODS

A. Transformer section

1) Sensor section

It has 5 sensor modules – voltage sensing, current sensing, phase neutral reversal sensing, oil theft sensing and fuse blown off sensing.All these sensors are made up of discrete components.

2) Voltage sensing circuit

This is based on series drop current limiter and potential divider network. Here 230V AC is converted to DC, stepped down to .5 – 4.7V. This voltage is applied to ADC pin of themicro controller.

3) Current sensing circuit

It is used to monitor the line current through the isolation current transformer. This circuit also consists of series current limiter and potential divider network. When current passes through the current transformer, voltage across the current transformer increases. This voltage ranges from 0.8V to 3.5V. This variable voltage is applied to the ADC pin of the micro controller.

4) Phase neutral reversal

Consists of two major components

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a. Optocoupler
b. Transister

When phase neutralreversal occurs, high kilo watt household equipments start giving electric shock due to the low resistance in the input path. To detect the phase neutralreversal occurance, the isolated optocoupler methodology is used. In this methodology, when phase neutralare in correct combination, the internal LED starts glowing. Resulting in the output of theoptocoupler goes high. This will trigger themicro controller. In this conditionmicro controller port goes low. This means phase neutralare in correct sequence. If it is reversal, micro controller pin logic goes high.

5) Oil theft

Transformer oil theft is a common problem for the electricity board because the transformer coolant is more costlier than ordinary coolant. If coolant is not there in the transformer, transformer gets over heated and leads to blown out or burning of the transformer.
To prevent this, we have designed oil theft circuit based on BC 547 transister. When oil is in proper level output logic of the circuit goes low. When oil level goes low, output logic goes high. This is applied to the digital pin of the micro controller.

6) Fuse blown out

This circuit is also constructed by using optocoupler. When fuse is in normal condition, output logic of the optocoupler circuit is low. When fuse blown up condition output logic of the circuit goes high. This is applied to the digital pin of the micro controller.

- ***Keyboard***

This is used to set the telephone numbers and transformer parameters in the EEPROM memory of the controller. This data can be changed frequently according to the user needs. There is no need of writing the program again and again.

- ***MAX232***

Used as a level converter to communicate between GSM modem and MC. The level converter voltage is boosted from 3.3V to 10V and 5V to 10V bi-directionally (the topology charged pump).

- ***GSM modem***

Based on AT command (Bell Labs) set. The name of the modem is SIM 900, manufactured by SIMTRON, same configuration modem by Toshiba and Telefanken.

B. Home section

Consists of microcontroller and current sensing transformer circuit. When over current consumption occurs at the consumer side, the system automatically detects the output of the overload and it will store penalty for one attempt.

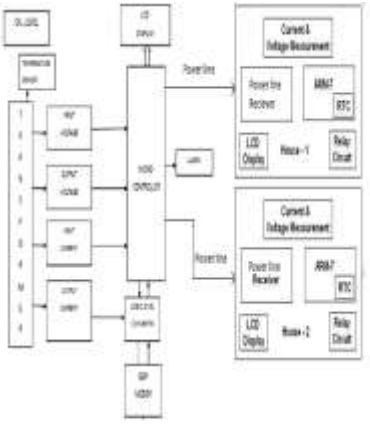

Fig 1: Block diagram of transformer and home

III. BLOCK DIAGRAM DESCRIPTION

Figure. 2.1 shows the block diagram of transformer and home sections. The transformer section consists of 5 sensors- voltage, current, phase neutral reversal, fuse blown and temperature sensors. These sensors are connected to the microcontroller and detect the variations in the transformer which sends the fault conditions to the consumer through GSM modem and displays on the LCD.

Home section checks the power consumption of the consumer, if the set limits are crossed the power supply to his home will turned off for certain time interval thus reducing the power wastage.

IV. RESULT ANALYSIS

Sensors are used to detect the fault conditions and the outputs from these sensors are sent to the IC PIC18F452, where the information processing is done. This IC is interfaced with LCD display to display the fault conditions. During test run this LCD displayed the fault conditions without any error, simultaneously these

messages are sent to cell phones of consumers at load side.

Overload message is successfully displayed on the LCD display present at the load side.

Also it is possible to charge penalty to the loads if they use more than the threshold power for certain time interval during load Shedding.

V. CONCLUSION

The project implemented here is to protect the transformer and power lines from the variations in voltage and currents, detecting and sending the fault conditions through GSM and monitor the power distribution during load shedding. And providing uniform distribution of current to every consumer end by Load scheduling ,so that the consumers will be more aware of the power wastages and eventually power saving can be achieved.

VI. FUTURE SCOPE OF WORK

Once this project is running it can be used in scenarios where fault detection in power supplying side is required. Used as over current and over voltage protection circuit for the transformers at Supplying end. By implementing features like protection from other electrical parameters we can improve this project. Also we can add security features at the supplying end.

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