International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 07 Issue: 04 | Apr 2020 www.irjet.net p-ISSN: 2395-0072

Load Distribution using PLC and SCADA

Pratiksha Aher[1], Shobhana Gadakh[2], Gayatri Sanap[3] , Mr. R. V. Patel

[1,2,3] *Student, Department of Electrical Engineering, GCOERC, Nashik, Maharashtra, India*
[4] *Asst. professor, Department of Electrical Engineering, GCOERC, Nashik, Maharashtra, India.*

Abstract - The world is facing a severe power shortage because the generation of power is less than the power consumption due to increasing demand from the consumer's side..So User Can't get reliable power supply. So in this project I am working to get automatic operations of circuit breaker using Programmable Logic Control system And SCADA. To overcome the problem of power distribution, we can manage the equitable power distribution by using Programmable Logic Controller (PLC). The aim of this project is to mainly monitor power consumption by different end users. If the consumer exceeds the limit of the sanctioned load, the supply of that consumer is disconnected by using the Programmable Logic Controller (PLC) through a relay installed in the energy meter. We use PLC in our project as the communication medium between the different types of consumers, i.e. (Residential, Commercial, and Industrial) and the control room. This system will monitor the supply of sanctioned loads for deferent users. The main application of this project is to control .The demand and supply balance of power in a distribution system.

Key Words: **Programmable Logic Controller, Relay, Circuit Breakers and SCADA.**

1. INTRODUCTION

Today, we are facing the most critical problem of inadequacy in power supply. The electricity demand is increasing with the growth of population and with the use of different appliances in the household. Instead, we can use the power available in such a way that the user will only use the power which is allocated to the user according to the limit of sanctioned load provided by the service provider. A properly installed and monitoring system is a valuable advantage to almost any type of energy consumer by avoiding the power theft and unorganised power management due to lack of sufficient and efficient past energy consumption data, that has led to huge losses to power companies or unbearable high electricity cost for the customers

2. LITERATURE SURVEY

In order to start the thesis, the first step is to study the previous work performed by researchers. For this purpose, various papers have been studied.

Heavy power consumer (Industrial applications) has to pay the fixed charges irrespective of the consumed power. Also, penalty is levied on such consumptions even if there is a slight overshoot in maximum consumption limit.There will not be any prior notification with this regard. In such situation, this implementation aims in providing details of overshoot time, peak power consumption, displaying the power consumption and the cost based on the tariff plans from any remote location. [1]

In the current financial climate, focus on energy saving within the home has intensified by the desire to reduce costs. Fossil fuel savings, carbon emission reductions, as well as a permanent fall in electricity prices, are significant incentives for the residential consumers to look at different methods to reduce their energy consumption. Demand Response (DR) is an alternative method which provides an opportunity for consumers to reduce their energy consumption cost by deferring or shifting their electricity usage during peak periods. To this aim, this study evaluates the effectiveness of price-based DR techniques currently available in Western Australia based on the consumers cost of electricity and comfort level. The electricity tariffs are systematically examined. [2]

3. PROPOSED SYSTEM

In this proposed system, a new protection system based on a programmable logic controller (PLC) has been introduced. This system has the ability to control the data of remote locations and also provides the proper monitoring results. In case of manual on/off operation the time span between failure of supply at any incoming feeder to the transfer of load to another feeder is much more. So user can't get reliable power supply. So in this project we are working to get automatic operation of circuit breaker using PLC and SCADA.

3.1. BLOCK DIAGRAM

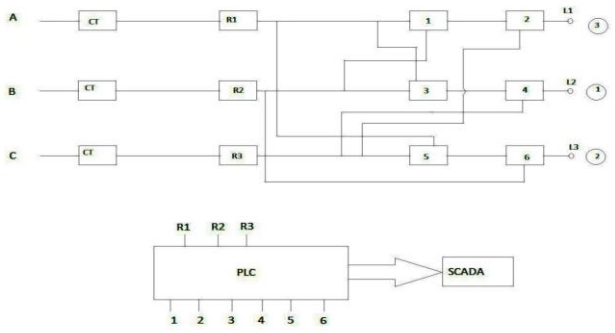

Fig -1: Block Diagram

3.2. WORKING

Here we have shown the circuit diagram of the switching circuit. In which there are three supply and three loads connected to their corresponding supply. Here the priority of the load is shown in diagram. In the condition when no fault is occurred in the system than the load 1 is connected to S1, load 2 is connected to S2 and load 3 is connected to S3. If any fault occur in S2 than load 2 gets off which has highest priority. So that we have to shift the supply from 1 to 2. So here we will activate Relay 1 and Relay 2. So that according to circuit the source will shift to load 2. If any fault occurs in source S3 than load 3 gets off but it has priority more than load 1.So here Relay 1 and 4 will be turned on and supply power will be shift from 1 to 3. If any fault occurs in source S1 and S2 than both of load 1 and 2 will be turned off. So we have to shift power from 3 to 2. So Relay 3 and 5 will be turned on by which the supply will shift from 3 to 2.

If any fault occurs in source S2 and S3 that the load 2 and 3 will be off. So the priority of load 2 is high. So we will turn on Relay 1 and 2. So the supply is shifted from 1 to 2 and load 2 is continued.

If any fault occur in source S1 and S3 than load 1 and 3 is off but load 2 is still on.

3.2.1. PLC

The PLC used here is Delta DVP14SS2 which has 8 digital inputs and 6 outputs which requires 20.4V to 28.8V dc supply for its operation.

3.2.2. RELAY

The relays (Power and Static) used are 24V and 5V dc used for switching action for PLC and to cut-off the power supplied to the loads.

3.2.3. SMPS

The SMPS that used in the system is of that has maximum range of 140-300V input voltage and up to 2A maximum output current. switched-mode power supply is an electronic power supply that incorporates a switching regulator to convert electrical power efficiently

3.2.4. SCADA

A SCADA(Supervisory Control And Data Acquisition) system for a power distribution application is a typically a PC-based software package.

4. SOFTWARE DETAILS

4.1 WPL SOFT

The WPL soft is a software which is used to Program Delta PLC. This software was developed to work on Windows XP, Windows Vista, Windows 7, Windows 8 or Windows 10 and can function on 32-bit systems. There are the common names to indicate this program's installer like WPLSoft.exe, Wpl.exe WPL209.exe, WPL208.exe or WPL207.exe.

4.2 WONDERWARE INTOUCH

Wonder ware In Touch it is the award-winning HMI visualization Software.

5. RESULTS

Fig -2: Expected Scenario

Fig -3: Cut Off Condition

6. CONCLUSION

The objective of proposed project is to make the system more accurate. The system which is implemented can distribute the power to the consumer ends. It can monitor the power distribution which is being distributed to the consumers and control the usage of power.

7. FUTURE SCOPE

- We can develop App for this system so that we can get the notification of load parameters on mobile.
- We can use IOT instead of PLC and SCADA, which is more reliable and manual operation will be replaced by automation.

8. ACKNOWLEDGEMENT

Sincere thanks to all the researchers for providing such a useful and helpful opinion, findings, conclusions and recommendations. Also gives immense pleasure to thanks to Project coordinator Prof. R. V. Patel, Principal Dr. N.G.Nikam and friends for their kind support and guidance

9. REFERENCES

1.Chintan H.Vekariya [1] PLC and SCADA System is used for monitoring the various electrical parameters (voltage, current, power factor etc.) By using these parameters, we can easily control any load in our system to improve system operation, system reliability, etc. alternatively, SCADA and PLC communication

2.Chaudhari Digvijay [2] The objective of proposed project is to make the system more accurate and the alertness and awareness about the sanctioned load and connected load thus will increase because of the instant action that will be taken by the system

3.Santosh B.Belekar [3] PLC and SCADA System is used for monitoring the various electrical parameters (voltage, current, power factor etc. alternatively, SCADA and PLC communication system make it possible to integrate protection control and monitoring electrical parameter together for maximum benefit.

4. S.R. KATKAR [4] This paper presents a load management application for use in industrial installations. The presented application is implemented in ICONICS and KGL_WE simulator software. The proposed work having Hardware and software Optimization with the help of PLC Ladder programming Logic.

5. Roshan Bhaiswar [5] In this study, an appropriate Programmable Logic Control (PLC) ladder diagram for a heater system was created SCADA software with the program to control and monitor the system from a central point was realized. The messaging between the analog and digital data, SCADA and PLC was achieved successfully

6.Renuka Kharche [6] When the overload can takes place in one phase it take the power from another phase. In this concept we can shift the load automatically when overload condition. And the different fault like overcurrent, overvoltages ,damaging the equipment, phase unbalanced are reduce.