



**THE GREAT EASTERN INSTITUTE
OF MARITIME STUDIES
(LONAVALA)**

PAPER PRESENTATION

ON

**Advanced Industrial Technologies and their
impact on Human Life**

FOR

TRANSTECH -15

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Abstract:

In today's world most of the systems are operate on automation. Because of that the automotive systems are most efficient. Automation means use of Programmable Logic Controller(PLC) & Supervisory Control And Data Acquisition(SCADA) instead of electromechanical devices.PLC & SCADA based distribution monitoring & control means use of automotive system in electrical distribution system for monitoring the electrical parameters(like voltage, current, power factor, etc) & controlling if any fault occurs in electrical system with the help of personal computer(PC). Main concept of our

paper is data acquisition & controlling by using SCADA software PLC. Here PLC is a medium between electrical system & Personal Computer for SCADA to take input and output bits. Automating electrical distributions systems by implementing a supervisory control and data acquisition (SCADA) system is the one of the most cost-effective solutions for improving reliability, increasing utilization, increasing efficiency and saving costs. Nowadays consumer requires more reliable & efficient power supply. So we can use automation systems as per the consumer requirement.

Keywords: Data acquisition and supervisory control, distribution system, programmable logical control(P.L.C).

1.INTRODUCTION:

In today's world, various electronic equipments are available for remote operation of power distribution system control. However, the main disadvantage of these systems is that they can be operated only from short ranges and also less reliable. So to remove this drawback, we are using PLC & SCADA system. Electric utilities must meet increasing demand for reliable power distribution while coping with decreasing tolerance for disruptions and outages. More than ever, utilities are squeezed to do more with less, and recognize the need to improve the efficiency of their power generation and distribution systems. Fortunately, many areas of the existing electrical distribution system can be improved through automation

“PLC and SCADA Based Power Distribution Monitoring” the name itself says that the electrical parameters (voltage, current and power factor) can be monitored, analyzed & then controlled in Computer (PC) by using SCADA Software. In our project the PLC works as a mediator between L.T. power distribution and PC at second level. PLC will collect data related to electrical power and build a link with the consumer side i.e. the PC then it gives the continuous power monitoring according to the used load on SCADA. A SCADA system for a power distribution application is a typically a PC-based software package. Data is collected from the electrical distribution system.

In our project, we have done GEIMS survey of electrical power distribution. We choose an Electrical department of GEIMS College for monitoring purpose of electrical parameters (voltage, current, power factor, etc). We are going to acquire data from only a specific lab i.e. Machine lab & consider only one single phase load. The data will be seen at the SCADA GUI. Automating electrical distributions systems by implementing a supervisory control and data acquisition (SCADA) system is the one of the most cost-effective solutions for improving reliability, increasing utilization and cutting costs.

Here we consider a single phase load which is connected to feeder for monitoring, analyzing & controlling. How works PLC & SCADA in our project? If any fault occurs in the feeder & there is discontinuity in supply to the load, then we can use auxiliary feeder which is connected to the main line or use of DG set for continuous supply. Here the operation of this auxiliary feeder is automatic, because we use programmable logic controller (PLC) & SCADA software. If the main feeder's supply is cut-off then the auxiliary feeder operate automatically in very less time, because in PLC programming

some time delay is given. Also we get real time information about the electrical parameters in our project.

2.METHODOLOGY:

2.1.1 Project Description:

The present day Supervisory Control and Data Acquisition (SCADA) systems consisting of SCADA hosts, Remote Terminal Units (RTUs) and field devices monitor and control process equipment and systems from multiple locations and exchange data from various distributed control systems along the local and wide area networks.

Main concept of our project is “Data Acquisition and Control using PC”. We are going to read the electrical data by the use of PLC and SCADA. Then the entire data will be displayed on SCADA. According to the readings controlling actions will be taken by the operator.

2.1.2 Complete Block Diagram:

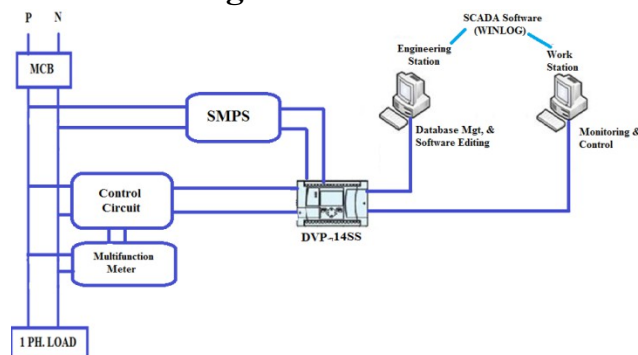


Fig.1 Main Block Diagram

In our project we consider only a single phase load which is to be monitor & control. Fig.3.2 shows the complete block diagram of the project. Here MCB is used for protection purpose. The multifunction meter is connected across the load for monitoring the electrical parameters like voltage, current, power factor, frequency, etc. There is control circuit is also connected across the load which gives the analog signal to PLC & then some PLC programming is done. Here we use WINLOG SCADA software for monitoring, analyzing & controlling. Then PLC communicates with the SCADA or PC through the KEP server. The data will monitored & controlled by engineering station and work station. The PLC is supplied by the switched mode power supply. In our project we can monitor the real time data related with the electrical power distribution by using the PLC & SCADA.

3. RESULTS & DISCUSSIONS:

3.1 Project Design:

3.2 Main Circuit Diagram –

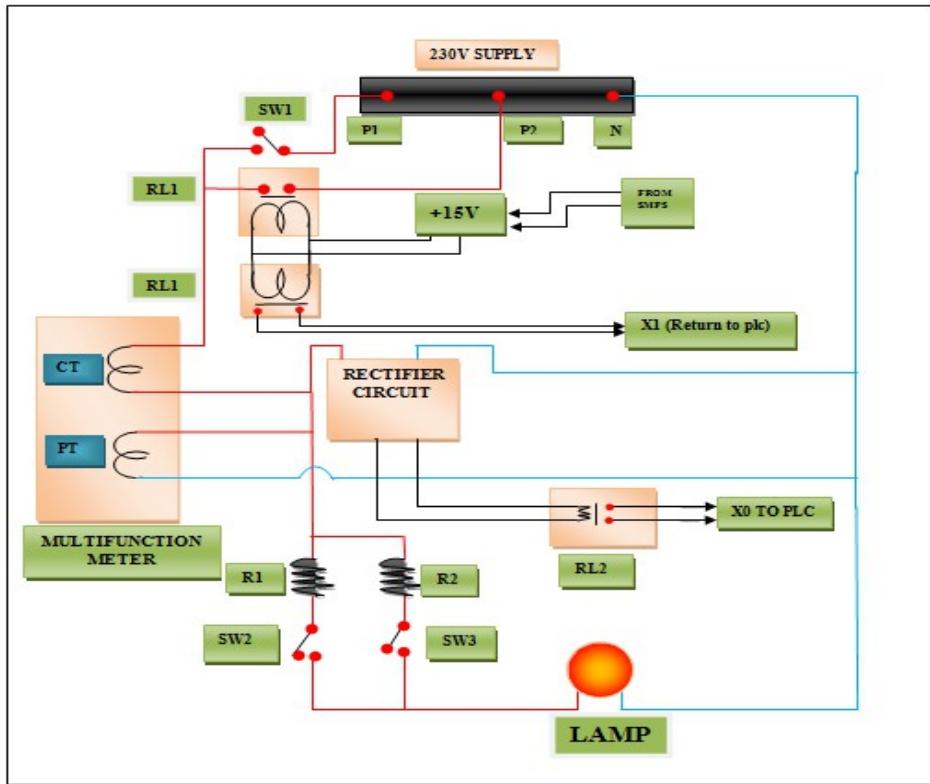


Fig 2 Main Circuit Diagram

In fig 2 shows detail operation of our project with connection diagram. Here we split the one supply single line to two lines. One main line goes to the lamp through multifunction meter & other line goes through double pole relay. Under normal condition supply is passing through the phase 1st and lamp is ON & this signal is sent to PLC by single pole relay (i.e. X0). If a fault occurs in feeder 1 then the load is OFF, then the double pole relay takes supply from SMPS & it actuates the connection & supply will continuously flow to the load by feeder 2 & this signal (X1) is sent to the PLC. Here we connect the multifunction meter for monitoring. Here we use two resistances in parallel for limiting the supply for safe operation of the panel.

3.2.1 Working:

In our project "PLC & SCADA Based Distribution Monitoring & Controlling" we consider only one single phase load which is connected to the feeder as shown in Fig.6.1. The main project is divided into two parts that is PLC supply panel & control panel. Here we use DELTA company's PLC which requires 24 V DC. So we design a separate power supply panel to supply the PLC. The required components for the power supply panel are a line filter, MCB & switched mode power supply (SMPS).

3.3 PLC Power Supply Panel:

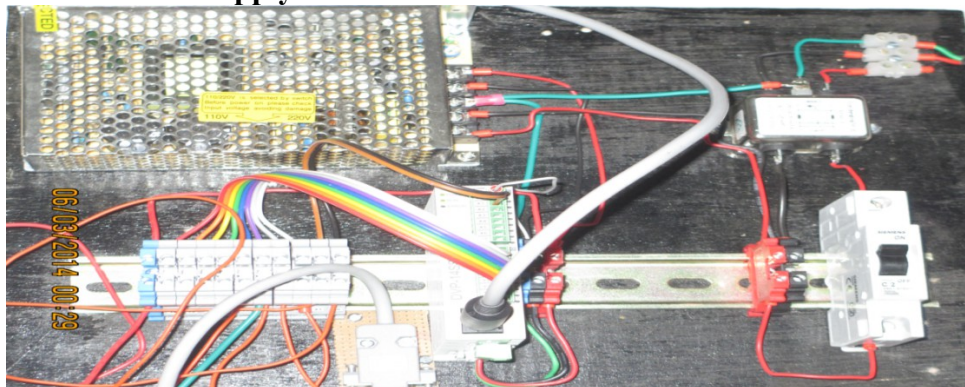


Fig.3 PLC Power Supply Panel

3.3.4 Working of Plc Power Supply Panel:

For the operation of control circuit 12 V DC supply is required, so we use centre tapped transformer & rectifier circuit to convert the AC supply into DC supply. We see the detailed operation of each component which is used for control circuit.

3.4 Control Panel:

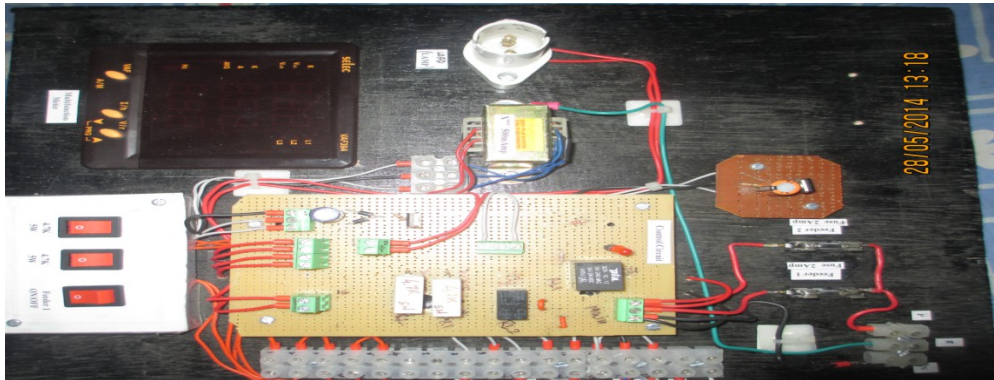


Fig.4 Control Panel

3.5 LADDER Diagram:

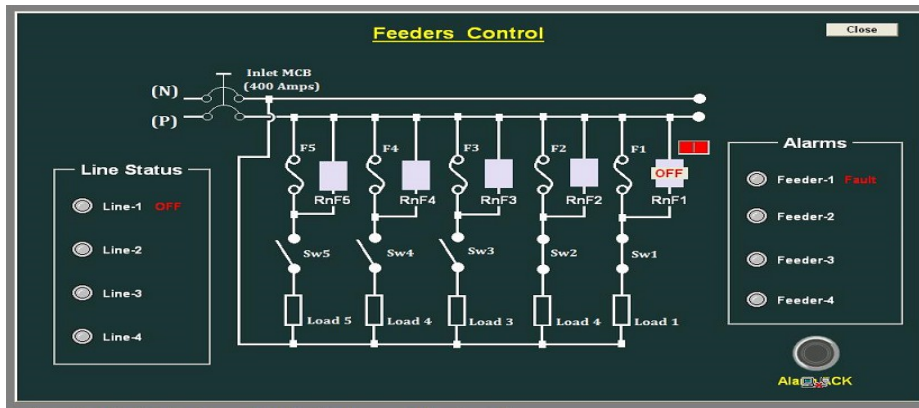


Ladder Algorithm:

When X0 (Input bits) is high then M0 (Scada bit) is high, that is Y0 (Output bit) is high that is lamp is ON. When X1 (Input bit) is high then M0 is low & timer is start after some time delay Y0 is high & M1 (Scada bit) is also high.

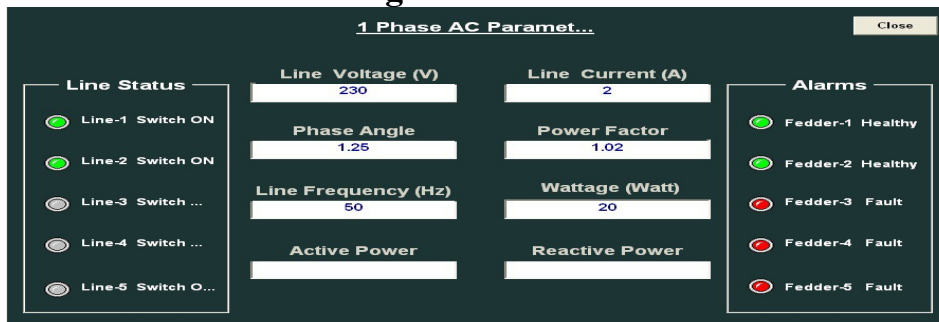
3.6 SCADA GUI's:

Feeder Control through SCADA



Feeder Control

Electrical Inlet Monitoring-



MACHINE LAB (Proposed Screen)

3.7. Project Features:

3.7.1 Features of project:

1. Use of PLC saves the lots of human efforts.
2. Switching time between loads connected across node is dynamically reduced.
3. Power can be saved up to some extent.
4. Fault detection becomes very easy.
5. System becomes robust right from electricity generation to distribution.
6. Switching losses is minimized up great extent.
7. Use of high end technology gives the additional features like temperature monitoring, load distribution and surge protection.

3.7.2 Advantages:

1. Reduced customer peak and overall energy demand.
2. Improves the electric grid's reliability.
3. Balances the electric grid through increased efficiency.
4. Energy efficiency.
5. Manages electricity costs.
6. Conservation through both behavioral and operational changes.
7. Load management.
8. Fuel switching.
9. Distributed energy.

10. And provide systems that encourage load shifting or load shedding during times when the electric grid is near its capacity or electric power prices are high.
- 11.

3.7.3 Application:

1. The Power Grid Corporation.
2. The industries which have different types of heavy load application.
3. Power generation station.
4. Various Industries or any of big organizations.

4. CONCLUSION & FUTURE SCOPE:

In this project “PLC Based power distribution monitoring and control” we are using PLC and SCADA. We are using this project for monitoring the Electrical parameter (voltage, current, power factor) in our MACHINE lab. This project proves that the control scheme for power monitoring to improve system operation, system reliability, etc. Various type of automation system such as relay contactor logic PLC and SCADA .We have concluded that SCADA and PLC communication system make it possible to integrate protection control and monitoring electrical parameter together for maximum benefit. The innovative development of automatic switching will yield more benefit to distribution utility. Truly, distribution automation and power monitoring are the choice for utility to improve system performance.

This system can become a very high end technology which serves circuit breakers, surge arrestors and solutions like substation automation. By using this system electricity thefts can be detected and located easily. If a fault occurs at any particular place this can be located on screen by using HMI & easily control through the computer. It is easy to avoid critical condition at the location or area which has higher priority & it is used for large range. By using this system the development is fast or growth of higher priority location. Electricity transmission & distribution system becomes easy & more reliable.

5. REFERENCES

- [1] Pingze ZHANG Changzhou Institute of Mechatronic Technology, Changzhou, Jiangsu, China 964899781@qq.com
- [2] An overview of continuous monitoring and control system for three phase induction motor based on programmable logical control & Scada Technology .volume 4,Issue4, July- August (2013) pp.188-196
- [3] PLC principle and application by John W.Webb.
- [4] www.wikipedia.com
- [5] www.springer.com
- [6] www.IEEEexplore.ieee.org

- [7] <http://www.modicon.com/techpubs/toc7.htm>
- [8] Modicon Modbus Protocol Reference Guide PI-MBUS-300 Rev.J
- [9] Web: <http://www.crmagnetics.com>.
- [10] www.selec.com

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a platform to render our ideas on the topic ,' **Advanced Industrial Technologies and
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