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Fault Detection and Autoline Distribution System with GSM Module

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Abstract - Transmission lines is the important factor of the power system. Transmission and distribution lines has good contribution in the generating unit and consumers to obtain the continuity of electric supply. To economically transfer high power between systems and from control generating field. Transmission line run over hundreds of kilometers to supply electrical power to the consumers. It is a required for industries to detect the faults in the power system as early as possible. "Fault Detection and Auto Line Distribution System With GSM Module" is a automation technique used for fault detection in AC supply and auto sharing of power. The significance undetectable faults is that they represent a serious public safety hazard as well as a risk of arcing ignition of fires. This paper represents under voltage and over current fault detection. It is useful in technology to provide many applications like home, industry etc..
Keywords: Fault, Fault Detection and types, Auto line distribution using PLC, GSM Module, Relay Switching.

I. INTRODUCTION

Electrical fault is the deviation of voltages and currents from normal values or states of input signal. In normal operating conditions, power system equipment or lines carry nominal voltages and currents which results in a accurate and good operation of the system. This paper represents the Line Protection on the applications of fault detection technology. This addresses the detection of those abnormal conditions where a conductor suffers from under voltage and over current condition. Detection of fault on line parameter (current and voltage) is done by using current and voltage sensor. If there is any fluctuation in parameter for more than 3 second than it will consider fault condition and load will share power from other load. Because in many application, machine or devices may have capacity with stand the fluctuation for a particular time. This system introduced with the 3 second of time period.

Automation of system has become the demand of the day. In fact most of the system are impossible to be controlled by human being. As fault analysis became important requirements of the electric power system to became more accurate. The need of automatic fault clearance became a necessity.

There are combinations of a circuit breaker and a relay protection system in a typical fault cleaning system. The main parts in protection system are wiring, transducers, auxiliary power supply, switches, circuit breakers, relays and the operating coil of the circuit breaker. Earlier fault is automatically cleared by electromagnetic relays. The electrical quantity, which is voltage or a current, was transformed to a mechanical force which operated the relay when a preset threshold was exceeded. But now a days the solid state relays are developed so that the operation can be performed easily and accurately.

II. 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.

TABLE I
RELATED WORK

Sr. No.	Paper Title	Year	Work
1.	Fault Detection Techniques For Power Transformers	2007	Author investigated An artificial neural network is used to detect off-line faults and whereas wavelet transforms are being used for on-line fault detection

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2.	Optimal Coordination of Automatic Line Switches for Distribution Systems	2012	Author focuses on distribution feeder automation system; protection coordination; underground 4-way automatic line switch This study investigates the coordination time intervals (CTIs) among the protection devices of the duty point of high voltage customers, automatic line switches lateral protection relays,
3.	High impedance fault detection of distribution network by phasor measurement unit	2013	Author estimated the High-impedance faults on distribution feeders are abnormal electrical conditions that cannot be detected by conventional protection schemes because of the low fault current due to the high impedance fault at fault point.
4.	Cable fault monitoring and indication	2013	Underground cable power transmission and distribution system are susceptible to fault. Author introduced power fault, fault, fault location, time domain reflectometer.

III.BLOCK DIAGRAM OF PROPOSED SYSTEM

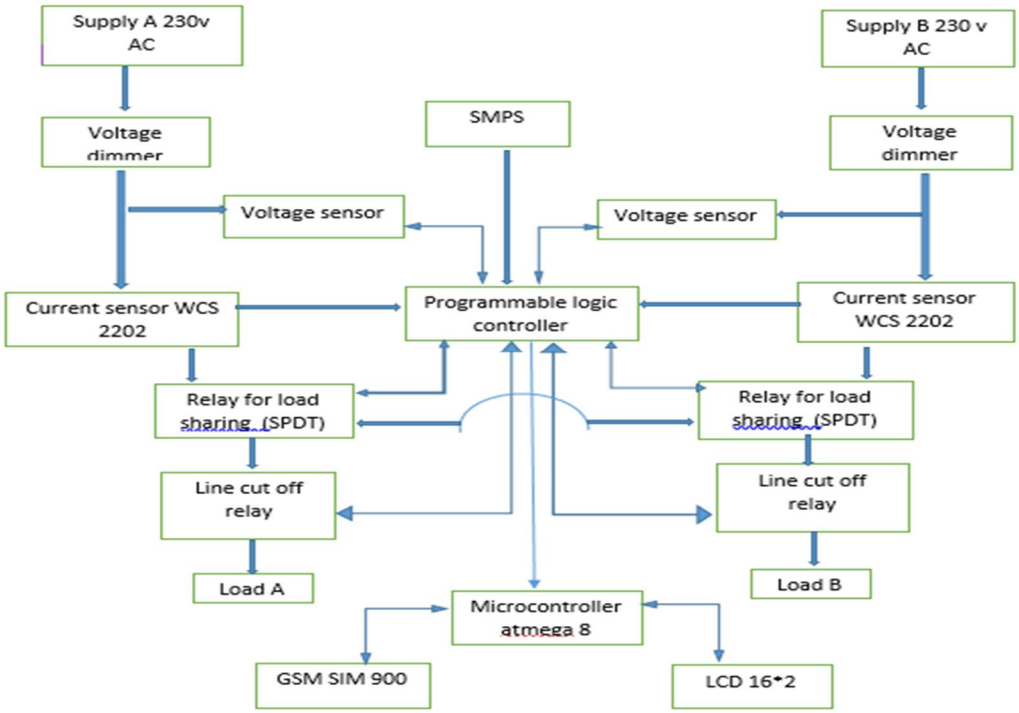

Fig No. 1 Block Diagram of Proposed System

The block diagram of proposed system is shown in above fig.1. This system is mainly having a sensing unit (voltage and current) and controller circuit. The circuit consists of dimmer to regulate the voltage, SPDT Relay for switching circuit and LCD and GSM SIM900 for information alert. PLC and microcontroller is used as a controller circuit.

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A. Modules for Proposed System

Design of system divide in two parts first part is to detect fault and Second part is to sharing of power between load.

B. Fault Detection

This system consists of voltage sensor and current sensor that sense the change in current and voltage from a particular value, which is use for gathers information of fault from input section then process on PLC and send data to display on LCD, which show Fault detection station. In this under voltage and overcurrent fault detection is done by using sensor unit.

C. Processing Unit PLC

This section is used for continuous measurement of various Monitoring and controlling parameters like voltage and current etc. PLC receive analog DC output voltage and change the polarity of relay if there is a fault condition. Aimed to help protect the device from over current and under current protection.

IV. SYSTEM OVERVIEW

A. Voltage Sensor / Voltage Transformer

Voltage transformer (9v, 500mA) is used to covered high voltage to low voltage. As a result, we get a constant ratio of voltage, with the help of rectification circuit we get constant DC voltage. which is proportional to input AC voltage (230v).

B. Current Sensor (WCS 2202)

A current sensor is a device that detects and converts current to an easily measured output voltage, which is proportional to the current through the measure path. The WCS2202 consists of a precise, low temperature linear hall sensor IC with temperature compensation and AC to DC rectifier circuit.

*C. Programmable Logic Controller (*SR3B261BD*)*

A PLC is an example of a hard real time system since output results must be produced in response to input condition with in a bounded time, otherwise unintended operation will result. SR3B261BD is analog input PLC operated at 24v DC. A SMPS of 24 v DC and 1A is used for PLC.

D. ATMEGA8

The AVR is a modified hardware architecture 8 Bit RISC single chip microcontroller which was developed by ATMEL. The AVR was one of the first microcontroller families to use on chip flash memory for program storage. Here there is the interfacing of PLC and microcontroller.

E. LCD

A LCD 16*2 display is connected with the microcontroller. when the fault is present microcontroller recognize it and then save text command for that fault detection station and display on LCD screen.

F. GSM SIM900

GSM module featuring an industry standard interface, the SIM900 delivers GSM/GPRS 850/900/1800/1900 MHz performance for voice, SMS, data and fax in a small form factor and with low power consumption. 12 volt, 1A adaptor is use for power supply for GSM module.

G. Relay SPDT

Relay is used for switching purpose And load sharing when fault occur. This is operated via PLC instruction.

V. IMPLEMENTATION AND RESULTS

This system is designed as explained in above section and Laddar diagram development is use, which is program using The Zelio™ Soft v2.0 software programming language with PLC. Code vision 2.04.1 software is used for programming in microcontroller Fig.2 shows complete input section model with. current and voltage sensor, PLC, Atmega8 microcontroller, along with GSM SIM900 and LCD.

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A. No Fault Condition

Fig. 2: Experimental Setup

B. Fault Detected In Line A (Voltage Below 150Volt) And Voltage Sharing From Line B

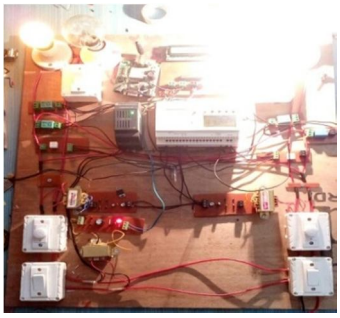

Fig. 3: Fault detected in line A (voltage below 150v)

C. Fault Detected In Line A (Over Current Fault)

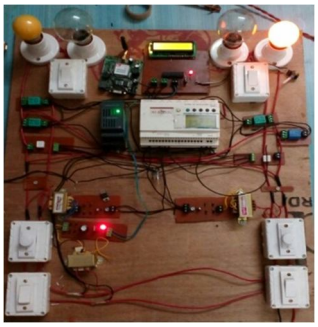

Fig. 4: Fault detected in line A (over current fault)

When over current occur then, current sensor will send SMS to PLC and it creats cut off condition to load. After reset the switch it will work in intial condition.

Fig. 5: Image after reset condition

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VI. CONCLUSION

The electric energy produced at generating stations is transported over high voltage transmission lines to utilization points. In the early days, electric systems were operated as isolated systems with only point-to-point transmission at voltages that are considered low by today's standards. Transmission lines should transmit power over the required distance economically and satisfy the electrical and mechanical requirements prescribed in particular cases. This system is used for over current and under voltage fault condition. There are so many devices which can withstand with voltage fluctuation for a particular time but beyond that it may damage. For protection of that device this system can be used. The choice of a device for fault consideration, best suited to particular field conditions, is not only a technical issue but also an economical one.

VII. ACKNOWLEDGMENT

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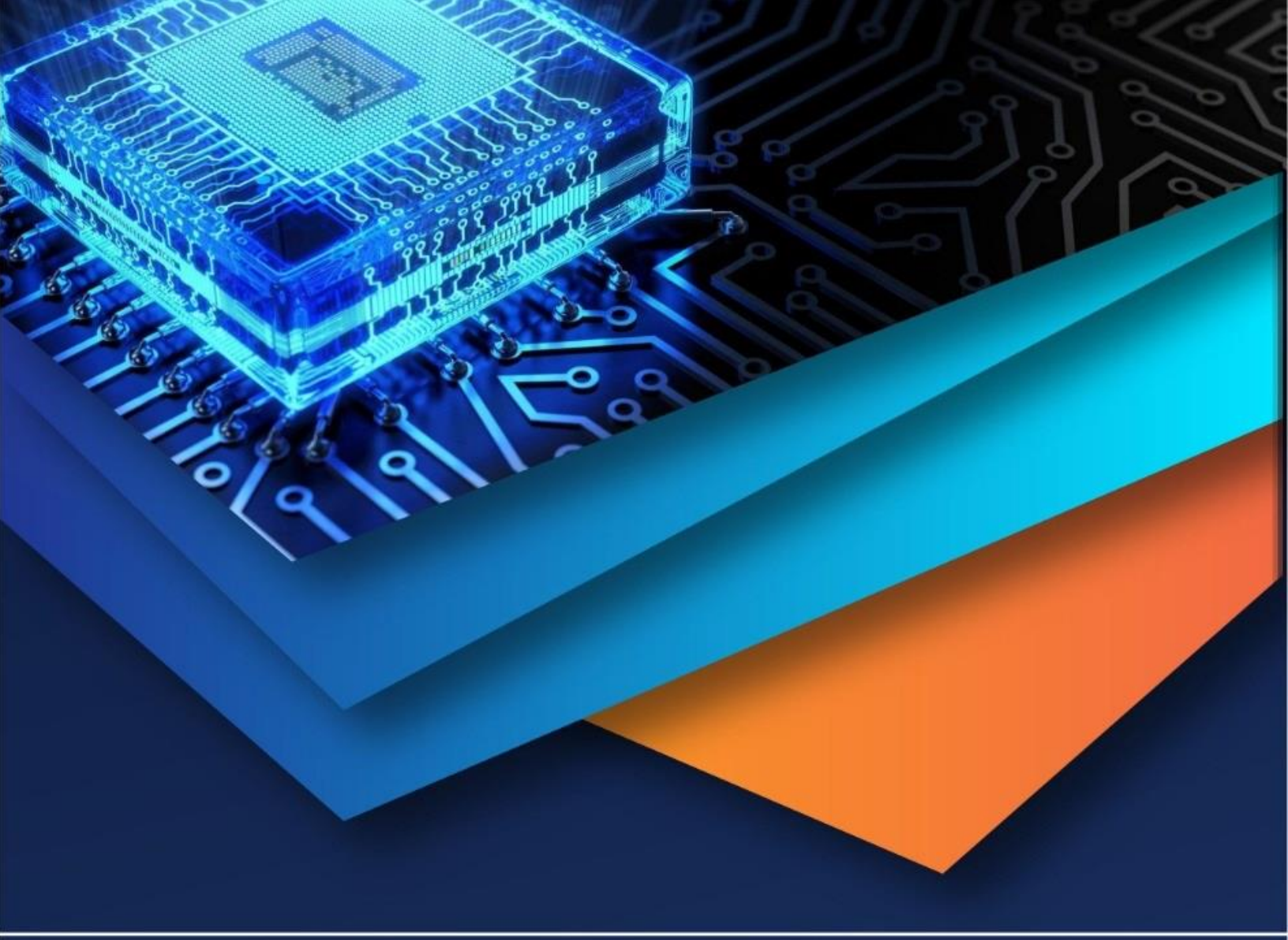

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