

THREE PHASE GROUND FAULT DETECTION WITH TRIP CIRCUIT BREAKER

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ABSTRACT

Our project is based on the faults specially ground faults that occur in three phase transmission line system due to climate changes like lightening, stormy weather etc..

Mostly we discussed about ground faults as it is threat to human as well as animal life who have no idea about all these things.

Even if ground fault will occur the whole transmission will collapse from the power station to sub station to local house hold , and also when ground fault will occur voltage will drop and according to Ohms law of basic theory if the voltage will drop flowing of current increases which may cause losses in other healthy lines.

So basically our project is based on the fault that occurs from the base.How does it happen& to how to detect this problems , its causes and effects, as well as its protection.

Keywords-Arduino ,Transistors, Fault Detector,Relays, Transformers, WIFI, LCD

Introduction

Faults

As we see in our daily surroundings, the fault occurred in the transmission line is very common especially in rainy season and stormy weather which is very dangerous for us and the surrounding. The electrical power systems are growing in areas and complexity in all sectors such as generation, transmission, distribution day by day, so in this complex network fault is happened which results in several economic losses and lowers reliability of electrical system.

Ground Faults

A ground fault is an unwanted source of the drift electrical current flows directly to the earth. Specially occur due to natural phenomena.

Causes

Most of faults occurred due to lightning smiles, storm and flashover these are very harmful for our society. In transmission system this type of faults: line to line faults, line to ground fault, there are many types of faults. These faults results in power system failure and also damage our electrical equipments.

Detection

Analysis of these faults in underground cables has always been a challenging task. With advancements in technology the conventional methods have become more efficient and other fault detection methods are also gaining popularity. Method of OHM'S law for detectionof underground cable faults is the most widely used and is apopular technique for fault detection .

In previous decades, there were many advancements had done in the practice of fault detection techniques, now a days, Microcontrollers can also be used to discover the faults in underground cables.

Techniques to Resolve Problem

We take care to settle this fault as soon as possible, if we failed to settle this then it can cause complete black our or grid failure. Normally, 70% to 90% of faults in overhead lines,

When we get the indication that ground fault will occur in between x to y substation, then from the x station transmission will be stopped using trip circuit breaker.

List of Components Used

S. N	Name of components	Specification	Quantity
1	Arduino		1
2	LCD	16*2	1
3	Capacitor	1000uf	1
4	Wire	Copper wires	2metre
5	Relay	5v	3
6	Bulbs	100 Watts	3
7	Bulb holders	Standing bulb holder	3
8	Wooden sheet	50*50 mm wooden sheet	1 sheet
9	Transistor	Bc548	3
10	Regulator	7805	1



Hardware Model

Operation

The proposed system is intended to automatically detect faults when they occur, analyze the fault to determine the type and then send information based on the fault type and fault location to the control room via GSM. The device location is determined by the SIM card in the modem, each SIM card having a unique identification and hence is used as the device's address. The system senses, analyses and transmits. It does this with the microcontroller which analyses, interprets and sends digital signals to the I/O devices for the system to operate. By programming, the microcontroller is made to perform these functions.

Working

This model consists of ARM7 MCU, Relays, transformers, WIFI, LCD, when Connects power supply to the system micro controller, GPS, WIFI, and Display will get initialize.

- Single phase fault analysis system is built using three single phase transformers input voltage 230 volt and output is 12 volts.
- In input side a fault is created for temporary and permanent fault using manual switch.
- Temporary and permanent faults status sent to control station by SMS using Internet of Things .
- In case line is short circuit for less than a second then auto reset will occur for load and if line short circuit occurs more than a second load will be permanently OFF.
- GPS is used to identify live position of the faulty area so that linemen can go and re-establish the service in faster way.

Result

The three terminal is connected to the switch when one switch is on and remaining two switches are closed then the output shown in display is terminal Y and B has been faulted (Suppose terminals are R,Y,B and terminal R is connected to supply i.e. switch is ON and other switches which are connected between terminal Y and B are OFF hence, its shows the fault.) The analysis of fault detection in location system of transmission line, any type of fault can be detected and located. When fault occurs on the transmission line the signal is send to the control room or mobile phone through a GSM modem. The message receive on the mobile is the fault between pole 1 and 2 and the fault which is symmetrical or

unsymmetrical like L-G, L-L, L-L-G, L-L-L, L-L-L-G. The signal that seems in the control room area or in mobile phone is the L*G or any other type of fault come about in transmission line.

Conclusions

The model is designed in such a way to resolve the problems faced by operator in transmission line By using this process, we can easily detect the fault and solve it.

It allow's operators such as GRIDco to correctly detect and locate faulty segments on their transmission lines and, therefore, minimize power disruption to distribution substations and save expensive instruments.

This method supplies us a cheap and reliable way to detect and locate the faults in the three phase transmission lines and also keeps data storage. Hence this procedure can be implemented to detect the faults and recover the corresponding data anytime.

REFERENCES

- [1] M M Saha, J. Izykowski ,& E. Rosolowski, Fault Location in Power Networks. New York: Springer, 2010.
- [2] M. T. Sant and Y. G. Paithankar, "Online digital fault locator for overhead transmission line," Proc. Inst. Electrical. Eng., vol. 126, no. 11, pp. 1181–1185, 1979.
- [3] T. Takagi, Y. Yamakoshi, M. Yamaura, R. Kondow, and T. Matsushima, "Development of a new type fault locator using the one-terminal voltage and current data," IEEE Trans. Power App. Syst., vol. PAS-101, no. 8, pp. 2892–2898, 1982.
- [4] Wiszniewski, "Accurate fault impedance locating algorithm," Inst. Elect. Eng., Gen. Transm. Distrib., vol. 130, no. 6, pp. 311–314,
- [5] L. Eriksson, M. Saha, and G. D. Rockefeller, "An accurate fault locator with compensation for apparent reactance in the fault resistance resulting from remote-end infeed," IEEE Trans. Power App. Syst., vol. PAS-104, no. 2, pp. 423–436, 1985.