ISSN (Print) : 2320 – 3765
ISSN (Online): 2278 – 8875

International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering

(An ISO 3297: 2007 Certified Organization)

Vol. 5, Issue 12, December 2016

Review for Overhead Line Fault Detection Using GSM technology

P.A.Gulbhile[1], J.R.Rana[2], B.T.Deshmukh[3]

PG Student, Dept. of EPS, MGM's Jawaharlal Nehru Engineering College, Aurangabad (M.S.) India [1]

Assistant Professor, Dept. of EEP, MGM's Jawaharlal Nehru Engineering College, Aurangabad (M.S.) India [2]

Head & Associate Professor, Dept. of EEP, MGM's Jawaharlal Nehru Engineering College, Aurangabad (M.S.) India [3]

ABSTRACT: In this paper, a technique for the detection & classification of faults on transmission line is proposed. The proposed system uses current and voltage sensing units, microcontroller, GSM (global system for mobile communication) module & different protective equipment's. Here protective equipment's are placed at sending end as well as at the receiving end side. The faults like all series & shunt faults get detected & classified according to characteristics condition of current & voltage at the occurrence of fault in the thee phase overhead line. The sensed signals are given to microcontroller for detection & classification of faults. Simultaneously mobile communication technique i.e. GSM is used to send message to responsible person or displayed on PC screen.

KEYWORDS: Global system for mobile communication, Line-to-Ground, Line-to-Line, Double line-to-Ground, Personal Computer.

I.INTRODUCTION

The design of systems to detect and interrupt power system faults is the main objective of power-system protection. Electrical networks, machines and equipment's are often subjected to various types of faults while they are in operation. When a fault occurs, the characteristic values (such as impedance) of the machines may change from existing values to different values till the fault is cleared. There may be lot of probabilities of faults to appear in the power system network, including lighting, wind, tree falling on lines, apparatus failure, etc. Transmission line is a vital component that acts as a bridge between the generating stations and end users. In the power system, reliability and stability must be ensured to provide continuity of service. Transmission lines run over several kilometers will have the chance for occurrence of fault. In order to maintain stability, faults should be cleared at short span of time with recent advancements in signal processing.

TYPES OF FAULTS: Electrical faults in three-phase power system mainly classified into two types namely open and short circuit faults. Further, these faults can be symmetrical or unsymmetrical faults.

Open Circuit Faults: These faults occur due to the failure of one or more conductors. The most common causes of these faults include joint failures of cables and overhead lines, and failure of one or more phase of circuit breaker and also due to melting of a fuse or conductor in one or more phases.

Short Circuit Faults: A short circuit can be defined as an abnormal connection of very low impedance between two points of different potential, whether made intentionally or accidentally. These are the most common and severe kind of faults, resulting in the flow of abnormal high currents through the equipment or transmission lines. If these faults are allowed to persist even for a short period, it leads to the extensive damage to the equipment.

II. CONCEPT OF THE SYSTEM

In this paper some faults concepts are discussed. The logic behind the microcontroller programing to detect the type of fault is obtained by using characteristics boundary conditions at the time of occurrence of fault on the line.

ISSN (Print) : 2320 – 3765
ISSN (Online): 2278 – 8875

International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering

(An ISO 3297: 2007 Certified Organization)

Vol. 5, Issue 12, December 2016

Ex. a. SLG fault
b. LL fault
c. LLG fault
d. Open conductor fault

a. SLG fault : A single line-to-ground (LG) fault is one of the most common faults and experiences show that 70-80 percent of the faults that occur in power system are of this type. This forms a short circuit path between the line and ground. These are very less severe faults compared to other faults. Fig 1.Shows SLG at point F of phase a.

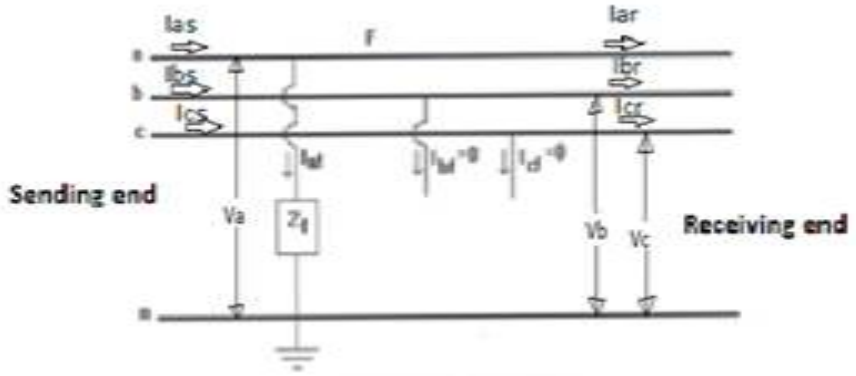

Fig. 1 Single line-to-ground (SLG) fault at point 'F'

For this fault, $V_a = Z_f I_a$ and $I_{bf} = I_{cf} = 0$. The normal value of voltage and current of lines changes during occurrence of fault on the overhead line. Voltage and current signals of the overhead line sensed using sensing unit and proportionally fed to microcontroller. Microcontrollers C programing helps for detection of occurred type of fault.

b. LL fault : A line to line fault occur when a live conductor get in contact with other live conductor. Heavy winds are the major cause for this fault during which swinging of overhead conductors may touch together. These are less severe faults and its occurrence range may be between 15-20%.
For this fault, $V_b - V_c = I_{bf} Z_f I_{af} = 0$ and $I_{bf} = -I_{cf}$. Voltage and current signals of overhead line sensed using sensing unit and proportionally fed to microcontroller. Microcontrollers C programing helps for detection of occurred type of fault.

c. LLG fault: In double line to ground faults, two lines come into the contact with each other as well as with ground. These are severe faults and the occurrence these faults is about 10% when compared with total system faults. Fig 2. Shows LLG at point F of phases b & c.
For this fault, $V_b = (Z_f + Zg) I_b + Z_g I_c$, $V_c = (Z_f + Z_g) I_c + Z_g I_b$, $I_{af} = 0$. Voltage and current signals sensed using sensing unit and proportionally fed to microcontroller. Microcontrollers C programing helps for detection of occurred type of fault.

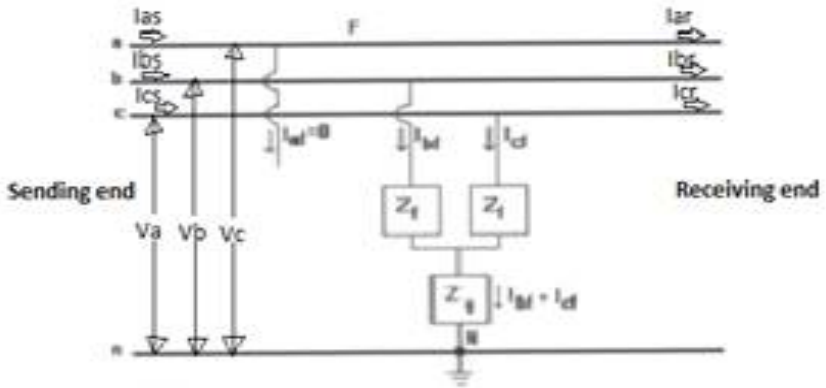

Fig. 2 Double-line-to-ground (LLG) fault at point 'F'

Above theory is necessary for determining the size of a circuit breaker for largest short circuit current. The greater current usually occurs for either L-G or L-L fault.

ISSN (Print) : 2320 – 3765
ISSN (Online): 2278 – 8875

International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering

(An ISO 3297: 2007 Certified Organization)

Vol. 5, Issue 12, December 2016

d. Open conductor fault:

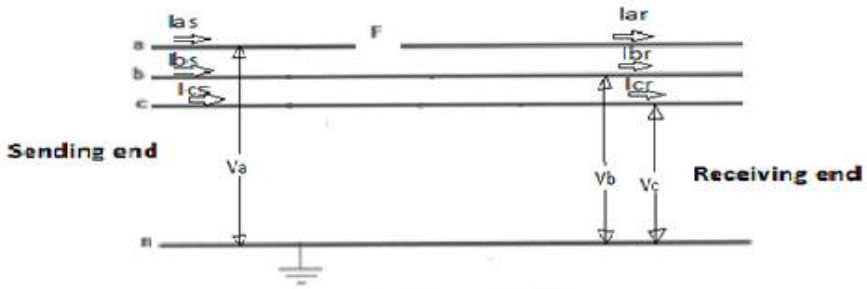

Fig.3 Open conductor fault at point 'F'.

A plain break in one or two conductor in three phase circuit leads to an open conductor or series fault. When fuses are used in three phase circuit , the fuses in one or three phases may blow off due to overload , the fault incurred is known as open conductor fault. Series faults are characterized by increase in voltage and frequency and fall in current in the faulted phase. Fig 3. Shows open conductor fault at point F of phase a. For this fault receiving end current is I_{ar}=0

III.PROCESS FLOWCHART

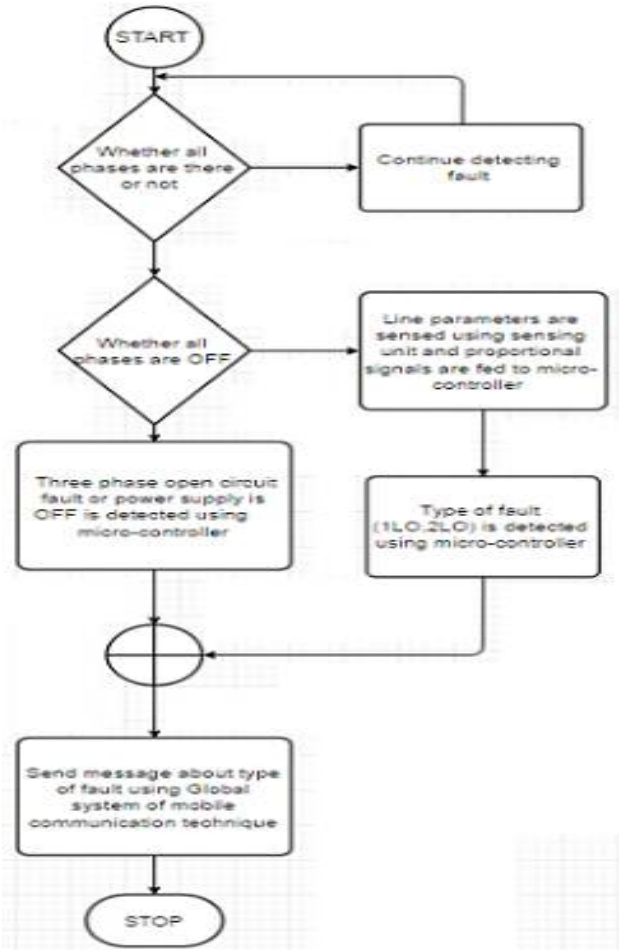

Fig.4 Flowchart for open conductor fault

ISSN (Print) : 2320 – 3765
ISSN (Online): 2278 – 8875

International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering

(An ISO 3297: 2007 Certified Organization)

Vol. 5, Issue 12, December 2016

IV.FUTURE SCOPE

Implementation of hardware circuit for detection of series and shunt faults of three phase overhead line could be possible.

V.CONCLUSION

Hence, phase parameters are sensed continuously & during the occurrence of any series and shunt fault (here in paper S-L-G, L-L, L-L-G, open conductor fault) on the three phase line, the type of fault is detected by microcontroller. Protective devices placed on sending end and receiving end works during occurrence of fault (specially short circuit fault). Respective message sending or displaying on PC screen takes place.

REFERENCES

[1] Ms.Devjani Banerjee, Prof Dr.Mrs.N.R.Kulkarni , "Three Phase Parameter Data Logging and Fault Detection Using GSM Technology", International Journal of Scientific and Research Publications, Volume 3, Issue 2, February 2013 1 ISSN 2250-3153

[2] K. Saravanababu, P. Balakrishnan and K. Sathiyasekar, "Transmission line faults detection, classification, and location using Discrete Wavelet Transform," 2013 International Conference on Power, Energy and Control (ICPEC), Sri RangalatchumDindigul, 2013, pp. 233-238.

[3] M. Singh, B. K. Panigrahi and R. P. Maheshwari, "Transmission line fault detection and classification," 2011 International Conference on Emerging Trends in Electrical and Computer Technology, Tamil Nadu, 2011, pp. 15-22.

[4] Neeta S. Sonwane1, Dr. S. D. Pable2 , "Fault detection and autoline distribution system with Gsm module", International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395 -0056 Volume: 03 Issue: 05

[5] M. F. Othman and H. A. Amari, "Online fault detection for power system using wavelet and PNN," 2008 IEEE 2nd International Power and Energy Conference, Johor Bahru, 2008, pp. 1644-1648.

[6] A. Cozza and L. Pichon, "Echo Response of Faults in Transmission Lines: Models and Limitations to Fault Detection," in IEEE Transactions on Microwave Theory and Techniques, vol. 64, no. 12, pp. 4155-4164, Dec. 2016.

[7] C. Zhang and L. Zhou, "220kv Transmission Line Fault Diagnosis and Analysis," 2012 Second International Conference on Intelligent System Design and Engineering Application, Sanya, Hainan, 2012, pp. 1343-1345.