A System for Detection of Overhead Distribution Line Fault

Anjali Gupta, Amit Tripathi

Abstract— The presented paper is related to fault detection of an overhead distribution line. The fault is detected by the installation of device at homes or any other buildings when occurs on overhead distribution lines. Correspondingly the signal is received by the substation coming from the homes and switch off the line when fault is detected. A system model is developed which is working in good situation. Radio frequency technique for communication is used in the system.

Index Terms— Substation, Home, Transformer, Relays, Circuit Breaker, Radio Frequency Communication.

I. INTRODUCTION

The major task is identifying and locating a fault in distribution network for the power electric community for periods. The transmission overhead lines and distribution overhead lines yield mainly a ground fault, SC fault because of numerous reasons and leads to a great risk for the pedestrians. Aluminium conductor has roughened surface, involved in the project and because of this susceptibility to loss is amplified. In a large scale distribution system a rapid and precise position of faults may make the system restoration faster, decreases time of outage, and makes the system more reliable.

The pedestrian can be damaged by high voltage type conductor when conductor is broken in an overhead line distribution system when the system is unable to detect and send a command for opening the circuit breaker. The projected paper presents a fresh process via that detection and location of the fault can be done in overhead distribution line.

The existing process solutions for detecting fault in overhead lines don't exhibit economic feasibility and this is the main issue.

The second section of the present paper explains working of the project. Section three shows the different simulation results obtained from the work done for home section module, substation section module and transformer section module.

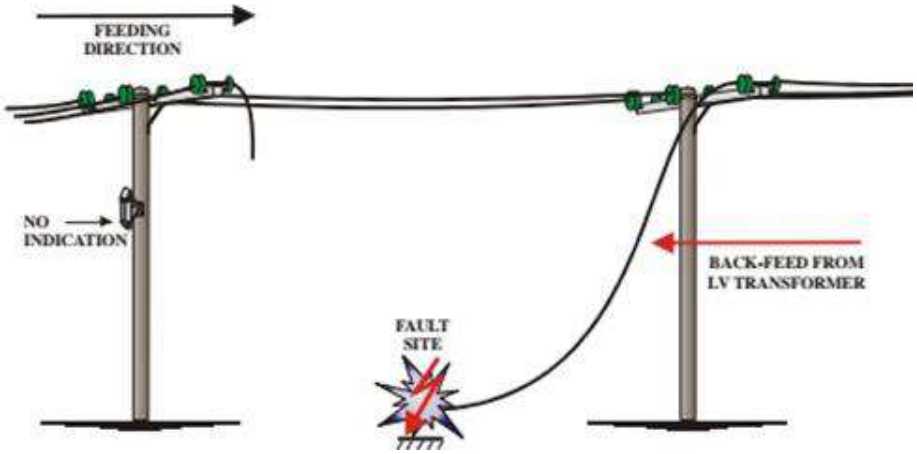

Fig.1 Diagram for Fault Detection

Revised Version Manuscript Received on 10 September, 2019.

Anjali Gupta, Department of Electrical & Electronics Engineering, Noida Institute of Engineering and Technology, UttarPradesh, India. (Email: researchnietip@gmail.com)

Amit Tripathi, Department of Electrical & Electronics Engineering, Noida Institute of Engineering and Technology, UttarPradesh, India. (Email: researchnietip@gmail.com)

II. WORKING

The working is explained in 3 sections wherein first one is a home section, second is a substation section and last one is transformer section. In this 2 different home modules have been considered and the device employed is PIC16F883 in combination with an RF type modem. This is positioned in every section of the above sections.

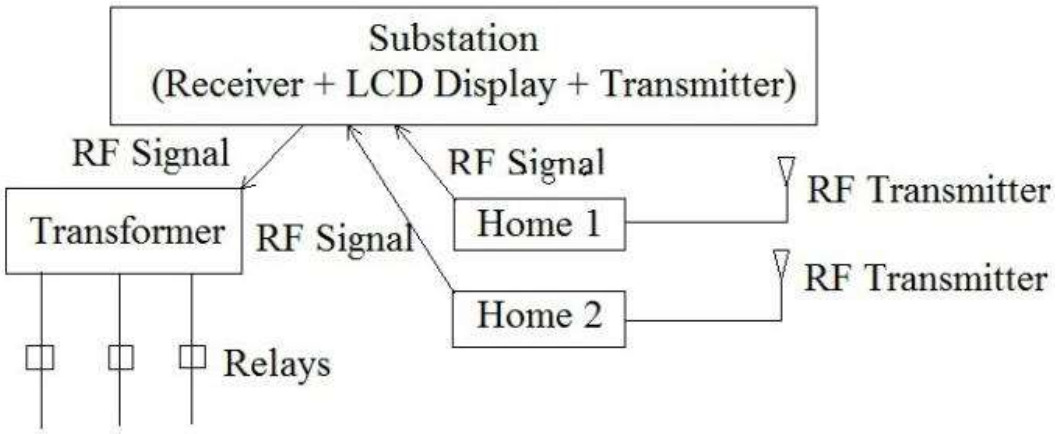

Fig.2: Basic Block Diagram

1. Home Section

2 home modules are considered. Each home consists of an RF module. RF signals are emitted by the RF module is transmitted to the substation while current is not present in the line.

2. Substation Section

The section is made up of a transmitter that transmits signals, a receiver for receiving signals and, an LCD display for displaying all the information on a screen. The RF signal transmitted by the home section is received by the substation section. The information displayed by the LCD is the consumer number for the fault location, thereby identifying the section of line which is faulted. The RF signal from the RF transmitter is then transmitted to the section of transformer.

3. Transformer Section

The receiver of this section receives the signal transmitted by the substation section. Receiver side consists of different Relays. During the fault condition these relay trips after receiving the signal.

III. SIMULATION AND RESULTS

1. Home Section Module

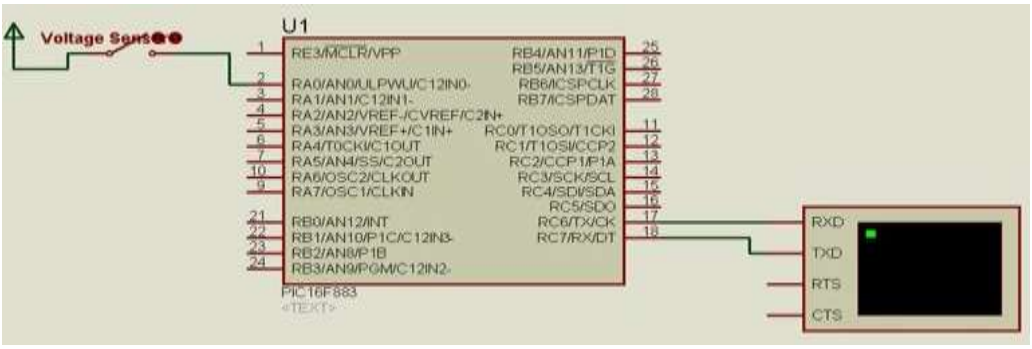

Fig. 3 Home section module simulation

From Fig.3. It is seen that if current is flowing in the like, the voltage sensor continues in closed state, else opens

.

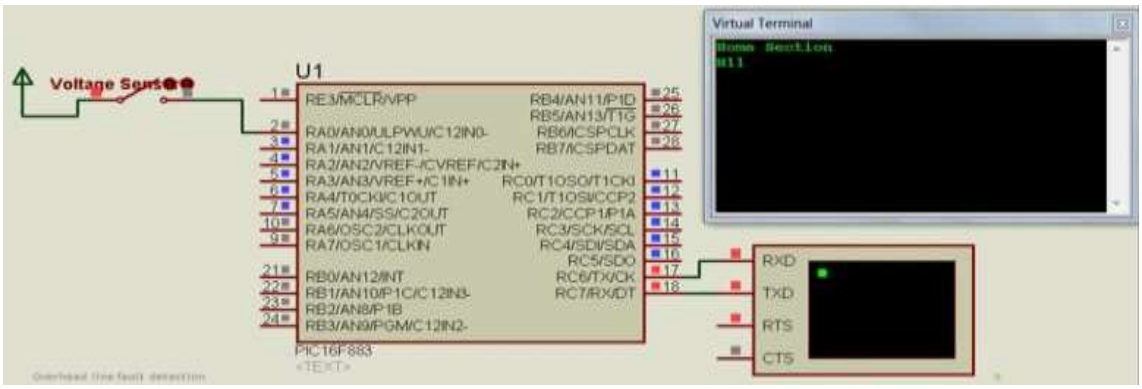

Fig. 4 Simulation result for home section

By Fig.4 a case is shown while the voltage sensor is in open condition because of faulty line.

2. Substation Section Module

When the signal transmitted by home section is received by the substation module as shown in Fig.5 this module performs various actions on that signal which has been received.

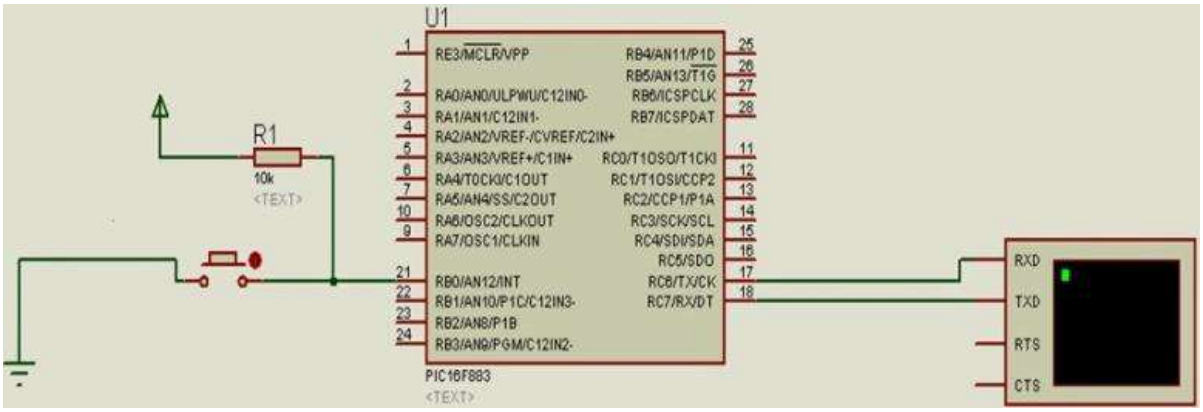

Fig 5 Simulation of substation section module

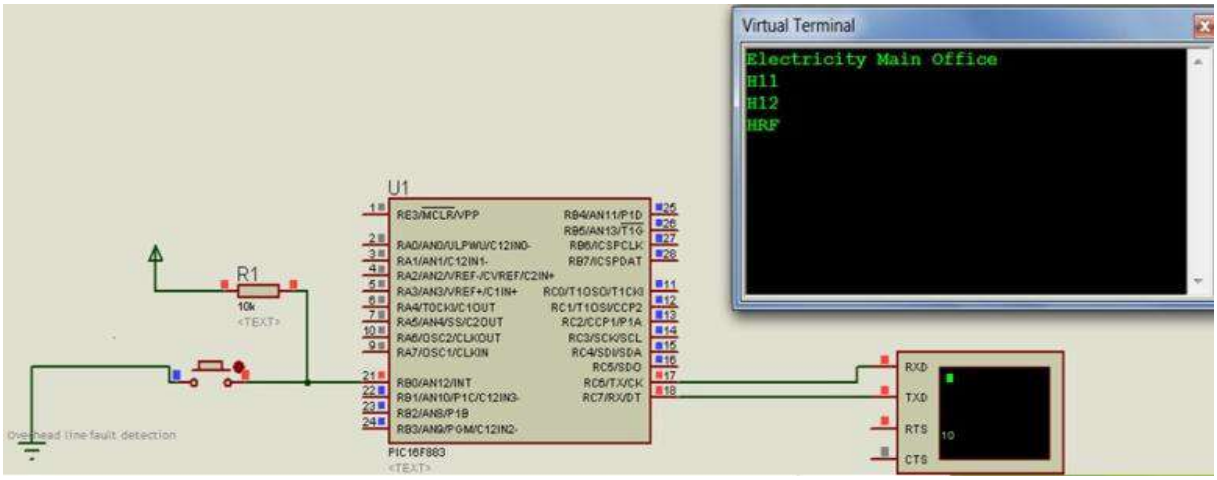

Fig. 6 Simulation result of substation section module

In Fig.6. Simulation shows that the module accepts the signal coming from two home modules, thus the signal is given to the following transformer section for operating replay.

1. Transformer Section Module:

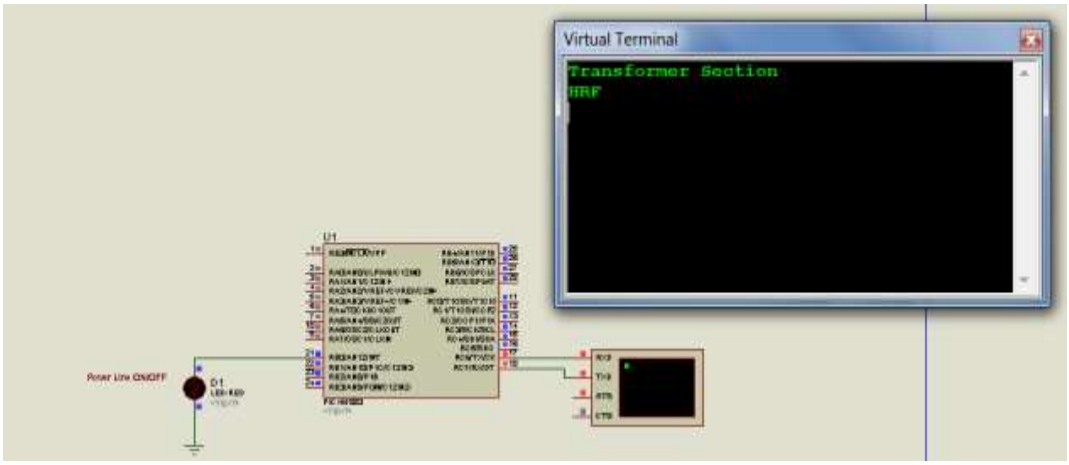

Fig. 7 Transformer section simulation

Fig.7 The signal is received by this section for turning off the power supply.

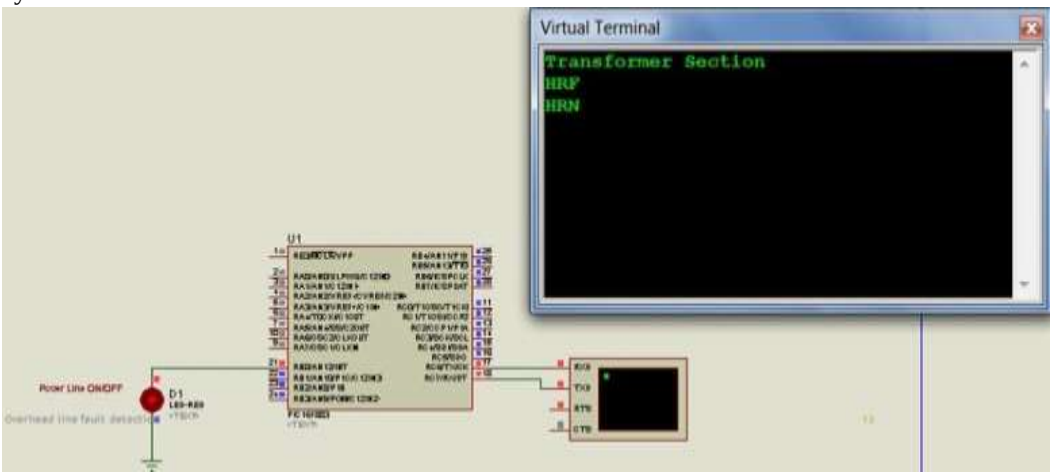

Fig. 8 Simulation result of transformer section module

Fig.8 The signal is received by this section for turning on the supply following the maintenance.

IV. APPLICATIONS

A. To protect lives modernization in existing system is needed in phased manner.

B. An automation in tripping procedure is introduced and designed here which accounts for protecting human being by automatic control.

C. When the conductor cracking happens, it may affect the life of a person. By the present system accidents caused by the fault in line can be avoided. Reliability of utilities can be improved as well as improved revenue stability.

V. CONCLUSION

A modified system is required to improve the stability of the system and to make the system reliable, therefore an automated system for fault detection has been implemented for reducing the accident occurred due to the faulty lines. The present system that has been implemented would be used in the absence of human interface but acts as a safeguard for various lives, therefore unavoidable for both the utility and appreciated lives. In order to become an Electrical Engineers, it is the main accountability to protect the valuable lives of people from electric shock caused due to faulty lines.

REFERENCES

1. J. Nagi, A. M. Mohammad, K. S. Yap, S. K. Tiong, and S. K. Ahmed, "Non-technical loss analysis for detection of electricity theft using support vector machines," in PECon 2008 - 2008 IEEE 2nd International Power and Energy Conference, 2008.
2. F. Koushanfar, M. Potkonjak, and A. Sangiovanni-Vincentelli, "On-line fault detection of sensor measurements," 2004.
3. R. Venkatasubramanian, J. P. Hayes, and B. T. Murray, "Low-cost on-line fault detection using control flow assertions," in Proceedings - 9th IEEE International On-Line Testing Symposium, IOLTS 2003, 2003.
4. "Electrical power systems quality," Choice Rev. Online, 2013.
5. J. Nagi, K. S. Yap, F. Nagi, S. K. Tiong, S. P. Koh, and S. K. Ahmed, "NTL detection of electricity theft and abnormalities for large power consumers in TNB malaysia," in Proceeding, 2010 IEEE Student Conference on Research and Development - Engineering: Innovation and Beyond, SCOReD 2010, 2010.