# Automatic Fault Analysis And Repair of Power Using IOT

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## Abstract

**The introduction of active devices in Smart Grids,such as smart transformers, powered by intelligent software and networking capabilities, brings paramount opportunities for online automated control and regulation. However, online mitigation of disruptive events such as cascading failures, is challenging. Local intelligence by itself cannot tackle such complex collective phenomena with domino effects. Collective intelligence coordinating rapid mitigation actions is required. This paper introduces analytical results from which two optimization strategies for self-repairable Smart Grids are derived. These strategies build a coordination mechanism for smart transformers that runs in three healing modes and performs collective decision making of the phase angles in the lines of a transmission system to improve reliability under disruptive events, i.e. line failures causing cascading failures. Experimental evaluation using self repairability envelopes in different case networks, AC power flows and varying number of smart transformers confirms that the higher the number of smart transformers participating in the coordination, the higher the reliability and the capability of a network to self-repair.**

## 1.INTRODUCTION

WITH the rapid economy growth, demands for electricity have been increasing dramatic, especially in developing countries. Due to the lack of new investments in generation and transmission networks, many urban power grids (UPGs) operate closer and closer to their limits.In addition, the increase in the penetration of distribution energy resources (DERs), especially renewable energy, such as solar and wind generating sources, in UPG makes the operations of UPGs more complex. Recently, many power system blackouts have taken place successively in big cities of various countries. These facts strongly remind an urgent need to design an intelligent control system to allow UPG to be self-healed when facing power system disturbances. The National Energy Technology Laboratory (NETL) in the United States has presented seven principal characteristics of a smart grid. A smart grid should be able to heal itself after a power system event; it should enable active customer participation, resist attacks, provide power quality for the 21$^{st}$ century needs, accommodate all generation and storage options, enable markets, and optimize asset utilization and operate.

Generation, transmission and distribution of electrical energy involve many operational losses. Whereas, losses implicated in generation can be technically defined, but T&D losses cannot be precisely quantified with the sending end information. This illustrates the involvement of nontechnical parameters in T&D of electricity. Overall technical losses occur naturally and are caused because of power dissipation in transmission lines, transformers, and other power system components. Technical losses in T&D are computed with the information about total load and the total energy billed [1].NTL cannot be precisely computed, but can be estimated from the difference between the total energy supplied to the customers and the total energy billed. NTL are caused by the factors external to the power system. In many developing countries, NTL are a serious concern for utility companies as they account to about 10 to 40% of their total generation capacity. Data regarding NTL is uncertain and it is very difficult to analyze theft in terms of actions that cause these losses. Electricity theft forms a major chunk of the NTL. Electricity theft includes bypassing, tampering with the energy meter and other physical methods to evade payment [2]. Illegal tapping of electricity from the feeder and tampering with the meter are the most identified and accounted ways of theft.

## 2.NEED OF THIS PROJECT

In India when a fault occur in transmission line to rectify the fault we need to call the wire man.If the fault occurs at the night time suddenly we can't get the power.To avoid this we need self-repairable power grid system.If the fault is in temporal nature there is no need of a human work the fault will be cleared automatically, else it will also be informed to the nearby power monitoring room.

## 3.EXISTING SYSTEM

Among them, self-heal is the key characteristic. Some literatures also called a smart grid as a self-healing grid European Technology Platform Smart Grids defined the word "self-healing" as not only automated network restoration strategies that take into account the impact of high penetration of distributed generation and demand side participation, but also high level decentralized preventive control methodologies that will address options for the management of unplanned outages "Self-healing" was also interpreted as an engineering design that enables the problematic elements of a system to be isolated and, ideally, restored to normal operation with little or no human intervention A framework for a self-healing power grid was presented in EPRI's Fast Simulation and Modeling (FSM) project .This concept is based on a distributed autonomous architecture and a set of coordinated closed loop controls. The Strategic Power Infrastructure Defense (SPID) system was proposed in. In SPID, preventive and restorative self-healing controls are defined as the self-healing strategy. A load shedding strategy based on islanding and rate of frequency decline was proposed in[11] to deal with catastrophic events in power systems. Other areas of relevant research could be pursued in. The common ground in these papers shows that self-healing is one of the advanced control techniques. Self-healing characteristic can provides a greater degree of automation to implement strategic improvements in power system security, reliability and availability.

Generation, transmission and distribution of electrical energy involve many operational losses. Whereas, losses implicated in generation can be technically defined, but transmission and distribution losses cannot be precisely quantified with the sending end information. This illustrates the involvement of nontechnical parameter in transmission and distribution of electricity. Overall technical losses occur naturally and are caused because of power dissipation in transmission lines, transformers, and other power system components. Technical losses in T&D are computed with the information about total load and the total energy bill. While technology in on the raising slopes, we should also note the increasing immoral activities. With a technical view, Power Theft is a non ignorable crime and at the same time it directly affected the economy of a nation. Electricity theft a social evil, so it has to be completely eliminated. Power consumption and losses have to be closely monitored so that the generated power is utilized in a most efficient manner. The system prevents the illegal usage of electricity. At this point of technological development the problem of illegal usage of electricity can be solved electronically without any human control .The implementation of this system will save large amount of electricity, and there by electricity will be available for more number of consumer then earlier, in highly populated country such as INDIA.

## 4.PROPOSED METHOD:

In this paper, the novel concept and detailed system structure of self-healing control of UPG are proposed. It is comprised of four subcontrols, which includes emergency control, restorative control, corrective control and preventive control. The multiagent system (MAS) technology is employed to design the entire self-healing system. For this system, three layers, the inner structure and the communication method are proposed.

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The modern self-healing UPG should perform continuous, online self-assessment to detect existing or emerging problems, and initiate immediate corresponding responses to avoid power grids in the high-risk condition. It needs fundamental supports from a variety of up-to-date hardware infrastructure, advanced measurements and communication techniques, new power relay protection scheme, and so on. The most important one is the coordination and control strategies, which are relatively weak in the current urban electric power management system.

The self-healing grid has become the latest trends of power system development. In this paper the self-healing control of UPG is decomposed into four subcontrols to reduce the overall vulnerability of the UPG with respect to unforeseen events and internal failures. The multiagent technology is introduced to realize a complete self-healing control system. Simulation results illustrate that under emerged or potential threats, the UPG with the proposed self-healing control system can intelligently adjust the power network operating state to eliminate these threats, and thus achieve the desired operation objectives.

In this proposed system Zigbee technology used to transmit the meter reading to the customer and government with the required cost. This process will be happen when needed that means if signal is received from authorized PC transmission between customer and government. Then the fault is identified by sensors. Also cut the power supply automatically as per request of authorized PC.

## 5.BLOCK DIAGRAM

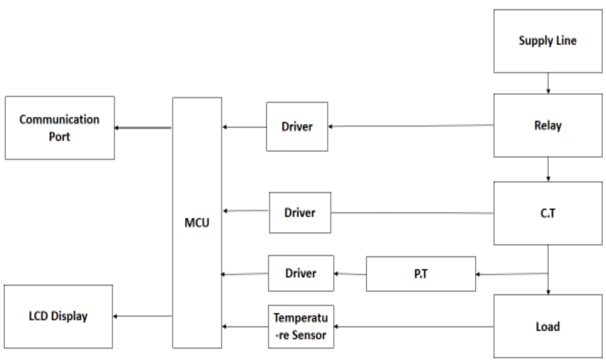



**Figure.**1

### 5.1 OVER VIEW

- PIC micro controller is used here because it has ADC and PWM internally.
- P.T,C.T,Temperature sensor are used for measurement purpose.
- Zigbee is used for communication purpose.

### 5.2 DISCUSSION

When the fault is occurred the recloser will be open suddenly.After some delay period the recloser should be closed automatically it checks the weather the ratings are in normal value.3 times it will be done.After checking 3 times if the fault is present then the recloser will be stay in open condition.The fault is reported as permanent fault.If the fault does not present after the checking of 3 times then the recloser will be closed the power supply will be given.All data will be send to the server it should be monitored by a person.

## 6.RESULTS

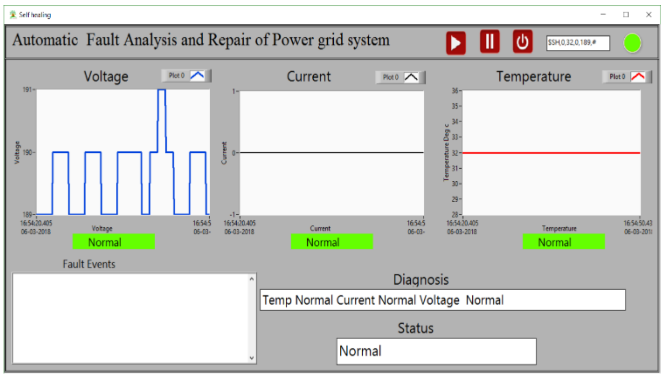



**Figure.2** Normal Condition

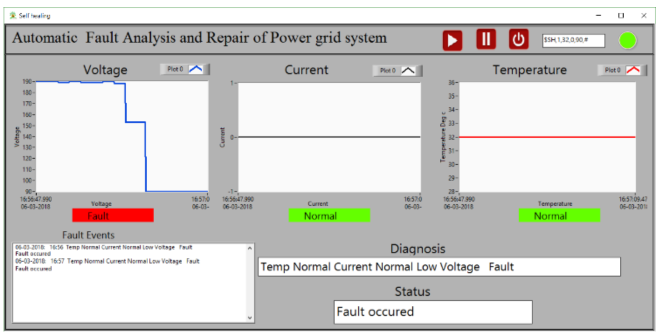


**Figure.3** Under voltage fault

**Figure.4** Under voltage fault is cleared

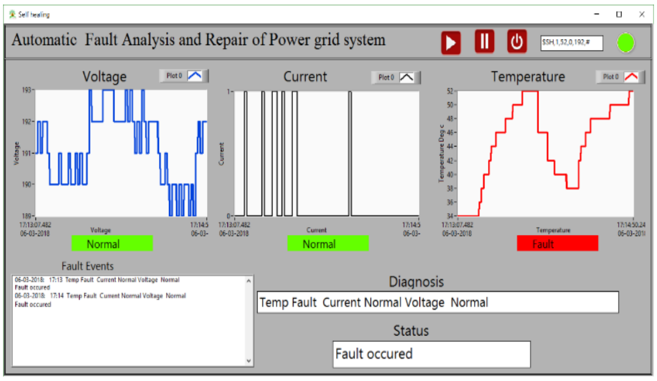



**Figure.5** Temperature fault is occurred

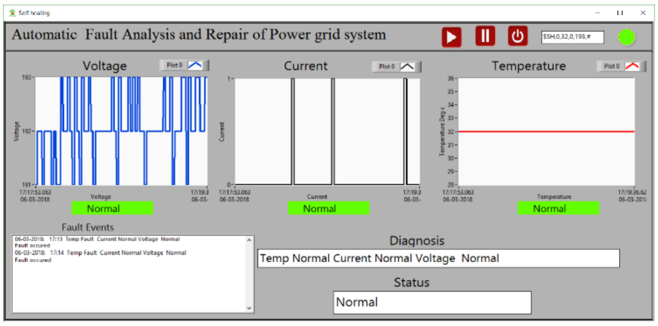
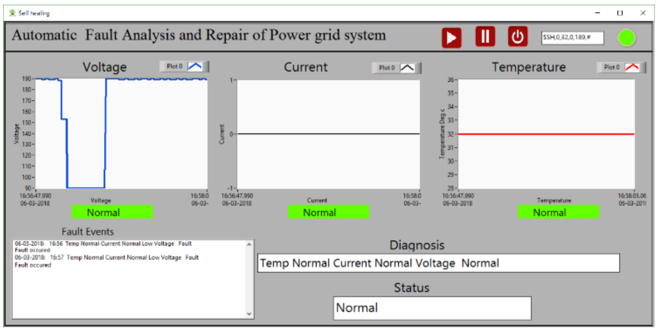



**Figure.6** Temperature fault is cleared

## CONCLUSION:

The project "**The Control and Analysis of Self-Healing Urban Power Grid** " has been completed successfully and the output results are verified. The results are in line with the expected output. The project has been checked with both software and hardware




testing tools. In this work "**PIC, POWER SUPPLY, RFTX,RFRX, RS232, LCD**" are chosen are proved to be more appropriate for the intended application. The project is having enough avenues for future enhancement. The project is a prototype model that fulfills all the logical requirements. The project with minimal improvements can be directly applicable for real time applications. Thus the project contributes a significant step forward in the field of "**PUBLIC WELFARE**", and further paves a road path towards faster development s in the same field. The project is further adaptive towards continuous performance and peripheral up gradations. This work can be applied to variety of industrial and commercial applications.

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