

Power Transmission Line Fault Detection and Location Using Labview

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Abstract: At present the field of science, engineers and technology is so dynamic due to recent improvement in computer and other technologies. The advances in computer field developed such programs to solve our traditional and novel problems of practical life. We can solve our complex problems within a few minutes due to high computational abilities, accuracy of computer based programs. For electrical people there are many software programs are currently used in academia to design and analyse different kinds of electrical circuits and models. The main objectives of this project is to find out transmission line fault, overload, unbalanced and power theft using LabVIEW software. Initially we have a balanced circuit then by using relays we will show unbalanced and overload condition and finally how power theft can be detected is also shown in our project. We collect current and voltage values from circuit to computer through data acquisition(DAQ) hardware which digitalises the analog values. This way we can acquire data if any fault occurs it will be displayed on the computer screen.

Keywords: LabVIEW, DAQ, Unbalanced, power theft, unbalanced.

INTRODUCTION

In an electric power system comprising of different complex interacting elements, there always exists a possibility of disturbance and fault. Transmission lines are designed to transfer electric power from source locations to distribution networks. However, their lengths are exposed to various faults. The error is high especially in transmission lines. Faults on power system transmission lines need to be detected and located rapidly, classified correctly and cleared as fast as possible. At present India is losing more than 55,000 crores rupees every year due to poor transmission and distribution system. If we could save 1% out of it will be a good profit to the power sector and also nature can be retained for some more extent. When all the said above things works better on line, we can save power.

Unfortunately all are not in a single roof and not possible in a single roof because it is a network of about thousands of kilometres. When we analyse the above said matters a common objective system is needed to remove the unwanted barriers of the power sector. We would like to automate the fault-finding system of the transmission and distribution to improve the utility factor, uninterrupted power, to reduce losses, to save the time thereby saving the cost.

Hardware

- Current sensors (ACS712, 5A).
- DAQ system (consists of sensors, DAQ measurement hardware and computer with LABVIEW software).
- Relays (3.2-5v, RCA switching).
- GSM module (along with UART converter and USB cable).
- Adaptor (12v).
- Printed circuit board (PCB).
- Resistors(100M,1M,20K,10K,1k-all are 0.5 watt).
- Bulbs (60w and 100w) and bulb holders.
- Single switch.
- IC 7805 regulator.
- Wires (RYB and Black-1.5mm diameter).

Data Acquisition (DAQ)

- Data acquisition (DAQ) is the process of measuring an electrical or physical phenomenon such as voltage, current, Temperature, pressure, or sound with a computer.
- A DAQ system consists of sensors, DAQ measurement hardware, and a computer.

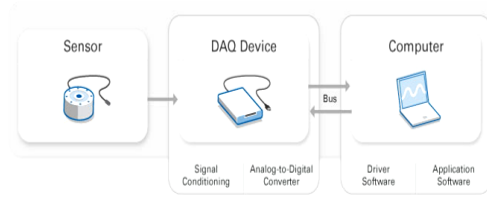


Fig for DAQ

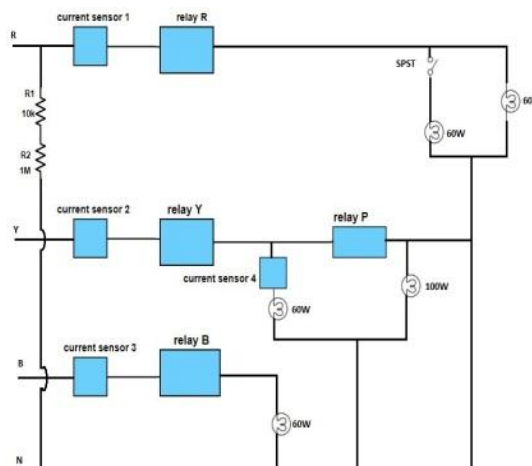
Software used

- LabVIEW software

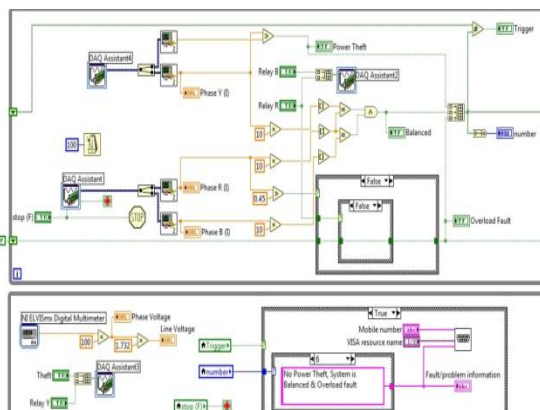
About LabVIEW

- The acronym LabVIEW stands for Laboratory Virtual Instrumentation Engineering Work Bench.
- LabVIEW is a graphical programming language that uses icons instead of lines of text to create applications.
- Programs can be completed in a hour using LabVIEW.
- The users can build instrumentation called virtual instruments (VIs) using software objects.
- VIs contain three main components –the front panel, the block diagram.
- Front panel is the interface of VI's. and block diagram is a VI's source code.

BLOCK DIAGRAM



Graphical program



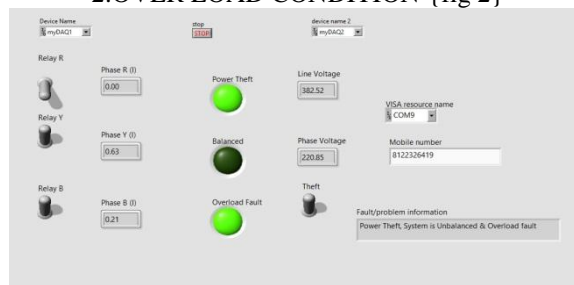
RESULT

FRONT PANEL VIEW

1. BALANCED CONDITION- {fig1}



2. OVER LOAD CONDITION- {fig 2}



3. POWER THEFT- {fig3}



WORKING

Initially the data is fed using mouse or keyboard to the front panel of LabVIEW.

Case 1-Balanced condition

Three phase Relays(R, Y, B) are enabled .SPST and Relay P is disabled. The 3 phase is provided with 60w load(bulb).in the front panel the balanced LED indicator will glow. This is seen in the fig1.

Case 2-overload condition(unbalanced)

Relay(R, Y, and B) and SPST switch are enabled. Relay P is disabled. In this conditions over current flows in phase R. Then relay R trips.IN front panel we observe zero current in phase R.Over load LED glows, this is seen in fig-2.

Case 3-power theft

Initially relay(R, Y, B) are enabled and SPST opened. And the if relay P in phase Y is enabled, more current flows in phase Y .This is shown in the front panel by glowing of power theft LED indicator. This is seen in fig 3.

In each and every above cases there will SMS send to provided number through GSM.

Advantages

- Using LabVIEW, we can avoid programming language in the detection of fault,
- We can ensure continuity of power supply.

CONCLUSION

In an electric power system, Faults on power system transmission lines need to be detected and located rapidly, classified correctly and cleared as fast as possible. This is achieved through a LabVIEW. The circuit is protect from the unbalanced load ,overcurrent fault. If there is any power theft that is displayed in the computer screen. SMS send to the provided number for every condition.

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