Fault Analysis Of Three Phase Using Auto Reset For Temporary Fault And Trip For Permanent Fault

V.Jayakumar, G.Kiran, M.Thangamurugan, P.Manikandan

Abstract: The motive of this paper is to create a routine tripping mechanism. For a three phase system, the output of our project resets for the temporary fault, while, in case of permanent fault, it trips the system. These shortcomings are detected by our gadget and it naturally separates the inventory to keep away from blast/fire harm which may influence the control equips in the sub-stations. The stumbling framework is made by utilizing 3, 1-stage transformers which have both info and yield in star association, and 3 transformers in delta associations with contribution of 220 volt and yield of 12 volt. Here low voltage testing is shown. For both transient and long span flaws 555 clocks are utilized. To activate tripping mechanism, switches are used which creates the three types of fault in low voltage side. Transient/Short duration fault gives a quick recovery as a temporary trip whereas longer duration of faults gives a permanent trip. This technique, if extended may help in IOT based applications for SMS based services to customers as well as utilities for fault detection.

Index Terms: Faults, Filament Bulbs, IOT, Relays, Smartphone, Transformer (230 V– 12V AC), Voltage regulator (LM7805),

1. INTRODUCTION

During operation of the electrical networks, the electrical equipment and electrical machines, the chances of occurring of fault is more. Such faults are undesirable, as they may change the characteristic value of impedance of the electrical network and may interfere with the normal operation of the power system. Temporary fault is a fault which is caused by insulation flashover and needs to be immediately tripped. This mechanism ensures the safety for the rest of the equipment from the aftermath of the fault. For the most part, there are three kinds of deficiencies. They are LG (Line to Ground), LL (Line to Line), 3L (Three lines). This fault is a typical transient fault where the circuit breakers isolate the fault for some time(say few seconds) and then re-establishes the contact for normal operation of the grid (re-energized). The natural phenomenon like lightening and gusting wind is the causes of the transient fault. The falling-off of trees and swinging of wires are main reason behind the permanent fault. The chances of occurring of transient faults are 70-80% whereas the chances of permanent faults are 20-30%. As the permanent fault causes breaking of wires, it may result in permanent damage. Currently, in the power system, the major problem is tripping, if we employ a proper tripping equipment then we can trip the system automatically without manual operation and thus, reclosing and reopening of the system becomes easier

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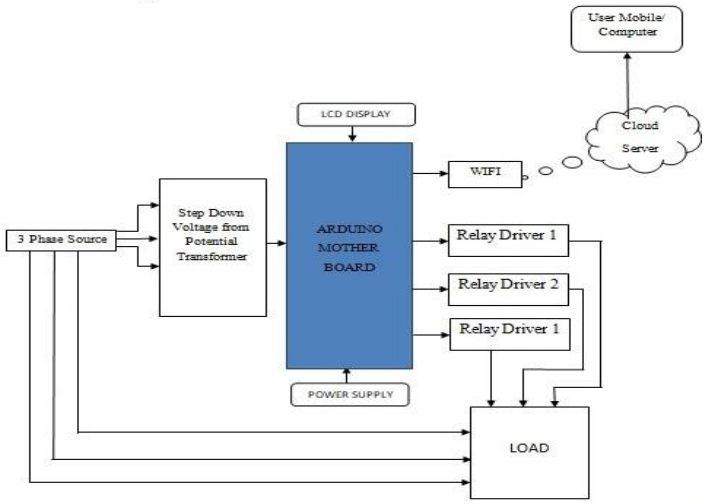
2 SYSTEM ARCHITECTURE AND CIRCUITRY

2.1 System set-up

Right now step-down transformers are utilized for holding the whole circuit under low voltage basis of 12V.This is done to test and investigate 3 stage variations from the norm[4]. The essential and the auxiliary terminals of the three transformers are associated with three stage power supply. While, the other three transformers have their optional as delta associated. The necessary yield at that point can be gotten after amendment from singular arrangement of inverters. The entire set up then is given to 6 transfer curls and 6 press catches[4] to [10]. The ordinarily shut contacts of the considerable. number of transfers are associated in an equal way to keep the various focuses grounded.

2.2 Block Diagram of Proposed work



2.3 Circuitry

The equal association of Normally Closed transfers is given to pin2 with the resistors R5 to a 555 clock, for example a monostable circuit. At that point we feed the yield of 555 clocks to an Op-Amp LM7385, through wire 11 and 12 to non-upsetting sort input pin3. We must be certain that info altering voltage is steady through resistor V2.To make voltage at pin2 from the potential divider higher than pin3, we utilize operation amp as a comparator, which gives zero-rationale incentive to pin1.

2.4 Proposed Circuit Diagram

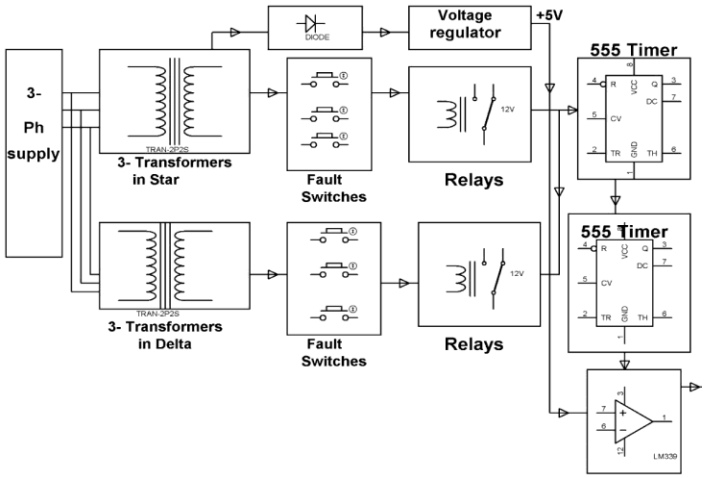


Fig. 1: *Schematic Diagram*

3 Components Used:

3.1 Voltage Regulator

Right now will investigate fixed, controlled force supplies. We will utilize the 78XX and 79XX arrangement of voltage controllers. They are made by a few makers, most are promptly accessible, and are economical. The LM78XX arrangement of three terminal positive controllers is accessible in the TO-220 bundle. Each type utilizes inside current restricting, warm shut down and safe working territory security, making it basically indestructible. On the off chance that satisfactory warmth sinking is given, they can convey over 1A yield current. These gadgets can be utilized with outside segments to get flexible voltages and flows. Accessible yield voltages: 5, 6, 8, 9, 10, 12, 15, 18, and 24V.

Table 1 : *Features of voltage regulator*

Parameter	Symbol	Value	Unit
Input Voltage (for V_O = 5V to 18V) (for V_O = 24V)	V_I V_I	35 40	V V
Thermal Resistance Junction-Cases (TO-220)	$R_{\theta JC}$	5	°C/W
Thermal Resistance Junction-Air (TO-220)	$R_{\theta JA}$	65	°C/W
Operating Temperature Range (KA78XX/A/R)	T_{OPR}	0 ~ +125	°C
Storage Temperature Range	T_{STG}	-65 ~ +150	°C

3.2 555 Timer

The 555 timer is an integrated circuit chipset primarily used for generating pulse, and oscillatory waves. It can be used to induce time delays like a flip-flop element.

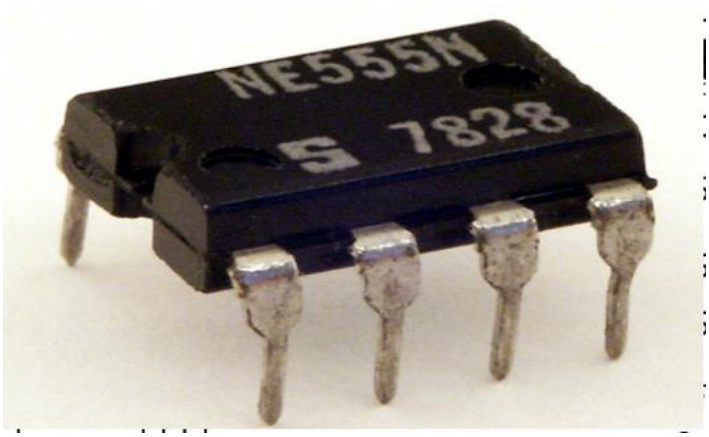


Fig. 2*: 555 Timer*

3.3 LM358

The LM358 IC is an op amp which consumes low power and it is a dual channel. It is crafted by National Semiconductor. This IC operates for single supply to wide varied range of supplies.

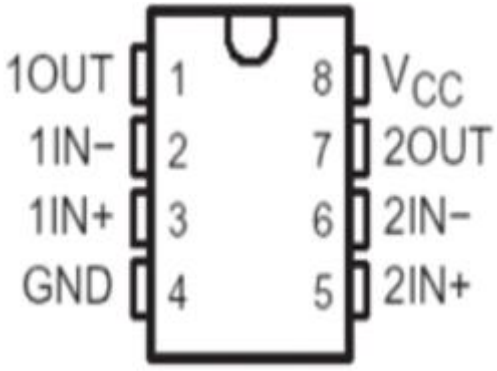


Fig.3: *LM 358*

4 PROCEDURE

The load up is given a 3-stage power supply which is AC, yet the various six hand-off loops get DC voltage, and the basic focuses are detached at NC and goes to the typically opened terminals, which guarantees that a rationale high is provided at pin2 of 555 clock U1 which implies that it is being worked at monostable mode [11] to 1[12]. On the off chance that any of the press fastens close by the transfer is squeezed it opens that hand-off contact and right now, contacts moves to the NC position which gives a rationale low at trigger pin of 555 clock to give a yield that brings the U3 555 clock which works under astable mode, for its reset pin to high esteem with the end goal that the astable activity happens at its yield which is given out as a glimmering by the LED D11. For brief nature of shortcoming, i.e., in the event that the press button is squeezed and promptly discharged, at that point the U1 monostable incapacitates U3, which triggers the yield to decrease to zero. On the off chance that any of the press button is squeezed for a more extended span of time, the

monostable yield gives a more drawn out time yield beats for U3, which is the astable clock. [1] to [3].This yield at that point charges capacitor C13 through R11 with the end goal that the yield over the comparator shoots up high that makes the hand-off to turn off three stage load. This is characteristic of a changeless flaw, and in this manner here, we utilize no auto-stumbling resembles that the force framework stays under off condition for the remainder of the heaps.

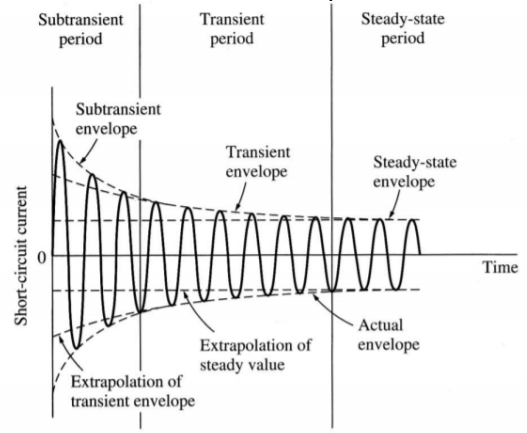


Fig.4: *SCC Vs Time*

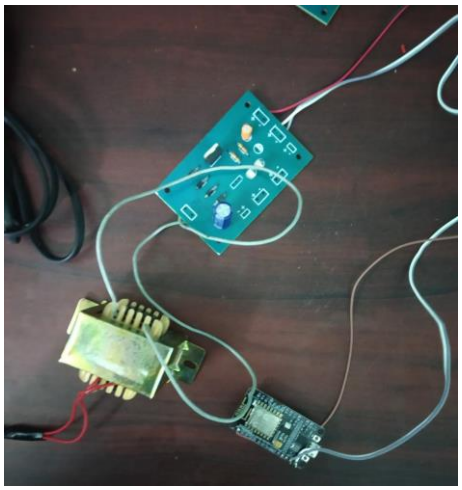


Fig.5*:Set-Up of kit*

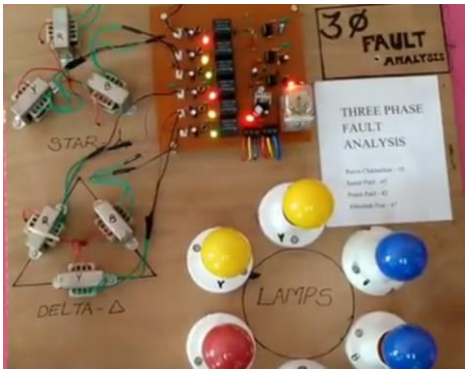


Fig.6*: Implementation of Basic Proposed Model*

5. RESULT AND DISCUSSION.

5.1 RESULT

From the working model of our experiment, we were able to analyze the three phase system fault by using individual 3 single-phase transformers as system supply side. The project senses fault and is able to send notifications to phone with the help of the Wifi module by identifying the exact nature of the fault.

5.2 DISCUSSION

In case of a temporary fault it trips the circuit for minimal time and re-establishes the connection. Whereas, in case of a permanent fault it trips it permanently. Since this project is already in use, this has been extended for the IOT project. Using Bluetooth module HC051, the users can also get the information for the fault produced via messages.

6 CONCLUSION

There are numerous efforts produced and published for dealing with the permanent and the temporary faults. In our project 555-timer is used with the relay for the fault analysis. Short duration fault is connected / returned to the supply immediately after the removal of fault, this is termed as temporary trip while long duration disconnects / trips the circuit permanently. As in this project we have deployed an app based connection which gives us the time duration for which the fault has occurred and also the time of occurrence of fault, this project can in future also be used in connection with IOT (Internet Of Things). In this way it is without chance contrasted with other kind of ensuring framework for 3-stage shortcoming.

7 REFERENCES

[1] Zhang Lini, Liang Yongliang, Sun Yong “Fault Type Recognition of Over-head Lines of Distribution Networks Based on Fault Indicator Waveform Data” ISSN: 2161-749X, 2018 China International Conference on Electricity Distribution (CICED)”

[2] Kumar, Vikrant & Singh, Harneet & Pandey, Monika & Rana, Rishabh & Rawat, Sumit. (2017). “Three Phase Fault Analysis with Auto Reset for Temporary Fault and Permanent Trip for Permanent Fault”. Asia-Pacific Journal of Advanced Research in Electrical and Electronics Engineering. 1. 15-22. 10.21742/ajaeee.2017.1.2.03.

[3] V. Jayakumar, DC.Kumaresan, R.Karthikeyan “Wind Energy Conversion System and Solar PV Integration” International Journal of Innovative Technology and Exploring Engineering (IJITEE) ISSN: 2278-3075, Volume-8 Issue-7, 1595- 1600, May, 2019. Scopus paper download link: https://www.ijitee.org/wp-content/uploads/papers/v8i7/G6084058719.pdf

[4] International Journal of Research Publications in Engineering and Technology (ISSN No: 2454-7875) Conference Proceedings of A National Conference on “Modern Trends in Electrical Engineering” (NCMTEE-2K17) 27th March 2017.

[5] A. Saranya; S. Dineshkumar, “Improving voltage stability of power system using facts device” 2017 IEEE International Conference on Electrical, Instrumentation and Communication Engineering (ICEICE) Year: 2017 Pages: 1 – 5

[6] Turan Gonen, “Electric Power Transmission System Engineering, Analysis and Design”, Crc Press Taylor and Francis Group.

[7] Rahul Agrawal ; Ebha Koley “Fuzzy Logic Based Protection Scheme for Symmetrical and Unsymmetrical faults in Three Phase Series Compensated Transmission Line” ISBN: 978-1-

5090-3411-6,2016 International Conference on Micro-Electronics and Telecommunication Engineering (ICMETE)
[8] R.Karthikeyan, "Comparison and Performance Analysis of FACTs Controller in System Stability", Circuits and Systems (CS) Volume 7, September 2016, pp 2948-2958. ISSN: 2153-1285
[9] W. N. W. A. Munim ; Hang Seng Che ; Wooi Ping Hew," Fault tolerant capability of symmetrical multiphase machines under one open-circuit ", 4th IET Clean Energy and Technology Conference (CEAT 2016),Year: 2016.
[10] A. Jeevitha ; S. Devi,Symmetrical fault 2015 Online International Conference on Green Engineering and Technologies (IC-GET),Year: 2015.
[11] Ali Hooshyar & Maher Abdelkhalek Azzouz "Three-Phase Fault Direction Identification for Distribution Systems With DFIG-Based Wind DG" ISSN: 1949-3037, IEEE Transactions on Sustainable Energy (Volume: 5 , Issue: 3 , July 2014
[12] Sathish Bakanagari "Int. Journal of Engineering Research and Applications" ISSN : 2248-9622, Vol. 3, Issue 6, Nov-Dec 2013, pp.1082-1086.

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