

# Fault investigation in three phase power transmission systems with tripping mechanism at temporary and permanent fault

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## ABSTRACT

The motive of this paper is to make a routine stumbling system. For a three stage framework, the output of our task resets for the impermanent deficiency, while, in the event of lasting shortcoming, it trips the framework. These deficiencies are recognized by our contraption and it normally isolates the stock to avoid impact/fire hurt which may impact the control prepares in the substations. The staggering structure is made by using 3, 1-stage transformers which have both information and yield in star affiliation, and 3 transformers in delta relationship with commitment of 220 volt and yield of 12 volt. Here low voltage testing is appeared. For both transient and long range blemishes 555 timekeepers are used. To initiate stumbling instrument, switches are utilized which makes the three sorts of deficiency in low voltage side. Transient/Short span deficiency gives a fast recuperation as an impermanent excursion though longer term of shortcomings gives a lasting outing. This method, whenever expanded may help in IOT based applications for SMS based administrations to clients just as utilities for flaw location.

## 1.INTRODUCTION

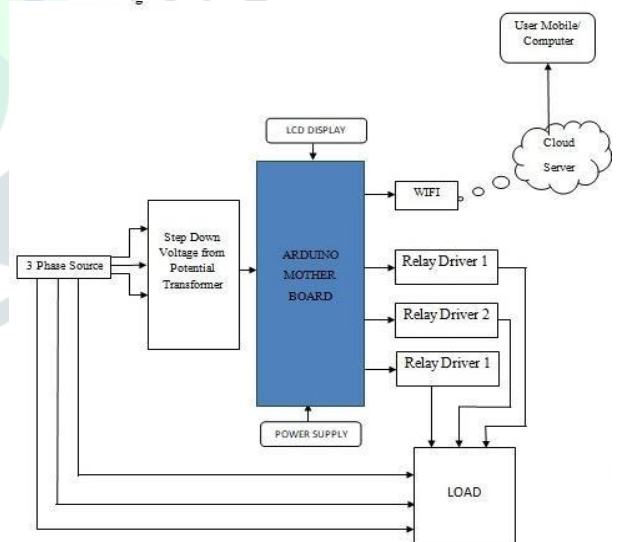
During activity of the electrical organizations, the electrical hardware and electrical machines, the odds of happening of shortcoming is more. Such blames are unwanted, as they may change the trademark worth of impedance of the electrical organization and may meddle with the typical activity of the force framework. Impermanent flaw is a shortcoming which is brought about by protection flashover and should be promptly stumbled. This component guarantees the wellbeing for the remainder of the gear from the outcome of the shortcoming. Generally, there are three sorts of lacks. They are LG (Line to Ground), LL (Line to Line), 3L (Three lines). This deficiency is an average transient shortcoming where the circuit breakers confine the flaw for some time(say few moments) and afterward restores the contact for ordinary activity of the framework (re-invigorated). The common wonder like easing up and blasting breeze is the reasons for the transient shortcoming. The tumbling off of trees and swinging of wires are primary purpose for the lasting shortcoming. The odds of happening of transient deficiencies are 70-80% though the odds of lasting shortcomings are 20-30%. As the perpetual flaw causes breaking of wires, it might bring about lasting harm. Right now, in the force situation, the serious issue is stumbling, on the off chance that we utilize a legitimate stumbling gear, we can trip the framework consequently without manual

activity and in this manner, reclosing and resuming of the framework gets simpler.

## 2. SYSTEM ARCHITECTURE AND CIRCUITRY

### 2.1 System set-up

At the present time venture down transformers are used for holding the entire circuit under low voltage premise of 12V.This is done to test and research 3 phase varieties from the norm[4]. The fundamental and the assistant terminals of the three transformers are related with three phase power supply. While, the other three transformers have their discretionary as delta related. The essential yield by then can be gotten after revision from particular course of action of inverters. The whole set up then is given to 6 exchange twists and 6 press catches [4] to [10]. The commonly closed contacts of the extensive. number of moves are related in an equivalent manner to keep the different centers grounded.



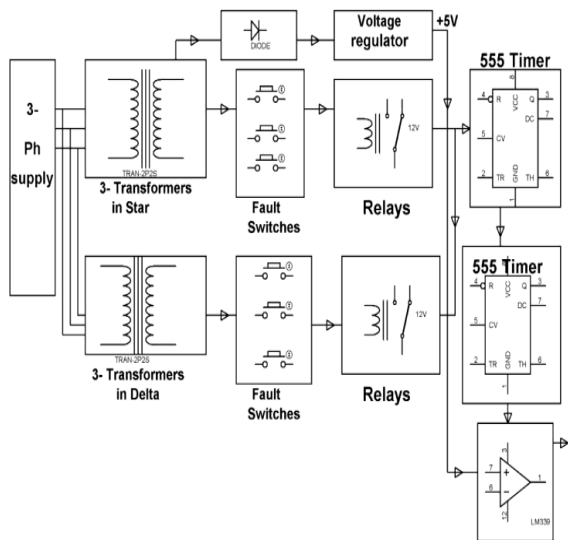
### 2.2.Block Diagram of Proposed work

### 2.3.Circuitry

The equivalent relationship of Normally Closed exchanges is given to pin2 with the resistors R5 to a 555 clock, for instance a mono stable circuit. By then we feed the yield of 555 clocks to an Op-Amp LM7385, through wire 11 and 12 to non-disturbing sort input pin3. We should be sure that data modifying voltage is consistent through resistor V2.To make voltage at pin2 from the potential divider higher than pin3, we use

activity amp as a comparator, which gives zero-reasoning motivator to pin1.

**2.4 Proposed circuit diagram**



**Fig.1:Schematic diagram**

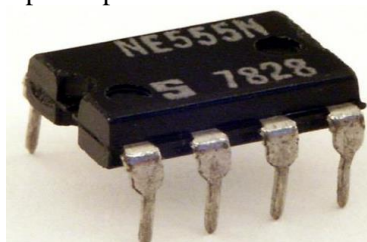
**3.Components used**

**3.1 Voltage regulator**

At the present time will research fixed, controlled power supplies. We will use the 78XX and 79XX game plan of voltage regulators. They are made by a couple of creators, most are speedily open, and are prudent. The LM78XX game plan of three terminal positive regulators is open in the TO-220 pack. Each type uses inside a current confining, warm shut down and safe working area security, making it essentially indestructible. If good warmth sinking is given, they can pass on over 1A yield current. These devices can be used with outside fragments to get adaptable voltages and streams. Open yield voltages: 5, 6, 8, 9, 10, 12, 15, 18, and 24V.

**3.2 555 Timer**

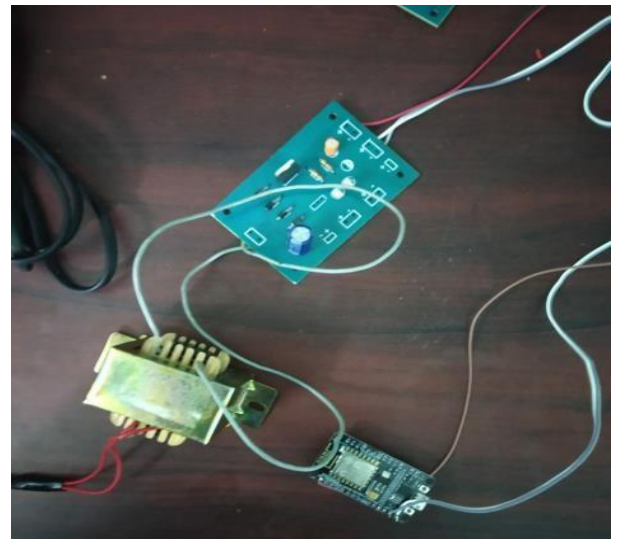
The 555 timer is an incorporated circuit chipset basically utilized for producing beat, and oscillatory waves. It tends to be utilized to incite time postpones like a flip-flop component.



**Fig:2.555 timer**

**3.3 LM358**

. The LM358 IC is an operation amp which devours low force and it is a double channel. It is created by National Semiconductor. This IC works for single stockpile to wide changed scope of provisions



**Fig.3: LM 358**

**4. Procedure**

The load up is given a 3-stage power supply which is AC, yet the different six hand-off circles get DC voltage, and the fundamental centres are withdrawn at NC and goes to the normally opened terminals, which ensures that a reasoning high is given at pin2 of 555 clock U1 which infers that it is being worked at monostable mode [11] to [12]. In case any of the press secures nearby the exchange is crushed it opens that hand-off contact and at the present time, contacts moves to the NC position which gives a reasoning 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 regard with the ultimate objective that the astable action occurs at its yield which is given out as a gleaming by the LED D11. For brief nature of inadequacy, i.e., if the press button is crushed and immediately released, by then the U1 monostable weakens U3, which triggers the respect diminishing to nothing. In case any of the press button is crushed for a more expanded range 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 by then charges capacitor C13 through R11 with the ultimate objective that the yield over the comparator shoots up high that makes the hand-off to kill three phase load. This is normal for an unchanging imperfection, and as such here, we use no auto-staggering looks like that the power system stays under off condition for the rest of the heaps.

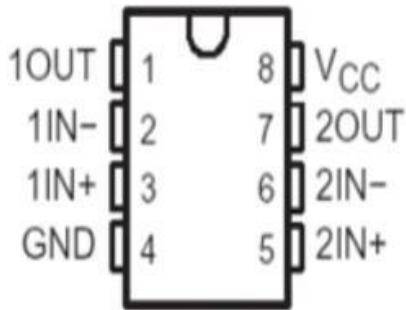


Fig.4: SCC Vs Time

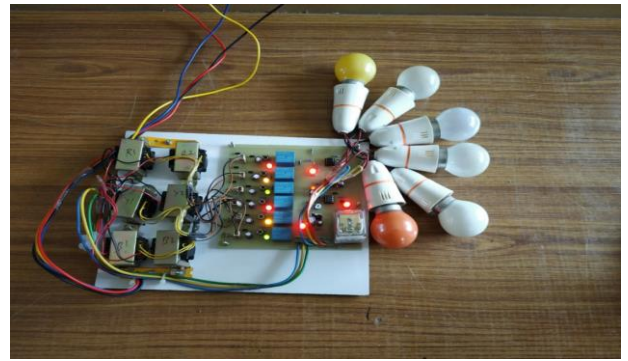


Fig 8.Load is disconnected permanently

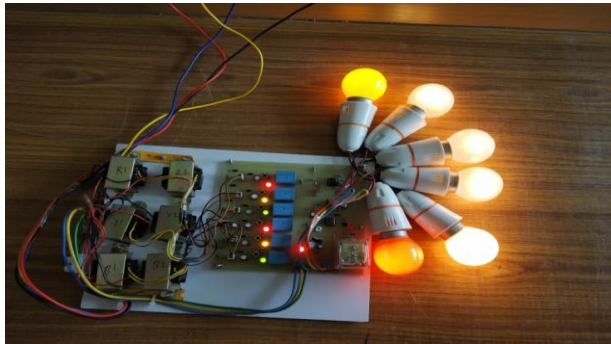


Fig.5:Set-Up of kit

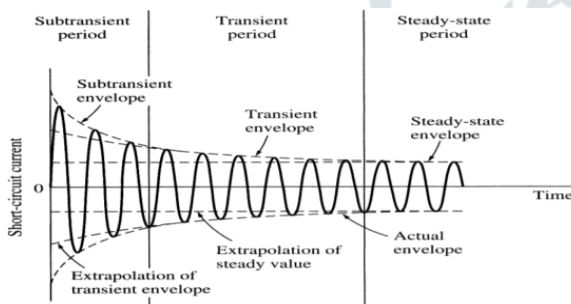


Fig.6: Implementation of Basic Proposed Model (Creating the temporary fault for <2sec)

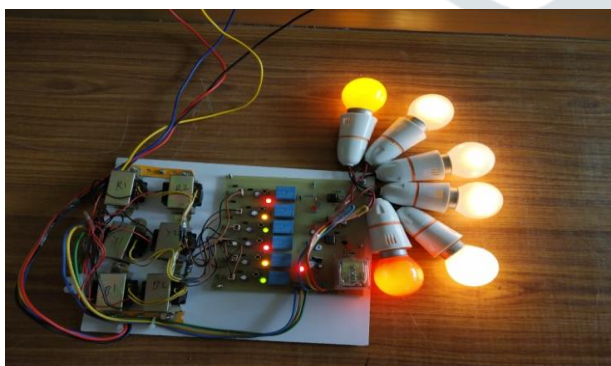


Fig.7: Implementation of Basic Proposed Model (Creating the permanent fault) for >2sec)

## 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. Thus the project has been successfully designed and tested.

### 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 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.

### Future Scope

Our project is mainly intended to develop an automatic tripping mechanism for the three phase supply system. The project output resets automatically after a brief interruption in the event temporary fault while it remains in tripped condition in case of permanent fault. The project can be extended by using microcontrollers to detect other faults also.

This system is built using three single phase transformers which are wired in star input and star output, and 3 transformers are connected in delta connections, having input 220 volt and output at 12 volt. This concept low voltage testing of fault conditions is followed as it is not advisable to create on mains line. Comparator is used for handling short duration and long duration fault conditions.

A set of switches are used to create the LL, LG and 3L fault in low voltage side, for activating the tripping mechanism. Short duration fault returns the supply to the load immediately called as temporary trip while long duration shall result in permanent trip. We can extend the project by adding microcontroller through which we can even display the alerts using messages onto the display module. The concept in the future can be extended to developing a mechanism to send message to the authorities via SMS by interfacing a GSM modem.

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