Quest Journals
Journal of Electronics and Communication Engineering Research
Volume 8 ~ Issue 10 (2022) pp: 01-04
ISSN(Online) : 2321-5941
www.questjournals.org

Research Paper

Short Circuit Indicator

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ABSTRACT
This project comes under smart city-industrial verticals. Smart city is a technologically modern urban area that uses different types of sensors. Smart city concepts ingrate information and communication technologies (ICT). Short circuit occurs during overloading or when two or more wires touch. A circuit is said to be overloaded when too much current flows causing heat buildup or wiring to break down. So, we propose short circuit indicator. It does the task of detecting the short circuit. In this way one can take appropriate measures to rectify the circuit.

Keywords: *Smart city; IOT; Short circuits; Stabilizer; Indicator system.*

***R**eceived 15 Oct., 2022; **R**evised 28 Oct., 2022; **A**ccepted 31 Oct., 2022 © The author(s) 2022.*
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I. INTRODUCTION

In circuit analysis, a short circuit is defined as a connection between two nodes that forces them to be at the same voltage. In an 'ideal' short circuit, tahis means there is no resistance and thus no voltage drop across the connection. In real circuits, the result is a connection with almost no resistance. In such a case, the current is limited only by the resistance of the rest of the circuit. A common type of short circuit occurs when the positive and negative terminals of a battery are connected with a low-resistance conductor, like a wire.

In an improper installation, the overcurrent from a short circuit may cause ohmic heating of the circuit parts with poor conductivity. Such overheating is a common cause of fires. In industrial and utility distribution systems, dynamic forces generated by high short-circuit currents cause conductors to spread apart. Busbars, cables, and apparatus can be damaged by the forces generated in a short circuit

II. LITERATURE SURVEY

Short circuit current literature survey report contains the results of a literature investigation on short circuit current limiters the occasion for this is a research program performed in the group called apparatus and systems for electrical energy supply of the Eindhoven University of technology on a method of short circuit current limiting. For this research the availability of survey of the literature on the subject appeared desirable. A short circuit results in excessive current flow in the power source through the 'short,' and may even cause the power source to be destroyed. In electrical devices, unintentional short circuits are usually caused when a wire's insulation breaks down, or when another conducting material (such as water) is introduced, allowing charge to flow along a different path than the one intended. In main circuits, short circuits may occur between two phases, between a phase and neutral or between a phase and earth (ground). Such short circuits are likely to result in a very high current and therefore quickly trigger an over current protection device. However, it is possible for short circuits to arise between neutral and earth conductors, and between two conductors of the same phase. Such short circuits can be dangerous, particularly as they may not immediately result in a large current and are therefore less likely to be detected. Possible effects include unexpected energisation of a circuit presumed to be isolated. To help reduce the negative effects of short circuits, power distribution transformers are deliberately designed to have a certain amount of leakage reactance. The leakage reactance (usually about 5 to 10% of the full load impedance) helps limit both the magnitude and rate of rise of the fault current.

2.1 COMMON FAILURE MODES:

Failure modes of large power transformers are not always straight forward. But purely from an assumption of the failure experienced in a large power transformer, most transformer failures can be classified into either one or a combination of more than one of the following three modes

1. Breakdown of insulation as a whole due to severe solid insulation ageing.
2. Breakdown of insulation by part, due to premature ageing by localized high temperature overheating.
3. Mechanical failure of windings.

III. SYSTEM ANALYSIS

3.1 PROBLEM STATEMENT

A short circuit is a fault. It means there is a very low resistance conducting path from one side of a component to other. A short circuit makes the circuit behaves as if the component wasn't there. The component stops working and the current everywhere in that circuit will increase, which can damage other components or, in extreme cases, cause a fire. So how can we explain shorts? A very misleading way of explaining them is to say that current takes the easiest path. Whenever you are working with electricity, the proper use of safety precautions is of the utmost importance to remember, in the front of all electronic technical manuals, you will always a find a section on safety precautions. Such short circuits are likely to result in a very high current and therefore quickly trigger an over current protection device. To help reduce the negative effects of short circuits, power distribution transformers are deliberately designed to have a certain amount of leakage reactance.

3.2 PROPOSED SYSTEM

In power sockets or even the site of the short circuit itself. Such is a common cause of an electric arc, if it forms during the short circuit, produces high amount of heat and can cause ignition of combustible substances as well. In industrial and utility distribution systems, dynamic by high short- forces generated circuit currents cause conductors to spread apart. Bus bars, cables, and apparatus can be damaged by the forces generated in a short circuit. Whenever you are working with electricity the proper use of safety precautions is of the at most importance to remember in the front of all electronic technical manuals, you will always find a section on safety precautions. Also posted on each piece of equipment should be a sign listing the specific precautions for that equipment. One area that is sometimes overlooked, and is a hazard especially on-board ship, is the method in which equipment is grounded.

IV. SYSTEM SPECIFICTAIONS

HARDWARE SPECIFICATION

To construct a system, we need materials that can be either objects or coding. The materials we need to construct the system include:

S.NO	MATERIAL	QUANTITY
1	Buzzers	1
2	Resistors	3 (47K ohms)
3	Diode	2 (IN4007)
4	PCB	Req. size
5	Capacitors	1
6	Transistors	2 (BC547)
7	LED	2
8	Cables and connectors	Req.

Table 4.1: Requirements for the project

V. PROJECT DESCRIPTION

5.1 EXISTING SYSTEM

In electronics and electrical engineering, a fuse is an electrical safety device that operates to provide overcurrent protection of an electrical circuit. It is a sacrificial device, once a fuse has operated it is an open circuit, and must be replaced or rewired, depending on its type. Circuit breakers can be used as an alternative to fuses, but have significantly different characteristics.

DISADVANTAGES:

1. It is not suitable for overload, at that time fuse blow off replacing of fuse takes time. During this period of lost power.
2. The protection of fuse is not reliable.

3. Low breaking capacity.
4. Fuse is slow compared to circuit breakers. It is a slow speed.
5. Considerable time is required in replacing a fuse after the operations, while the circuit breaker can be used multiple times.

5.2 WORKING OF PROPOSED SYSTEM

The short circuit fault indicator refers to a device used to indicate the flow of electrical short circuit fault current. The principle is to use the positive current mutation and the line power failure to detect the fault when the line fails. According to the characteristics of the power line short circuit, the fault is judged by measuring the sudden change and duration of the current in the line by electromagnetic induction method. Therefore, it is a fault detection device that adapts to load current changes and reduce the possibility of mis operation.

Introduction of short circuit fault indicators:

The short circuit in power system indicator is composed of electronic components and mechanical structure.

1. Fault indication
2. Online operation
3. Good adaptability
4. Strong anti-interference
5. Automatic reset
6. Live loading and unloading
7. Fixing method

5.3 BLOCK DIAGRAM

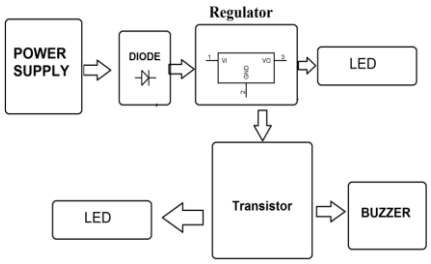

Fig 5.1: Block diagram of short circuit indicator

5.5 SOLUTION

When you connect a wire across the terminals of a bulb you are effectively creating a little parallel circuit. The thing with parallel circuit is that the effective resistance is less than the smaller resistance. In this case the smallest is just the wire and this has a very low resistance indeed.

5.6 RESULTS:

Calculations can be made from the utility transformer secondary to the utilization equipment in an electrical system. Print outs are available for each calculation, and the helps system guides you through the calculations.

1. Save time by easily obtaining the short circuit magnitude at each point in the power system.
2. Design safer systems by comparing the calculated fault current to the ratings of installed equipment.
3. Increase design reliability by supporting proper selection of circuit protection equipment for protection and coordination.
4. Reports AC and DC currents for four user defined times.
5. Reports zero crossing time of total current.

Short circuit indicator project does the task of detecting the short circuit in a circuit in which it is connected automatically. When a transformer is subjected to a short circuit in the attached network, then it experiences considerably increases current flows for the duration of the external fault. The magnitudes of the resulting 'through fault' currents are usually much higher than normal in – service currents, because they are no longer limited by the load impedance and may only be limited by the impedance of the transformer itself. The short circuit may arise because of a defect arising in another item of network equipment, or as a result of a system or environmentally generated transient, example close up lightning strike, which causes a phase to earth fault.

VI. CONCLUSION

Finally, in short circuit study, we have to learn about the short circuit and we have to clarify some doubtable questions like: what is short circuit? How it happens? When it happens? Why it happens? when it happens? why it happens? And also learn prevention methods of short circuit study. Fault currents that exceed equipment rating are capable of extensive equipment damage and are serious threat to human life. To protect the buildings from this short circuits we have to learn about this short circuit phenomenon**.**

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