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Detecting Power Grid Synchronization Failure System on Sensing Frequency or Voltage beyond the Acceptable Range

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Abstract: ***In this project we are going to implement the use of up-to-date technology in sensing the very low variations in frequency or voltage magnitude of a generator in a Power grid in which there may be many generators working in synchronism with the grid in terms of phase sequence, voltage magnitude and frequency. In today's practical Power grid as we all know many generators or power source are working together and to maintain stability between all, the detection and isolation of the sources falling out of synchronism, is of crucial significance as otherwise it would have caused the entire system to fail. Hence various techniques have been developed in industries and power plants (especially solar power plants) to keep all the generators and sources in synchronism with the Power Grid and in case of and failure detect and isolate the failed generator out of the grid and hence maintain a stable operation of the Power System.***
Keywords: Grid Synchronization, voltage variation, frequency variation, Timer, Microcontroller.

I. INTRODUCTION

In a creator, hitching different energy sources to give uninterrupted power to a truck, a grid connection. Fault discovery that finds frequency or voltages beyond respectable is truly important. However, more current will flow through the electrical outfit or outlet, causing damage or destruction of electrical outfit or connections, if the connected electrical outfit does not meet these two limits. For this purpose, the mains voltage and mains frequency are constantly covered, and when they are the same, all electrical outfit is accompanied or connected simultaneously. When the synchronization fails, the system disconnects the affair weight and saves the affair weight. To ensure the stability and responsibility of these systems, the frequency and voltage of electricity must be accompanied in all corridor of the network. A synchronization error can do when the frequency and voltage of an element differs from the value of the rest of the network. Grid- connected hydroelectric, thermal, solar, etc. There are multitudinous types of electricity generation analogous as provides power to the weight. This generation process needs to be powered by the rules in the grid. These conditions include keeping voltage and frequency variations within limits. Still, the same confluent must be forced to leave the network, this is called Islanding. We have five public grids in India, West Grid, East Grid, North East Grid, South Grid, and North Grid. To attend all power shops with the country and public grid, we named three parameters voltage, frequency and voltage and current angle. It will be suitable to meet all three conditions for synchronization, so it will be accompanied with the network and called island state. Therefore, according to the IEEE1547 standard, the island state must be recognized and terminated within 2 seconds. There are multitudinous styles that can be used to identify the candidate. Synchronization is the reduction of the difference between the voltage, frequency and phase angle of the affair creator and the phase connection of the grid. Compared with technology, the system is more compact and reliable. This system is cheaper than other systems.

A. Objectives

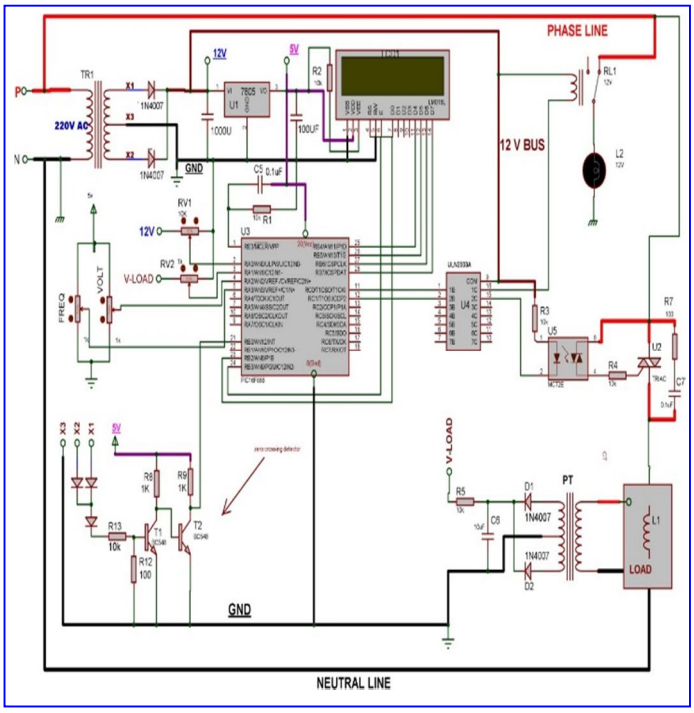
1) The main objective of this project is aimed at development of such a system so as to avoid any over/under voltage and over/under frequency in Power System.
2) It also uses phase sequence indicator to show any phase sequence of the system (RYB or RBY)
3) The system reliability and security by avoiding failure of the entire system due to abnormalities in one or two of system units.
4) In case of any abnormal conditions pertaining to voltage or frequency the fault has to be detected and the system to be islanded or disconnected from main grid.
5) The faulty unit shall be replaced by a standby unit to meet the load requirement; this can be achieved by further implementation of electronics devices.
6) The project aims to detect voltage variations beyond (200-250) volts and frequency variation beyond (49-50) Hz.

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II. METHODOLOGY

The system is made of 8051 series microcontroller. The microcontroller observers and detects the low/ high voltage through the comparison group. Since the mains frequency cannot be changed, this design uses a variable frequency creator to change the frequency and also uses a different standard to change the input voltage to measure design performance. In addition, the design can be developed by using electrical energy to separate the network from the wrong place, and a better discovery result can be attained by measuring circle by circle. Still, it may affect the grid and beget the grid to fail, if the voltage and frequency exceed the limit. Mains Synchronous Fault Detection System for Induced frequency or Out of Control Voltage that operates by measuring the voltage and frequency of electrical outfit. In this system, the microcontroller recognizes the force voltage and frequency with the help of the operating system and also matches the voltage and frequency with the backup force and frequency.

A. Circuit Diagram



B. Components List

1) Mills are used to reduce AC voltage in mains coetaneous fault systems where the convinced frequency or voltage is slightly controlled. It reduces 220V AC to 12V.

2) Bridge therapy when the induction frequency or voltage of the power grid coetaneous fault system is detected to be further than the respectable value, the ground therapy is used to convert the c voltage to dc voltage to supply the voltage to another electrical outfit.

3) Blocking Diode in this system, blocking diode is used to block the rear opposition current to save the motor.

4) Voltage stabilizer the voltage stabilizer is used to control the DC voltage when the convinced frequency or voltage of the detecting grid synchronization fault system exceeds the respectable value. Then LM 7805 is used to control from 12V DC voltage to 5V DC voltage.

5) Liquid demitasse when the induction frequency or voltage of the grid synchronization fault discovery system is further than the respectable value, liquid demitasse is used to display the electrical outfit, frequency and voltage of different electronic bias. It interacts with the microcontroller and is powered by 5V DC.

6) Voltage sensor When detecting the convinced frequency or voltage of the mains synchronization fault system beyond respectable, the voltage sensor is used to check the voltage of the voltage.

7) Frequency sensor when the coetaneous line is detected, the frequency discovery doesn't work or the voltage is bad, the frequency sensor is used to descry the frequency of the power force, and the machine is used for this purpose.

8) Single- chip microcomputer snap 18F452 when the induction frequency or voltage of the power grid synchronization fault system is detected to be further than respectable, a single- chip microcomputer is used to control the intelligent system. It works with 5V DC and connects with TV display and voltage, frequency sensor.

9) Data coagulate in this system, 555 timekeeper integration is used as data backup. Frequency can be changed using this IC.

10) Relay motorist in this system, a motorist IC is used to operate the relay cargo and affiliate with the microcontroller.

III. SIMULATION RESULTS

After completing the hardware and software, we observed the following calculations: After using the system, we found weakness and instability in certain voltage range...

Voltage (V)	LCD Display	LAMP Indication
<240	Low Voltage	ON
240-250	Stable Voltage	OFF
>250	High Voltage	ON

After using this system, we have seen the light according to the frequency of the

Frequency (Hz)	LCD Display	LAMP Indication
<48	Display frequency	ON
48-52	Display frequency	OFF
>52	Display frequency	ON

IV. CONCLUSION

In this way, a system that knows the difference between frequency and voltage by detecting the coetaneous failure of electrical outfit outside the network has been established. Grid- connected hydrothermal, solar, etc. There are numerous power shops. Provides power to the cargo. Grid law deals with making the difference between frequency and frequency at the boundary. However, the same confluent must be disconnected, If there's a difference between the grid. This can descry abnormal voltage and frequency, precluding serious problems or power outages. This board is grounded on the single- chip 8051, which has numerous advantages by changing the programming. thus, the backup plan remains on hold to avoid full network failure

REFERENCES

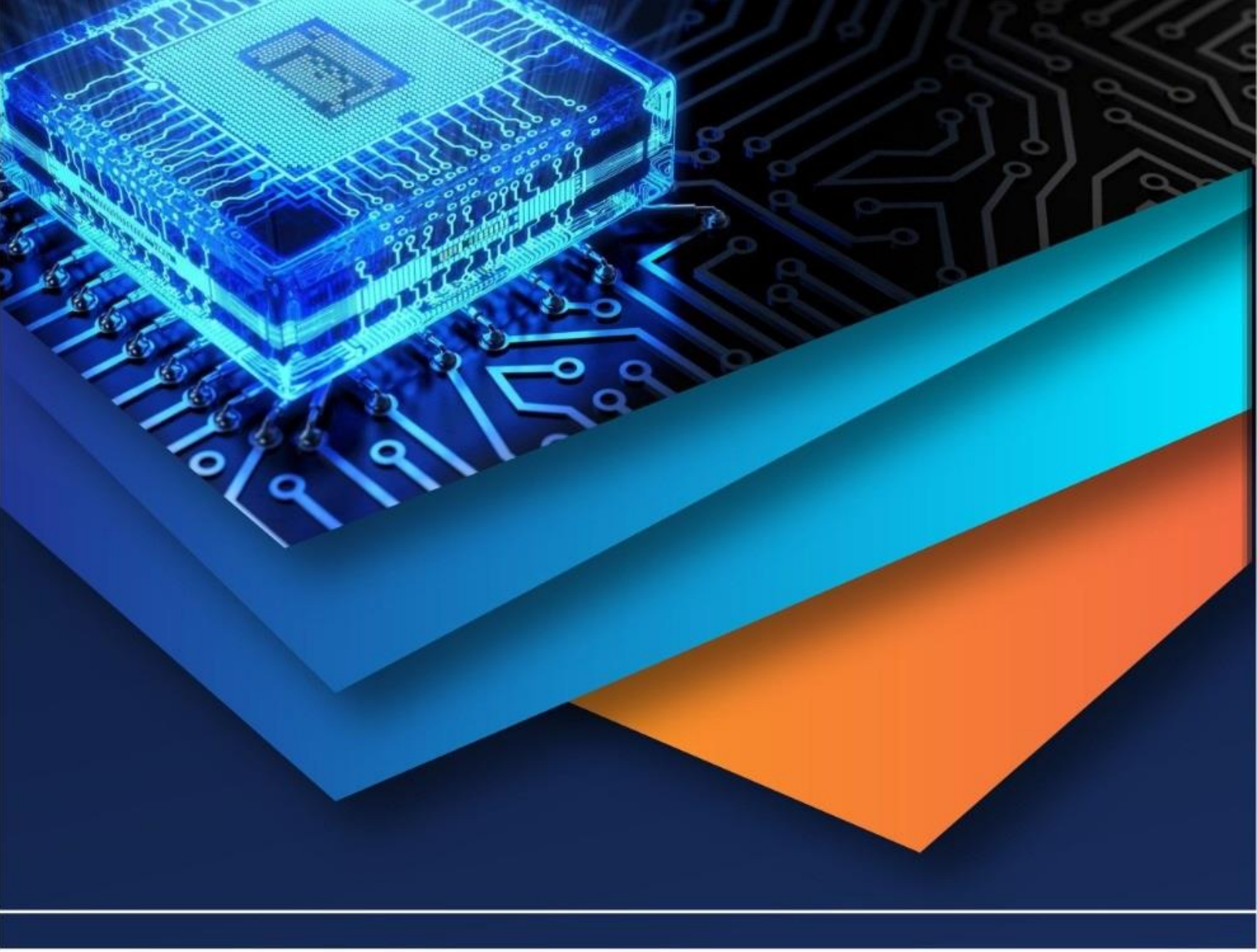
[1] Laukik S. Raut, Shahrukh B. Pathan, Gaurav N. Pawar, Mandar V. Pathak, "Detecting Power Grid Synchronization Failure on Sensing Frequency or Voltage beyond Acceptable Range"- International Journal of Research in Advent Technology, Vol.4, No.4, April 2016

[2] Yop Chung, Wenxin Liu, David A. Cartes, Emmanuel G. Collins and Seung-Il Moon, "Control Methods of Inverter-Interfaced Distributed Generators in a Microgrid System", IEEE transactions on industry applications, vol. 46, no. 3, May/June 2010.

[3] Shubhdeep Joshi, Tushar Parihar, Varun Kumar Shakya, Pradeep Kumar , Upendra Pal Singh "Detection of Power Grid Synchronization Failure on Sensing Frequency and Voltage Beyond Acceptable Range"- International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering, Vol. 6, Issue 4, April 2017.

[4] "IOT Based State Estimate For Microgrid", MdMasudRana, Wei Xiang and Eric Wang- Jan 2018 (IEEE Paper).

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