Detecting Power Grid Synchronization Failure on Sensing Frequency or Voltage Beyond Acceptable Range

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***Abstract*— The project is designed to develop an islanding arrangement for grid on sensing bad voltage/ bad frequency. There are several power generation units connected to the grid such as hydro, thermal, solar, wind etc. To supply power to the load. In modern power system, electrical energy from the generating station is delivered to the ultimate consumers through huge network of transmission and distribution. These generating units need to supply power according to the rules of the grid. Thus, for satisfactory operation of loads, it is desirable that consumers are supplied with substantially constant voltage and frequency.**

***Index Terms*—Introduction, Literature Survey, Objective and Block diagram**

I. INTRODUCTION

Energy provides the power to progress. Availability of sufficient energy and its proper use in the country can result in its people rising from subsistence level to highest standard of living. Energy exists in different forms in nature but the most important form is the electrical energy. The modern society is so much dependent upon the use of electrical energy that it has become a part and parcel of our life. Several new trends have already employed in the electricity infrastructure. It includes the expansion of the existing grid with micro grids and mega grids, extensive sensors, data processing, visualization tools, etc. Increasing electrical energy demand, modern lifestyles and energy usage patterns have made the world fully dependent on power systems thus the need of a reliable and stable power system grid. However, the power system is a highly nonlinear system, which changes its operations continuously. Therefore, it is very challenging and uneconomical to make the system be stable for all disturbances. At present, the interest toward the distributed generation systems, such as photovoltaic arrays and wind turbines, increases year after year. But wind turbines and generally DGs will have affects in the power system network that one of these influences is an islanding phenomenon. Islanding refers to the condition in which a distributed generator (DG) continues to power a location even though electrical grid power from the electric utility is no longer present.

II. LITERATURE SURVEY

[1**].** N. Dhaka, Developing Islanding Arrangement Automatically for Grid on Sensing Voltage or Frequency Beyond Range, IJERMT Mag., vol.2, Mar2015, pp. 184-187.

The project is designed to develop an islanding arrangement for grid on sensing bad voltage/ bad frequency. There are several power generation units connected to the grid such as hydro, thermal, solar, wind etc. to supply power to the load.

[2]. G. F. Donald and H. W. Beatty, Standard Handbook for Electrical Engineers, Eleventh Edition, McGraw-Hill, New York, ISBN 0-07- 020974-Xpp. 3-64,3-65.

The following definitions are based on the principal meanings listed in the IEEE Standard Dictionary (ANSI/IEEE Std 100-1988), which should be consulted for extended meanings, compound terms, and related definitions. The United States Standard Symbols (ANSI/IEEE Std 260, IEEE Std 280) for these quantities are shown in parentheses.

III. OBJECTIVE

1. To avoid any over/under voltage and /or over/under frequency in Power System.

2. It also uses phase sequence indicator to show any phase sequence of the system (RYB or RBY).

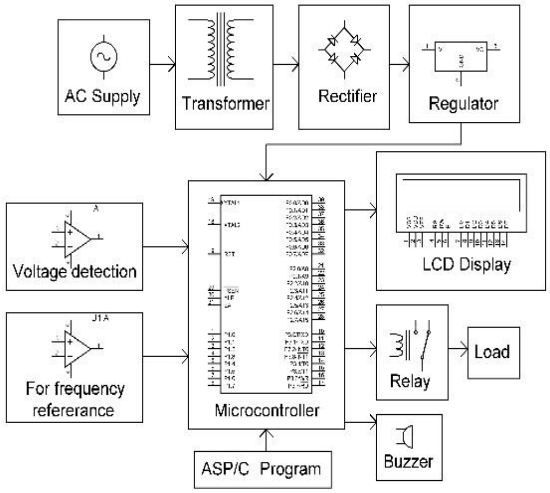
3. This project further enhances the system reliability and security by avoiding failure of the entire system due to abnormalities in one or two of system units.

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. A phase sequence indicator is used to indicate the phase sequence of the 3-phase system.

IV. METHODOLOGY

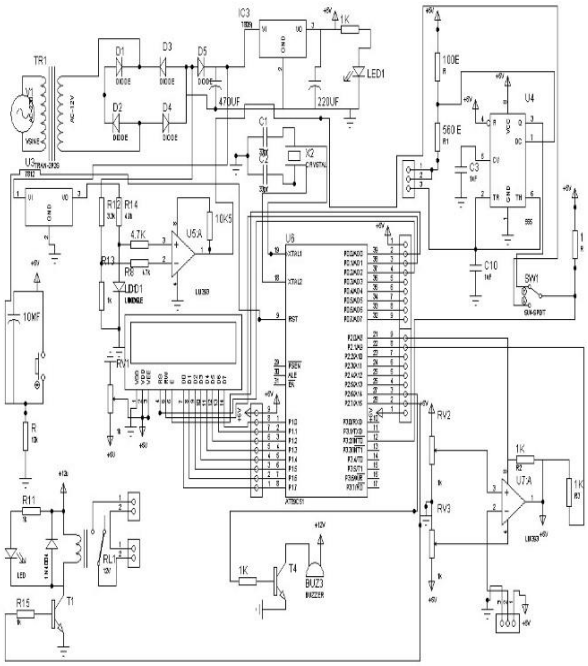


REGULATOR-7805 /7812 gives constant 12 v and 5v.and this voltage applied to the circuit.

FILTER- Is used to removing the ripples from output and get pure dc voltage.

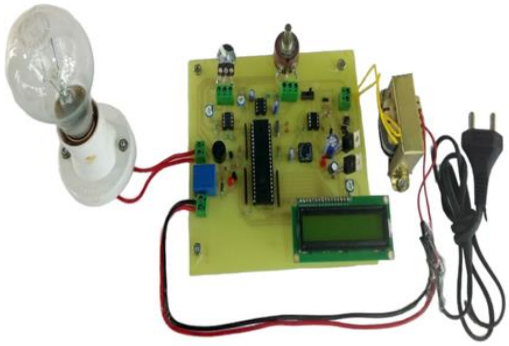
Zero crossing detector-A zero-crossing detector (ZCD) is a basically a comparator having the reference level set at zero. It is used for detecting the zero crossings of AC signals. That is to say is the type of voltage comparator, used to detect a sine waveform transition from the i/p crossing the zero voltage 15 condition. It can be made from an operational amplifier with an input voltage at its positive input. Output of this zero-crossing detector is fed to ATmega328p microcontroller.

V. A. CIRCUIT DIAGRAM



In this proposed system we use 8051microcontroller for the I landing condition. I landing is the condition where the distribution generator it will continue to the power to the particular location even though the electrical grid power is low long a present the for example of solar panel. In this project already we will give the power supply through stepdown transformer. When we give the supply. First, we provide normal frequency that is real frequency. the zero-crossing detector provides the real frequency i.e 50Hz when we press the sliding switch and vary the frequency then frequency is low that's why I landing takes place which is indicated by the bulb. next vary the voltage using this pot. when we increase the voltage, it shows over voltage so I landing takes place by this bulb. When voltage is low then it's shown under voltage and I landing is take place. So, both the frequency and voltage within the exactable range otherwise I landing take place.

B. MODEL



C. Results:

Voltage Condition

Sr.No	Condition	Buzzer	LED Light
1	Low Voltage	On	On
2	Normal Voltage	Off	Off
3	High Voltage	On	On

Frequency Condition

Sr.No	Condition	Buzzer	LED Light
1	Low Frequency	On	On
2	Normal Frequency	Off	Off
3	High Frequency	On	On

D. CONCLUSION

this brief idea about indicator which senses the abnormalities in voltage as well as in frequency so as to detect the synchronization failure of any external supply source to the power grid. This type of indicators are much needed in most crowded EHV substations where number of voltage levels, number of sources, number of power transformers and number of load lines are existing. In short it will be beneficial in case of complicated substation because at present the facility available is FTR i.e. Frequency Trip Relay and UFR i.e. Under Frequency Relay which performance function of directly disconnection of particular feeder which may cause sudden rise of voltage on system bus. Also, there is a chance for the power system to get imbalance in the absence of such indications and automatic disconnection i.e. islanding.

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