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**AUTOMATIC LOAD SHIFTING AND PHASE BALANCING**

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**ABSTRACT**

In the current scenario we face the power cut situation so the main purpose of this project is to provide continuous power supply to a load, by selecting automatic supply line come from source . When one of line get fails, the load from that line automatically shifts to next line and load is balanced. This leads to a load balancing method, which is a process to avoid system overload. A bad distribution system can overload some areas and underutilize some areas. In the world wild industries, domestic and many more in order to get the supply and according to this result overloading can takes place. To overcome this we build an automatic phase shifting and load balancing.

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**I. INTRODUCTION**

Three-phase imbalance is a major problem in India today. Unexpected power loss due to overload, sudden increase in voltage after power transfer to subsystem is complete. The point is to distribute the power of Continus to all consumers. Therefore, power control and hence load control in these areas is required to avoid these conditions. The demand for electricity is continuously increasing due to various human factors. The industry is increasing the load day by day. Most loads are inductive and therefore dissipate reactive power. Electricity demand is increasing day by day as a result of consumer demand. As the population grows rapidly. Smart electrical grids necessitate a high level of attention to the subject of electrical load distribution balance. This issue stems from the lack of a solution for large-scale systems in which a high number of single-phase consumers are connected to a three-phase system in the electrical distribution system.

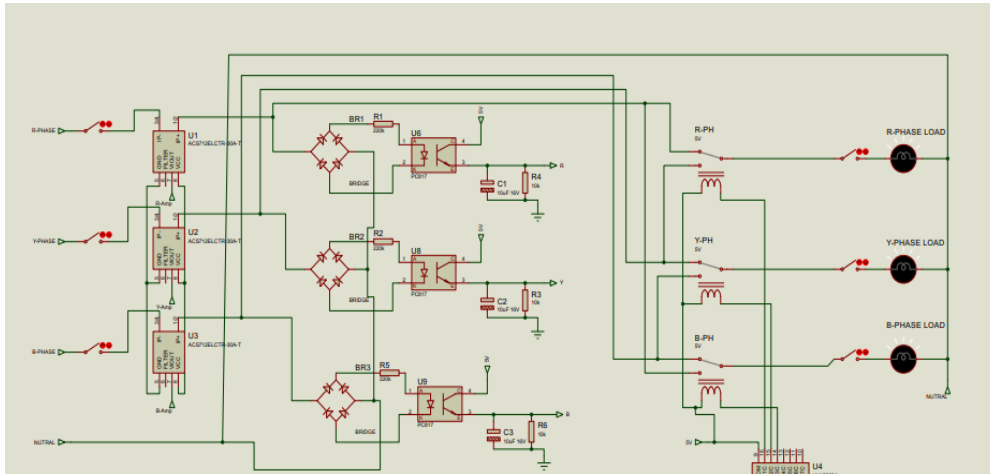
**II. PROPOSED SYSTEM**

For the normal functioning of the distribution system, a system based on automatic load balancing and phase difference is installed, and in this process, there is a dedicated device that simultaneously performs phase difference and balancing for communication between distribution systems. An important concept of automatic load balancing and phase shifting is that each system can operate independently of the other, so that the other can be turned off when not in use.

**OBJECTIVE**

- Load balancing on 3 phase 4 wire systems.
- Provided continuous power to load in case any phase is failed.
- Individual power phase monitoring.

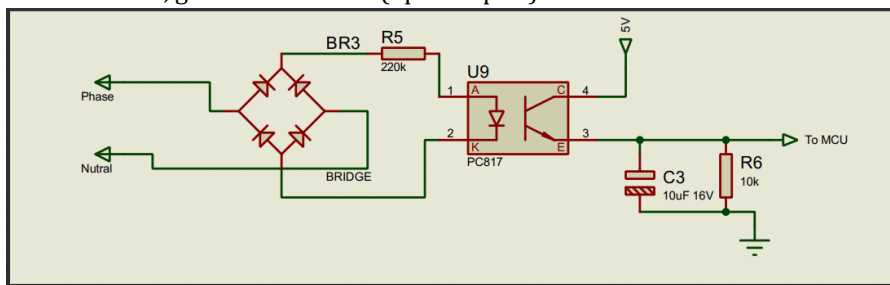
**CIRCUIT DIAGRAM**



**IMPLEMENTATION OF CIRCUITS**

• **Phase Detector Circuit**

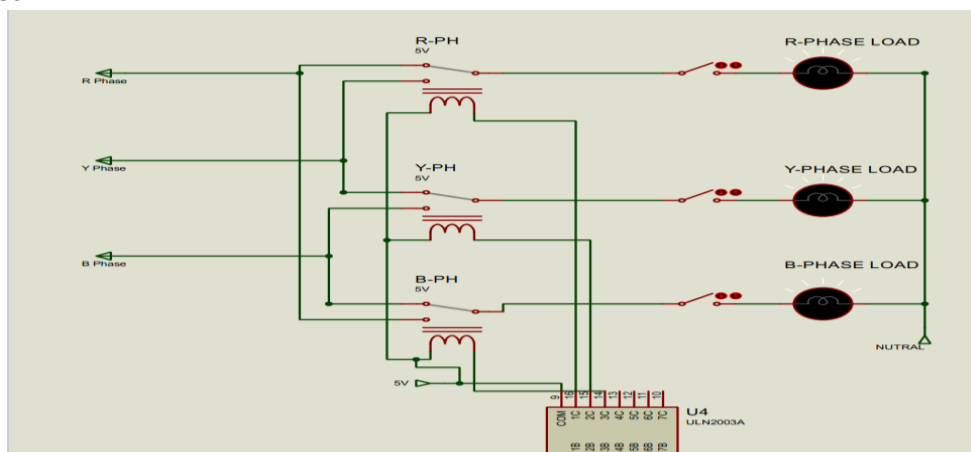
This circuit is designed to monitor and signal the presence of AC mains voltage to other circuits such as microcontrollers. For this task, galvanic isolation (optocoupler) is used in the PC817 circuit.



**Fig (a)**

• **Phase Shifter Circuit**

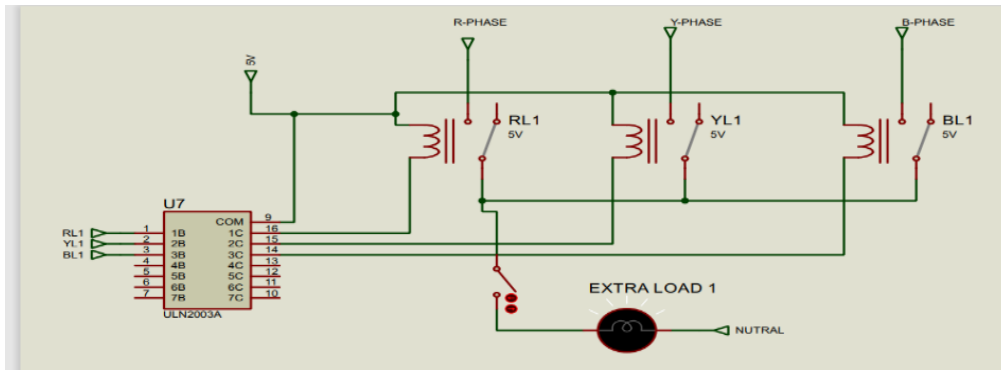
The phase shifting circuits produce section shifts that rely on the arability of phase and load that shifted to the another phase.



**Fig(b)**

• **Extra load phase selector circuit**

The device automatically selects the nearest phase priority and couples a single-phase load to it. Automatic phase switches are used in industrial and residential applications where single-phase loads are required in 3-phase 4-wire networks. Therefore, voltage fluctuations in the network are unacceptable and uninterruptible power supply to responsible single-phase consumers is ensured.



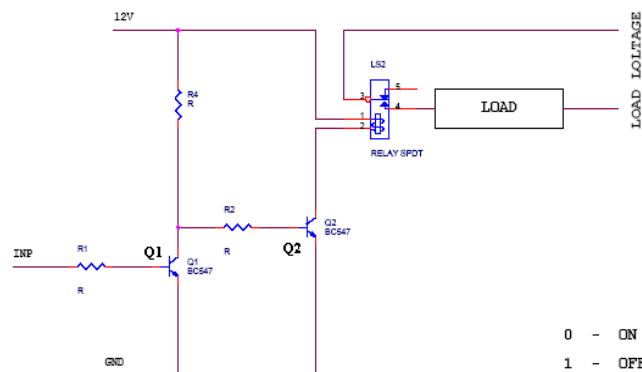
Fig(c)

**HARDWARE**

**Arduino uno R3:-**

The Arduino Uno is a microcontroller board based on the ATmega328 (datasheet). It has 14 digital input/output pins (6 of which can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, USB connection, power connector, ICSP header, and a reset button. It includes everything the microcontroller needs to start up by properly connecting it to a computer using a USB cable, or powered by an ACtoDC adapter or battery.

**Relay Schematic diagram:**



**Relay Schematic Explanation:**

This circuit is designed to manage the load. The load can also be motor or any other load. The load is grown to become ON and OFF through relay. The relay ON and OFF is controlled through the pair of switching transistors(BC 547).The relay is connected in the Q2 transistor collector terminal. A Relay is nothing however electromagnetic switching gadget which consists of three pins. They are Common, Normally shut (NC) and normally open (NO).The relay common pin is connected to provide voltage. The generally open(NO)pin connected to load. When high(5 Volt)pulse sign is given to base of the Q1 transistors, the transistor is conducting and shorts the collector and emitter terminal and zero (0 Volt)signals is given to base of the Q2 transistor. So the relay is turned OFF state. When a low pulse is applied to the base of transistor Q1, the transistor is turned off. Now the base of transistor Q2 is 12V, so the transistor is on and the relay is on. Therefore, the common terminal and the NO terminal of the relay are shorted.. Now load gets the grant voltage through relay.

**ACS 712(Current Sensor)**

ACS712 provides economical and precise solutions for AC or DC current sensing in industrial, automotive, commercial, and communications systems. With a full set of devices, customers can easily implement it. Typical applications include motor control, load sensing and control, switching power supplies, and, overcurrent protection.

**LIQUID CRYSTAL DISPLAY (LCD)**

The use of C-MOS LCD controller and driver ICs result in low power consumption. These modules can be interfaced with a 4-bit or 8-bit microprocessor & micro controller. A 20x4 LCD means that it can display 16 characters per line, two of those lines, and on this LCD each character is displayed as a matrix of 5x7 pixels. This LCD has two registers: Command and Data.

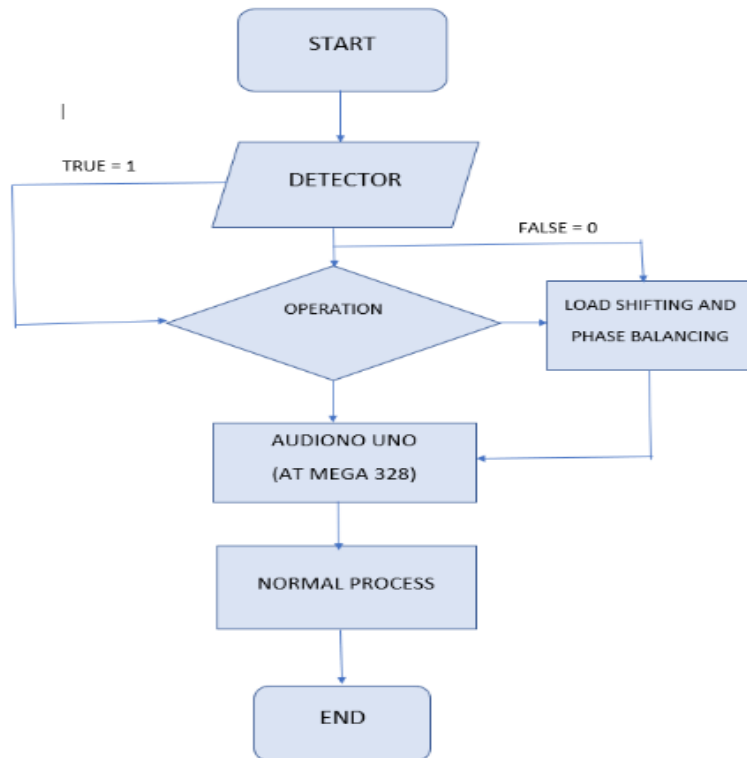
**Octocoupler**

Octocoupler it comes in package of 4-pin DIP (dual in pack) .spacing option available in wide-lead. octocoupler have high Collector-Emitter Voltage ( $V_{CE0}$ ). In octocoupler several CTR ranks are available.

**PROCESS:**

In Automatic load shifting phase balancing supply is given to the load at that time suppose one of the phase is failed then optocoupler count as '0' and command is give to aurdiuno. If the phase is not failed it count as '1' that is normal condition. Relay is provided along with the load for sensing purposes. An ACS 712 current sensor is provided for sensing the current at the time of operation and according to this phase balancing and load shifting are done with the attachment of aurdiuno.

All the operation command is going through Arduino R3 and according to this our phase shifting and load balancing is done by checking the availability of supply and load is shifted according.



**Advantages**

- Unbalancing problem is decreases.
- The system is safe for the electrical network.
- Prevent the single phasing in case of lower loading.
- In the case of single-phaseoverloading, the circuit is automatically shifted load on other low-loaded phase and prevents from one phase overloading, the circuit is balanced.
- Level errors are less.

**III. CONCLUSION**

This project is implemented in many industries using various power sources. The system verifies that all systematic job jobs are turned off for one step. You can avoid many losses such as raw materials, cars and major valuable times. Because this event is not faster, the automatic phase displacement system is the most appropriate and the most appropriate and loads that are not human workforce. The trend function is to avoid these events in the future, and the functionality of the journal's performance is useful because it comes

from what steps and loads are pouring from the reaction. You can then send this information to the engineer for quick calibration. In addition, the flexibility of the priority list can explain a variety of priorities in a variety of times. This is often necessary because production depends on seasonal and other factors.

#### IV. FUTURE SCOPE

- The modifications to be done in this project are addition of voltage sensor or voltage comparator.
- This system can be more accurate in term of timing.
- We can also use the GSM module to get the information.
- This system can be used in DC parameter fault analysis.
- This system can be used to analyze DC parameter errors. In future are more useful for many in electric field and electronic.
- The project itself can be modified to achieve a complete comfort and the safety.

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