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AUTOMATIC PHASE CHANGER USING RELAY AND ARDUINO UNO

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Abstract

In three phase equipment sometimes there can be phase voltage problems created. One phase voltage get low and equipment doesn't work properly. For this proper rating is required in R, Y, B lines. When voltage became lower than rating voltage of any one phase that time phase shifted to one of the other phase. The circuit consist of relay, microcontroller in Arduino Uno, comparator, filter, rectifier, transformer (CT And PT) and switches. This project is designed to check the availability of any live phase, and the load will be connected to the live phase only. If two or three phases are live, the phase will be connected to the phase that is ON only and automatically transferred to the phase that is ON in the event of a main outage or from generator back to main when restored. Arduino Uno overcome all the drawbacks of relay and microcontroller. In Arduino Uno programming is done so that phase will change automatically. Load will be continuing on if there is a problem in phase. Switching is done automatically. This Phase Changer can be used in pharmaceutical industries and in thermal power plant also. Here are also some example where huge application been controlled like infrastructure airport and railways. Automatic phase changer is also been used in commercial and service sector.

Index Terms: *Underground cable, Encoder, Decoder, LCD, RF, Resistance, Voltage Drop.*

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1. INTRODUCTION

Electricity is the main thing in economy now a day. Without it we can't even done small stuff or it make though to us. Engineers and scientist are working to make things better in their way.

In 21st century of modern science there was a thing in mind which we can apply for several daily applications. So on that basis, Automatic Phase Changer came in our mind for project .If there is a low voltage in one or two phases three phase equipment will rum properly using this equipment.

The main equipment using for this project are Arduino uno and relay. Arduino Uno is good to operate, programming is easy can store data and operate automatically as per the programming. There is no need of external RAM for data saving, because microcontroller is connected in it. In order to overcome the various phase change issue and avoid damages in industries and automation area plus hospitals & airports this project will applicable.

1.1. Problem Statement

There is power generation and distribution system instability in developing countries make need of production of automation of power supply and safety. Automation result in more reliable and continuous flow of electricity without damaging the equipment. This equipment will increase efficiency. Our focus is to minimize the difficulties in daily life so that we consider about this project.

1.2. Objective

Objective of this project is changing the phase of the power supply when one or two phase gets low using Arduino Uno and relay. This work is done automatically. The connected phases indicated by red, yellow blue wires. Phase is change by switching relay. Relay also protects the equipment. In this project interlocking is done in between relays.

2. BLOCK DIAGRAM

The block diagram is as follows.3 phase supply of 440 volt is given to the load. Sensors connect to all three wires. All three relays interconnect with each other so that they can interchange the phase. Arduino Uno connects with these three.

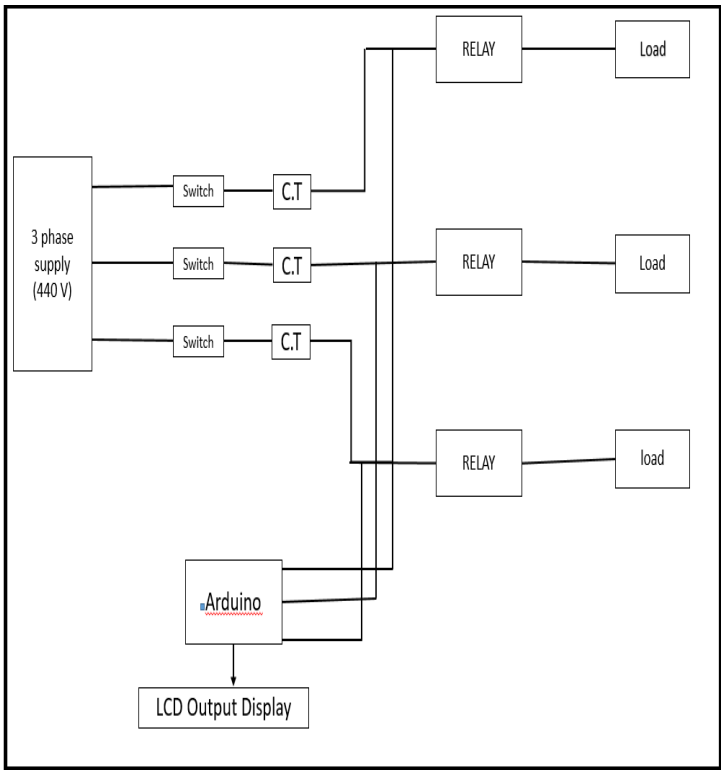
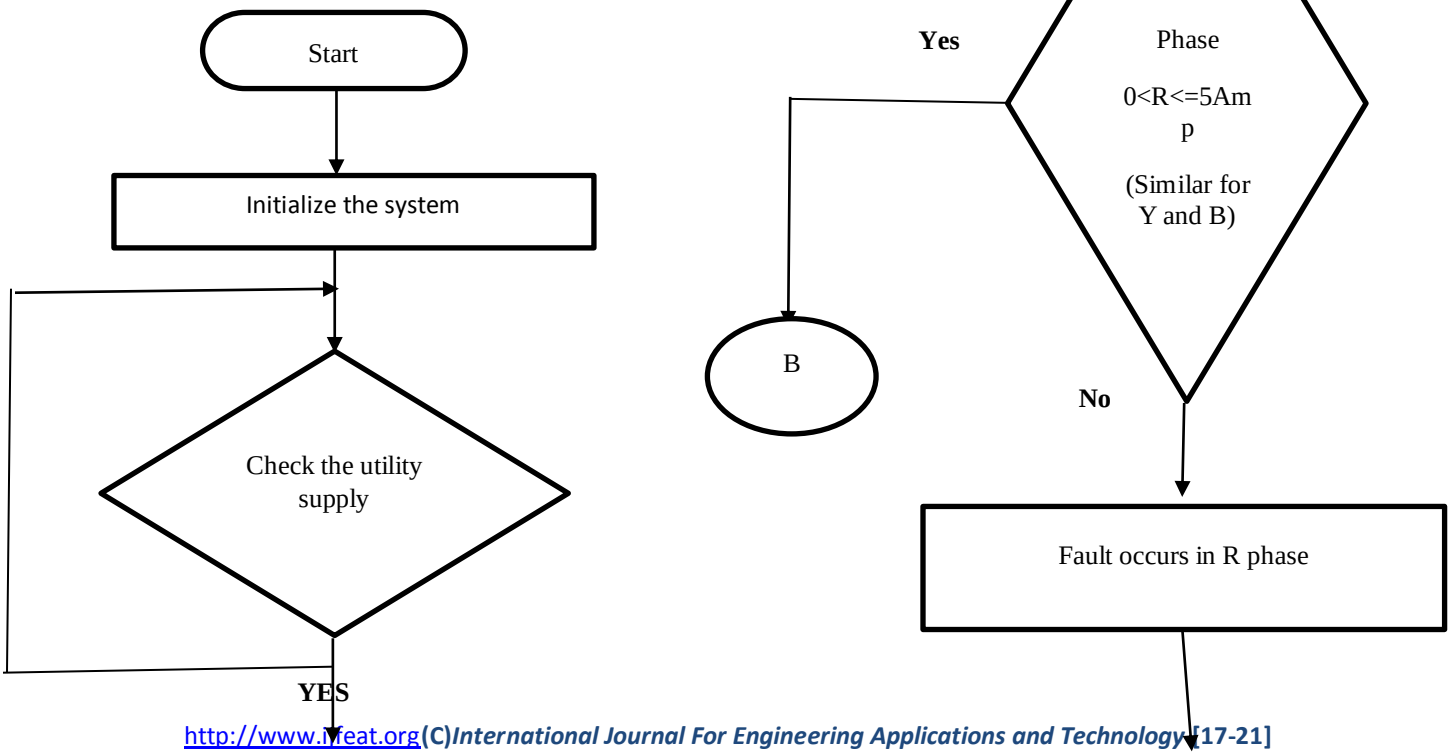


Fig-1: Block diagram

3. FLOW CHART

We draw the flow chart here it is.



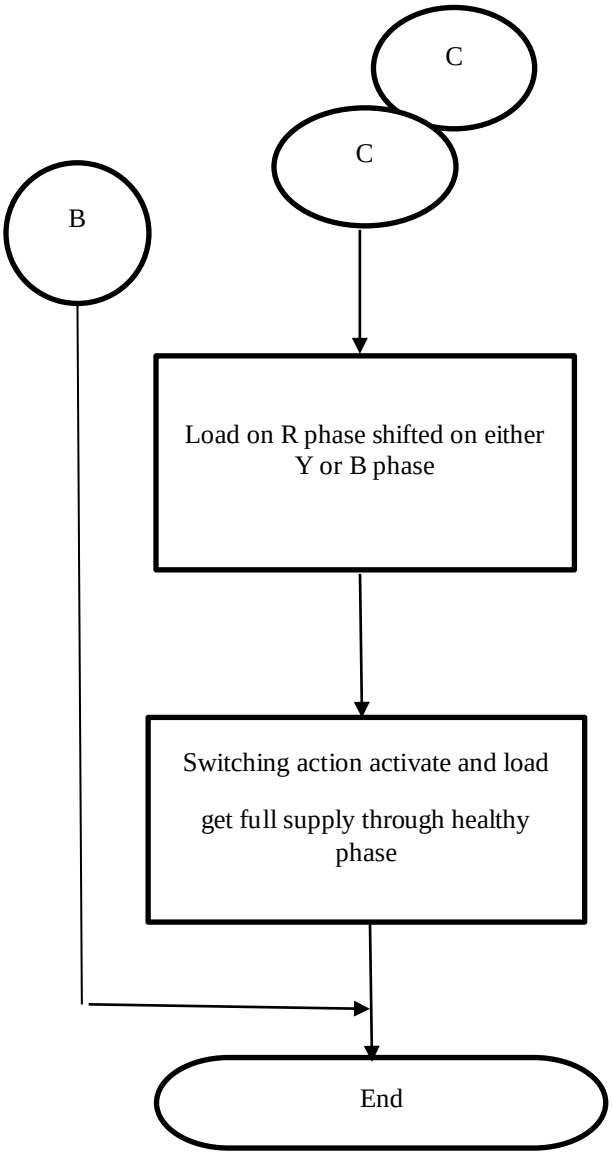


Fig-3: Low chart of Automatic Three phase changer

4. WORKING AND CONSTRUCTION

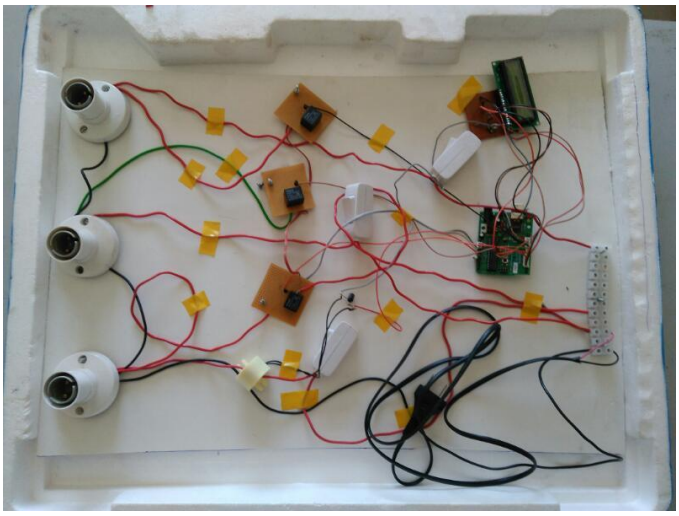


Fig-4: Project photo

Automatic phase changer is use to change the phase of the supply. For three phase supply 440V supply is given and for one phase 230V supply is given. Sensor is for this project so that sensor senses the fault in the supply and gives signal to relay and Arduino Uno.

In this supply is sense by sensor. If supply has no fault then three phase changer will not work and equipment work properly. When voltage of any phase get less than 5V then sensor give signal to Arduino Uno and relay. SPDT relay is used in this project.

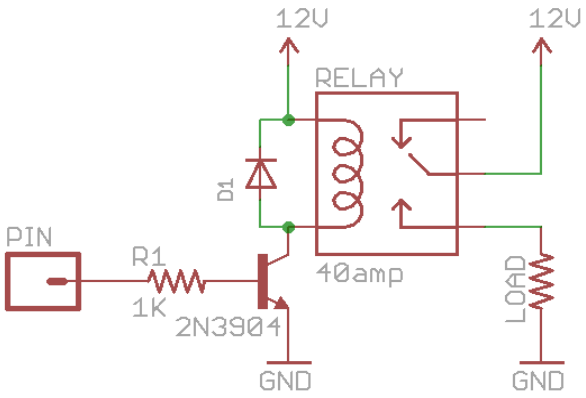


Fig-5: SPDT Relay

Relay trip the phase. This phase change is done by programming of Arduino Uno. Phase shift automatically. When sensor give the signal to Arduino Uno. It trips the SPDT.

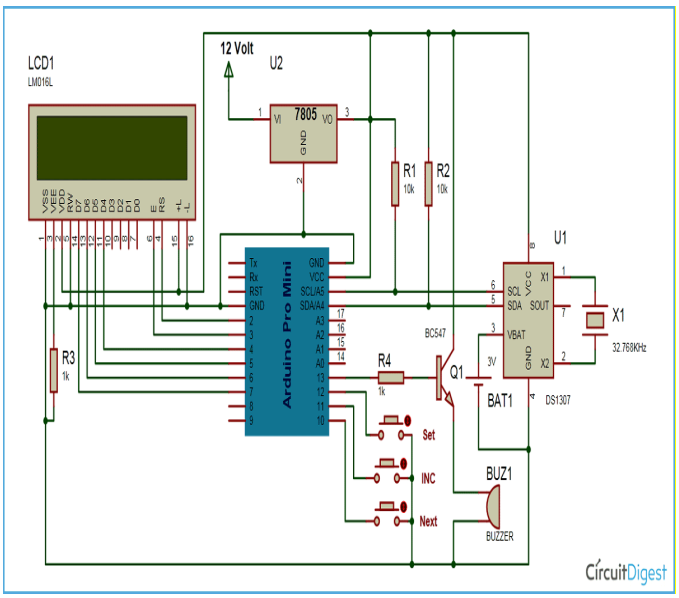


Fig-6: Arduino Uno block diagram

Block diagram of Arduino Uno is shown by above diagram. This Arduino Uno consists of microcontroller and resistance and capacitance. Construction is shown by diagram.

In this way whenever there is a fault in the phase (voltage) get low in the phase. Relay shift the phase of circuit. It helps equipment to work properly. Equipment will work softly by this project.

In this circuitry we are using program as follows:

```
#include <LiquidCrystal.h>
int reading1 = 0;
int sensorPin1 = A0;
int reading2 = 0;
int sensorPin2 = A1;
int reading3 = 0;
int sensorPin3 = A2;
int relay1 =7;
int relay2 =8;
int relay3 =9;
 int celsius1=0;
 int celsius2=0;
 int celsius3=0;
// initialize the library with the numbers of the interface pins
LiquidCrystal lcd(12, 11, 5, 4, 3, 2);

void setup() {
 // set up the LCD's number of columns and rows:
 lcd.begin(16, 2);
 // Print a message to the LCD.
 pinMode(relay1,OUTPUT);
 pinMode(relay2,OUTPUT);
  pinMode(relay3,OUTPUT);
 lcd.setCursor(0, 0);
 lcd.print("Three phase ");
 lcd.setCursor(0, 1);
 lcd.print("Current Measurement ");
 delay(500);
 delay(500);
 delay(500);
 delay(500);
 delay(500);
 delay(500);
 lcd.clear();
}

void loop() {
 // set the cursor to column 0, line 1
 // (note: line 1 is the second row, since counting begins with
0):

 reading1 = analogRead(sensorPin1);
 celsius1 = reading1/2;
 lcd.setCursor(0, 0);
 lcd.print("Current1: ");
 // print the number of seconds since reset:
 lcd.setCursor(0,1);
 lcd.print(celsius1, DEC);
lcd.print(" ");
 lcd.print(" ");
 lcd.print("AMP");
  delay(500);
delay(500);
  delay(500);
    lcd.clear();
     reading2 = analogRead(sensorPin2);
 celsius2 = reading2/2;
 lcd.setCursor(0, 0);
 lcd.print("Current2: ");
 // print the number of seconds since reset:
 lcd.setCursor(0,1);
 lcd.print(celsius2, DEC);
lcd.print(" ");
 lcd.print(" ");
 lcd.print("AMP");
  delay(500);
delay(500);
  delay(500);
    lcd.clear();
     reading3 = analogRead(sensorPin3);
 celsius3 = reading3/2;
 lcd.setCursor(0, 0);
 lcd.print("Current3: ");
 // print the number of seconds since reset:
 lcd.setCursor(0,1);
 lcd.print(celsius3, DEC);
 lcd.print(" ");
 lcd.print(" ");
 lcd.print("AMP");
  delay(500);
delay(500);
  delay(500);
    lcd.clear();
 if (celsius1 >35)
 {
   lcd.clear();
```

```
  digitalWrite(7,HIGH);
   lcd.setCursor(1, 0);
 lcd.print("PHASE 1 FAULTY ");
 delay(500);
    lcd.clear();
 }
  if (celsius2 >35)
 {
   lcd.clear();
   digitalWrite(8,HIGH);
   lcd.setCursor(1, 0);
 lcd.print("PHASE 2 FAULTY ");
 delay(500);
    lcd.clear();
 }
  if (celsius3 >35)
 {
   lcd.clear();
   digitalWrite(9,HIGH);
   lcd.setCursor(1, 0);
 lcd.print("PHASE 3 FAULTY ");
 delay(500);
    lcd.clear();
 }
 else

 {
   lcd.clear();

   lcd.setCursor(1, 0);
    lcd.print("ALL PHASE OK ");
 delay(500);
    lcd.clear();
 }
 delay(500);
 lcd.clear();
}
```

5. CONCLUSION

In this way using this project a correct voltage level at output is achieved using Arduino Uno and relay. In short the control of voltage level at the output of three phase circuitry is done. The circuit also provides an automatic phase change in the circuitry (i.e. R, Y, and B). Hence using this circuitry efforts are minimize and the motive of phase change is achieved automatically with the help of Arduino Uno, which leads to various industrial, medical power plant usages. Moreover the circuit break up problem is also considered in this project.

6. REFEENCE

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