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SMART PROTECTION AND MONITORING SYSTEM FOR HOME DISTRIBUTION

NAME OF GUIDE

PROF. RASHMI PHASATE

NAME OF PROJECTEES

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Abstract – In India utilization of energy can be divided into commercial use and residential use. People utilize house-hold appliances with new technology. In this project we have design smart protection and monitoring system for home. This work provides a smart protection which is reliable and economical for residential use. We have tested the device for different faults and abnormal conditions, test result found that equipment performance can be more efficient. This smart device can also be used for monitoring purpose. Currently we require man when the circuit gets closed but after using this smart device we do not need man power, as in the case of minor fault condition the fault gets cleared by using this device. By using this device consumers also comes to know that how much load he/she is consuming in particular rooms, and it can also be compared with energy meter readings.

INTRODUCTION-

1. In the system currently available we required man power as the circuit gets closed in minor fault condition. Now, for closing the circuit required a system through which its get automatically open and closed under fault condition.
2. Currently in this system it only display the total power consumed by the enter house. Now, there need sub circuits through which the power consumption of each room can be shown.
3. We can also monitor all the parameters of sub circuit i.e for one particular sub circuit we can measured the parameter like voltage, current, frequency and power
4. In the present scenario, the world is facing energy crisis. The optimum solution of this trending problem is to monitor and control the power consumption.The numbers of consumers are growing speedily and thus the energy requirement is more. More the energy requirement more is need to save energy losses. To save losses we need to monitor the power consumption losses,so that we can utilize the generated power.

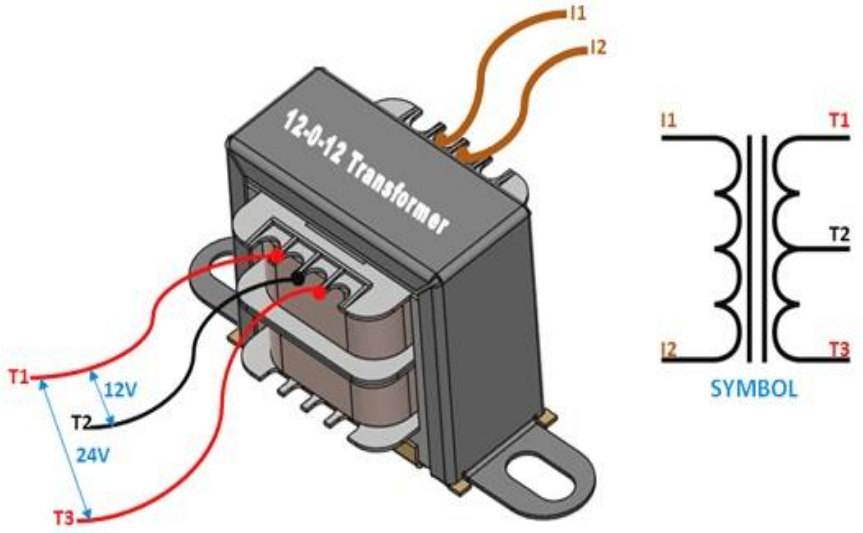
METHODOLOGY-

- **Design of Smart protection and monitoring system for home:** After we came up with the concept of the Smart protection and monitoring system for home we discussed and designed a way to install the components using the journal paper we decided to install it on the PCB for a install the components.

- **Selection of Components:** Based on the results obtained by the calculations we were able to select components for the Smart protection and monitoring system for home. Based on the requirement of capacity and range.

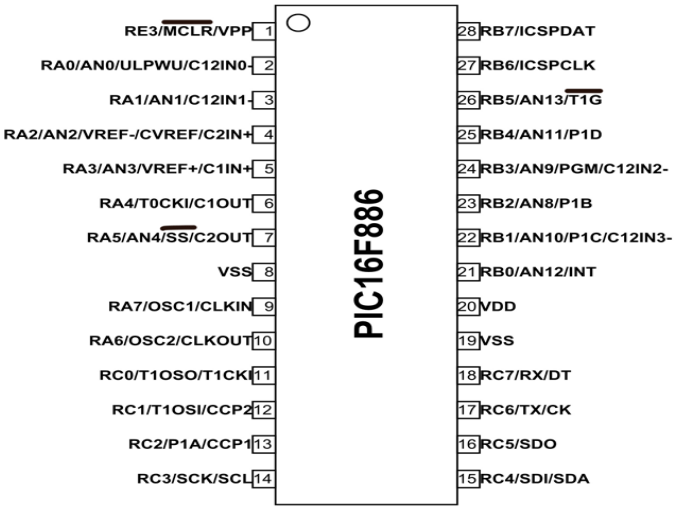
1. **TRANSFORMER**

   A centre-tapped transformer also known as two phase three wire transformer is normally used for rectifier circuits. When a digital project has to work with AC mains a Transformer is used to step-down the voltage (in our case, to 24V or 12V) and then convert it to DC by using a rectifier circuit. In a center-tapped transformer the peak inverse voltage is twice as in bridge rectifier hence this transformer is commonly used in full wave rectifier circuits.



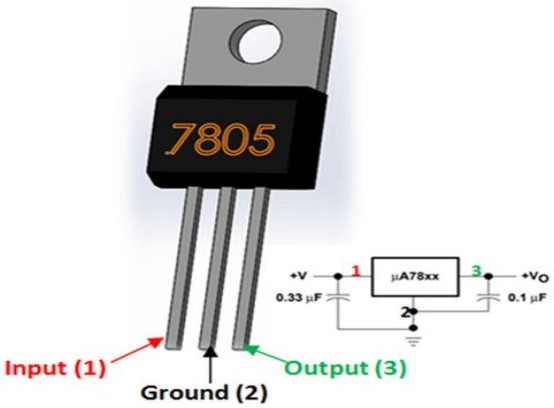
2. **PIC16F886 – 8 Bit Microcontroller**

PIC16F886 is microcontroller from 'PIC16F' family and is made by MICROCHIP TECHNOLOGY. It is an 8-Bit CMOS Microcontroller with nano-Watt Technology. This microcontroller is popular among hobbyists and engineers due its features and cost.



3. **REGULATOR IC 7805**

They provide a constant output voltage for a varied input voltage. In our case the 7805 IC is an iconic regulator IC that finds its application in most of the projects. The name 7805 signifies two meaning, "78" means that it is a positive voltage regulator and "05" means that it provides 5V as output. So our 7805 will provide a +5V output voltage.



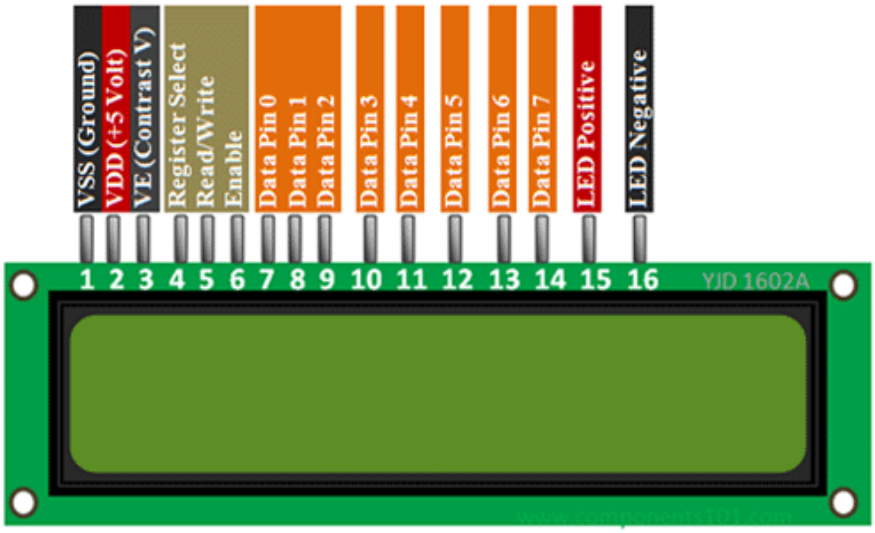
4. **CRYSTAL OSCILLATOR**

A crystal oscillator is an electronic oscillator circuit that uses a piezoelectric crystal as a frequency-selective element. The only oscillator frequency is often used to keep track of time, as in quartz wristwatches, to provide a stable clock signal for digital integrated circuits, and to

stabilize frequencies for radio transmitters and receivers.

5. **LIQUID CRYSTAL DISPLAY(LCD)**

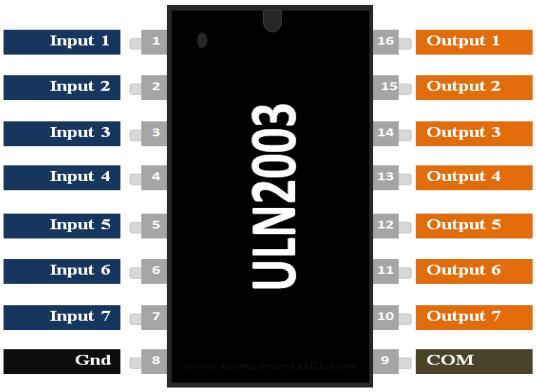
- LCDs are commonly used for monitoring voltage, current, frequency and power.
- Operating Voltage is 4.7V to 5.3V
- Current consumption is 1mA without backlight
- Alphanumeric LCD display module, meaning can display alphabets and numbers
- Consists of four rows and each row can print 16 characters.
- Each character is build by a 5×8 pixel box
- Can work on both 8-bit and 4-bit mode
- It can also display any custom generated characters
- Available in Green and Blue Backlight.



6. **DRIVER IC ULN2003**

The ULN2003 is a 16-pin IC. It has seven Darlington Pairs inside, where each can drive loads up to 50V and 500mA. For these seven Darlington Pairs we have seven Input and Output Pins. Adding to that we can a ground and Common pin. The ground pin, as usual is grounded and the usage of Common pin is optional. It might be surprising to note that this IC does not have any

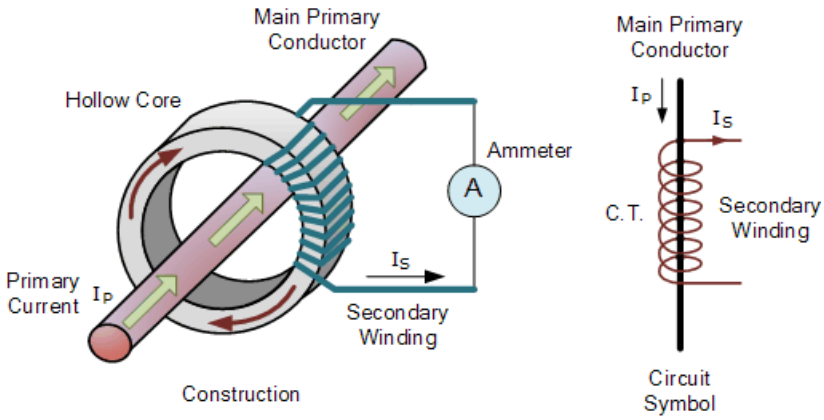
Vcc (power) pin; this is because the power required for the transistors to work will be drawn from the input pin itself.



7. **Current Transformer (CT)**

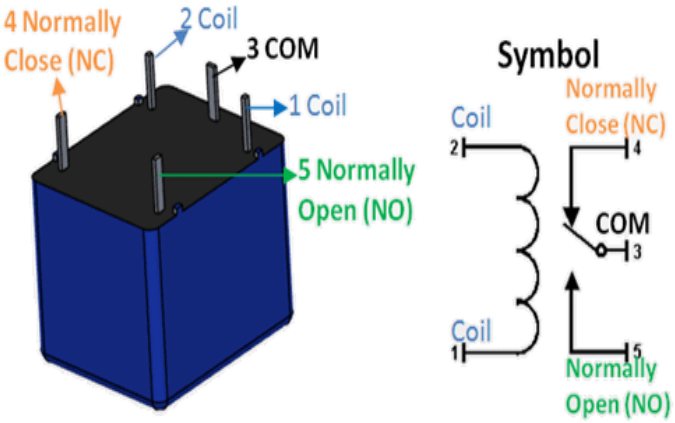
A current transformer is a device used to produce an alternating current in its secondary, which is proportional to the AC current in its primary. This is primarily used when a current or voltage is too high to measure directly. The induced secondary current is then suitable for measuring instruments or processing in electronic equipment, which typically needs isolation between the primary and secondary circuit.

This reduction of high-voltage currents allows for a convenient way of safely monitoring the actual electrical current flowing in an AC transmission line using a standard ammeter.



8. **RELAY**

Relays are most commonly used switching device in electronics. There are two important parameters of relay, first is the Trigger Voltage, this is the voltage required to turn on the relay that is to change the contact from Common → NC to Common → NO. The other parameter is your Load Voltage & Current, this is the amount of voltage or current that the NC, NO or Common terminal of the relay could withstand, in our case for DC it is maximum of 30V and 10A. Make sure the load you are using falls into this range.



- **Testing:** After the completion of the Smart protection and monitoring system for home we are various tests were carried out on the Smart protection and monitoring system for home like the Voltage, Current, load.

I. Overvoltage, overcurrent, overload.

II. Undervoltage, Undercurrent, Underload.

III. L-L fault, L-G fault.

Result:

- We are expecting smart protection system can automatically open the circuit in fault condition, and after sometime the same circuit automatically gets closed in the case of minor fault condition and after that there will be continous supply in the system.
- Consumer knows that how much load he/she is consuming in particular rooms.
- Consumers can also compare energy meter reading with smart protection system and monitoring system

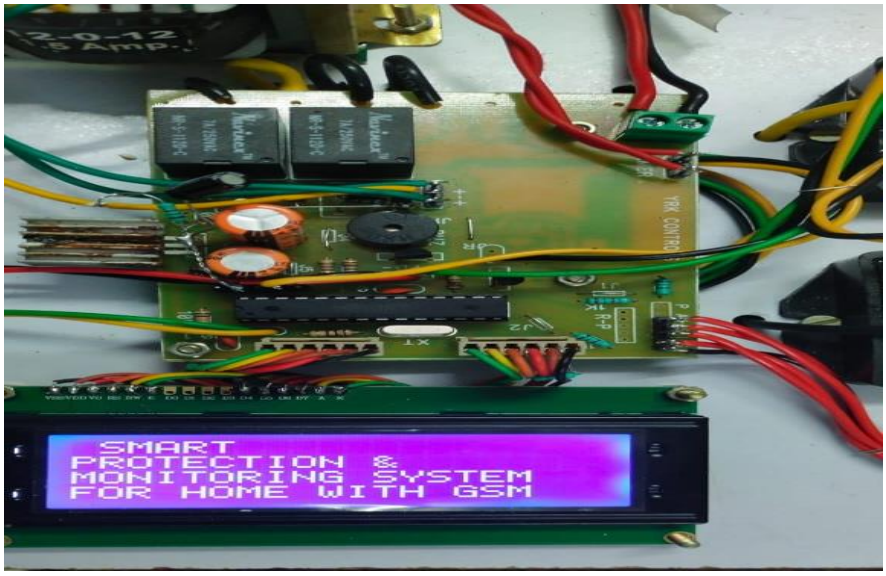
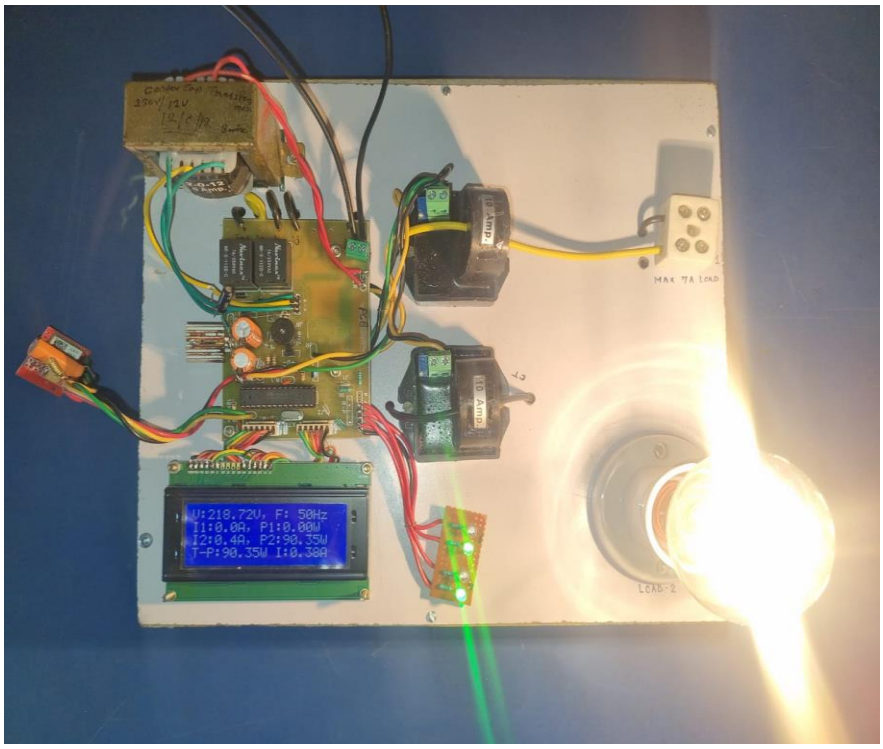
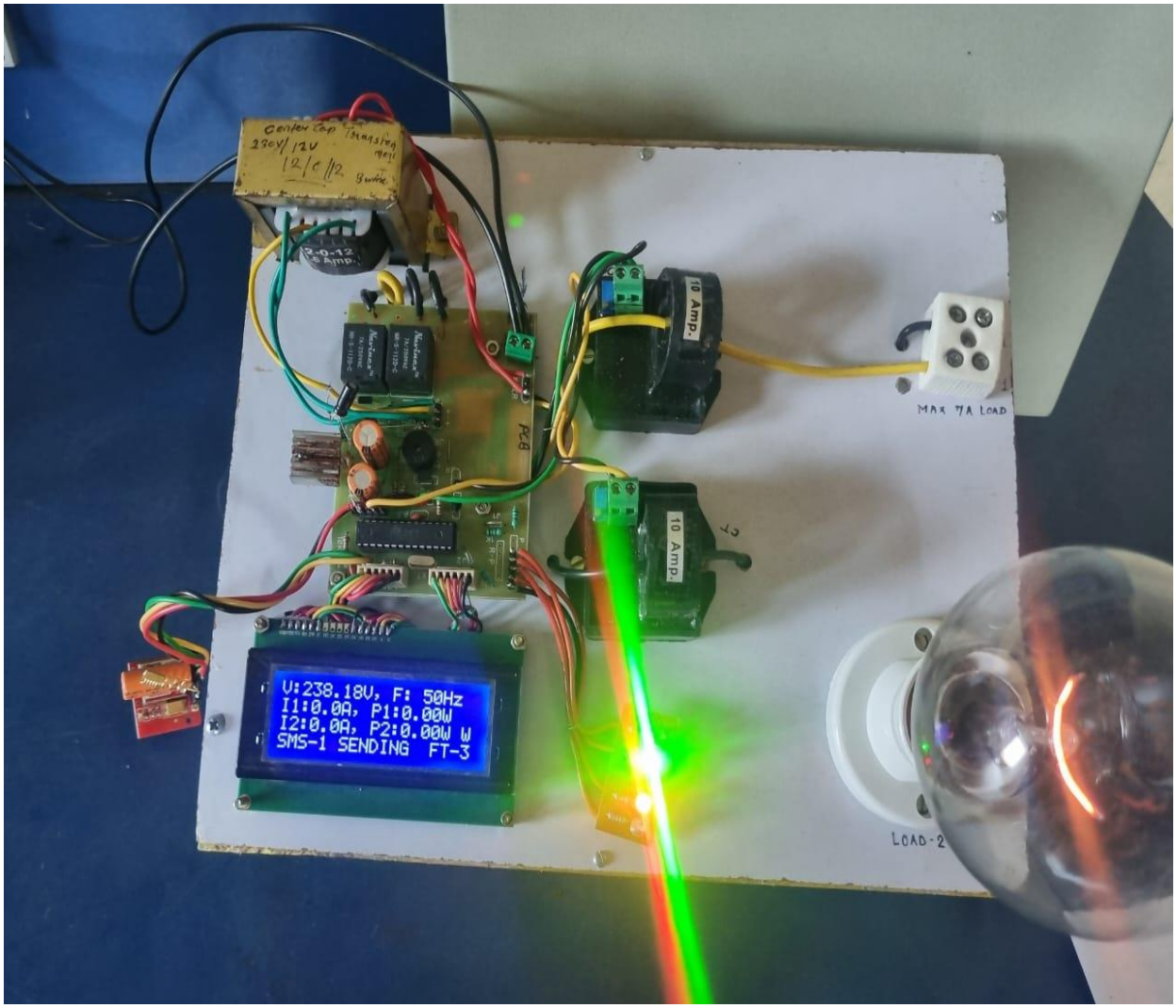


Fig (A). Implementation



Fig(B).100w Bulb in normal condition



Fig(c).200w bulb in fault condition.

Conclusion-

1. In case of minor fault condition man power is required for operating the MCB. As in case of low/high voltage in any fault condition in system the smart device automatically cuts the supply.
2. Consumer does not no that how much load he/she is consuming in particular room. Consumer complaints that if he/she did not consume the power in large amount, so by using smart device consumer knows that how much load he/she consuming in particular rooms.

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