

## IOT BASED LOAD SHARING AND POWER MANAGEMENT

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**ABSTRACT** Load management allows utilities to reduce demand for electricity during peak usage times, which can, in turn, reduce costs by eliminating the need for peaking power plants. In addition, some peaking power plants can take more than an hour to bring on-line which makes load management even more critical should a plant go off-line unexpectedly for example. Load management can also help to reduce harmful emissions. New load management technologies are constantly under development both by hospital, private industry and public entities.

### 1 Introduction

Once the power transmission to sub-system is done the next thing is to distribute the power among all the consumers. The faulty distribution system can lead some areas overloaded and some areas with less loaded. So to avoid these condition, controlling of the power and hence, controlling of the load is required in this areas. It leads to the load sharing technique and the load to design and implement a load sharing and monitoring in the power distribution system by using IoT.

### LITERATURE REVIEW

The most common monitoring/testing 13 methods used for transformer condition assessment are

sharing is the process to prevent the system from the overloading condition. This project explains the details of load sharing and steps for the how It is used to allow electronics things to connect, interact and exchange data. With the help of the IoT the load sharing is controlled and distributed through online by mobile application

discussed by **Darveniza** et al. The traditional routine tests are: Transformer ratio measurement, Winding resistance, Short-circuit impedance and loss, Excitation impedance, and Dissipation factor and capacitance, as well as applied and induced potential tests. Winding Movement Detection and Spectral Response **Test (Arshad & Syed Islam 2017)**. When talking about load management, the

prerequisite issue is to mention about the measurement or rather monitoring of the energy usage in the system. That is when the energy usage is quantified it becomes viable for the consumers to plan the energy savings. Some researchers have already worked in the area of home energy measurements using microcontrollers. **T. M. Chung** et al<sup>5</sup> developed a single phase power meter using arduino microcontroller. The prototype calculates the voltage, current and active power of the load using instantaneous calculation method. The system is 96.54% accurate, though it is limited to measuring active power, voltage and current to a maximum of 13A current. Similar work has been done by **P. Srividya** et al<sup>8</sup> in which power and energy of a single phase system is measured using arduino.

## **OVERVIEW OF THE PROJECT**

Once the power transmission to sub-system is done the next thing is to distribute the power among all the consumers. The faulty distribution system can lead some areas overloaded and some areas with less loaded. So to avoid these condition, controlling of the power and hence, controlling of the load is required in this areas. It leads to the load sharing technique and the load sharing is the process to prevent the system from the overloading condition. This project explains the details of load sharing and steps for the how to design and implement a load sharing and monitoring in the power distribution system by using IoT. It is used to allow electronics things to connect, interact and exchange data. With the help of the IoT the load sharing is controlled and

distributed through online by logging in into the account. Transformer is the vital component in the electric power transmission and distribution system. The problem of overloads, voltage variations and heating effects is very common. It takes a lot of time to its repair and also involves lot of expenditure. This work is all about protecting the transformer from overload condition.

The main process of a transmission system is to transfer electric power from electric generators to customer area, whereas a distribution system provides an ultimate link between high voltage transmission systems and consumer services. This generator can supply important domestic or industrial loads during power shortages. One problem facing generator usage is overloading by consumers which affects the efficiency of the generator.

To improve the quality of power with sufficient solutions, it is necessary to be familiar with what sort of constraint as occurred. Power distribution systems are imposing new constraints on the sub-stations.

## **SYSTEM ANALYSIS**

### **PROPOSED SYSTEM**

The proposed method is to monitor and control the load sharing management. IoT is mainly used to monitor the process anywhere from the world. Automation is fully done with the help of the ARDUINO which supports the Microcontroller. It communicates with the computer through the USB cable. The Arduino UNO can be programmed with the Arduino software. This project, we explain about the load sharing and

power management. The power from the generating station is given to the substation. From there it is given to the transformer where it converts the 220 V supply to the 12 V supply. The voltage regulator is used to regulate the voltage inside the kit. The 5V is taken as output from the voltage regulator and given to the microcontroller as input. The Arduino UNO R3 controls the whole circuit. The switching process takes place through the relays and the transistors. Due to the over load condition the LCD display shows the alert signal as overload. If the domestic gets overload the power does not he affect the hospital. The wifi hotspot is used to track the detail about the power supply.

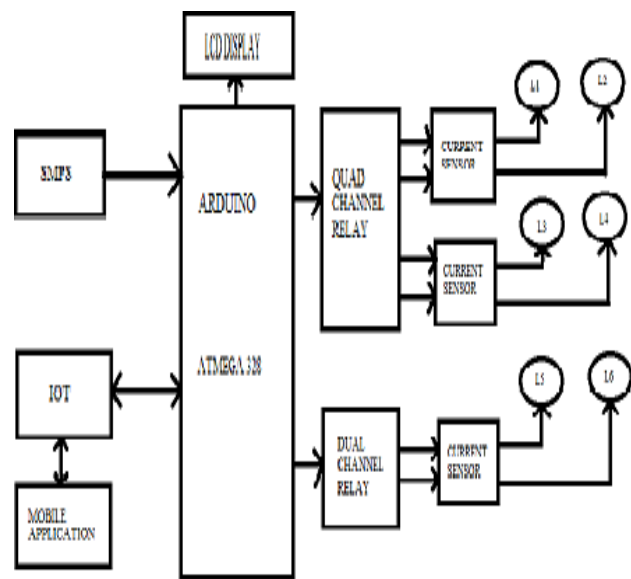
### EXISTING SYSTEM

The existing project mainly aimed on the transformer load sharing, whenever load is increased for certain value and also protecting transformer under overload condition. Drop in efficiency and overheating in secondary winding can be prevented with the help of this project. Load sharing of transformer is possible with the help of this project. It is also use as uninterrupted power supply. The objective of this project is to protect the domestic supply and power transformer from over load power. The existing has mainly for load sharing. we explain about the load sharing and power management. During demand period all the power supply will cut off. So we calculate when the demand occurs .

### Drawbacks

In the existing system, the load sharing is only controlled and the monitoring process is not possible. It leads to various damages to the transformer and also to the distribution system. By the improper function of the transformer is often get overloaded and damaged. The function is not monitored, so there is a chance to affect the system. The overvoltage cannot be managed due to the improper maintenance. The so far proposed load sharing method mainly focuses on the equal sharing of the load and does not manage the power system.

### BLOCK DIAGRAM

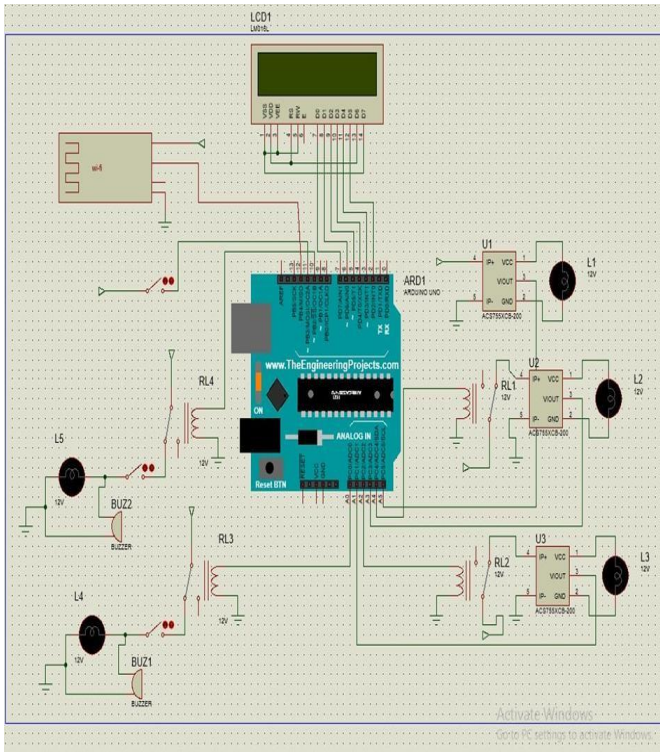


In this project, we explain about the load sharing and power management. During demand period all the power supply will cut off. So we calculate when the demand occurs: **CONDITION 1: HOSPITAL** We prefer most important to human life care, so 24 hours no limits of power, in demand time period. **CONDITION 2: INDUSTRIAL LOAD** If the powers demand occurring 50 percentage, suddenly the total power will be stopped automatically, when the generating power increasing or reach 75 percentage, automatically total power enters into the industries. **CONDITION 3: DOMESTIC** Total power will be stopped automatically, and same time solar power encaging the demand period, when the

generating power increasing or reach 95 percentage , automatically total power enter

into the domestic.

**Circuit diagram**



In this diagram drawn by ISIS professional software was used. In the values of current for different ON loads are specified. This helps to prioritize different loads according to our need. This also helps to monitor and provide the industrial power requirement without interruption. In Fig. 12, the respective currents are shown with respect to time of switching.

**Components and description of units**

- Microcontroller
- Arduino
- Current sensor
- Relay
- LCD
- Wifi Module

**ARDUINO UNO R3**

The Arduino Uno is a microcontroller board based on the ATmega328. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller.



**Microcontroller Atmega328**

The high-performance Microchip Pico Power 8-bit AVR RISC-based microcontroller combines 32KB ISP flash memory with read-while-write capabilities. Programmable watchdog timer with internal oscillator, and five software selectable power saving modes. The device operates between 1.8-5.5 volts.



**Current Sensor**

A current sensor is a device that detects electric current (AC or DC) in a wire, and generates a signal that can be then utilized to display the measured current in an ammeter or can be stored for further analysis in a data acquisition system or can be utilized for control purpose.



**Relay**

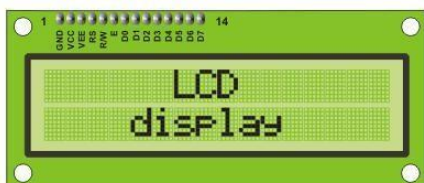
A relay is an **electrically operated switch**. Current flowing through the coil of the relay creates a magnetic field which attracts a lever and changes the switch contacts. The coil current can be on or off

so relays have two switch positions and they are **double throw (changeover)** switches.



## LCD

LCD stands for Liquid Crystal Display. LCD finding wide spread use replacing LEDs (seven segment even digital output. It can be then utilized to display the LEDs or other multi segment LEDs)



## WiFi Module

I've got this ESP8266 WiFi module hanging around that I've never really used. I also have a few Arduino UNOs sitting here not getting any use at the moment. I thought this would be a great time to put the two together for a project I'm working on. It wasn't easy. There was a ton of conflicting and confusing content that made it much more difficult. I'm writing this up in hopes it might help the next guy just a little bit.



## Proposed Model

This section presents the tools and techniques used in the proposed models. Arduino provides a complete package with software and hardware facility, which has been incorporated to implement the proposed system. Pins of the Arduino are set for digital and analog input/output accordingly and may be interfaced with various boards and circuits. proportional to it. The generated signal could be analog voltage or current. or even digital output.

## Hardware Interface

Finally, the hardware interface is presented and Hardware interface includes two portions: one is the control room and one is the field. From the control room, the status of feeders and the current flow can be monitored and displayed via a 16x2 LCD.



## Conclusion

In this paper, a smart industrial distribution and load balancing model is presented. The proposed system is able to provide the status of different feeders with respect to changes in different loads namely domestic, municipal, commercial, and industrial load. For decision making and operation as per desired preferences, the proposed model has used Arduino. It is observed through experimental work that based on the Arduino control preferences, the model is able to provide automatic operation of the distribution as well as load balancing of the power system.

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