

## IOT BASED POWER SHARING AND OVER LOAD INDICATION

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### ABSTRACT

IoT has been a great use in the modern world; the importance research going into IoT based power management systems. The increase in power requirement has pushed the researchers and industrialist to design low power systems. The wastage of energy is a very serious concern; this paper proposes a novel method to reduce the wastage of power in technical universities by the power distribution agencies across the world. The system consists of thermal sensing and IoT enabled microcontrollers for the working. Power management is an important aspect towards the development of the nation. Most of the countries are trying to develop and execute various projects to conserve energy. The proposed methodology is however based on pre-standard smart grids applications in both rural and urban environments. This system proposes the load sharing concept by calculating the load demand using current sensor, the output loads are calculated using relays, as the overload detects it manually cutoffs the power and shares the load by sensing the current value using current sensor. The information of power load is shared to cloud by using ESP8266 and indicated through LCD.

**Keywords:** IoT, ESP8266, RELAY, SMARTGRID, SENSORS, LCD.

**INTRODUCTION:** The distance between the generators and load may be regarding hundreds of miles hence the amount of enormous power exchange over long distances has turned out as a result of the lack of quality of the electric power. During the earlier development stages, the issues on quality of power were not frequently reported. Demanding the quality of power being delivered to the user side has raised the alarm due to the increase in demand for electricity in the customer side. A massive amount of energy is lost during the transportation of the general power which prompts the decrease in the nature of intensity got at the substation. Improve the quality of power with a different solution, it is necessary to be familiar with what sort of constraint has occurred. Additionally, if there is any inadequacy in the protection, monitoring, and control of a power system. The system might become unstable. Therefore it necessary a monitoring system that can automatically detect, monitor, and classify the existing constraints on electrical lines. Today power still experiences control blackouts and power outages because of the absence of mechanized examination and poor deceivability of the utility over the grid. WSN will give the service provide the needed view by collecting information from the different sub-systems of the grid. A sensor node will decide information or to slightly delay this notification whether to notify the sink about this information immediately. PB COOP operation.1) The evaluation of sense data: we define three priority levels {0, 1, and 2} ) The determination of a correspondence strategy: need 0-no further activity is performed, need 2-esteem is sent to the sink since it is considered as earnest and a warning should be straightforwardly sent, need 1-we consider that esteem ought to be accounted for in light of the fact that it might motion as blame or an issue that is less pressing than need 2 information.

**OBJECTIVES OF PROJECT :** The objective of my study would be to analyse the determinants of changing in— consumption pattern of electricity in rural and urban areas. To develop a holistic understanding regarding utility rate of electricity in rural and— urban area. 4 To determine the expenditure in rural and urban areas on electricity consumption.— To identify the number of household were electrified in rural area Following points are few of the likely significance of my study: This study will give a descriptive analysis of how change in consumption pattern electricity is increasing in both rural and urban area. This study will provide – what are the factors responsible for the rise in consumption electricity and the sufferings face by the poor people without electricity in rural areas. This study will help us to know why rural people are using electricity illegally and what reasons are behind this situation and how urban people are enjoying more benefits as compared to rural areas. This study will provide to understand that electricity of 100 watt is been provided to BPL card holder free but it is not sufficient for the rural people because the voltage level of electricity is very low. This study will also

explain how china meter remains only for name sake but do not provide any fruitful. This shows how the rural poor people are misled by electrical officials.

**RESEARCH METHODOLOGY:** This study on consumption pattern of electricity both in rural and urban areas was carried out in and around Rourkela city. The following research tools have been used for my field study: **SAMPLING:** Two types of samples are been taken into account. First, purposive sampling – this method was adopted in order to select the study areas. Second, random sampling – this was used for selecting the sample respondents. Random sample are been taken because the number of households in a single village consist of more than 350 to 400. Therefore, I have used random sampling to collect data for my study. **SAMPLE SIZE:** In this study around six villages are selected namely, Dalposh, Jabpanposh, Bijadehi, Bartoli, Jogitoli, Santoshpur and in urban areas SAIL quarters namely, Sector 3, Sector 4, Cheap type, Executive Koelnagar (privately owned) are been taken 5 into account. In total I have taken 200 household for my study out of which 100 sample were taken from rural areas and 100 from urban areas of Rourkela respectively.

**DATA COLLECTION:** For collecting the data, I used both primary and secondary sources. Primary data was quarters and collected by interviewing people of both rural and urban household. For gathering quantitative data household survey was conducted using pretested schedules. The secondary data's were collected from related articles, journals, literature, documents, published reports. I was also partly a participant observer though it was short duration of study. This enhances my findings and enables me to connect the literature with the field. **DATA ANALYSIS:** Since my study involves both qualitative and quantitative data I used an SPSS analysis to interpret the quantitative data. Quantitative data were tabulated column wise and entered in an excel sheet whereas, qualitative data were interpreted based on the information collected from field study through interview and observation.

**CASE STUDY ON POWER LOSE DURING DISTRIBUTION:** Power losses take place in the progression of distributing electrical energy to users due to technical and commercial losses. The technical losses are due to energy dissipated in the conductors and equipment used for transmission, transformation, sub- transmission and distribution of power. These technical losses are inherent in a system and can be reduced to an optimum level. The losses can be further sub grouped depending upon the stage of power transformation & transmission system as Transmission Losses (400kV/220kV/132kV/66kV), as Sub transmission losses (33kV /11kV) and Distribution losses (11kV/0.4kv). The commercial losses are caused by pilferage, defective meters, and errors in meter reading and in estimating unmetered supply of energy The power wastage during the transmission is very high .the graphs below shows the power lose in rural places of India. The power lose during distribution is one of the very serious concern in power management across the globe

## PROPOSED WORK:

### A. Smart power starts with smart devices

The 'Internet of Things' is gradually permeating every aspect of our lives, including the power infrastructure of our buildings. Smart energy and power quality meters, protection relays, and circuit breakers are helping facility and services teams to see deep within the electrical system. You can now pinpoint more sources of wasted energy and money, while being alerted to more types of risks before they can cause downtime or damage. Device networks are also designed to adapt as your needs grow.

### B. Connecting to every opportunity

For fast decisions and fast response, it's critical to get the data you need when you need it. Within the power infrastructure, IoT-enabled devices offer many networking options, including wireless, Ethernet, and embedded web servers. This connectivity helps you supervise and optimize all of your important energy assets.

Aggregating data to cloud-based apps gives operations teams the access they need to make smarter decisions about energy use, while maintenance teams keep on top of equipment reliability and service needs using mobile-accessible logbooks.

To protect this new level of connectivity against cyberattacks, many manufactures are now focusing on cybersecurity training, code best practices, and more extensive testing.

### C. Making sense of everything

Rather than be overwhelmed by the 'big data' created by all these connected devices, the newest analytic apps convert data into actionable insights, tailoring for each team. Dashboards and reports help you compare performance, set baselines, track progress of initiatives, validate savings, and calculate your carbon footprint.

These new tools allow you optimize energy use without compromising reliability. Predict energy needs and simplify participation in demand response while optimizing the use of onsite renewables. Improve uptime while reducing maintenance costs using strategies like predictive breaker maintenance. And use the cloud as a conduit to expert managed services.

Leading power distribution innovation for over 50 years, Schneider Electric is helping you take full advantage of the new energy paradigm with our IoT-enabled EcoStruxure™ Power architecture. From connected products to edge control, apps, analytics, and services, EcoStruxure Power unifies all aspects of power and energy management into a single, secure, accessible platform. For building owners and facility teams, reliability, safety, efficiency, occupant comfort, and sustainability are taken to the next level. For design engineers, contractors, system integrators and panel builders, proven and interoperable power architectures give you peace of mind and make your job easier.

#### Optimize for efficiency and savings:

Energy waste can be pinpointed, whether due to equipment malfunctions, occupant behavior, or the need to optimize HVAC setpoints.

- **Address risks before they cause downtime or damage**

Devices with features like integrated control capabilities, real-time and logged data, and alarm notifications help teams take action remotely.

- **Adapt and expand intelligence as your business grows**

Meters, circuit breakers, and distribution systems are compact, compatible, and customizable, making it easy to increase intelligence as your operations grow.

- **Enable distributed, digitized devices to connect**

The latest communication technologies allow smart devices to connect together to deliver the full promise o

**BLOCK DIAGRAM OF PROPOSED WORK:**

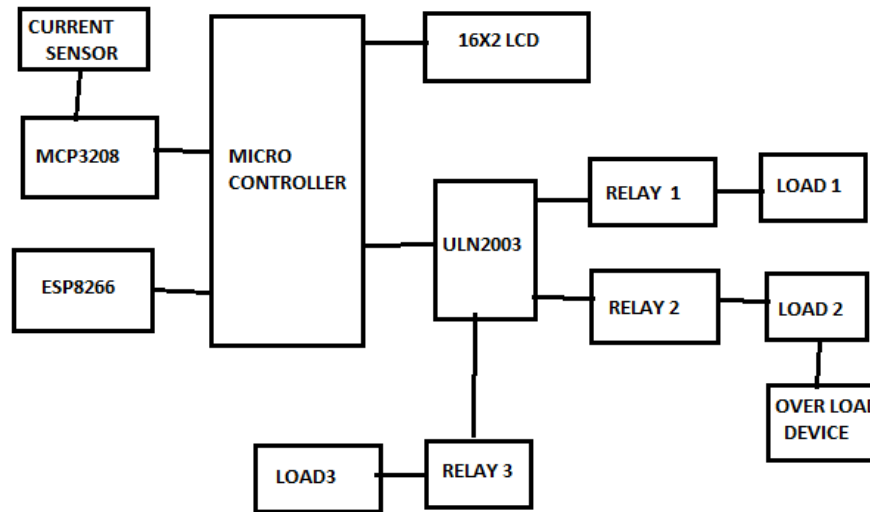


FIG 1 Block Diagram

**RESULT :** The IoT based power sharing and over load detection has been implemented within this paper. Here a profoundly organized and impactful discourse of all our related work relating study, that incorporated the various loads has been presented. The various loads used in our project demonstrated the function that are being performed and hence the communication between cloud and various devices are associated whenever the over voltage is occurred in the alarm is activated and cloud server is gives indication. By using the IoT supply is activated through smart devices ON and OFF indication displayed in LCD BOARD and The Advantages are the immediate attention can take place if a variation happens in the sub-station parameters. IOT based control is easy to identify the fault in any variant. The various parameters can be modified and analyzed continuously through a network.

**HARDWARE OUTPUT:**

PARAMETER	SPECIFICATION	INPUT	OUTPUT
TRANSFORMER	Step down	(0-230)V AC	(0-5)V DC
CURRENT SENSOR	Step down	(0-10)Amp	(0-2)amp
PIC CONTROLLER	Monitor and Control	(0-5)V	(0-5)V
RELAY	Trip	(0-12)V	(0-5)V
IoT	Monitor and control	Monitoring	controlling

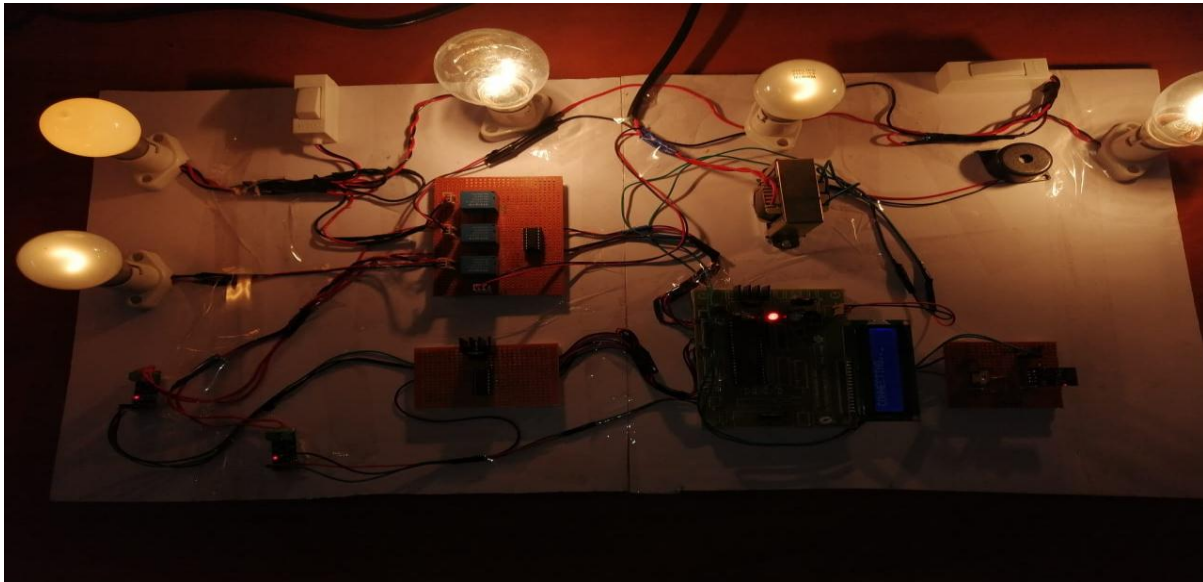


Fig 2 Practical view of Hardware

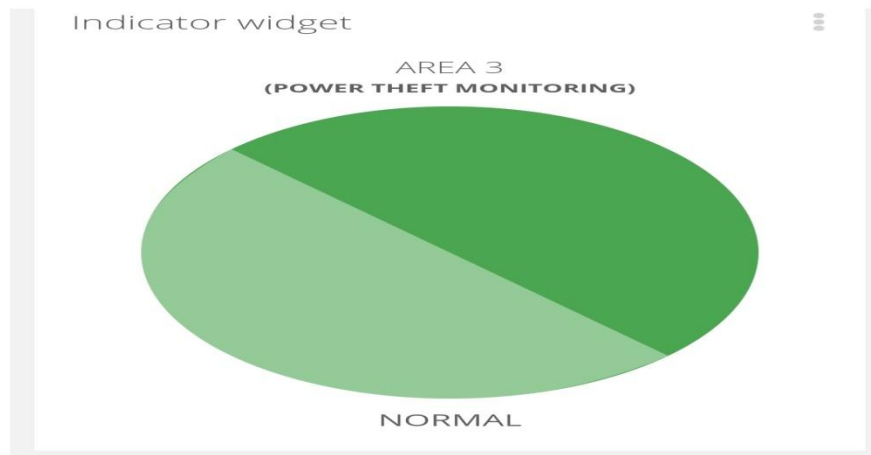


Fig 3 cloud server update under Normal Load it shows the green colour

It indicates that area power supply is normal without any power theft.

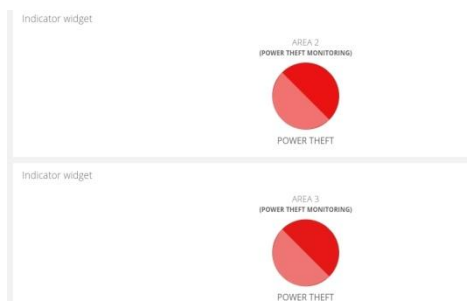


Fig 4 Cloud Server Update Under Power Theft

The red colour indicates that area is under Power theft .



Fig 5 Cloud Server Update Under OverLoad

the orange colour indicates that area is in over load.

**Application:**

1. Sub-station
2. Power generation
3. Distribution area.

**CONCLUSION:**

On completion of our project "Substation Monitoring and Control using Microcontroller and IOT," we can improve the quality of power transferred and provide uninterrupted power supply. Also, real time monitoring of different parameters is done which can ensure safety to the substation and its equipment. Besides, utilizing very propelled IC's with the assistance of developing innovation, the undertaking has been effectively executed. In this manner, the undertaking has been effectively composed and tried the designed system provides easy control of remote substation. It enables two-way interchanges. The substation can speak with the service organization to show, with what sort of fault, a substation has been related. The exact location of the substation can also be determined by sending location coordinates of the substation .finally the experimental output verified.

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