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INDUSTRIAL CONDITIONING MONITORING SYSTEM

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Abstract: This paper aims at helping people manage the various load conditions. Here load condition monitor system which will detect maximum demand and present power factor. This project introduces the Industrial Conditioning Monitoring System to manage the industrial power load easily. Various condition for load crosses the demand value, Based on this approach we design an industry system with the implementation of simulation software and also prototype hardware. It has several advantages, such as better utilization of power, improved load factor. It is microcontroller based system which continuously monitor the present power consumption by the end user. We also keep alert system and automatically trip at level so as to avoid the penalty from provider.

***IndexTerms* – Conditioning, Monitoring.**

1.INTRODUCTION

We are designing our project for the Need of Electrical Load Management in a macro perspective, the growth in the electricity uses and diversity of end use segments in time of use has led to shortfalls in capacity to meet demand. As capacity addition is costly and only a long-time prospect, better load management at user end helps to minimize peak demands on the utility infrastructure as well as better utilization of power plant capacities. The utilities (State Electricity Boards) use power tariff structure to influence end user in better load management through measures like time of use tariffs, penalties on exceeding allowed maximum demand, night tariff concessions etc. Load management is a powerful means of efficiency improvement both for end user as well as utility. As the demand charges constitute a considerable portion of the electricity bill, from user angle too there is a need for integrated load management to effectively control the maximum demand. Maximum demand refers to the maximum amount of electrical energy that is being consumed at a given time. It is measured in kilowatts per hours, which is measurement of total electricity used for a period of time. The purpose of controlling the demand is, not to exceed the contracted maximum demand limit. There are possible loads to be disconnected such as lights, compressor, air conditioners, pumps, fans and packaging machinery.

2.LITERATURE SURVEY

Mrs. Ravi Babu.et.al [1] introduces proposed methodology the reliable supply to the domestic consumers can be improved by having power supply to only the basic loads say lights and fans during the peak hours and reducing the power cuts during the peak hours and great reduction of peaks in the load curve influences the appreciable improvement in the load factor. In this paper an intelligent hardware system called Maximum Demand Limiter is designed for controlling the domestic loads, that is providing supply for the basic loads only during the electrical energy shortage hours, hence with this the power cut rate can be reduced and it may postpone the capital investments on installation of new power projects and there by reduces the electrical energy crisis during peak hours.

Ms. Kishori Rewatkar.et.al.[2] introduces, by using Demand Meter, the delinquency of stealing power may be conveyed to an end. This recommended work will help us in preserving power so that our country will be improved. This research work can make an excessive change in calculation of electricity bill and can give the assistances to the administration by reducing the man power and time consumption. Load management is one of the main functions that allows Industrialist to make up-to-date decisions regarding their power consumption and supports the power suppliers reduce the crest load demand and remake the load profile.

Mr. Syafrudin Masri.et.al.[3] evaluated the DSM measures to gain the energy saving in terms of reducing the electricity bill. With the increasing of electricity tariff by power provider since January 2014, the consumer must bridge the alternative way to make sure the operational cost (electricity bill) is not increase. There are 3 types of DSM measures, which are energy reduction program, load management program and load growth plus conservation program. The load management program by clipping technique is proposed in this case study in order to achieve the goals. This technique is chosen because the expected impact on electrical tariff reduction is greater and efficient cost reduction compared to other techniques such as power factor regulation in energy reduction program. The main strategy is to manipulate the maximum demand by changing the main supply from power provider to the alternative power generator during the peak hours. The integration of the Genset and the MD control device with the existing BAS system will Significantly increases.

The efficiency and reliability of energy monitoring thus promoting the comprehensive energy management of specified building or premises. Implementing this method, the consumer that is USM will consume the same amount of electricity demand without interruption operation of the existing system and at the same time, pay the lowest rate. From the case study presented, USM can generate saving almost 15% from the annual billing per year only from Library (LI) building. This is a huge overview how much USM can save by generate it annually if this proposed strategy is implemented to another buildings. On the other hand, the energy saving could be increase if all the DSM measures are incorporate together to achieve a better energy saving scheme. In order to support the sustainability, the alternative power supply instead of using the diesel gen-set can be considered such as photovoltaic power, wind power or biomass diesel which offer more economic features and less maintenance. Last but not least, the management of USM is highly recommended to support the energy management program in order to improve the efficiency of building's energy. Thus, gain the energy saving.

3.BLOCK DIAGRAM

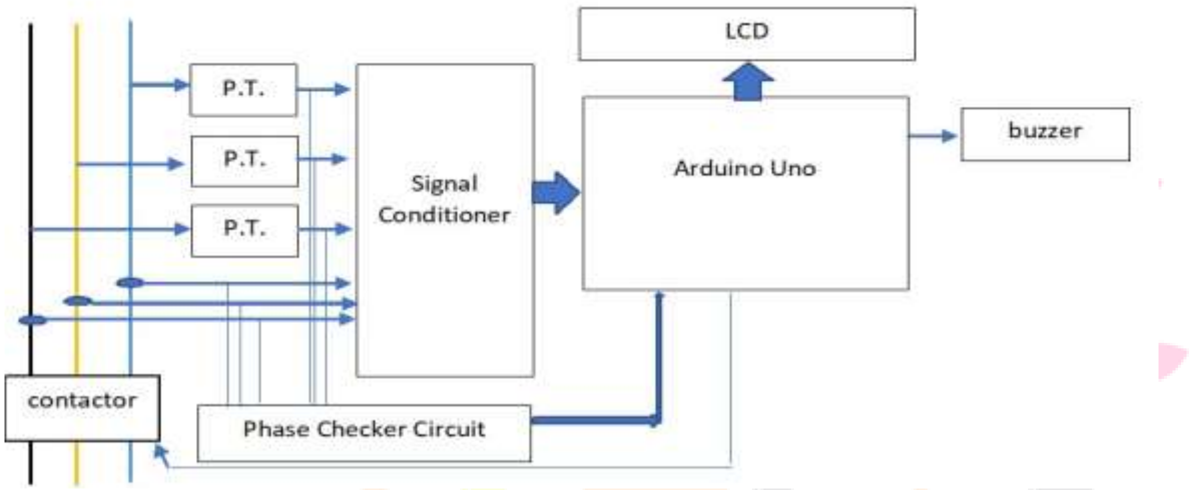

Figure 1: Block Diagram

4. Operation and results

As shown the above figure for industrial load monitoring. It consists of microcontroller, LCD, signal conditioning circuit as step down transformer. Our project in the first stage we have used Proetus for simulation of project circuit. In the circuit the Arduino Uno is used for sensing the input voltage with the help of step-down transformer. In our project step down transformer is used as P.T. to reduce the voltage level from 230V to 12V and this voltage rectified using rectifier and filtered through C type filter this dc voltage given to voltage divider network which reduces to 12dc to required Arduino voltage level. Hence this voltage is continuously monitored and for current measurement uses the CT for sensing each phase current.

The Arduino Uno will measure the input voltage and current flow and same time it calculates the power and if the system current flow is beyond the above limit, then microcontroller will alert the consumer using buzzer.

4.1 Simulation design

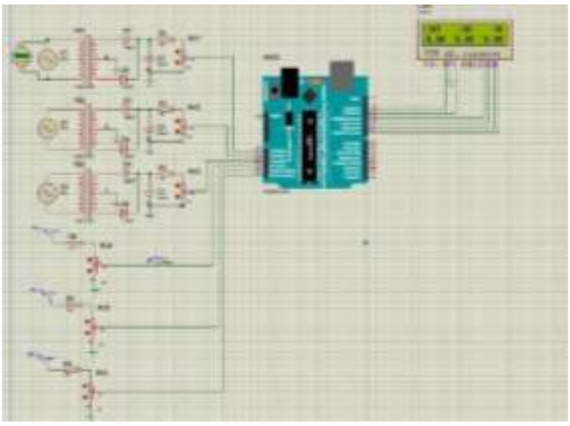

Figure 2: Operational Diagram.

4.2 Case 1: For Voltage:

As shown the fig for case 1 for measurement of voltage of each phase and display on LCD. It consists of Potential transformer (PT), Arduino uno, LCD, signal conditioner circuit. In our project we have used PT as step down transformer of primary 0-230, sec 12-0-12,500ma specification. This transformer will reduce the input voltage 230v into 12v but the output from this circuit is a.c. so we need to convert into dc we have used diode-based rectifier and capacitor as filter to get pure d.c. voltage which is required for Arduino Uno. But the output from this circuit more than 5v range we need to attenuate to required level for that purpose we used voltage divider network for the same and this voltage is applied to microcontroller Adriano uno for measurement of analogue voltage. This voltage then measured with use of 10bit ADC which is inbuilt in AT mega 238 microcontroller. The microcontroller reads this voltage A0 pin for Phase, A1 for Y phase, A2 for B phase and display on LCD. In our project we have use 16*2 LCD in 4-bit mode

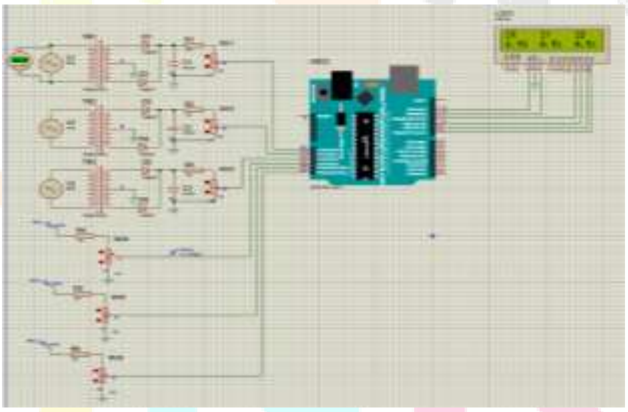

Figure 3: Operational Diagram for voltage.

4.3 Case 2: For Current:

As shown the fig for case 1 for measurement of voltage of each phase and display on LCD. It consists of Potential transformer (PT), Arduino uno, LCD, signal conditioner circuit. In our project we have used PT as step down transformer of primary 0-230, sec 12-0-12,500ma specification. This transformer will reduce the input voltage 230v into 12v but the output from this circuit is a.c. so we need to convert into dc we have used diode-based rectifier and capacitor as filter to get pure D.C. voltage which is required for Arduino uno. But the output from this circuit more than 5v range we need to attenuate to require level for that purpose we used voltage divider network for the same and this voltage is applied to microcontroller Arduino Uno for measurement of analogue voltage. This voltage then measured with use of 10bit ADC which is inbuilt in AT Mega 238 microcontroller. The microcontroller reads this voltage A0 pin for R phase, A1 for Y phase, A2 for B phase and display on LCD. In our project we have use 16*2 LCD in 4-bit mode.

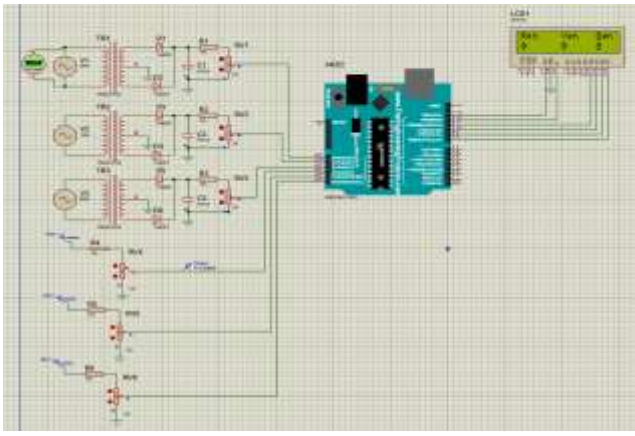

Figure 4: Operational Diagram for Current.

4.4 Case 3: For power

As shown the fig for case 1 for measurement of voltage of each phase and display on LCD. It consists of Potential transformer (PT), Arduino Uno, LCD, signal conditioner circuit. In our project we have used PT as step down transformer of primary 0-230, sec 12-0-12,500ma specification. This transformer will reduce the input voltage 230v into 12v but the output from this circuit is a.c. so we need to convert into dc we have used diode-based rectifier and capacitor as filter to get pure d.c. voltage which is required for Arduino Uno. But the output from this circuit more than 5v range we need to attenuate to required level for that purpose we used voltage divider network for the same and this voltage is applied to microcontroller Arduino uno for measurement of analogue voltage. This voltage then measured with use of 10bit ADC which is inbuilt in ATmegha 238 microcontroller. The microcontroller reads this voltage A0 pin for R phase, A1 for Y phase, A2 for B phase and display on LCD. In our project we have use 16*2 LCD in 4-bit mode.

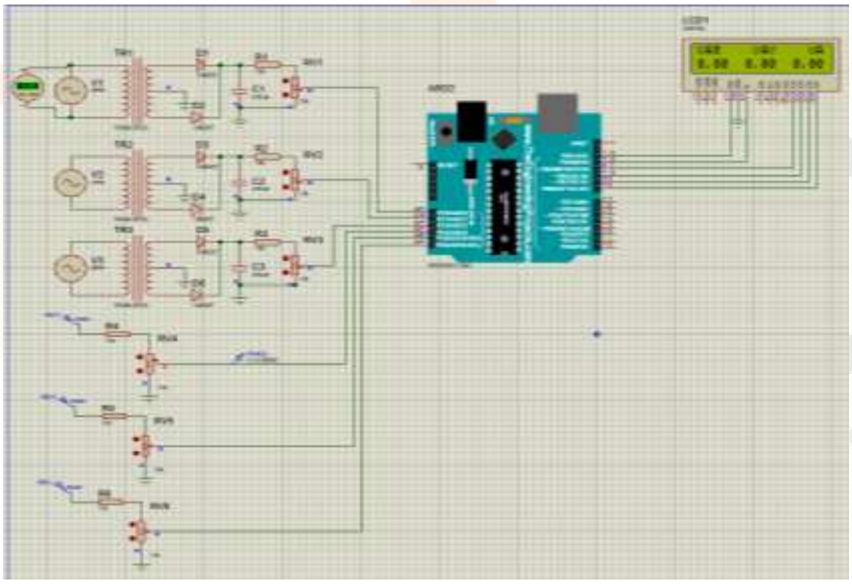

Figure 5: Operational Diagram for power.

4.5 Result

Sr. No.	Parameter	Loads	R phase	Y phase	B phase
1	Voltage	Resistive	229	212	212
2	Current	Resistive	6.96	0.51	0.51
3	Power	Resistive	1.59	0.11	0.51

Table No.1

4.6 Conclusion

In this paper we have designed beneficial industrial load management methods and process. The paper which shows the project is economical with smooth, quick response and user friendly. The concept of project is designed in simulator help of digital microcontroller. This report shows the all-operating conditions of project in simulator.

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References

[1] Mrs. Ravi Babu & Mr. V.P Shree Divya "Maximum Demand Limiter for Reliable Supply by Reducing the Power Cuts to Domestic Loads" ICPEC 2013, 978-1-4673- 6030-2/13/2013, IEEE.
[2] Ms. Kishori Rewatkar, Prof. Shashikant Kewte, Prof. Shital Rewatkar & Prof. Xma Pote "Industrial Power Load Management using Maximum Demand Meter" ICECDS 2017, 978-1-5386-1887-5/17/2017, IEEE.
[3] Mr. Syafrudin Masri & Mr. Syafrudin Masri "Demand Control & Monitoring System as the Potential of Energy Saving" 978-1-4799-6428-4/14/IEEE.
[4] O.V. Thorsen and M. Dalva, "Failure identification and analysis for high voltage induction motors in the petrochemical industry",IEEE Trans. Ind. Appl., vol. 35, no. 4, pp. 810-818, July-Aug. 1999.
[5] S. Nandi, H. A. Toliyat and X. Li, "Condition monitoring and fault diagnosis of electrical motors- A review",IEEE Trans. Energy Convers., vol.20, no. 4,pp. 719-729, Dec. 2005.
[6] J. Wang, Y. Shi, and Y. Zhou, "Intelligent demand response for industrial energy management considering thermostatically controlled loads and EVs," IEEE Trans. Ind. Informat., vol. 15, no.6, pp. 3432-3442, Jun. 2019.
[7] E. Abd-Elsadek, H. A. E.-K. Ashour, R. Hamdy, and M. M. Sedky, " An approach of load management and cost saving for industrial production line using particle swarm optimization,(dept.E)," MEJ. Mansoura Eng. J., vol.45, no. 4, pp.37-44, Nov. 2020.