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Dynamic Demand Response Using Shared Energy Storage

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ABSTRACT: The transformer is unreasonable and cumbersome hardware of force framework. It works for 24 hours of a day and bolsters the heap. Now and then the circumstance may happen when the heap on the transformer is abruptly expanded over its own appraised limit. When this circumstance happens, the transformer will be over-burden and overheated and harm the protection of transformer bringing about intrusion of supply. The best answer for maintain a strategic distance from the over-burdening is to work the quantity of transformers in parallel. It is same like parallel operation of transformers where the quantity of transformers shares the framework load. In the recommended approach second transformer will share the heap when the heap on the to start with transformer will transcend its evaluated limit. The principle point of the work is to give an un-interfered with force supply to the vitality purchasers. By usage of this plan the issue of interference of supply because of transformer over-burdening or overheating can be stayed away from.

KEYWORDS: Transformer, Microcontroller, Current sensor, GSM technology, voltage regulator, Relay

I.INTRODUCTION

Transformer is the fundamental part in the electric force transmission and appropriation framework. The issue of over-burdens, voltage variety and warming impacts is extremely normal. It requires part of investment to its repair furthermore includes parcel of use. This work is about ensuring the transformer under over-burden condition. Because of over-burden the effectiveness gets diminished and the optional winding gets overheated or it might be smoldered. Along these lines, by lessening the additional heap, the transformer can be ensured. This should be possible by working another transformer in parallel with principle transformer through comparator and change over transfer. The comparator looks at the heap on the principal transformer with a reference esteem. At the point when the heap surpasses the reference esteem, the second transformer will naturally be associated in parallel with first transformer and offer the additional heap. In this manner, two transformers work proficiently under over-burden condition and the harm can be forestalled. For home machines, business and mechanical burdens, the transmitted voltage must be soaks down to a dissemination level. This may happen in a few stages. In sub-stations the voltage gets ventured down from transmission level (in the tens or a huge number of volts reach) to the conveyance level (ordinarily under 10,000 volts).
In this work, a slave transformer shares the heap of expert transformer on account of over burden and over temperature. A sensor circuit is intended to log the information from expert transformer and in the event that it is observed to be in over-burden condition, instantly the slave transformer will be associated in the parallel to the expert transformer and the heap is shared. At first when we exchanged ON the heap that heap will be shared by the principal transformer. When burden has been expanded on first transformer over its appraised limit then the stand by transformer (second) will share the heap consequently. Here, we utilized managed 12V, 500mA force supply, 7805 three terminal voltage controller is utilized for voltage direction. Span sort full wave rectifier is utilized to redress the air conditioner yield of auxiliary of 230/12V stage down transformer.
The idea of programmed burden sharing of transformer or over-burden assurance of transformer is finished by different means like by utilizing chip, by utilizing GSM innovation, and by utilizing relay's. In this work we are utilized a transfer and comparator IC's for programmed load sharing between three transformers. The quantity of transformers to be worked in parallel can likewise be expanded by of a specific territory. While working the quantity of transformers in parallel we need to tail some conditions like same voltage proportion, same X/R proportion, same KVA evaluations, same extremity and so forth i.e. we need to work indistinguishable transformers in parallel.

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II.PROBLEM STATEMENT

A key worry in transformer security is the high cost of the transformer and the relative long blackout time that happens when a substantial transformer comes up short. The correct kind of security can frequently distinguish beginning flaws before they get to be major, and along these lines major physical change and long blackout times (Anderson, 1999) Transformer encounters issue which prompts disintegration and increasing speed maturing and disappointment of transformer twisting coming about because of protection disappointments, one of the causes is the over current. Because of over-burden and remotely connected conditions including over present and short out causes ascend in temperature of both transformer oil and winding (bashi,2007) At whatever point the winding temperature raises and surpass transformer warm restrains, the protection will fall apart and may come up short rashly .Proceeds with warm over-burden (over temperature) may debilitate the protection of transformer and bringing about quick transformer death toll.

Over excitation (an expansion in framework voltage), inner issues can prompt weakening, quickening maturing and blames trips in transformer security capacity (reza,2003) So also, transformers must not be subjected to draw out overvoltage. For most extreme effectiveness they are worked close to the knee of their immersion bend, so at voltage above 110% of appraised, the excitation current turn out to be high. Only a couple present increments in voltage results in an extensive increment in current. These substantial current can annihilate the unit in the event that they are not lessened immediately (Blackburn, 2006).However architects and researcher have worked out different path in which the transformer can be secured; one of the such routes is by utilizing a transfer.

III.PROPOSED SYSTEM

By and large, a transformer is implied for circulating force up to certain area. That ought to be continually circulating force up to certain degree of applying burden on it. Be that as it may, at whatever point, the heap will surpasses the farthest point naturally, the transformer will be brake down or it falls flat in exchanging of primary supply to the heap. To keep away from issue, we have build up an undertaking called "Dynamic Interest Reaction Utilizing Shared Vitality Stockpiling for Family unit Vitality Administration" utilizing GSM innovation.

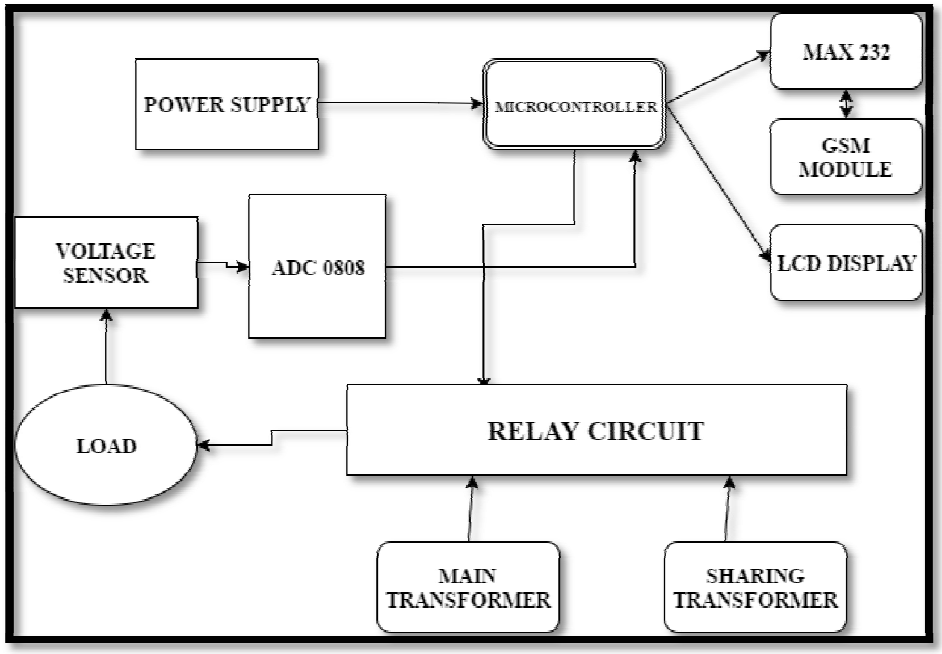

Fig.1 Proposed system

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Transformer:
The potential transformer will venture down the force supply voltage (0-230V) to (0-6V) level. At that point the auxiliary of the potential transformer will be associated with the exactness rectifier, which is developed with the assistance of op–amp. The upsides of utilizing exactness rectifier are it will give crest voltage yield as DC, rest of the circuits will give just RMS yield.

Bridge Rectifier:
Give us a chance to accept that the transformer is working appropriately and there is a positive potential, at point A and a negative potential at point B. the positive potential at point A will forward predisposition D3 and opposite inclination D4. The negative potential at point B will forward inclination D1 and converse D2. As of now D3 and D1 are forward one-sided and will permit current stream to go through them; D4 and D2 are opposite one-sided and will piece current stream. The way for current stream is from point B through D1, up through RL, through D3, through the auxiliary of the transformer back to point B.

IC Voltage Regulators:
A voltage controller is a standout amongst the most generally utilized electronic hardware as a part of any gadget. A directed voltage (without vacillations and clamor levels) is vital for the smooth working of numerous advanced electronic gadgets. A typical case is with smaller scale controllers, where a smooth directed info voltage must be supplied for the miniaturized scale controller to work easily. Voltage controllers are of various sorts. A case of IC based voltage controller accessible in business sector is the well known 7805 IC which directs the yield voltage at 5 volts.The series 78 regulators provide fixed positive regulated voltages from 5 to 24 volts. Similarly, the series 79 regulators provide fixed negative regulated voltages from 5 to 24 volts.

- For ICs, microcontroller, LCD --------- 5 volts
- For alarm circuit, op-amp, relay circuits ---------- 12 volts

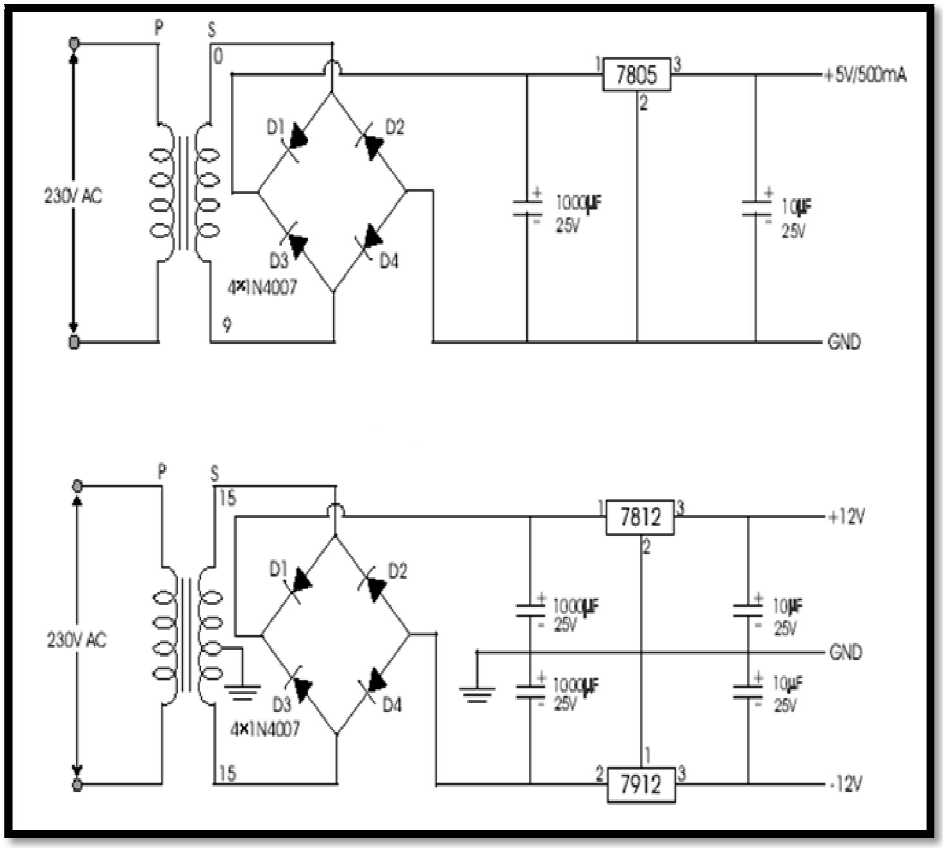

Fig.2 5volt & 12 volt Power supply

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Microcontroller 16F8778:

The 16F877A is a standout amongst the most mainstream pic microcontroller and its simple to see why –it arrives in a 14 Pin DIP Pin Out and it has numerous inward peripherals. The 14 Pin Make it less demanding to utilize the peripherals as the capacities are spread out over the pins .This make it less demanding to choose what outside gadget to connect without stressing to much if there are sufficient pins to the occupation.

One of the fundamental point of interest is that every pin just shared between a few capacity so its simpler to choose what are the capacity. The 28-pin gadgets have three I/O ports, while The 28-pin gadgets have fourteen interferes with, The 28-pin gadgets have five A/D info channels while the 40/44-pin gadgets have eight Parallel Slave Port is actualized just on the 40/44-pin device.[2]

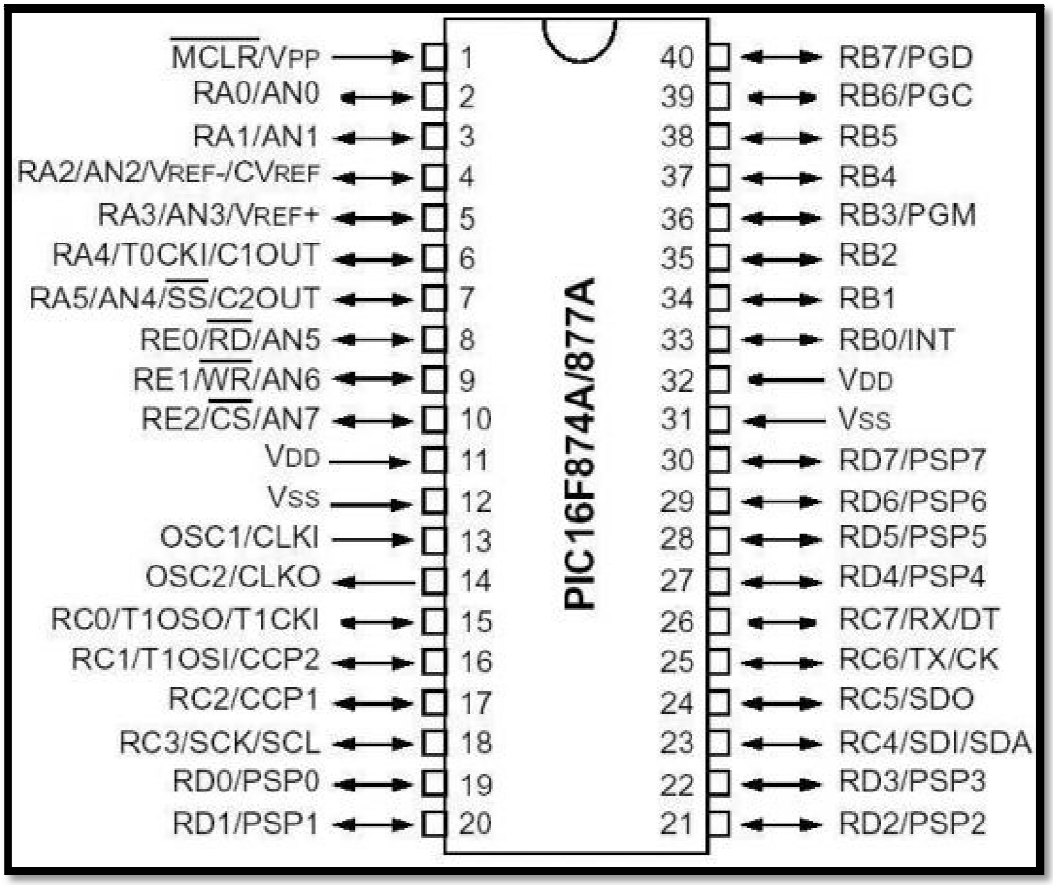

Fig.3 Pin Diagram of Microcontroller 16F8778

GSM Technology:

GSM (Global System for Mobile interchanges) is the innovation that supports the greater part of the world's cellular telephone systems. The GSM stage is an enormously effective remote innovation and an uncommon story of worldwide accomplishment and collaboration. GSM has turned into the world's quickest developing correspondences innovation ever and the main worldwide versatile standard, spreading over 218 nations. GSM is an open, advanced cell innovation utilized for transmitting versatile voice and information administrations. GSM works in the 900MHz and 1.8GHz groups GSM bolsters information exchange velocities of up to 9.6 kbps, permitting the transmission of fundamental information administrations, for example, SMS.

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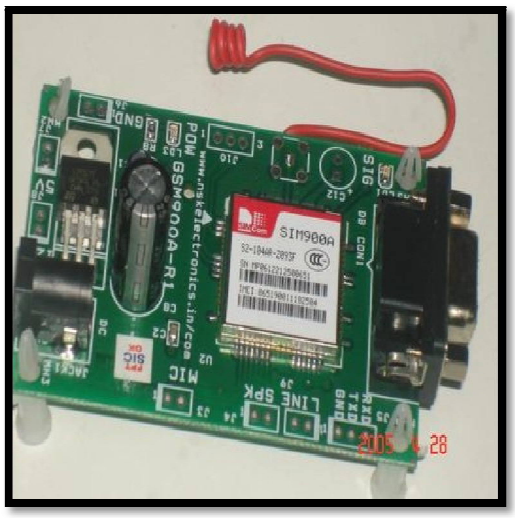

Fig.4 GSM Modem

Relay:
A hand-off is an electrically worked switch. Numerous hand-off utilize an electromagnet to mechanically work a switch , yet other working standards are likewise utilized, for example, strong state transfers are use where it is important to control a circuit by a low power signal (with a complete electrical disengagement amongst control and controlled circuit), or where a few circuit must be control by one sign. The principal transfer were use in long separation broadcast circuit as a speaker: They rehashed the sign rolling in from one circuit and re-transmitted it on another circuit. Transfers were use outer.

ADC0808:
ADC0808 is a 8 bit simple to computerized converter with 8 information simple channels ,that is it can be take 8 distinctive simple inputs .The information which is to be changed over to advanced structure can be chosen by utilizing three location lines .The voltage reference can be set utilizing Verve+ and Verve-pins. The progression size is chosen taking into account set reference esteem .Step Size is the adjustment in simple contribution to Cause a Unit change in the yield of ADC. The default step size is 19.53MV relating to 5V reference Voltage .ADC 0808 requirements an outer clock to work not at all like ADC0804 which has an inside clock .the ADC needs some particular control signal for its operations likes begin change and conveys the information to yield pins. at the point when the change is finished the EOC pins goes low to demonstrate the end of transformation and information prepared to be crest up.

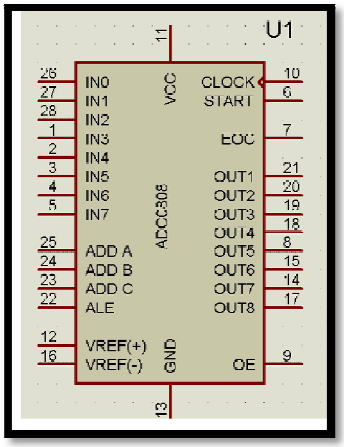

Fig.5 PIN configuration of ADC 0808

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Keil micro-Vision IDE software:
Small scale Vision IDE (Integrated advancement environment) permits designers to implanted application utilizing the keil improvement apparatuses . It incorporates a task administrator (to make and look after undertakings), make use (for amassing ,assembling and connecting inserted application), source code supervisor , debugger and test system into one environment . Keil small scale vision is a free programming with comprehend a number of the torment point for an installed program Developer . This product is a coordinated situation (IDE),which incorporated a content manager to compose programs , a compiler and it will change over source code to hex documents as well. The µVision IDE joins venture administration, run-time environment, manufacture offices, source code altering, and program investigating in a solitary capable environment. µVision is anything but difficult to-use and quickens your inserted programming improvement. µVision underpins various screens and permits you to make singular window designs anyplace on the visual surface. It gives a solitary domain in which you may test, confirm, and upgrade your application code. The debugger incorporates conventional elements like straightforward and complex breakpoints, watch windows, and execution control and gives full perceivability to gadget peripherals. Keil gives a wide scope of improvement devices like ANSI C compiler, large scale constructing agents, debuggers and test systems, linkers, IDE, library administrators, continuous working frameworks and assessment sheets for Intel 8051.

IV. RESULT AND DISCUSSION

Two transformers are associated with the hand-off which is controlled by the implanted controller .the fundamental transformer is 9v and sharing transformer is 12v. The force supply through the 7805 voltage controller is given to the microcontroller which gives 5v supply. Through the small scale controller, we are controlling this offering of energy to the assistance of hand-off .The transfer is over-burden hand-off . The transfers will excursions to another transformer after surpassing the point of confinement of burden. Burden is resistive load.[5]The ADC 0808 is a simple to advanced converter which changes over the estimations of simple current worth to the computerized esteem. This data is gone to the controller and after that the controller checks the direction and advances it to the GSM modem. The modem quickly sends that specific sms to the mobiles for which it is doled out and this will be shown as burden status on the LCD show. On account of utilization SIM 900 we get present rating message on cellular telephone. The LCD show demonstrates the yield of the task .the showcase is 16x2 which show which transformer is on or which is off and by utilizing Gsm innovation message of current rating is additionally show in portable .

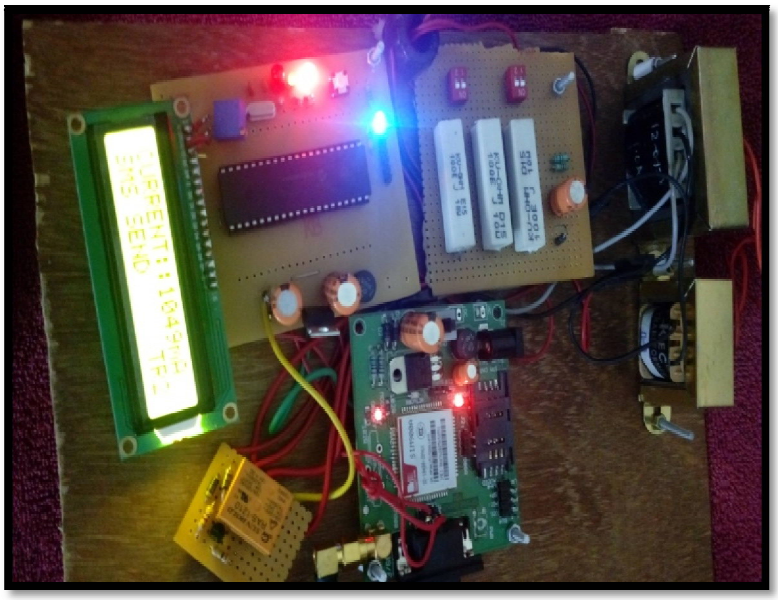

Fig.6 Hardware Implementation

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V. CONCLUSION

This paper has displayed the configuration of a productive, practical and solid Microcontroller-Based Automatic Transfer Switching System (MATSS), which can precisely screen the force supply from the service organization and react properly upon a force blackout by beginning an on location generator to supply power. Upon the rebuilding of utility power, the framework drives the heap back to utility and close down the generator. Incorporated into the configuration is an overvoltage/over-current assurance unit. This empowers the framework to consequently changeover when the voltage or current ascents over its rating, to shield gear from harm. This new framework accordingly offers significant operational focal points and cost sparing over the manual framework at present utilized by numerous organizations as a part of Ghana. The switch move mode utilized (open move mode) disposes of the issue of standby force generators "back-encouraging" into the utility lines.

REFERENCES

[1] Zhimin Wang, Cheng hong Gu, Furong Li, Philip Bale, Hongbin Sun, " Active Demand Response Using Shared Energy Storage for Household energy management",IEEE,VOL.4,NO.4,Pp1888-1897,Decmber 2013.

[2] Nan Ei Ei Naing , Zaw Min Min Htun," Design and Construction of Load Sharing control system using PIC microcontroller"IJECSE,VOL.3, NO.2,Pp.138-147.

[3] S.R.Balan, P.Sivanesan1, R.Ramprakash2, B.Ananthakannan3, K.Mithin Subash4 KIT , " GSM Based Automatic Substation Load Shedding And Sharing Using Programmable Switching Control ",SJSR,VOL .6 NO.2 ,Pp.59-61,2014.

[4] Dr. JBV Subrahmanyam ,TC subrahanyam ,TC shrinivasroa , M. kalavani, Haritha Inavolu., " Auto control of standby transformer using microcontroller",IJAER,VOL.NO.2,Issue No. V ,November 2011.

[5] Ashish R. Ambalkar1, Nitesh M. Bhoyar 2, Vivek V. Badarkhe 3 ,Vivek B. Bathe, "Automatic Load Sharing of Transformers",IJSRD, Vol. 2, Issue 12, Pp.739-741,2015.