# IMPLEMENTATION OF DC-DC CONVERTER FOR ENERGY MANAGEMENT SYSTEM USING RENEWABLE SOURCE

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***Abstract***
*This paper proposes a dc-dc converter for energy management system using WSN (Wireless sensor network). This proposed converter has the ability to controlling the electrical power of loads. The WSN is used for cost efficient monitoring and controlling over the geo location. The main aim is to provide low cost and flexible operation. Increasing power consumption is becoming a huge problem. This research helps to users and power distribution centre to manage the power in an efficient manner. For controlling the parameters, it sends intimation to the user when the parameter exceeds their predefined values. To provide a high degree of security user or authenticator ID is given by server to consumers. Due to ID users only access their corresponding loads. In this paper, microcontroller is employed to interface a digital signal with WSN.*
***Keywords:*** *WSN, IC, Monitor, Control*

## Introduction

Energy management aims to regulate and monitor the energy consumption of an organization, company or an individual. Home energy management is related to individual and households. Smart home energy management introduces advanced and smart technology to the energy management process to make it more efficient for every individual to manage their energy consumption that could be caused by human errors in his/her house. The human errors are very common in almost every house. New technologies should be used to ensure that new invention can benefit as the most. With the growing idea of the IoT or internet of things, it is only logical that creat systems that serve the society's needs using this technology.

With the help of the internet things hundreds of small tasks can be done automatically which makes things quicker and more efficient. Improvements in power electronics technologies and utilization of renewable energy sources for power generation have given rise to the use of distributed generation and create concept of smart grids and micro grids to overcome rapid increase in the demands for electricity and depletion of conventional energy sources. Monitoring of power system parameters like voltage, current and power at distribution level is crucial for efficient functioning of smart grid. The power exchange between the smart grid and the utility grid happens by switching. This switching needs complete synchronism between the smart grid and the utility grid.

Monitoring of the power system essentially has two main modules: communication module which is the backbone and the sensor module for sensing the different parameters like voltage, current and power. The basic communication architecture is simple and the actual network topologies can be very diverse and depend mostly on the field level network. The sensor node is one of the main parts of WSN. The hardware of a sensor node generally includes four parts: power and power management module, a sensor, a microcontroller, and a wireless transceiver.

The power module offers the reliable power needed for the system. The sensor is the bond of a WSN node which can obtain the environmental and equipment status. A sensor is in charge of collecting and transforming the signals, such as light, vibration and chemical signals, into electrical signals and then transferring them to the microcontroller. The microcontrollers receives the data from the sensor and processes the data accordingly.

**Energy Management System**

Implementation of dc –dc converter for energy management system block diagram is given. In this paper, proposed architecture to monitor and control various parameters like voltage, current and power using a Wireless Sensor Network (WSN) technology. Voltage and current in load can be monitor and controlled by using IoT.

In proposed System, designed an converter with multi inputs which going to monitor the load by using voltage and current sensors. To monitor the Voltage and current Characteristics of converter through IoT, which can able to monitor and control the load through wireless communication. This protocol satisfies load demands and power demand to real house application.

Load can be monitor and controlled. It can be operated for a longer distance. On using the Multi Input multi Port in a single hybrid converter, so maintenance will be easier. High Efficiency is generated on the converter. On using the Natural sources we can save the EB power.

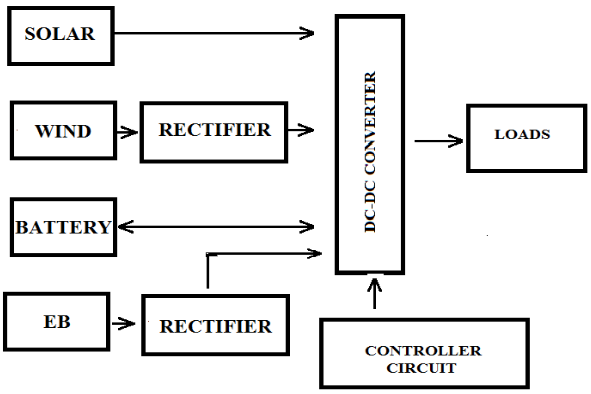



**Fig.1: Block diagram**

The sensors in the transmitter section consist of temperature current sensor, potential sensor. It senses the signal and sends it to the microcontroller unit for processing.

The display unit displays the values of current and potential sensor received by microcontroller unit. The receiver receives the sensed data through ATMEGA 32 and the data is transmitted by transmitting antenna. In the receiver section, WSN is used to receive the data from Transmitter. The received signal is feed on the Computer/Laptop.

## Simulation Diagram & Result

Implementation of dc-dc converter for energy management system simulation diagram is given by

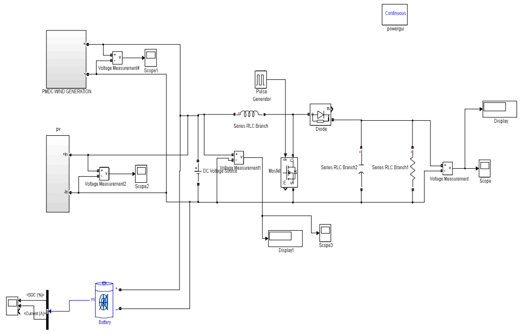


**Fig.2: Simulation diagram**

The proposed wind part is produced 50v of input voltage and fig.3 is shows the input voltage waveform of wind system.

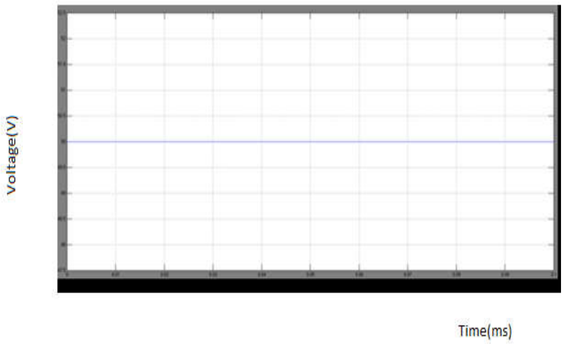



**Fig.3: Wind waveform**

The proposed solar part is produced 50v of input voltage and fig.4 is shows the input voltage waveform of solar system

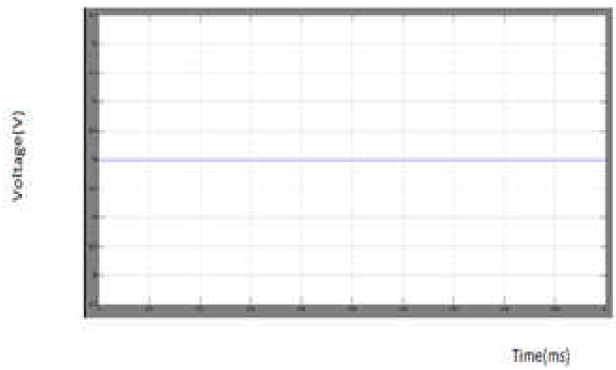



**Fig.4: solar waveform**

The proposed battery part is produced 50v of input voltage and fig.3 is shows the input voltage waveform of battery system.

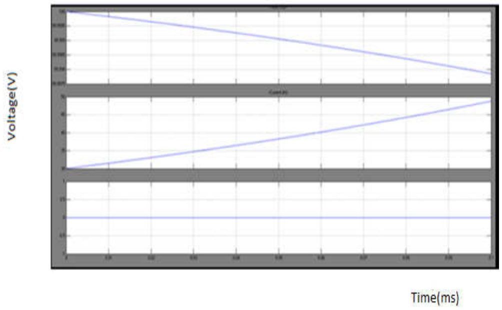



**Fig.5: Battery waveform**

The proposed dc part is produced 50v of input voltage and fig.3 is shows the input voltage waveform of dc system.

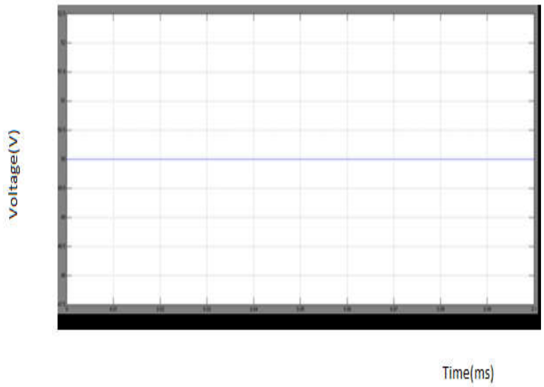



**Fig.6: DC waveform**

## Proteus Diagram

It proteus operation generate different output voltage and output current for various loads.

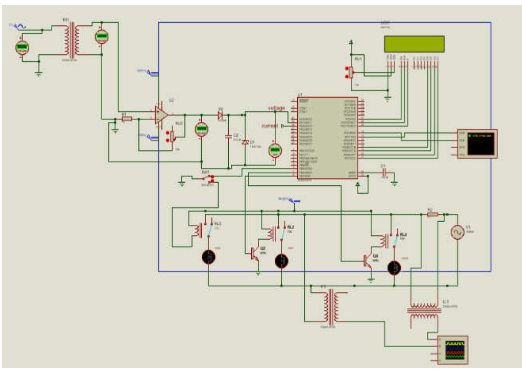


**Fig.7: Proteus diagram**

Fig 8 Shows the output voltage and output current for initial state.

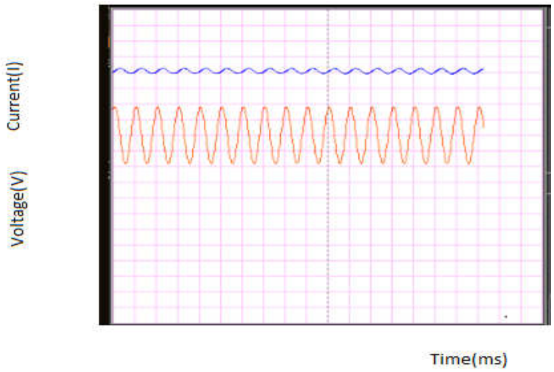



**Fig.8: Initial State waveform**

Fig 9 Shows the output voltage and output current for Load A Waveform is given by

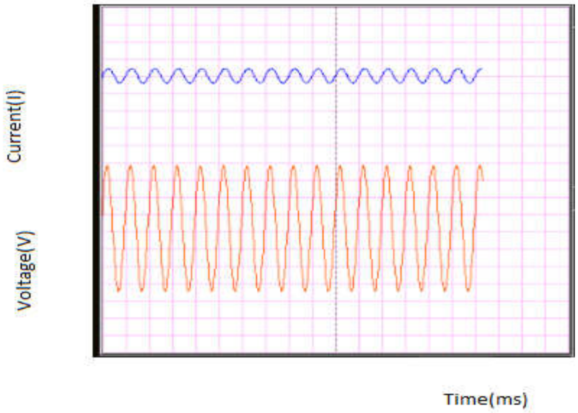



**Fig.9: Load A waveform**

Fig 10 Shows the output voltage and output current for Load B Waveform is given by


**Fig.10: Load B waveform**

## Control Circuit

## Micro Controller Unit

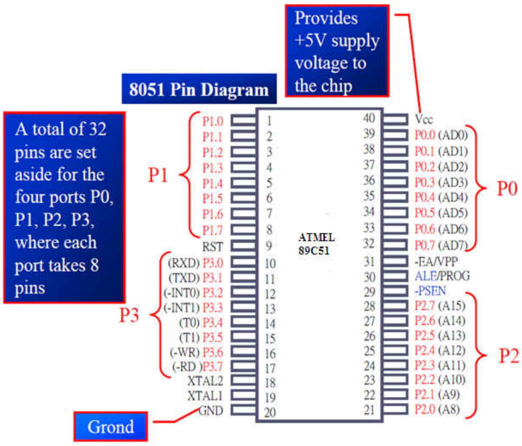



**Fig.11: ATMEL 89C51 pin details**

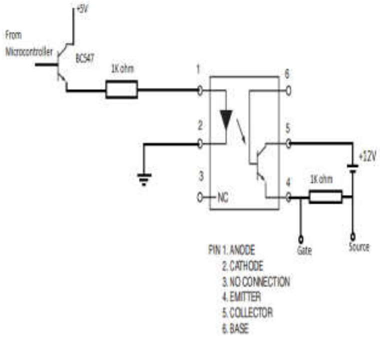
The AT89C51 is a low-power, high-performance CMOS 8-bit microcomputer with 4 Kbytes of Flash Programmable and Erasable Read Only Memory (PEROM). The device is manufactured using Atmel's high density nonvolatile memory technology and is compatible with the industry standard MCS-51Ô instruction set and pin out. The on-chip Flash allows the program memory to be reprogrammed in-system or by a conventional nonvolatile memory programmer.

By combining a versatile 8-bit CPU with Flash on a monolithic chip, the Atmel AT89C51is a powerful microcomputer which provides a highly flexible and cost effective solution to many embedded control applications. The AT89C51 provides the following standard features: 4 Kbytes of Flash, 128 bytes of RAM, 32 I/O lines, two 16-bit timer/counters, five vector two-level interrupt architecture, a full duplex serial port, on-chip oscillator and clock circuitry. In addition, the AT89C51 is designed with static logic for operation down to zero frequency and supports two software selectable power saving modes.

**Table 1.1 showing the features of AT89C51**

| | |
|---|---|
| Part Number | AT89C51 |
| ROM | 4K |
| RAM | 128 bytes |
| I/O Pins | 32 |
| Timers | 2 |
| Interrupts | 6 |
| Vcc | 5 V |
| Packaging | 40 |

## Driver Unit




## Description

In contrast to bipolar transistors, MOSFETs do not require constant power input, as long as they are not being switched on or off. The isolated gate-electrode of the MOSFET forms a capacitor (gate capacitor), which must be charged or discharged each time the MOSFET is switched on or off. As a transistor requires a particular gate voltage in order to switch on, the gate capacitor must be charged to at least the required gate voltage for the transistor to be switched on. Similarly, to switch the transistor off, this charge must be dissipated, i.e. the gate capacitor must be discharged.

When a transistor is switched on or off, it does not immediately switch from a non-conducting to a conducting state; and may transiently support both a high voltage and conduct a high current. Consequently, when gate current is applied to a transistor to cause it to switch, a certain amount of heat is generated which can, in some cases, be enough to destroy the transistor. Therefore, it is necessary to keep the switching time as short as possible, so as to minimize switching loss. Typical switching times are in the range of microseconds. The switching time of a transistor is inversely proportional to the amount of current used to charge the gate. Therefore, switching currents are often required in the range of several hundred milliamperes, or even in the range of amperes. For typical gate voltages of approximately 10-15V, several watts of power may be required to drive the switch. When large currents are switched at high frequencies, e.g. in DC-to-DC converters or large electric motors, multiple transistors are sometimes provided in parallel, so as to provide sufficiently high switching currents and switching power.

The switching signal for a transistor is usually generated by a logic circuit or a microcontroller, which provides an output signal that typically is limited to a few milliamperes of current. Consequently, a transistor which is directly driven by such a signal would switch very slowly, with correspondingly high power loss. During switching, the gate capacitor of the transistor may draw current so quickly that it causes a current overdraw in the logic circuit or microcontroller, causing overheating which leads to permanent damage or even complete destruction of the chip. To prevent this from happening, a gate driver is provided between the microcontroller output signal and the power transistor.

## Conclusion

The loss is minimized and efficiency is maximized leading to profitable power production. The real-time monitoring of the electrical appliances can be viewed through a system. The processed voltage and current values are displayed on system screen. A Proteus is software for microprocessor simulation, schematic capture, and printed circuit board design. It is developed by Lab center

Electronics. The sensor networks are programmed with various user interfaces suitable for users of varying ability and for expert users such that the system can be maintained easily. The current and voltage of a transformer is monitored continuously using wireless sensors. The experimental set up was verified by both simulation and hardware.

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