Designing And Hardware Implementation Of Net Meter For Multigrid System

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***Abstract* - Energy is said to be an important export for development of any country. The world growth is placing large demand or its energy resources. The mechanism of setting the unit consume by the consumer from the grid and hence reduce electricity bills is achieved with the issue of green energy, Net metering is a charging system which not just urge the purchaser to control from their own needs, yet additionally pay them for the abundance power created by sun based PV cells satisfies they immediates energy need for the consumers like office/home /building electricity bills. Any extra power generated is exported back to the electric grid. The proposed smart net metering comprises of voltage and current estimation circuit.This measures the instantaneous voltage and current respectively Net meter give permission to the consumer generated some or all of their electricity to use their electricity any time, instead of when it is generated. Monthly net meter allows consumer used solar power, generated power during day at night.**

***keywords* - solar energy, net meter, solar photovoltaic system**

INTRODUCTION

Net Metering is a concept that has got the potential to revolutionize the usage of solar power in India in the coming days. It's an addvances technology and has helped in popularizing solar power from California to Germany. Renewable power generation has become an ultimatum in recent times many energy experts, scientists, engineers and activists actively promote a 100% renewable energy vision. The recent reports suggest that, we have already used almost 2/3 of our carbon budget and at the current projected rate; this entire budget will be used by the year 2040. A Net meter records both the measure of power that is taken care of into Grid as Import and the measure of power that is expended from the Grid as Export. Energy is considered to be an important commodity for development of any country. The worlds growth is placing enormous demand or its energy resource .Energy is meter said to be an important commodity for development of any country .AMI(Advance Metering Infrastructure) provides consumers the information they need to make intelligent decisions, the ability to execute those decisions and a variety of choices leading to substantial benefits they do not currently enjoy. Infact, AMI is a technology which can be used to modernize existing power system. With the rapid development of wireless communication systems in the digital home, WMR Systems allow users to log the consumption data of energy meters such as electricity, water and gas. Smart grid, among other features, facilitates different strategies for energy management. Distributed generation of electricity is an important strategy to reduce the energy crisis. It also involves generating electric power in small scale, by deploying renewable energy units at individual homes.The remote access of smart meter by consumers helps in consumer integration to the grid and considers consumer's wish also for energy management in consumer premises.

THEORY OF OPERATION

From the three-phase supply, primarily phase sequence is monitored and the signal is sent to the microcontroller. If the phases are in sequence, then the voltages and current are measured and converted into analog signals of 5V using a bias circuit which will be sent to the microcontroller. Then the microcontroller checks whether the voltages and current are within the set values. If all the above conditions are satisfied then the controller sends signal to the driver circuit which will turn on the motor via relay

and contactor. With the help of GSM module, the PIC microcontroller communicates with the server using application or SMS. If the phases are not in sequence, then the LCD display displays phase is locked" and also it terminates the motor operation.

- User Friendly Settings**: -**

User can set all the parameter

1. Under Voltage
2. Over Voltage
3. Under Current
4. Overload Current
5. Dry run Current

5) Termination:

DETAILED BLOCK DIAGRAM

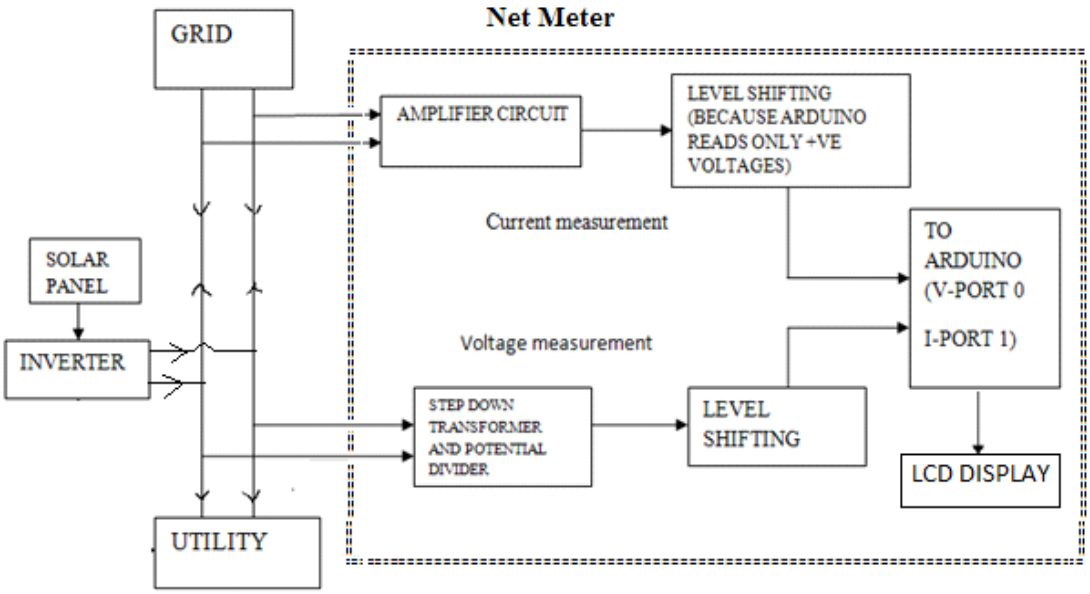

Fig 1. block diagram

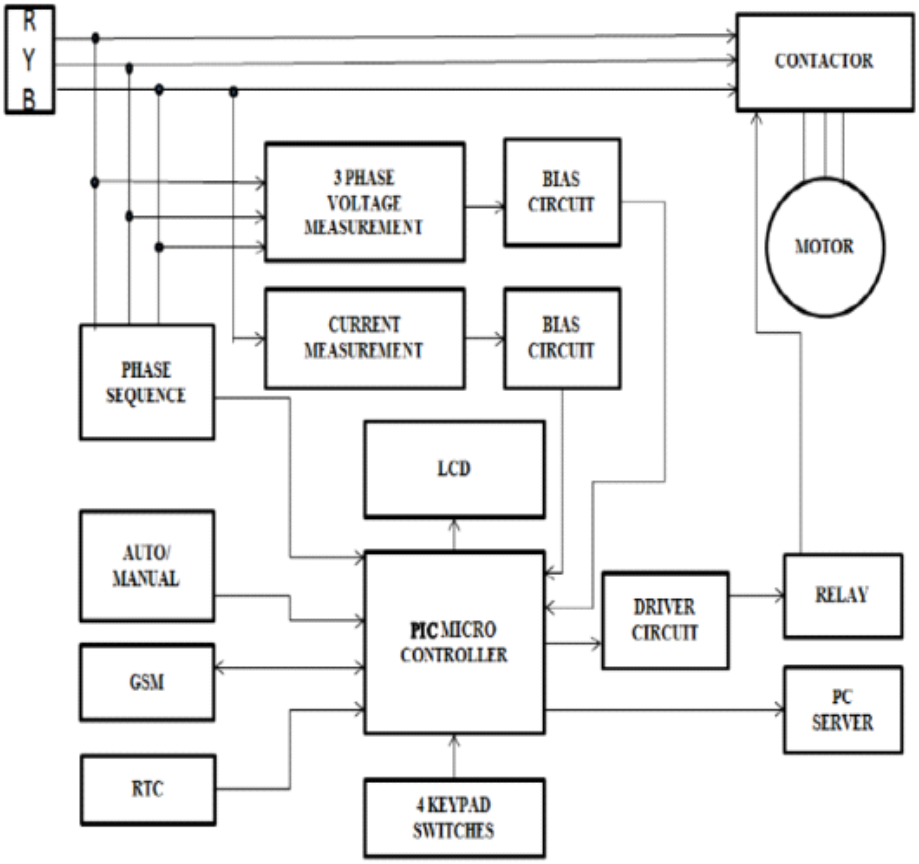

Fig 2. block diagram

1. MICROCONTROLLER *(*PIC18F4620*)* :-

The PIC18F4620 microcontrollers offer cost-efficient solutions for general purpose applications written in C that use a real-time working framework (RTOS) and require an intricate correspondence convention stack, for example, TCP/IP, CAN, USB, or Zig Bee. PIC18F gadgets give streak program memory in sizes from 8 to 128Kbytes and information memory from 256 to 4Kbytes, working at a scope of 2.0 to 5.0 volts, at speeds from DC to 40MHz.. The basic features of PIC18F-series microcontrollers are: 77 instructions PIC16 source code compatible Program memory addressing up to 2Mbytes Data memory addressing up 4Kbytes The microcontroller program is done using MPLABIDE and is interfaced with the micro controller using mini pro programmer. Under voltage, over voltage and dry run values are given to the microcontroller at any time using the application. In case of any above fault the microcontroller sends signal to the GSM module and also terminates the motor operation.

2. PHASE SEQUENCE: -

Three phase of a three-stage AC supply accomplish greatest voltage when they are in a specific succession. In this way, it imperative to keep the stage in arrangement. Hence primarily Phase sequence is monitored and is given to the PIC microcontroller. If the phases are in sequence, the motor will operate.

3. BIAS CIRCUIT :-

The voltages of the three phases and current are measured and are given to the bias circuit. The bias circuit will manipulate the voltages and current signals into analog signals of 5V which will be sent to the microcontroller.

4. TIME CLOCK (DS1307) :-

It sends the current date and time signals to the PIC microcontroller. The date and time will be displayed in the LCD.

5. RELAY: -

A transfer is an electromagnetic switch worked by a tolerably minimal electric flowthat can kill on or an a lot bigger electric flow. The center of an exchange is an electromagnet; it is a circle of wire that transforms into a fleeting magnet when force courses through it.The voltage from the microcontroller is sent to the relay circuit if there is large amount of current flowing through the circuit then the normally open terminal the relay is energized and the circuit is closed. The supply to the contactor is cut off and the motor is shut down. Thus, it protects the motor from short circuit condition.

6. GSM MODULE: -

A GSM module amasses a GSM modem with standard correspondence interfaces like RS-232 (Serial Port), USB and so forth., so it very well may be effectively interfaced with a PC or a microcontroller-based framework. The force supply circuit is likewise worked in the module that can be initiated by utilizing a reasonable connector. The GSM MODEM is a class of remote MODEM gadgets that are intended for correspondence of a PC with the GSM and GPRS arrange It requires a SIM (Subscriber Identity Module) card simply like cell phones to enact correspondence with the system. Additionally they have IMEI (International Mobile Equipment Identity) number like cell phones for their distinguishing proof. A GSM MODEM can get, send or erase SMS messages in a SIM. The MODEM needs AT directions, for associating with controller, which are conveyed through sequential correspondence. These directions are sent by the controller. The MODEM sends back an outcome after it gets a direction.

1) Voltage Measurement Circuit: The AC supply is given to the 12-0-12 transformer with the current rating of 1 amps. In voltage measuring circuit, a step-down transformer converts 230V AC to 12V AC. The input of 12V AC is given to the potential divider circuit to reduce the voltage to 5V AC.The 5V AC is given to the level shifter to get the positive voltage in light of the fact that the Arduino peruses just positive voltages. The yield from the level shifter is given to the port1of the Arduino. Fig.2 shows the voltage estimation circuit.

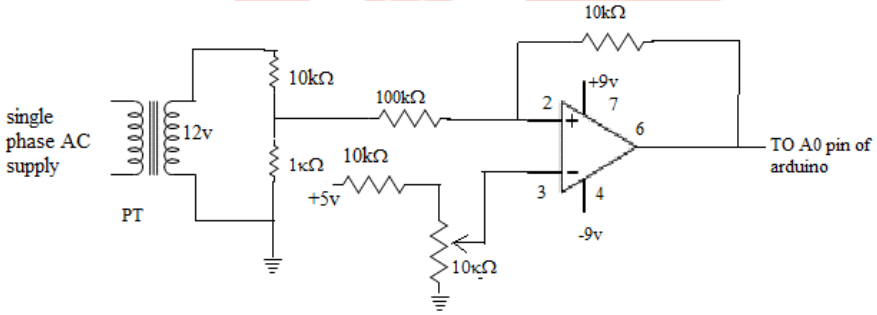

Fig. 3. Voltage measurement circuit

2) Current Measurement Circuit: The current measuring circuit consists of an amplifier circuit and level shifter circuit. The output from the present sensor is given to the channel circuit to relieve the waves and afterward it is given to the amplified circuit. The amplifiers sign is given to the level shifter circuit which is taken care of to Arduino (A1). Fig.4 shows the present estimation circuit.

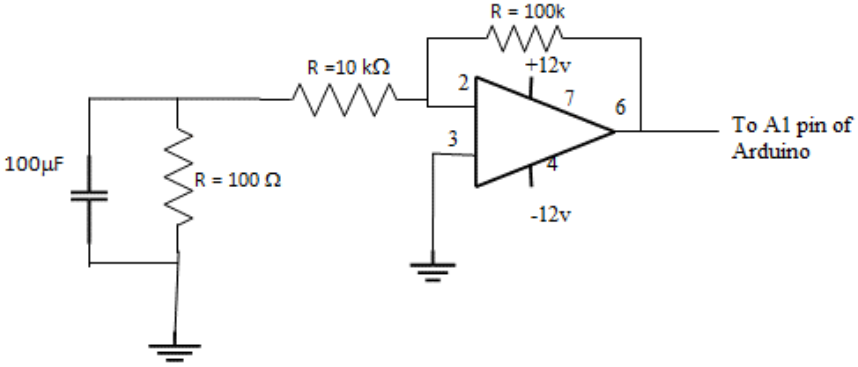

Fig. 4. Current Measurement Circuit

3) Power Supply Circuit: The 230V AC supply is given to the centre tapped step-down transformer. The step-down transformer converts 230V AC to 9V AC. The bridge rectifier circuit converts AC to DC. The output from the bridge rectifier is given to the voltage regulators to get 5V and 9V respectively.

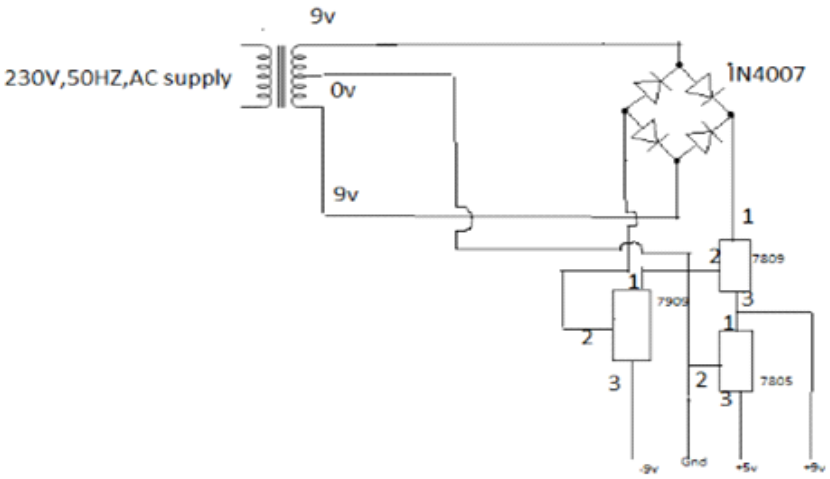

Fig 5. Power Supply Circuit

4) Processing Unit -The microcontrollers an interactive system that through the use of hardware and software can interact with its environment. The proposed system uses Arduino (Type of ATmega 328) as processing unit. The input to the Arduino is fed from voltage and current 47

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