CAPTIVE POWER NON CONSERVATIVE WITH THEFT DETECTOR

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ABSTRACT

The paper aims Project work based on MPPT and PWM technique, in which we were basically improving power of our non-conservative source, as we all know in non-conservative typically solar energy, getting not much power, so we were mostly focus on how we improve the power, so basic and main purpose of our project is nothing but power improvement, means maximum power transfer, which we did by improving voltage level and as usually we track the maximum power as required for our project. We just focus on how an industry can generate our own power for own purpose in which there is no losses, so our project typically its own fault detector and controller, maximum power generation and maximum power transfer.

For automation procedure we use microcontroller of ATMEGA16 which is suitable for our project, we operate, simulate and discuss the whole procedure in PROTEUS software.".

Keywords— *Stepper Motor, MOSFET Driver Circuit Microcontroller ATMEGA16; Buzzer Circuit ; Opto-coupler;*

I. INTRODUCTION

India is ranked number one in solar electricity production per watt installed, with an insolation of 1700 to 1900 kilowatt hours per kilowatt peak. Solar energy is one of the most important renewable energy sources. The tracking of solar energy was firstly done by the British astronomer John Herschel. With about 300 clear sunny days in a year, the theoretically calculated solar energy incidence on India's land area is about 5000 trillion kilowatt-hours per year. Presently, solar generation is serving to meet the peak load during the day time in non-monsoon months when the electricity prices are increasing above the daily average price. On 16 May 2011, India's first solar power project with a capacity of 5MW was registered under the Clean Development Mechanism. The project is in Sivagangai village, Sivaganga district, Tamil Nadu. Solar power in India is a fast growing industry and as a 31

December 2016, the country's solar grid had a capacity of 9,012.66 MW. During 2015 , 118,700 solar home lightning systems were installed and 46,655 solar street installations were provided under a national program.

The power generation in India can be divided into two categories: Generation Utilities and Generation Non-Utilities or Captive power plants (CPPs). So our project is based on captive power plant. Captive Generating plant means a power plant set up by any person to generate electricity primarily for his own use and includes a power plant set up by any co-operative society or association of persons for generating electricity primarily for use of members of such co-operative or association. From 2005, Indian captive power producers association (ICPPA) is actively taking up issues for protecting interests of captive power producing industries as is clear from the invitations by Minister of Coal to policy framing. ICPPA is an all India registered body under societies Act 1860. Any organization with 1 MW or higher installed capacity can become ICPPA member. The idea of captive power generation was comes in summer 2009 when India was facing severe power crisis and short term prices were above Rs. 10 per unit. Installation of captive power plants in future is likely to grow at a higher rate compared to the current rate of growth.

For tracking maximum energy from solar we were proceed by the MPPT (Maximum power point tracking) technique by using boost converter. It is a technique used commonly with solar systems to maximize power extraction under all conditions. MPPT is the efficiency of power transfer from solar cell depends on both the amount of sunlight falling on the solar panels and the electrical characteristic of the load. As the amount of sunlight varies, the load characteristic that gives the highest transfer efficiency changes. This load characteristic is known as maximum power point tracking. Tracking the sun creates powerful renewable energy sources gives as much as 40% of the solar light to be converted into green energy.

For boosting up the output voltage of solar panel we used boost converter. As it is stated above that the maximum power point tracking is based on load matching problem. A DC to DC converter is required in order to change the input resistance of the panel to match the load resistance by varying the duty cycle α.

When the switch is closed the inductor gets charged through the battery and energy is stored. The diode blocks the current flowing and the load current remain constant which is supplied further due to discharging of the capacitor.

Electricity is now become the necessity. The need of electricity is increasing day by day. With increasing need of electricity the power theft is also increasing. There is a need to develop a system to avoid the increasing theft. Detection of theft is nothing but the detection of fault in transmission line. So after boosting up the voltage, we have done the detection of fault in transmission line. A fault in transmission line is defined as a defect in its electrical circuit due to which the current is diverted from the normal path. Fault are generally caused by mechanical failure, short circuit of transmission line, tapping, etc. During the faults, the current are relatively high and the voltages become unbalanced. It is necessary to detect fault as early as possible that is why we are using relay which will sense the fault and trip the circuit due to which buzzer will on and fault is detected.

II. LITERATURE REVIEW

Our idea of captive power plant is to generate maximum energy by using MPPT technique and detect the fault in transmission line. By doing so, a loss of energy will reduces and generate by our own.

Our basic idea is to generate more energy to reduce the energy crisis. The construction of our captive power plant model is consisting of 20 watt solar panel. Stepper motor of 5kg is mounted on solar panel to rotate the panel in each 7.2 minute in 100 steps that means it deflected in each 1.8 degree. Further for boost up the voltage by PWM technique is used. After boost up the voltage the detection of fault is done in transmission line using a relay. A relay is an electrically operated switch which is activated by a current to open or close the circuit. All the process is control by microcontroller ATMEGA 16 which runs on 5 volt supply and 16 MHz frequency. Programming is done by code-vision software.

We take BALKAN JOURNAL OF ELECTRICAL & COMPUTER ENGINEERING , 2014 , vol 2, no 1, for getting the idea of how to implement the PWM technique and MPPT algorithm for relay we used BHIDE & PAITHANKAR of POWER SYSTEM & PROTECTION and for fault we discuss some conceptual idea about voltage and current relation when load is connected from our respected guide

As we using MOSFET switch that having switching frequency is 7.8khz which means it have switching time 0.128ms that is to be used the total on and off time as our requirement

III. HARDWARE

The circuit for automatic lux level control is designed with the help of "Proteus Software". Figure 1. Shows the circuit diagram in detail and the components used are as mentioned below the circuit

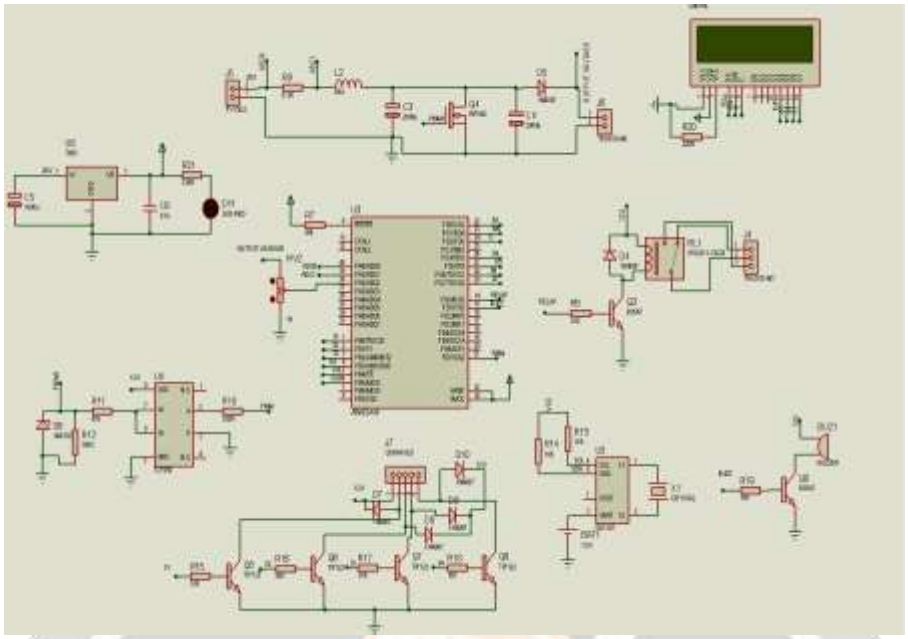
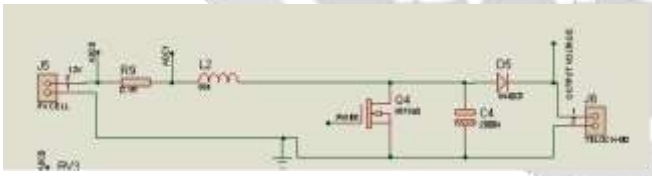


Figure 1. Circuit Diagram for Automatic Lux Level Control

- Boosting circuit
- Power supply of atMEGA16
- TLP250, MOSFET driver
- Stepper motor driving circuit
- RTC circuit
- Buzzer circuit
- Relay circuit
- LCD

IV. WORKING

BOOSTING CIRCUIT:

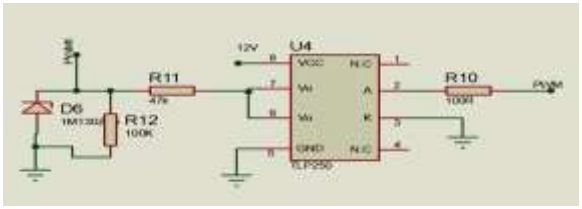


Capacitor: We used capacitor in boosting circuit named as C4. C4 is to boosting the voltage. Capacitor display its true characteristics only when a change in voltage is made in the network.

POWER SUPPLY TO ATMEGA16:

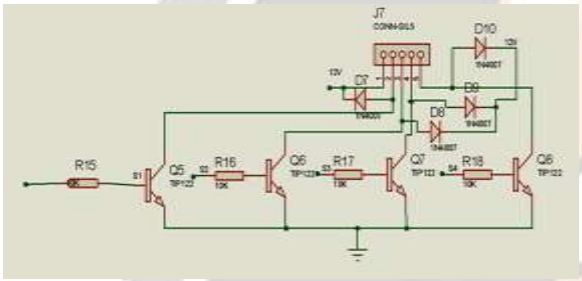
LM7805 IC: It is a voltage regulator IC which has three pins i.e. input, ground and output. It restricts the output to 5V regulated power supply which is given to microcontroller ATMEGA 16 as a power supply.

MOSFET DRIVER CIRCUIT



TLP250: It is a MOSFET driver IC of 8 pin. It works like an optocoupler. Input stage has LED and output stage has photo diode. Whenever input stage LED light falls on output stage photo detector diode, output becomes high. Its switching frequency is 7.8 KHz. Pin number 1 and 4 of IC are not connected to any point so it is not in use. Pin 2 are connected to anode point of input stage through 100R resistor and Pin number 3 and 5 is connected to ground which provides return path to power supply ground. Pin number 6 and 7 is internally connected to each other which are further connected to PWM channel through a zener diode which used to get a constant voltage. Pin number 8is used to provide power supply to TLP250. It provides output from low to high with minimum threshold current of 1.2mA and above.

STEPPER MOTOR CIRCUIT:



Stepper motors are DC motors that move in discrete steps. They have multiple coils that are organized in groups called “phases”. By energizing each phase in sequence, the motor will rotate, one step at a time. Since stepper motor move in precise repeatable steps, they excel in application requiring precise positioning. A stepper motor has maximum torque at low speeds, so they are a good choice for applications requiring low speed with high precision.

BUZZER CIRCUIT:

BC547: It is a NPN bipolar junction transistor. It has three pins collector (Vcc), base, and emitter (ground). It stands for transfer of resistance and is used to amplify the current. A small current at base controls a large current at collector and emitter terminal.

HARDWARE RESULT

- We have 20v solar panel which give 20v at no load when we going to connect as a input boost up voltage then we getting 66v and input side 11v instead of 20v because of consumption of LED,LCD, resistor of PCB and microcontroller.
- When we connect 10kΩ then we get the output 52 v
- Again connect 10kΩ then we get the output 32v
- Again connect 10kΩ then we get the output voltage 28v
- As we were set the tapping limit 30v so relay on and buzzer on.
- So there is boost up voltage and stepper motor run as respected
- Theft detected.

VI. CONCLUSION

When we give the delay angle 0.8 then we get the output 6 times of input voltage, which means we are boostimg the input voltage.
We track the rotation of solar panel which is 2.5 kg and we are using stepper motor which produced 5kg torque N-m so it will easily rotate as our requirement.
We done theft detection. Programmed done by CODE-VISION EVALUATION.

VII. SCOPE OF IMPLEMENTATION IN INDUSTRY

1. Solar technology for electricity generation is one of the best solutions to the growing fossil fuel crisis.
2. Good for high temperature region.
3. Effective energy utilization and its management for minimizing irreversibility has made human to look for efficient energy consumption and conversion..

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