



A REVIEW ON SOLAR AND SMART ENERGY SYSTEM

¹Bakale Akshay Jivan , ²Deore Mayur Vijay, ³Kate Tushar Balu

¹UG Scholar Dept. of Electrical Engineering S.N.D.C.O.E.& R. C. Yeola - Nashik,

²UG Scholar Dept. of Electrical Engineering S.N.D.C.O.E.& R. C. Yeola - Nashik,

³UG Scholar Dept. of Electrical Engineering S.N.D.C.O.E.& R. C. Yeola - Nashik,

ABSTRACT - Sun is a source of renewable energy called solar energy. Solar energy is a basic need of living plants and human being on the earth. By the use of solar energy there is no pollution and no waste. There are many fields of using solar energy. It can be used directly in a variety of thermal applications like heating of water or air, charging batteries, drying, distillation, cooking etc. Bangladesh is an under developing country. It is a country of lot of problems. Energy crisis is one of the important problems. To overcome this problem solar energy may be used as an alternative. It is not possible to solve the giant problem over a night but it can be decreased. Solar energy is one kind of renewable energy. Everyday a lot of power is used for charging purpose like mobile, camera, light etc. Those devices can be easily charged by using solar charger. In this project a solar cap is designed and constructed for charging mobile phone, camera etc. which is nothing but a solar panel based charging system. Here a solar panel is placed on a cap. An USB port is attached with the panel. A cable is connected with the solar panel and the device that will be charged. At day time the device can be easily charged by using this solar cap. If the device is fully charged then the extra charge can be stored in a reservoir. So, by using the charger the devices can be charged day and night. Traffic congestion is one of the major issues in the present-day world. The present day traffic signal control only works on a fixed time delay basis irrespective of the vehicle density. With the rapid increase in vehicle usage, such a system can prove to be inefficient causing a lot of losses. In this proposed system involves a density based traffic control system which uses Arduino UNO, IR sensors and LED's for the effective signal handling and vehicle density control at the junction.

Keywords : solar energy, energy, renewable energy, solar.

I. INTRODUCTION

Energy crisis is one of the basic problem in developing country like Bangladesh. One step to overcome this problem may be the use of solar energy as an alternative. A huge amount



solar energy is available in the environment that can be utilized and also could be stored to use any suitable time.

Solar energy, radiant light and heat from the sun, is harnessed using a range of ever-evolving technologies such as solar heating, solar photovoltaic, solar thermal electricity, solar architecture and artificial photosynthesis. Solar technologies are broadly characterized as either passive solar or active solar depending on the way they capture, convert and distribute solar energy. Active solar techniques include the use of photovoltaic panels and solar thermal collectors to harness the energy. Passive solar techniques include orienting a building to the sun, selecting materials with favorable thermal mass or light dispersing properties, and designing spaces that naturally circulated with air.

Sun is responsible for most of accessible energy resources. Solar energy can be used both directly and indirectly. It can be used directly in a variety of thermal applications like charging of batteries, heating water or air, drying, distillation, cooking etc. The heated fluids can in turn be used for applications like power generation. A second way in which solar energy can be directly through the photovoltaic effect in which it is converted to electrical energy. Indirectly, the sun causes winds to blow, plants to grow, rain to fall and temperature differences to occur from the surface to the bottom of oceans. Useful energy can be obtained for commercial and non-commercial purposes through all these renewable sources. Solar portable charger is one type of chargers which can be carried any place at any time. In addition, a good portable solar charger should be straightforward and easy to use. In this type of portable charger, solar panel is placed on the cap which is put on the head. When sun strikes on the solar panel photons release from it. Then electron starts flow through the cable which is connected with solar panel.

Solder the positive output wire of the voltage regulator to the USB's positive. Similarly, connect the negative output of regulator to the negative of USB. The USB port must be fixed properly to the PCB board. A reservoir is used which store charge and supply charge to the battery when require. Solar portable charger is very effective for everyday use. It is suitable for use in

1.1 Problem Statement

The purpose of this project is to develop a series of systems model for traffic passing through a 4-way intersection, controlled by traffic light. We will assume that arrangement of traffic lights and road lanes is fixed and that the lights switch from red to green to amber in a regular repetitive pattern. Moreover, we assume that driver behavior is constrained by the road rules (we keep this part really simple) and the desire to avoid vehicle collisions.



II. SYSTEM DESIGN & COMPONENTS DATA SHEETS

2.1 Methodology

Solar Battery Charger:

Solar Battery Charger circuit is designed, built and tested. It acts as a control circuit to monitor and regulate the process of charging several batteries ranging from 4 volts to 12 volts, using a photovoltaic (PV) solar panel as the input source for the battery charging process.

2.3 Smart Traffic Control System:

The Smart Traffic control system is an intelligent approach in reducing the traffic related problems. Conventional traffic control systems work on the basis of the division of time in which each direction is allotted a specific time interval that drives the whole system. The pattern of opening and closing of traffic signal is changed in a regular pattern so that there is no actual study of the traffic situations happening on the road. A Smart Traffic Control System is based on intensity of traffic that is prevailing on the each direction. The situation solves the main problem that conventional feedback system cannot do. Since there is an interaction happening between the external environment and the micro controller system it is easy to determine the traffic intensity and the desired operation that is to be done. IR sensors fixed on the ground gives the information about the traffic intensity, when the vehicles pass by through them. The lanes where the most number of IR sensors are activated are figured out by the micro controller and analysis is done so that more time is allotted to that respective lane. Also arrangements are done so that that direction gets more time to clear the row and again the cycle repeats. In order to prevent the continues operation happening in only one lane the cycle after a definite repetition give chance to the whole lane to be opened. The next attractive feature of the system is its preference given to the emergency vehicles. This is done by providing special communicating devices that can control the traffic lights so that lane opens and allow that vehicle to pass by. The interactive feature in the system helps the vehicles approaching the traffic system to get the immediate notification concerning the present traffic situation of the junction this helps the vehicle to get the idea of the traffic condition without even looking at the lights. The idea is also helpful in alerting the road users about an incoming traffic junction for those who are new to the area.

2.4 Circuit Diagram

2.4.1 Solar Battery Charger:

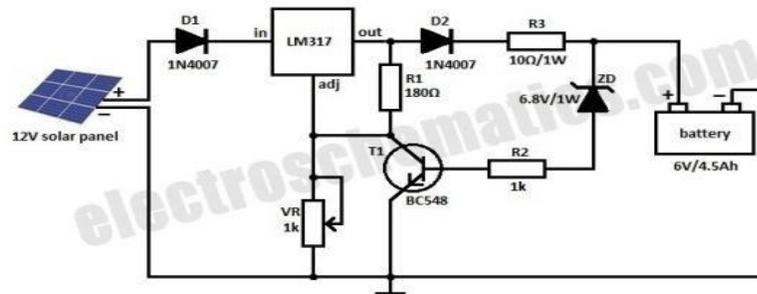


Fig. 2.4 Circuit Diagram

2.5 Working:

2.2.1 Solar Battery Charger Circuit Working Principle:

Solar battery charger operated on the principle that the charge control circuit will produce the constant voltage. The charging current passes to LM317 voltage regulator through the diode D1. The output voltage and current are regulated by adjusting the adjust pin of LM317 voltage regulator. Battery is charged using the same current.

2.2.2 Solar Battery Charger Circuit Design :

Circuit must have adjustable voltage regulator , so Variable voltage regulator LM317 is selected. Here LM317 can produce a voltage from 1.25 to 37 volts maximum and maximum current of 1.5 Amps.

III. SMART TRAFFIC CONTROL SYSTEM

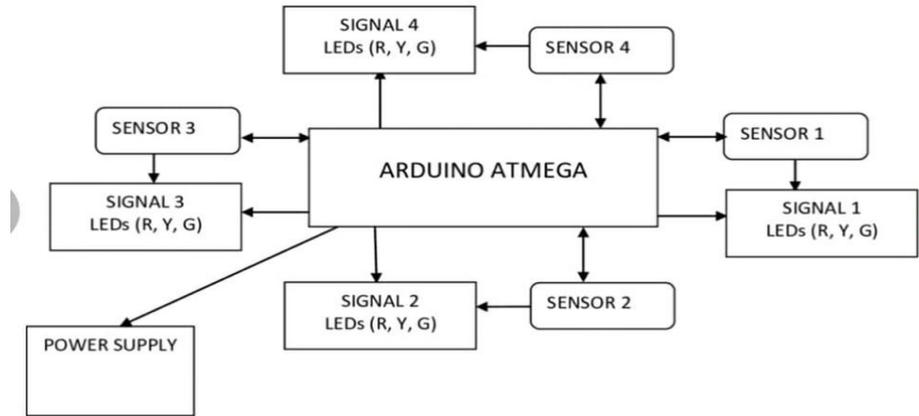


Fig.3.0 Smart traffic control system

The model works on the principle of changing of Traffic signals based on the density through an assigned section of the road. There are four sensors placed at four sides of a four way road which checks the density of the area covered by the sensors. Here we are using IR sensors to design an intelligent traffic control system. In order to measure the density of traffic on each side, IR sensors will be kept on either sides of the road at a specific distance. Each of the IR sensors consists of an IR transmitter and an IR receiver. Just as the name suggests, the IR transmitter transmits the IR rays and the receiver is responsible to receive the rays. The whole system is controlled by the microcontroller which is the Aurdino. Arduino is interfaced with Serial to parallel IC (74HC595) and IR sensors .As the vehicle passes through these IR sensors, the IR sensor will detect the vehicle

Program:

```
int sensor1;
int sensor2;
int sensor3;
int sensor4;
void setup()
{
  DDRD  =
  B11111111;
  PORTD
```



```
=B0000000
0;
}
void loop() {
  sensor1          =
digitalRead(8);  sensor2
=digitalRead(9); sensor3
=digitalRead(10);
sensor4          =
digitalRead(11);   if
{sensor1==1}
{
  PORTD = B11100001;
  delay(2000);
}
else if{sensor2 == 1}
{
  PORTD = B11010010;
  delay(2000);
}
else if{sensor3 == 1}
{
  PORTD = B10110100;
  delay(2000);
}
else if{sensor4 == 1}
{
  PORTD = B01111000;
  delay(2000);
}
else
{
  PORTD = B11100001;
  delay(1000);
  PORTD = B11010010;
  delay(1000);
  PORTD = B10110100;
```



```
delay(1000);  
PORTD = B01111000;  
delay(1000);  
}}
```

IV. CONCLUSION

The “Solar mobile phone Charger” is successfully tested and implemented. Through the implementation of this in Real time, We can make use of abundant availability of Solar Energy and also store it for further needs. A portable solar charger by using a solar cap has been designed and constructed successfully. Battery has been charged directly by the dc voltage produced by a solar panel through a USB port. The proposed traffic control system is the very basic step towards achieving automation in the field of traffic control system. With various advancements taking place in today’s world, people are in search for automated systems which not only saves their time but also a lot of energy in different forms. The saving of fuel (petrol, diesel, natural gas), reduction in time of the operation of automobile engines, reduction in the emission of the harmful gases in the atmosphere. Thus this system helps in reducing the number of accidents that take place just because of this improper traffic control system and paving way to a better traffic control system. The proposed system aims to save the number of man hours wasted at the signals and hence making effective utilization of time. Further a lot of work and progress and be made on these lines by giving priority to emergency tag vehicles. Also, a lot of work can be done on the usage of solar energy of the operation of such systems which can also make them highly energy efficient. It is also possible to make use of gas sensors to control the timing of the timers in the traffic nodes. Using GPRS map as an additional step for progress in this area, the best route can be figured out for emergency as well as police vehicles

REFERENCES

1. Ozisik M. Necati, “Heat Transfer, A Basic Approach”, International edition, McGraw - HillBook Company, 1985.
2. Suhas P Sukhantme, “Solar Energy Principle of Thermal Collector and Storage”, 2ndEditionTata McGraw-Hill Publishing Company, New Delhi, 1997.
3. Bullock, Charles E. and Peter H. Grambs. “Solar Electricity: Making the Sun Work for You”, Monegon, Ltd., 1981.



4. Komp, Richard J., “Practical Photovoltaic”, Aatec Publications, 1984.
5. Edelson, Edward. “Solar Cell Update”, Popular Science. June, 1992. 5. Murray, Charles J., “Solar Power's Bright Hope”, Design News. March 11, 1991.
6. Duffie, John A. and Beckman, William A., “Solar Engineering of Thermal Processes”, A WileyInterscience Publication, John Wiley Sons, Newyork, USA, 1980.
7. R. S. Khandpur, “Printed circuit boards: design, fabrication, assembly and testing”, TataMcGraw Hill, 2005
8. Vignesh.Viswanathan and Vigneshwar. Santhanam “Intelligent Traffic Signal Control Using Wireless Sensor Networks”, 2nd International Conference on Advances in Electrical and Electronics Engineering (ICAEE'2013) March 17-18, 2013 Dubai (UAE).
9. Malik Tubaishat, Yi Shang and Hongchi Shi, Department of Computer Science, University of Missouri – Columbia, Columbia, MO 652112060Email: {mma4n6, yshang, shih}@missouri.edu, “Adaptive Traffic Light Control with Wireless Sensor Networks”, 1-4244-06676/07/\$25.00 © 2007 IEEE 187.
- N.Yuvaraj, V.B.Prakash, D.Venkatraj, “ HiFi Traffic Clearance Technique for Life Saving Vehicles using Differential GPS System”, Engineering and Technology 58 2011.