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Electricity Save in Traction System

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Abstract – *In this paper we used solar energy for traction purpose. In India the sunlight available in sufficient amount. So we can convert this sunlight into electrical energy by using solar panel. This generated energy we also used for transportation.*

Sunlight emitted on solar panel they can absorb and converted and then stored in a battery. In India very high energy is consumed for traction system. Also in our paper electricity save in two section tunnel and platform. In previous day tunnels used the sodium vapor lamps they consumed much energy if replacing LED lamps saves more energy and also long life. Also at times when train not goes through tunnels, there is wastage of light in the tunnel. Therefore we designing the IR sensors are used for detection of train. Also in platform of train more electrical energy is used for lighting purpose. Generally 40 watt fluorescent tube is used in platform but replacing the 15 watt LED lamp saves 35 watts by each lamp. Also in many platforms wastage of energy at day time they can be reduce by using LDR (light dependent resistors) sensor. The main aim of this paper is to save electricity, reduce load shading of electricity.

Key Words: PV cell; solar train; Tunnel; Platform

1. INTRODUCTION

The Indian railways are one of the largest networks in the world and most of the people travel through railways. Most of energy is used in traction system. To save electricity in electric traction system solar power is used. The solar power train is a step in saving these non-renewable sources of energy. In India where whether is mostly sunlight is available whole year, It is very good idea to use solar energy for the purpose of transportation. In this system, solar cells are installed on the rooftop of the train. We provide solar panels on the roof of the coach to directly charge the storage battery. Many specifications must to know about solar train from solar array, motor and battery. This project a lot of depends on solar panel because it using influence if the solar train can drive or not.

Automatic Train tunnel and platform Light Control System is a simple concept using sensors. By using this system manual Work are 100% removed. It automatically switches ON lights when the sunlight goes below the visible region of our eyes. This is done by a sensor called Light Dependant Resistor (LDR). It automatically switches OFF lights whenever the sunlight comes, visible to our Eyes. By using this system energy consumption is also reduced because Nowadays the manually operated street lights are not switched off even the Sunlight comes and also switched on earlier before sunset. In this project, no Need of manual operation like ON time and OFF time setting. The resistance of light dependant resistor (LDR) varies according to the light falling on it.

2. METHODOLOGY

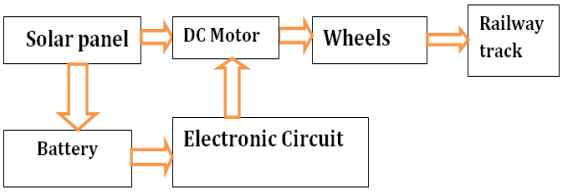

Fig1. Block diagram of solar train

The basic principle of solar train is to use energy that is stored in battery during and after charging it from a solar panel during sunlight. Solar array is made up of many

photovoltaic solar cells that convert sun energy into electricity. The charged batteries are used to drive the motor which serves here as an engine and moves the train in forward direction. The power produce by the solar array varies depending on the whether the sun position in the sky and solar array itself. The PV cell is producing electricity—the flow of electrons. The produced current goes in the controller and controller regulates the current and charging battery. If a load such as a D. C. Motor load is placed along the battery and switch, the electricity will do work as it flows and then motor start rotating. For 4.5 kW a current on/off 6 poles switch is placed between the motor and solar panel for rotating the motor clockwise. Solar cell converts solar energy to electrical energy.

2.1 Energy saving in train:

Suppose for train in India generally 20 coaches are used. With each coach fitted with 12 solar panels and one solar plate size is 17.6 square foot generated 250 watt. Using 6 hours of full sun gives you this equation:

=250 watt x 6 hours

=1500 watt [1.5 kW] per day.

Means one solar plate produces 1500 watt energy per day.

=1500 x 12 panels

= 180 watt. Means 18 kW power is produced in one coach.

=18 kW x20 coaches

=360 kW. So it's 360 kW total energy is generated per day.

Fig2.1 Solar panel placed on train

2.2 Energy saving in tunnel:

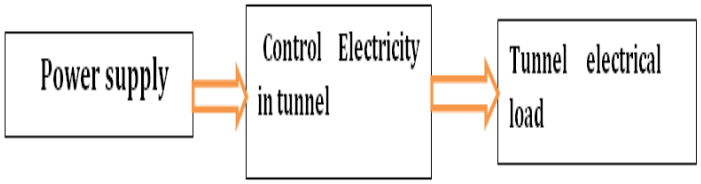

Fig.2.2 (a) Block diagram of tunnel

At times when train goes through tunnels, there is wastage of light in the tunnel. Therefore we designing the IR sensors are used for detection of train. When the trains enters into the tunnel, lights in the tunnel are automatically switched ON &OFF With the help of IR sensors.

One tunnel calculation: Generally in tunnel 1000 watt sodium vapour lamp are used but replacing the 300watt LED lamp saves 700 watt energy by each lamp. Suppose 20 lamps uses in one tunnel.

so power consumed for sodium vapour lamp:

= 1000 watt x 20 lamp

= 20,000 watt.

Let's tunnel has avg. of 12 hours per day & 365 days of year for a total 4380 hours per year.

So, 700 watt x 4380 hours =3,066 KW

3,066 KW saves per year on each lamp.

Fig 2.2(b) Tunnel system

2.3 Energy saving in platform:

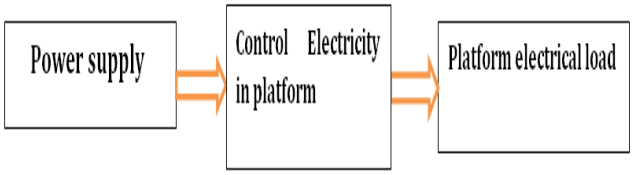

Fig.2.3 (a) Block diagram of platform

For controlling the electricity in platform the LDR is used. When the light level is low the resistance of the LDR is high. This stop the current flow to the base terminal of the transistor. So the LED does not light. However, when the light intensity onto the LDR is high, then the resistance of the LDR is low. So current flows onto the base of first transistor and then second transistor.

Calculation:

Generally in platform 40 watts fluorescent tubes are used but replacing the 15 watt Inlet tube series LED lamp saves 25 watt energy by each lamp. Suppose 50 lamps uses in one platform so power required for fluorescent tubes:

=40 watt x 50 lamp

=2,000 watt.

Let's platform has avg. of 12 hours per day & 365 days of year for a total 4380 hours per year.

So, 25 watt x 4380 hours =1, 09,500 watt-hour.

1, 09,500 watt saves per year on each lamp.

Fig2.3 (b) platform system

3. Advantages

1. Solar energy is renewable and freely available.
2. Fuel source for Solar Panel is direct and endless so no external fuels required.
3. Unlimited life of Solar Modules, fast response and high reliability.
4. Pollution free.
5. Minimum Maintenance
6. It can be installed and mounted easily with minimum cost.
7. Solar energy does not cause pollution. However, solar collectors and other associated equipment / machines are manufactured in factories that in turn cause some pollution.
8. It provides zero% carbon emission.

3.1 Disadvantages

1. Initial cost is high
2. Solar energy can only be harnessed when it is daytime and sunny.
3. Additional cost for storage battery.

4. CONCLUSIONS

The solar trains are used at very low scale, at present. Though they have been around for about few years only, the technology is still in the developmental stages. Hence they cannot be used as a practical means of traction. So here is the conclusion that the challenge lies in making it a viable means of transport. Further research is needed in this regard to improve solar panels, increase efficiency, and reduce weight, to improve reliability and to reduce the cost. Research is being carried out on many semi-conductors and their alloys to develop more efficient solar cells. Thus this technology will definitely live up to its potential sometime in the future.

REFERENCES

[1] Pee-Chin Tan, Poh Chiang Loh, Donald Grahame Holmes, "Optimal impedance termination of 25-kV electrified railway systems for improved power quality," IEEE Trans. Power Delivery, Vol.20, No.2, pp. 1703-1710, Apr. 2005.

[2] Satish Kumar.G, Dr.Narayanan.R, "Solar powered crack detector applicable for tracks", international Journal of Scientific Research, Vol. 3 (2), Nov. 2014.

[3] http://www.solarserver.com/solarmagazine/solar-news

[4] https://www.railelectrica.com

[5] http://www.solarpowerrocks.com

[6]http://photovoltaicsoftware.com/PVsolarenergycalculation

[7]http://www.technologystudent.com/energy1/solar7.htm

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