Hybrid Helio Tube

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Abstract- *The use of solar energy has received widespread attention in recent years as an approach to the conservation of energy. While many solar energy systems have been developed for heating, distillation, and the generation of electricity, little or no attention has been given to its potential for providing light to enclosed quarters where a substantial amount of electrical energy is used during the daylight in offices, homes, theaters, restaurants, stores, factories etc. The paper aims in solving this issue with a feature called helio tube, a solar concentrator, which utilizes the solar energy to its fullest there by the use of electricity to brighten up the room during day time can be eliminated. By using solar cells, the solar energy can be converted to electrical energy and during night using this solar energy the electrical components can be worked.*

Keywords- solar energy, solar concentrator, electricity

I. INTRODUCTION

Electricity has become a major unavoidable factor in our day today life. The energy most commonly used is the hydroelectricity. There are several other methods of producing energy. Now a day's people uses solar energy, which is an abundant natural resource for power generation. The population has shown a drastic growth, and due to which the number of buildings that are built on the surface of the earth has also showed a great leap. the recent trend is to build multi-storied buildings on a very small piece of land. And these buildings in metropolitan cities are very close to each other and they are not properly oriented to the sun. in present day construction is being carried out in underground like in colleges for constructing libraries, laboratory areas, and metro stations. So the interior of the building is dark even during daytime. Thus to create the illumination inside the building during the day time, a lot of power (electrical) is wasted. A huge amount of electricity is consumed in order to have a visibility within during the daytime. This power consumption is really unnecessary and can be avoided by using the solar energy to produce the electricity to lighten the electric bulbs, tube lights etc.

The number of reinforced buildings are more these days. people tends to use tube lights, CFLs etc even during day time. Even when there is abundant sunlight still we depend on artificial lightening systems.

The paper aims to resolve this issue by introducing helio tube, a device that concentrates the solar light into the indoor area, there by lightening the area without using electric bulbs. There are design considerations while designing the tube and placement of it.

II. DESIGN

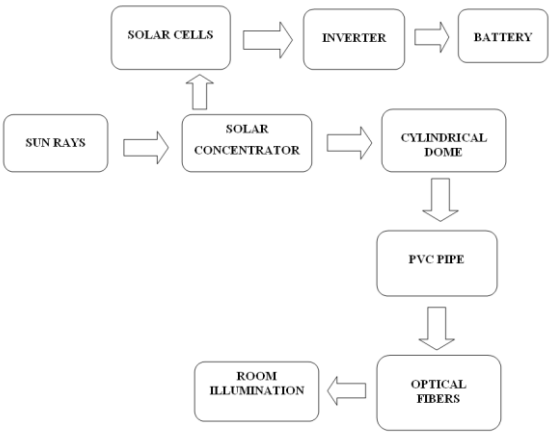

Figure 1: block diagram of helio tube

The helio tube is designed to concentrate the maximum solar energy to the solar concentrator. the cylinfrical dome penetrates these solar radiations through the pvc to the optical fibers through total internal reflection and the room is illuminated with the help of optical fibers.

III. COMPONENTS

1. SOLAR CONCENTRATORS

A solar concentrator uses Fresnel lenses that takes the sunlight and direct it to a specific spot by focusing the light ray.

The solar concentrator has to be positioned in such a manner that it can directly face the sun. To ensure that the solar concentrator can absorb maximum solar radiation during the day time, the concentrator needs to follow the suns direction. This can be achieved efficiently with the help of a

solar tracker. Tracking can be of single axis which is from east to west or west to east and also can be from north to south so that the altering path of the sun can be tracked.

2. CYLINDRICAL DOME

It is a acrylic sheet structured into a cylindrical shape. The dome helps the sunrays that are concentrated using the solar concentrator to pass into the pvc pipe, from where optical fibers takes up the energy.

3. OPTICAL FIBERS

An optical fiber is a transparent flexible fiber made using the glass silica or plastic to a diameter of slightly thicker than that of human hair. The transmission of light is made possible using optic fibers. It finds wide range use in fiber optic communication. It carries light into or out of an enclosed area or open area. The two components in an optic fiber are code and the cladding. Light is transmitted through the core by the phenomenon called the total internal reflection.

4. SOLAR CELLS

A solar cell, or photovoltaic cell, is an electrical device that will convert the light energy into electrical energy by using the principle photovoltaic effect. Many Individual solar cells can be combined together to form solar panel modules. A single solar cell can produce a maximum voltage of 0.5 votls to 0.6 volts. Solar cells are photovoltaic, despite of the source, sunlight or an artificial light.

5. INVERTER

An inverter converts the direct current coming into it into an alternating current. Solar inverters convert the direct current produced by the solar cells into alternating current and store it in a battery.

6. BATTERY

Solar batteries are used for storing energy produced by the solar panels for using later. In some cases, solar batteries have their own inverter and it converts the energy from direct current to alternating current by its own. The battery stores the energy from the inverter. Later, when the solar panels are inactive in producing electricity, the energy can be taken from earlier stored energy in the battery for night use.

IV. DESIGN STRATERGIES

The designing of the proposed system must be done taking care of certain aspects and design stratergies.

- The function of the window and other openings has to be studied.
- The different positions the sun in the horizon have to be analyzed.
- The position of the solar concentrator needs to be precise so that it can capture the maximum sun light.
- The lighting required for each building and each room have to be analyzed separately and the system should be installed accordingly.
- The rooms that can utilize the cylindrical dome directly have to be listed separately and positioning of the dome that can well utilize the sun light have to be analyzed.
- The reflectors used should be precise for better penetration of sun rays. .

V. WORKING

The hybrid helio tube is a combination of the conventional helio tube for lighting the rooms of the apartments, houses etc by making use of the natural sunlight. And converting this suns radiation using the solar panels placed in the solar concentrators and on roofs into electrical energy to run the electrical components in the building.

The solar concentrator concentrates the sun rays around it into a cylindrical dome. The cylindrical dome is a cylindrical structure made using acrylic sheet. The acrylic and polycarbonate materials can block infrared heat and harmful uv rays, and both are extremely impact resistant. These materials are lighter than glass, making them safer. The PVC pipe is coated with reflector, a white reflective tape for reflection of the sun rays. The reflective coat will provide improved brightness. This light is captured and fed to the optical fibers. The optical fibers takes this light into the room for illumination. The optical fibers run along the rooms and provide enough illumination to the room.

The use of electrical bulbs can be avoided during day time using this set up. But what about night time? This question is solved through this paper. The electricity usage during night can be avoided using solar energy. The solar concentrator and the roofs are mounted with solar cells. The solar cells in the solar concentrator and roof will take up the solar radiation and convert this using photovoltaic effect and is fed to the inverter. The direct current produced in the solar cells are converted to alternating current in the inverter for the

running of the electric equipments. This is then stored using a solar inverter battery. And during night the battery discharges the energy to work the electrical equipments.

VI. CONCLUSION

Through this paper, the sun rays, which is the natural resource of light is utilized its best in order to replace the electric lighting equipments used during day time in hotels, schools, colleges, buildings, houses etc. The paper aims to conserve the electricity and reduce the electric charges that are due to the lighting equipments used during the day time in various buildings. The sun's rays which are more powerful than any artificial lighting systems are introduced into the building to create a bright atmosphere. The daytime compensation for artificial lights that uses the electricity can be replaced using this. And using solar cells mounted on the solar concentrator, the artificial lights can be powered using the solar energy stored using the solar inverter battery.

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