

Solar Roadways

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Abstract – Roadways are critical pieces of infrastructure that connect people and allow them to travel. Solar roadways are simply structurally formed solar panels that can pass for ordinary roads with ease and efficiency, with the only difference being intelligence and smartness. Because these solar roads are incredibly clever and well adapted to the current era's development, they have been aptly dubbed "Smart Roads." The main goal is to replace as many traditional asphalt and concrete roads, parking lots, and driveways as possible with solar road panels that create clean renewable energy, which will subsequently be used to power a specific or full section of a developed city. A smart highway infrastructure as well as a The consumption of fossil fuels will be considerably reduced by a self-healing decentralised power infrastructure, lowering greenhouse gas emissions.

Key Words: Solar irradiation, solar panel, microcontroller, relay, LDR sensor

1. INTRODUCTION

Many people are looking for sustainable energy solutions to ensure that the world is preserved for future generations, as concerns about global warming and the depletion of fossil fuel supplies mount. Solar irradiation varies during the day due to light intensity and shadows cast by clouds, birds, trees, and other objects. When input vibrations were applied, we introduced two methods and evaluated their output performance: using piezoelectric materials for electromechanically conversion, using a mass-spring system as a medium of force conversion from vibrations applied on piezoelectric materials, and using a spring-magnet system where relative displacement of magnet with respect to coil generates. Highways, parking lots, bike lanes, and footpaths, among other places. Energy collection for use in homes and businesses.

2. OBJECTIVES

On highways and any other walkable or driveable surface, to generate clean renewable energy.

To reduce greenhouse gas emissions and pollutants, as well as to provide a smart grid with fewer accidents and improved elevation.

To eliminate the use of fossil fuels imported from other nations and to reduce fossil fuel imports from other countries.

3. METHODOLOGY

The solar panel transforms solar energy into electrical energy, which it then transfers to the battery to be stored. The microcontroller is connected to the battery output via the power supply. The system's general operation is controlled by a microcontroller, and Power is being supplied to the load. The LDR sensor controls its Resistance varies with the amount of light that hits it. Its opposition lowers and vice versa when exposed to light. Relay on the microcontroller provides power to the load.

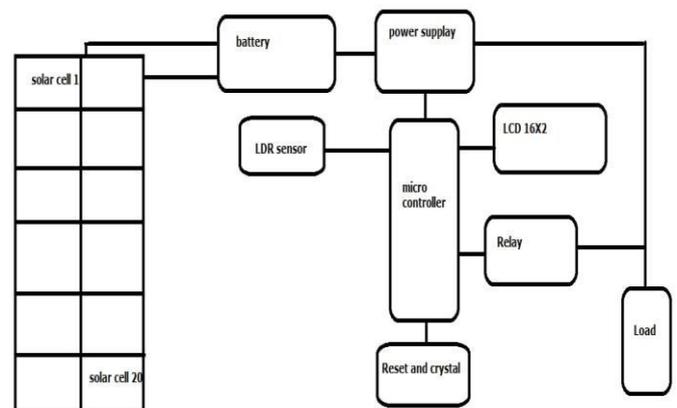


Fig-1: Block diagram representation of solar roadways system



Fig-2: Solar Road Construction

Solar Panels and pavement layers:

1. Road Surface Layer
2. Electronics Layer
3. Base Plate Layer

1. Road Surface Layer:

This is the upper layer of the road assembly. The integrated solar cells (photovoltaic cells) in solar panels are protected by this layer. This layer should be permeable to let sunlight to pass through while still providing enough traction to keep vehicles from slipping. It is designed to be exceptionally sturdy and strong to endure large traffic loads, as well as waterproof to protect any electronic components beneath it. A solar panel is a collection of photovoltaic cells mounted on a structure. Solar panels use sunlight as a source of energy to generate direct current power. PV panels are made up of PV modules, whereas PV arrays are made up of PV panels. The efficiency of a photovoltaic system arrays converts solar energy into electricity. The photovoltaic effect is used in photovoltaic modules to create electricity from the Sun's light energy (photons).

2. Electronics Layer:

This is the layer beneath the surface of the road. Every 12 feet, microprocessor boards are installed that can detect loads on the surface. When it detects a car approaching, the LEDs and road lights will switch on, saving energy by turning the lights off when there is no traffic. It also contains a heating element that melts snow on the roads, which is a particularly beneficial feature in snowy areas. When a car gets within a particular distance of the light, such as 500 metres or 250 metres, the lights turn on.

3. Base Plate Layer:

Underneath the electronics layer is this layer. The electronic layer takes data and sends it down the line to all of the other layers, distributing all of the energy created electricity. Connected to the solar power system roads are homes, offices, businesses, and other structures. To protect the other layers, this layer is also waterproof. An electrical layer is provided by groundwater.

4.PROJECT IDEOLOGY

In the solar road system, photovoltaic cells are used to produce and construct solar roadways. Piezoelectric devices could be great candidates for harvesting energy in asphalt paving roadways or roads with solar panels, depending on the best combination of circumstances. The basic objective of solar roadways, as seen above, is to replace asphalt roads with solar panels that generate electricity from the sun. The entire building procedure begins with the furnishing and wiring of the base plate,

followed by the installation and connection of solar photovoltaic cells with the previously installed layers, and ultimately the placement of the glass layer. Solar highways or roads with solar panels generate electricity because photovoltaic cells are employed throughout the construction process, and solar roadways generate power as a result of these photovoltaic cells.

The solar panel on top of the divider stud's road receives solar energy from the sun, which can then be converted into electrical energy and stored electricity energy converted into light energy automatically. Solar Roadways' main goal is to generate clean renewable energy on roads and other surfaces that can be walked or driven on. Parking lots, walkways, roads, tarmacs, plazas, bike pathways, playgrounds, garden paths, pool surrounds, courtyards, and similar areas fall under this category. Solar energy has a long history of beneficial applications. The SR idea raises the bar for solar technology. The goal is to collect the significant solar energy that now falls on these surfaces but is not being used. They will serve a dual role in this way: contemporary infrastructure and a smart power grid. This also gives the solar business access to a whole new market.



Fig-3: Solar Roadways



Fig-4: Actual Project Model Of Solar Roadways

5.CONCLUSION

The construction of the biggest solar panel in the world has already begun thanks to Solar Roadways. For about the same price as the existing systems (asphalt roads and using fossil fuels), Depending on the electricity producing facilities, the Solar Roadways implemented. No more

global warming would occur in solar roads No more blackouts (roaming or otherwise).The advantages of solar roadways over traditional roads include safer circumstances for driving. Solar roads have significantly fewer in comparison to other routes, pollution It speaks for a brand-new, secure highway system that is self-sustaining. It also aspires to create a decentralised, secure power grid that can repair itself. No longer will Solar Roadways be dependent on foreign oil. However, this new's installation costs are extremely costly. Technology has the ability to replace expensive fossil fuel. method that provides renewable energy without affecting the climate change.

6. REFERENCES

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