Thermistors Innovation and Electromechanical System Included Solar Roads

Dr Prafull Kumar
SOA, Sanskriti University, Mathura, Uttar Pradesh, India
Email id- prafull@sanskriti.edu.in

ABSTRACT: ***The aim of this article is to combine solar power with a piezoelectric device and a thermocouple system. Smart roads and smart roads are the names of the different proposals to utilize solar energy infrastructure on roads. Solar roads utilize solar panels, photovoltaic effects, LEDS and circuit board microprocessor processors. The future of roads would have solar pathways that offer energy conservation and artificial intelligence. Renewable energies generated from solar panels will meet current electrical fossil fuel needs, as well as gasoline for power vehicles, and over half of their greenhouse emissions will be eliminated. The installation of solar highways would lead to a boom in renewable energy, stimulating massive private investment at relatively modest additional costs. It is essential to cooperate with solar pathways in the concept that piezoelectricity and thermo-coupling technologies not only improve solar power efficiency, but decrease our dependence on fossil fuels, thereby regulating greenhouse gas emissions from the burning of conventional energy sources.***

KEYWORDS: Crystals, Piezoelectricity, Thermocouple Technology, Solar Highways, Solar Roadways.

1. INTRODUCTION

Approximately 12 feet * 12 feet each panel on the Solar Road binds the solar road to the surrounding panels. The prototype of the Solar Road Panel consists of 1024 modules including each solar cell, an ultra-scale condenser and a light pollution diode. The solar route produces electricity from the sun and becomes a transparent, intelligent energy supply network that eliminates the degradation of our current power supply system. The easiest approach to explain a solar route is to combine a number of panels on roads to produce energy. Furthermore, this includes the substitution of solar panels for roadways, parking lots, etc., so that energy may also be provided for various rural, residential, commercial and industrial uses. Cooperation in piezoelectricity and solar path technology may be a phenomenon that can assist decrease the gap between electricity output and energy consumption. When all the roads in the world are paved with solar panels, the total energy production would almost four times higher compared to present electricity generation. And the light half of the planet will drive the dark half. In other terms, "secure energy" may be described[1].

Electricity may be generated on foot, or in combination with solar roadways, since it not only increases energy output but also increases and limits solar energy efficiency. The deformation of piezoelectric equipment generates electricity by the significant pressure from road cars. A sensor is used to determine acceleration, pressure, strength or load by converting it to an electrical load. Products like Lead Zirconate Titanate crystal (PbZiTio3) may generate visible piezoelectric strength when the static structure is distorted by around 0.1 percent of the crystalline substance's static dimension when using the external electric field. It is utilized in beneficial applications, such as sound creation and sound identification, generation of high voltage, electric signaling, micro balancing, and ultrafine optical focus. Scanning microcopies such as AFM, STM, SNOM, MTA, etc. may also provide the foundation for a variety of scientific atomic resolution instrument methods. The bulk of the crystals utilized may include quartz, turmaline, topaz, salt from Rochelle and cane sugar. Nevertheless, quartz and Rochelle salts display greatest piezoelectricity. Titanate lead, titanate barium and Zirconium lead are ceramic materials and crystals that show piezoelectricity when twisted or squeezed. It enables the transducer to interact comfortably with electric and mechanical oscillations. Rochelle salt may be used for producing high voltages of compression[2].

This may also provide a few extra advantages, since it can operate at night if solar cells fail. In warm water storage schemes, thermocouples technology (the link between two distinct metals producing temperature-related voltage) may also be utilized. The water gathered beneath the freezing line will remain below 60 Fahrenheit, and it may be injected into the road surface by means of electric pumps to cool solar panels to make them more efficient. Thermocouples may be placed between cold and hot water pipes and voltage can be created throughout the cooling process. The reverse may be done in the winter when the air is between 50 and 60 degrees Fahrenheit over an almost frozen surface. This method also works at night. Both of these technologies are considered for future advancements. Solar reuse and lifetime integrated in piezoelectric power

and thermocouple technology. The major feature of this advancement is that it lowers dependence on energy generation from fossil fuels. The life of roads is an average of almost 30-40 years, which on average is a big difference for asphalt roads, for example for 7-12 years[3].

1.1 The Concepts of Piezoelectricity:

Electricity production may be achieved by walking or combining electricity with solar roadways, since it not only improves energy output but also increases and lowers solar energy efficiency. The deformation of piezoelectric machines causes a huge strain of road cars to generate energy. A sensor is used to detect acceleration, friction, force or strain by converting it into an electric charge. If, while the outside electrical field is being utilized, the static structure is deformed by about 0.1 percent of the static dimension of the crystalline material, goods such as Lead Zirconate Titanate Crystal (PbZiTio3) may generate measurable piezoelectric power. It is utilized in beneficial applications such as sound processing and sound detection, high voltage production, electrical signals, micro balancing and ultra-finished optical component focusing. Microcopies of scanning probes, such AFM, STM, SNOM, MTA, etc. may also form the basis of a variety of scientific instrument methods for atomic resolution. The majority of crystals used may be quartz, tourmaline, topaz, rocket salt (Sodium Potassium Tartrate Tetra hydrate) and cane sugar. Nevertheless, the largest piezoelectricity shows quartz and Rochelle salts. The plum titanium, barium titanate and plum zirconate are ceramic compounds and crystals that exhibit piezoelectricity when bent, twisted or deformed. The connection between mechanical and electrical oscillations with the transducer is convenient. Rochelle salt may be used to produce high compression voltages[4].

1.2 Thermocouple Technology Implanted Solar Highways:

It will also have some additional benefits since it can be effective at night if solar cells fail. Thermocouple technology may also be utilized in hot water storage schemes (a connection between two different metals generating a temperature-related voltage). The collected water will stay below Fahrenheit 60 below the freezing threshold and may also be pumped into the road surface by electric pumps to cool solar cells to make them more efficient. Thermo couplings may be installed between cold and hot water pipes, and the cooling mechanism can produce electricity. In winter, the opposite may be achieved when the air travels over a nearly frozen surface between 50 and 60 degrees Fahrenheit. This method works at night as well. All these advancements are taken into account for future developments. Solar roads reuse and lifespan integrated with piezoelectric strength and thermocouple technology. The important feature of this growth is that it reduces the dependence on fossil fuels for the supply of oil. For asphalt roads, for example, 7-12 years, on average the life cycle of roads is nearly 30-40 years, and on average this is a huge difference[5].

1.3 Military Application:

Without jeopardizing human life, eyes and ears should be everywhere in the globe. Drop a solar panel via Parachute into the hills. The parachute continues under the plate and is replaced. Open and target camera modules in all directions. A satellite dish is built in every area of the globe for communications. Marines monitor the camera and, if required, view the pictures and order assaults on their computer displays. The Solar Road Panel does not produce noise compared to conventional generators and thus allows the opposing fighters to identify thermal footprints. No refueling is required to prevent damage to our troops. Entire bases may be placed on solar panels anywhere in the globe. Generators that need frequent refueling are automatically supplied without energy. When the procedure is finished, solar road panels may be placed and utilized elsewhere[6].

1.4 Health Advantages:

Solar roads will save many lives in northern climes via snow and ice removal, night road illumination, and animal warning. It also prevents contaminants from flowing into the rivers, streams, lakes and seas to maintain a stable and safe environment.

1.5 Use of Existing Roads for The Intended Purpose:

When solar energy reaches the surface of the planet, the quantity of sunshine decreased around midday on a clear day to approximately 1000 watts per square meter. On average 24 hours a year approximately a barrel of oil is generated every year, or about 4.2 kilowatts per year of about energy equivalent, for every square

kilometer of the world surface. During more than six kilowatt-hour days per square meter, deserts get the greatest sun with extremely dry air and very little cloud cover. Secondly, because the existing roads can be utilized to produce energy, solar roads are the most important, so additional land and utilities are not really needed[7].

1.5.1 Charging:

Electric cars may be more and more utilized and charged anyplace at a convenient location, where drivers can recharge and recharge their vehicles after travel. The induction plating system may be recharged for electric vehicles, such as engines and buses, on the road without wasting time on lines for hours, applying the concept of reciprocal inductivity. Increasing EVs would reduce fuel consumption. Cars are simple to drive by replacing the internal combustion engine.

1.5.2 Aesthetics:

First of all, the photos of the ugly power wires are gone. Just imagine the journey and therefore the absence of these obstacles. Solar Highways prevent snow and ice from collecting electricity from these cables. This would also make the world cleaner for solar roads, no unnecessary energy poles, relay stations, combined cables, cooling towers, carbon stacking, etc., details utilized on real roads, for instance, telephones, televisions, Internet, cables, etc. Central power facilities, such as coal and nuclear power stations, help keep sky safer. Solar electricity produced by solar roadways can be electrified using automated traffic control techniques. Solar Roadways is an intelligent road that provides free, renewable energy, safe driving conditions and data diffusion[8].

With the continuous increase in congestion and the ongoing deterioration of the decade-old roads and bridges, both state and central governments do not meet the requirements of existing facilities and development of capacity, and now is the ideal moment to say 'goodbye to crumbling roads.' RFID tags (Radio Frequency Identification) were put on dangerous cars that people enjoy. In contrast to the gloomy roads on which people travel at night, the solar roads would feature LEDs which illuminate the roadways, since energy is not necessary for road lighting. If the microprocessor is run automatically, traffic congestion would not save gasoline at greater scales.

1.5.3 Electricity Generation:

1. Clean water transportation to agricultural centers or communities.
2. Internal or on route renting refers to companies such as telephone, broadband high-speed, cable TV, etc.
3. By selling LEDs on the road or in the car park.
4. Paying for their hybrid vehicles to companies or individuals.
5. For a solar road system of 83.333 kWh, the average daily production of 11.4 kWh is anticipated to be compensated for original cost over 20 years.

1.6 Management of Water:

The harmful effects of climate change on water supplies and freshwater environments have raised major questions. Ocean oil is very susceptible to being involved in a cascade of aquatic ecosystems, such as acidification, heating and overfishing because of the various ocean tensions which result in an extensive assessment of the current risks to marine and human life potential hazards. On public highways, parking lots and raspberries, rain and snow wash water and absorb various pesticides, bacteria, anti-glazing, petroleum, brake fluid, trash and gravel. Pollution is defined as "storm water." And solar roadways will meet many difficulties and obstacles connected with an energy demand fight if utilized frequently, thus decreasing fossil fuel consumption and, eventually, reducing emissions from clean, paradise-like environments[9].

1.7 Material Recycled Waste Management:

The items recovered may also be used to the internal aid programme. According to estimates, over 50,000 pieces of plastic trash still float on every square mile of the water. Certain trash may be combined into other recycled goods, such as water bottles, waste bags, other plastic waste and rubber tires, which allows 3R

(Reduction, Reuse, Recycle) to be effectively recycled via appropriate waste management methods. The Solar Road Panel Roadways project would convert this idea of reducing, reusing, recycling trash into a green project, from manufacture through maintenance and implementation[10].

2. DISCUSSION

Solar roadways will play an important role in meeting energy needs and requirements. Dependence on fossil fuels may also be reduced via energy production from solar roadways. Greenhouse gas emissions, aerosols or any kinds of environmental monitoring are thus not accessible as a renewable source. The usage of 50% CO2 emissions is expected to be avoided. The piezoelectric concept incorporated in the solar roadways may also increase the performance of the system. The heating equipment utilized in the home will remove ice from the colder areas and save a lot for clearing roads. LEDs may also be useful for traffic signals or crosswalks. The microprocessor utilized in solar roadways is responsible for all traffic control. No agricultural land may be sacrificed for the development of projects such as oil asphalt highways. Current solar road systems plan both future development areas and vehicle parks for cum to reduce our carbon footprint as much as possible. Solar highways provide safe driving conditions and energy supply to clean renewable energy. The solar roadways also pay for themselves via energy generation and other revenue.

The Solar Roadway is a set of structurally manufactured solar panels. The goal is to replace all existing oil asphalt roads, parking lots and driveways with solar road panels that gather energy for our homes and enterprises. The ultimate objective is to store surplus energy on or along solar roads. This renewable energy is a substitute for the requirement for existing fossil fuels for power production. In turn, the greenhouse emissions are reduced to half. Solar Roadways offers a long-term paradigm shift solution for significant problems to infrastructure, energy and environment. At the moment, the Solar Roadways system would cost about three times the cost of the installation of an asphalt road, but would be more durable than our economy could consume by modularly replacing and paying for itself. At just 15% efficiency, considerably behind expectations, 100% Solar Roadways would generate three times the entire demand for energy.

Additional advantages are the integrated smart grid, the major new investment and job generation, the economic benefits inherent in the global leadership in building the most advanced clean energy infrastructure each dollar invested in renewable energy sources ultimately generate revenues because the resources are not burnt or lost. The roads also interact with vehicles alerting them to the presence of pedestrians at a crossroads using visual signals. Asphalt works in various ways and is easy to put down in comparison with other techniques. It brought our automobile infrastructure into the 21st century. However, hidden expenses make it more difficult and costly to continue to prefer asphalt as the main model of road repair for the whole country. This is why asphalt isn't suitable for road building. Solar Roadways can provide rewards to the public budget, enhance efficiency in our infrastructure expenditures and substantially reduce consumer and corporate energy bills. It can make the developing electric car economy cheaper and simpler to control. They can enable us to reduce the externalized costs of fossil fuels by hundreds of billions of dollars a year or more. And we can lead the world in strong clean-energy exports that turn down enormous quantities of pollutants and greenhouse gases.

Perhaps the most significant aspect of the Solar Roadways technology is that it shows the basic feasibility of renewable energy sources in its power production. The presence of clean energy technologies may drive the whole economy of the nations and more. However, the commitment to significant infrastructure investments and incentives is needed. If this technology is improved, we can generate employment and a sustainable energy boom, which spurs enormous private investment with very little additional cost.

3. CONCLUSION

Solar highways will play a major role in meeting energy needs and demands. The need on fossil fuels may also be reduced by generating power from solar roadways. Emissions of greenhouse gases, aerosols or any kind of chemical contaminant monitoring are thus not accessible as a clean source. Half of CO2 emissions are anticipated to be halted. The piezoelectric principle used in the solar roadways also enhances gadget efficiency. In the colder regions, the heating systems in the home may help recover ice and save a significant lot of money for road maintenance. For traffic signals or crosswalks, LEDs may also be helpful. All traffic controls are responsible for the microprocessor used on solar roadways. The development of infrastructure, such as oil

coated highways, cannot compromise farmland. The current solar road systems design both prospective building sites and cum parking spaces so that our carbon emissions are as low as feasible. Solar highways provide sustainable energy sources with safe driving conditions and power delivery. Solar highways would also pay for themselves by generating electricity and other revenues.

Currently there will be 2,5 million assembly workers using solar roads, separating the world from pause employment, and making solar roads the country's biggest employer and economic savior. Accidents will cease because drivers may be informed that solar grid loads might be sensed if anything is on the panel floor. The charging cells work like weight machines. Embedded LEDs warn the drivers as the animal reaches the road and the driver has enough time. First, the future is human and planet-friendly from Evacuated Tube Transmission to what humans term "antigravity." Replacing conventional roads with Solar Roadways would generate Green Color employment and promote the solar manufacturing sector. Many more negative effects are avoided if this endeavor meets its obligations.

REFERENCES:

[1] S. Johny and S. K. John, "A Review on Solar Roadways: The Future of Roads," *Int. J. Recent Innov. Eng. Res.*, 2017.

[2] A. A. Kulkarni, "'Solar Roadways' – Rebuilding our Infrastructure and Economy," *Int. J. Eng. Res. Appl.*, 2013.

[3] J. J. Achari, K. A. Holla, A. Hebbar, and S. M. Revankar, "Review Study on Solar Roadways," *Int. J. Recent Res. Asp.*, 2018.

[4] P. G. Kristiyan Yotov, Yana Panayotova, "Solar Roadways," *SOFIA Univ. Fac. Econ. Bus. Sol.*, 2015.

[5] R. Agrawal and O. Prakash, "Feasibility Study of Solar Roadways," *Imp. J. Interdiscip. Res.*, 2017.

[6] A. Mehta, N. Aggrawal, and A. Tiwari, "Solar Roadways-The future of roadways," *Int. Adv. Res. J. Sci. Eng. Technol.*, 2015.

[7] K. W. Lee, D. Ph, and F. Asce, "Solar Energy Harvesting from Roadways," *Transp. Res. Board 93rd Annu. Meet. 12-16 January 2014, Washingt. DC.*, 2014.

[8] M. S. Wu, H. H. Huang, B. J. Huang, C. W. Tang, and C. W. Cheng, "Economic feasibility of solar-powered led roadway lighting," *Renew. Energy*, 2009, doi: 10.1016/j.renene.2008.12.026.

[9] S. D. Brusaw and J. A. Brusaw, "Intelligent Solar Roadway System and Solar Roadway Panels," *US Pat. App. 15/840,123*, 2018.

[10] E. R. Ranjan, "Solar Power Roads : Revitalising Solar Highways , Electrical Power and Smart Grids," *Int. J. Eng. Res. Gen. Sci.*, 2015.