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SOLSTICEX ECOS – Self-Engineered Solar Ecosystem

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Abstract – The large amounts of funds allocated for the fuel fulfillment of the local governmental public transport systems are getting wasted due to inefficient use of energy resources. In India, Rs.18,000 crores were allocated for the fossil fuel fulfillment according to the union fund allocation bureau to the public transport departments. The main fuels for these transport vehicles are Gasoline, Diesel Fuel, Ethanol, Bio-diesel, etc. According to International Energy Agency, transportation accounted for 24% of global Carbon Dioxide emissions in 2020 and this air pollution causes an estimated 385,000 premature deaths each year in the European Union alone. The economic costs of air pollution from transportation are estimated to be $1.7 trillion globally. Yet, there is the only solution of Electronic Vehicles (E.V) which indirectly pollutes the atmosphere as 71% of electricity is generated by Thermal Power Plants in India. This Challenge can be easily surmounted with the introduction of renewable resources such as Solar Energy. This paper aims on presenting the groundbreaking solution of an ecosystem that has redesigned solar panels that adjust their angles to get maximum efficiency on the basis of the data collected by visuals analyzed by artificial intelligence. This will provide a major boost in the progress of a clean future and a drop in premature deaths by air pollution. It will also economically save up the annual provision of funds.

Key Words: *Funds for Fuel, Public Transport Systems, Financial Sustainability, Fossil Fuels, Air pollution, Electronic Vehicles, Thermal Power Plant, Redesigned Solar Panels, Artificial Intelligence*

1.INTRODUCTION

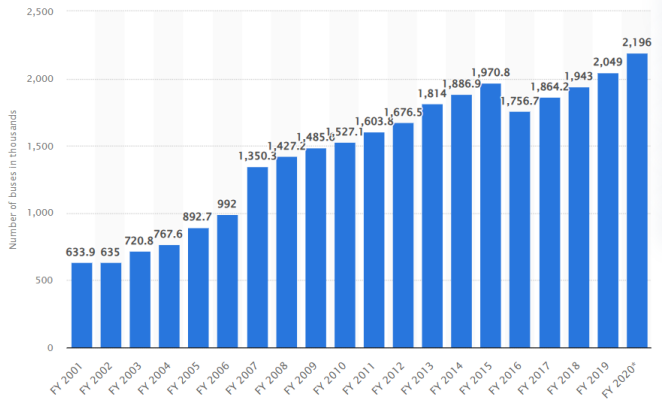

Fig –1: Increasing Local Bus numbers (India)

Local Public transport system is a huge market with around 2.2 million buses operating only in India. The $475 Billion market for fuel fulfillment has still not tapped the renewable energy resources such as solar, hydro and wind power. These public transport vehicles mainly contribute to the increasing air pollution levels in numerous countries. The International Council on Clean Transportation found that if the usage of fossil fuels is not decreased, it could result in estimated 174,000 premature deaths per year by 2030. According to the WHO, air pollution is the leading environmental risk factor for disease, and exposure to particulate matter emitted by buses and other forms of transportation can lead to respiratory and cardiovascular disease, stroke and even lung cancer. The new range of "eco-friendly vehicles" which is Electronic Vehicles (E.V) has been pressurizing the environment indirectly.

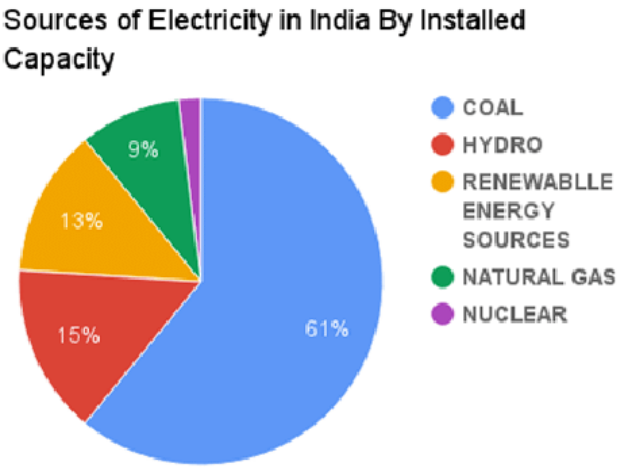

Fig – 2: Sources of Electricity Generation In India

The U.S Energy Information Administration (EIA) has stated that fossil fuels account for 62% of electricity generation in the United States, 2020, with natural gas and coal being the two largest sources. According to the Central Electricity Authority of India, coal accounted for 71% of the country's total power generation capacity, 2020. By using self-engineered and redesigned solar technology of SolsticeX, we could surmount these global issues and uproot one of the main pollutant contributors. These solar panels are integrated with hydraulic motors. The solar panels adjust their angles according to the data analyzed by artificial intelligence program that is linked with a database having all the information about sun's

angle on various timings at various places. This could help to get maximum solar intensity and make the solar panels work at a more higher efficiency rate. This technology could resolve the issues of energy fulfillment by generating much more electricity than it's used to power the public transport vehicles. In this report, a solar ecosystem based on this technology is explained which could be integrated in our local public transport systems to generate high amounts of electricity.

1.1 FUELS AND ENERGY FOR CARS

This table shows the direct and indirect pollution from buses, trains and other means of public transport.

Fossil Fuels (Direct Pollution from Cars): 1. *Gasoline* 2. *Diesel* 3. *Liquified Petroleum Gas*
Sources Of Indirect Pollution: 1. *Electricity for E.V* 2. *Liquified Petroleum Gas (LPG)*

1.2 HARMFUL TOXIC GASES EMITTED BY VEHICLES

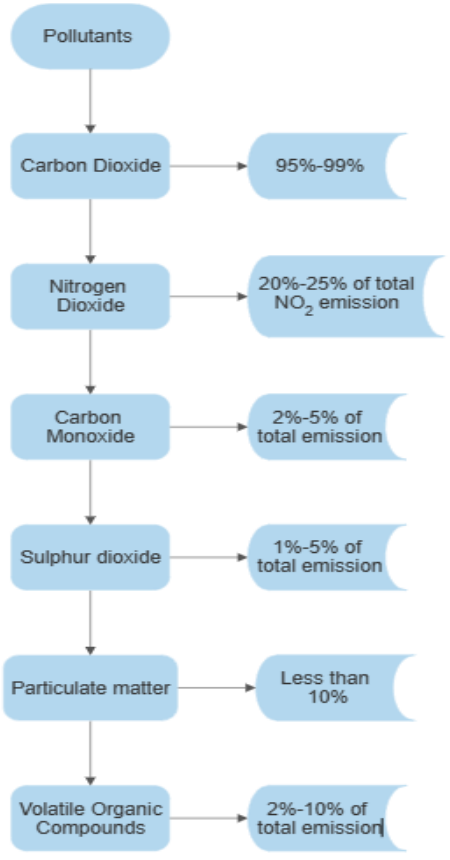

Fig –3 Pollution and Emissions from vehicles

2. SOLUTION

The proposed solution is a self-engineered solar ecosystem named "SolsticeX Ecos", which aims to reduce the greenhouse emissions caused due to public transport industry and save the large sums of funds allocated for fuel fulfillment. An ecosystem installed with a redesigned solar technology, visual artificial intelligence and cloud database. The database consists of the data related to the angle of sun on various timings at various places. The data is analyzed by the artificial intelligence which is linked with a camera or visual capturing device which tracks the movement of sun on various timings. The code then starts instructing the hydraulic motors beneath the solar panels on the basis of the sun's angle. According to the data analyzed, the hydraulic motors levelized the solar panels to an angle which was nearer to the perpendicular angle where the solar intensity is maximum. The solar panels move according to the sun's position and adjust their angles to get maximum efficiency. The electricity generated would be stored on a different battery in the vehicle, which the vehicle could only use when the main battery is drained. When the vehicle returns to the Ecos main Hub, the second charged battery is discharged and the electricity is transferred to a high-capacity main stationed battery. This main battery acts as a central reservoir of energy which will be installed at the stations of public transport vehicles. This would help in decreasing the pressure of direct as well as indirect pollution on the atmosphere. This technology could be implemented in cities such as Mumbai and Delhi in India, Jakarta in Indonesia, metropolitan cities of USA and China, etc. so that the greenhouse effects could get in control in these places and increase the financial economy by generating high capacity of electricity.

3. METHOD

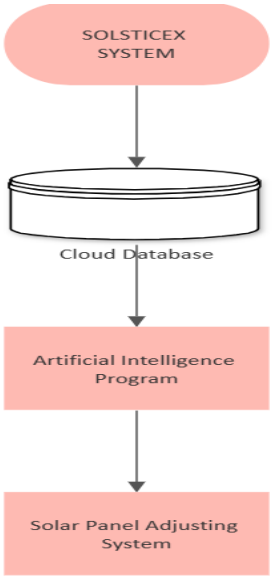

Fig –4: Methodology

The Ecosystem is an electricity generator by harnessing the solar energy. A redesigned solar panel is used to harness the solar power at a higher efficiency rate. Firstly, the artificial intelligence which is connected with a visual input. The sun's movement is tracked and analyzed. The sun's angle from the camera is calculated through mathematical expressions and that angle is matched with the time period and is saved in the cloud database. The cloud database acts as the main database which is connected with the solar panel's network of that particular region. Once the movement of sun has been tracked, the solar panels' network is fed with that data. The solar panels have hydraulic motors attached beneath them which move the solar panels and set their position in an angle which is nearer to the perpendicular angle. Once the solar panels are at an angle nearer to perpendicular (90°), the efficiency of the solar panels also increases as it receives a more direct sunlight than the normal solar panels.

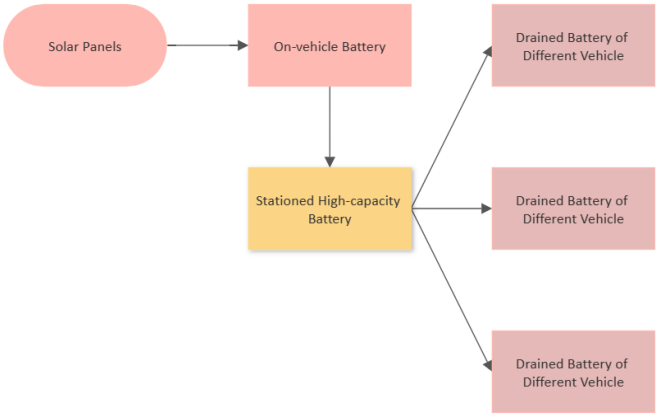

Fig – 5: Transfer and Storage Of Generated Electricity

The electricity generated is stored in a second battery in the bus or any vehicle. The second battery is not used to power the vehicle directly but it stores the power till the vehicle reaches the hub. Once the vehicle reaches the Hub, the second battery discharges itself and transfers the power to the main stationed high-capacity battery which is located in the main hubs. This stationed battery acts as the central energy reservoir and all the vehicles store their generated energy in this battery. This high-amount of stored electricity is then used to power the drained batteries of vehicles. The excess energy so generated could also be used by the government or the company for other commercial purposes such as powering the hub or selling that amount of electricity. The Artificial Intelligence is not only used for adjustment of Solar panels but also helping in driving the public transport vehicle much more efficiently than a normal fully human operated vehicle. The artificial intelligence program which is taking the visual input, analyzes the input and bifurcates into three functions - human detection model, vehicle detection model and traffic signal and regulation detection. It detects these modules on the visual frame and if any of it is detected, it provides an impulsive reaction to it. For example, the program detects a car moving at a distance of 50 meters. The bus has this SolsticeX system and it detects the car with the distance at which it is moving from the bus. It signals the drive once the bus is near to the car and calculates the instantaneous velocity of bus and the car through mathematical expressions. Once it is calculated, if the prediction made by the artificial intelligence is an alert signal, it means that the bus is too nearer to the car and chances of collision are high in sudden emergency situations. The bus would also have an instant braking system if the bus is extremely close to the car in motion. It would also signal the vehicles behind the bus in order to prevent any collision due to sudden braking systems. These functions are all dependent on the artificial intelligence program's robustness and precision which could be improved by training various types of models.

4.1 REDESIGNED SOLAR TECHNOLOGY

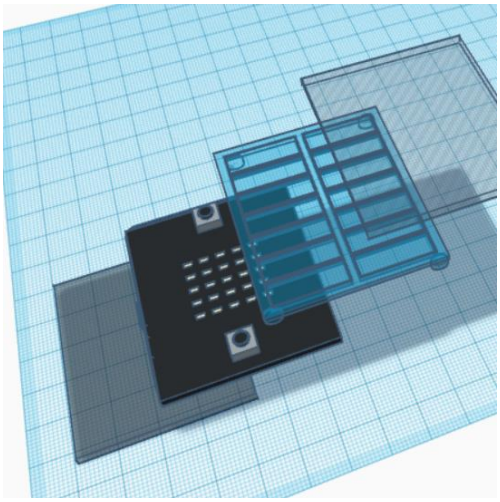

Fig – 6: Solar panel layer bifurcation

The solar panels are self-engineered and redesigned to increase efficiency and generate more amount of electricity than the normal solar panels. This increase in generation and efficiency is due to self-adjusting feature of the SolsticeX's solar panel. The solar panels have hydraulic motors beneath them which tilt the solar panels to a particular angle. This angle is calculated by analyzing the data of the sun's movement from the cloud database. The angle at which the solar panels are tilted gives it a more perpendicular angle and once the solar panels have an angle from the sun nearer to or equal to perpendicular angle, the efficiency increases as more direct rays of sun are falling on it. The solar panels are installed with this smart system and its layer bifurcation is also seen in Fig.5.

4.2 ARTIFICIAL INTELLIGENCE PROGRAM

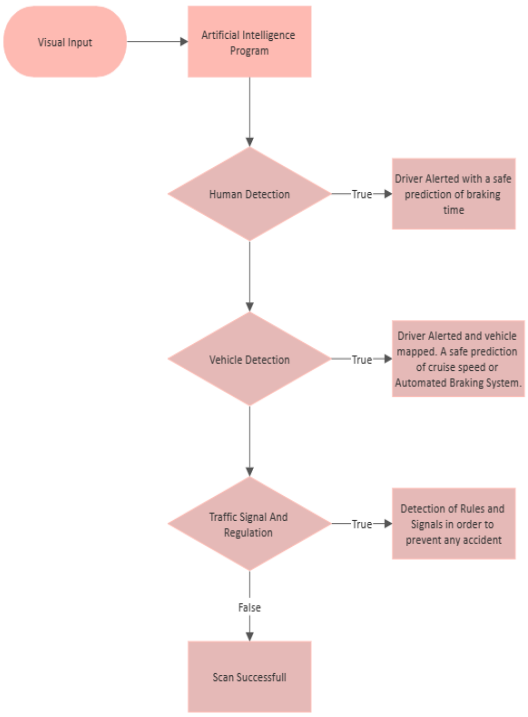

Fig – 7: Artificial Intelligence Algorithm Flow

Artificial Intelligence program is a code running in the background which takes the visual input and analyzes it. This program is linked with the cloud database where it stores all the data related to the sun's movement with its time period. It then calculates the angle needed by the solar panels to get near to the perpendicular angle. Once the calculations are completed, the data is then transferred into the circuit of the solar panel's adjusting system. Artificial intelligence not only adjusts the solar panels but also plays a vital role in helping to drive the bus safely and efficiently. The artificial intelligence software analyses the visual input and divides it into three functions: human identification model, vehicle detection model, and traffic signal and regulation detection. It detects these modules on the visual frame and, if any are discovered, it reacts impulsively to them. For example, the program's algorithm recognizes an automobile driving 50 meters away. The bus is equipped with the SolsticeX system, which recognizes the automobile based on its distance from the bus. It informs the driver when the bus is close to the automobile and uses mathematical formulas to compute the instantaneous velocity of the bus and the car. If the artificial intelligence computation is an alarm signal, it signifies that the bus is too close to the automobile and the risks of accident are considerable in unexpected emergency scenarios. If the bus is dangerously near to a moving automobile, it will also feature an immediate braking mechanism. It would also alert drivers behind the bus to avoid an accident caused by rapid braking systems. These functions are all dependent on the robustness and precision of the artificial intelligence programme, which is capable of being enhanced by training different types of models.

5. FEATURES OF THE CAR

5.1. THE GENERATION AND TIME RELATION

The redesigned self-engineered SolsticeX's adjusting solar panels have an efficiency rate of 72% which is 34% more than the normal solar panels. This advantage helps to generate more power in less time. Thus,

1 kilo-watt needs to 50hrs of solar exposure.

5.2 ECO-FRIENDLY SYSTEM

The ecosystem is based on renewable energy source which is the solar energy and thus its environmental sustainability is secured. The batteries used here are the bio-degradable batteries which does not use chemicals like lithium which are hazardous towards human health as well as environment. This results in SolsticeX Ecos to attain the badge of an Eco-friendly System.

CONCLUSION:

The target of this model of this Ecosystem is to decrease the greenhouse emissions and aims to be a part of the environmental fight against the fossil fuels. It also aims to cut off the excess funds used for the fossil fuel fulfillment on an annual basis. This would increase the lifespan of humans which was diminished by the fossil fuels. This project would also boost the popularity and the importance of the redesigned solar technology and the advent of Artificial Intelligence. This would revolutionize the whole automotive industry into an environment friendly industry as it would also lessen and gradually end the premature deaths due to air pollution. It would, on a gradual basis, increase the profitability of the government or the customer using this ecosystem technology on the money earned by selling the excess amount of electricity so generated by this system.

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