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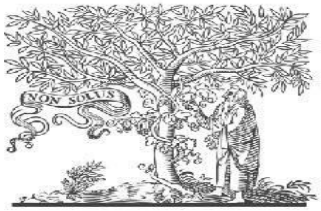

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SPEED BUMP ENERGY CHARGING CENTER

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Abstract

The speed bump energy charging center is a proposed concept that aims to convert the kinetic energy of passing vehicles into electricity that can be used to charge electric vehicles. This project involves the installation of speed bumps equipped with generators that capture the mechanical energy of vehicles passing over them. The captured energy is then stored in batteries and can beused to charge electric vehicles at charging stations located nearby.

The TP4056 charging chip is used to efficiently and reliably charge the batteries that store the captured energy. This chip is a low-cost and high-performance solution that provides a constant current and voltage output, ensuring the safe and fast charging of batteries.

The primary goal of this project is to provide a sustainable and cost-effective solution for electric vehicle charging infrastructure. The speed bump energy charging center can be installed on roads and highways, where there is a high volume of vehicle traffic, and can contribute to reducing carbon emissions and promoting the use of renewable energy sources.

Overall, the speed bump energy charging center has the potential to revolutionize the way we think about electric vehicle charging infrastructure, providing a sustainable and innovative solution to meet the growing demand for electric vehicles.

Introduction

One of the most appealing aspects of speed bump charging centers is their ease of installation. Because speed bumps are already present in many areas, retrofitting them with the necessary technology to become charging centers is a relatively simple process. This means that they can be installed in a wide range of locations without requiring significant construction infrastructure costs.

Furthermore, speed bump charging centers offer a flexible solution to the challenge of EV charging infrastructure. Because they can be installed in a variety of locations, they can help to fill gaps in the charging network, particularly in

areas where traditional charging stations are not yet widely available. This can help to increase the overall accessibility of EV charging, which is crucial for encouraging more people to switch to electric vehicles.

In addition to their environmental benefits, speed bump charging centers can also provide economic benefits for businesses and municipalities. For example, they can help to reduce energy costs and provide a new revenue stream for businesses that install them on their property. In some cases, municipalities may also be able to generate revenue by selling excess energy generated by the charging centers back to the grid.

While speed bump charging centers are a relatively new technology, they have already been successfully implemented in a number of locations around the world. For example, the city of Gijón in Spain has installed speed bump charging centers in several locations, including a shopping center and a park-and-ride facility. The system has proven to be effective, generating enough energy to power streetlights and other nearby infrastructure.

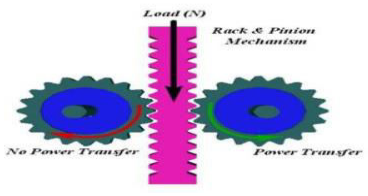
As the demand for EVs continues to grow, the need for accessible and sustainable charging infrastructure will only become more urgent. Speed bump charging centers offer an innovative and practical solution to this challenge, providing a way to generate renewable energy while also making EV charging more convenient and accessible for drivers.

COMPONENTS

Rack Pinion Mechanism

A rack and pinion mechanism is a type of linear actuator that converts rotational motion into linear motion. It is commonly used in a variety of applications, including power generation. In power generation, rack and pinion mechanisms can be used in speed breakers to generate electricity. When a vehicle passes over the speed breaker, the rack and pinion mechanism converts the vertical motion of the speed breaker into rotational motion. This rotational motion can then be used to generate electricity using a generator or dynamo.

The rack and pinion mechanism consists of a gear (the pinion) with teeth that meshes with a straight bar (the rack) with teeth along its length. As the pinion rotates, it moves the rack in a linear motion. This linear motion can be used to drive other components or machinery, such as generators or dynamos.



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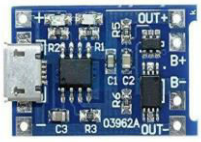

TP-4056 CHARGING CHIP:

The TP4056 is a chip designed to charge a single cell lithium-ion battery while protecting it from overcharging and undercharging. It has two status outputs to indicate charging status and programmable charge current of up to 1A. The input voltage range of 4V-8V allows charging of batteries directly from a USB port. However, it's important to note that the maximum current from a USB port is 500mA. Two types of break-out boards are commonly used for this chip - one with only the charger chip and another with three chips on the board. The TP4056 uses a constant current and constant voltage charging method and stops overvoltage and overcurrent charging by detecting specific voltage conditions. It has a charge termination of c/10, a trickle charge threshold of 2.9V, and an upper charge stop voltage of 4.2V. The chip also has a soft start inrush current limit and an automatic recharge feature to keep the battery optimally charged when connected to a charger.

LED LIGHTS AND BATTERIES:

LED (Light Emitting Diode) bulbs produce light by passing an electric current through a semiconductor material, which emits photons (light) through the process of electroluminescence. Unlike traditional incandescent bulbs, which produce light by heating a wire filament until it glows, LEDs do not rely on heat to generate light. This means that they run much cooler and are significantly more energy-efficient than incandescent bulbs, which waste a lot of energy as heat.

LED bulbs also have a longer lifespan than traditional bulbs, typically lasting up to 25 times longer than incandescent bulbs. They are also more durable and resistant to shock, vibration, and extreme temperatures, making them ideal for use in a wide range of applications, including home lighting, commercial lighting, automotive lighting, and even street lighting.

Batteries are essential devices that have revolutionized the way we power our everyday electronic devices. These devices function by converting the energy that is stored in chemicals into electrical energy. This conversion is achieved through the process of a flow of electrons between two materials, known as electrodes. The flow of electrons produces an electric current that

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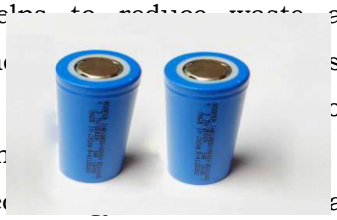
can be utilized to power various applications, such as smartphones, laptops, and even cars.

To ensure that the flow of electrons is maintained, charged ions flow through an electrolyte solution that comes into contact with both the electrodes. This electrolyte solution helps to maintain the balance of electrons, which is critical for the battery to function properly. The type of electrodes and electrolytes used in the battery can affect the chemical reactions that take place, ultimately determining the battery's performance, energy storage capacity, and voltage.

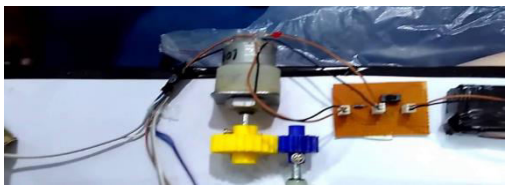
Batteries come in different types and sizes, each with unique features that determine their efficiency and suitability for different applications. Rechargeable batteries are a popular type of battery as they can be reused multiple times, which helps to reduce waste and save m s has had a our lives, an battery te ake them more efficient, reliable, and safer for use in various applications.



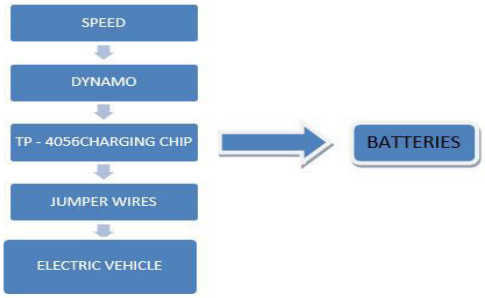
WIRES :

In the process of generating power through speed breakers, wires play a critical role. The energy produced by vehicles passing over speed breakers is transformed from kinetic to potential energy, which can be converted into electricity using generators connected to the speed breaker.The wire is used to connect the generator to the speed breaker and transmit the electrical energy to the storage device or grid. It is important to choose the right size and material for the wire and carefully consider the distance between the generator and the storage device to minimize energy loss and prevent overheating.

Efficient and safe transmission of electrical energy is possible only with proper wiring. Therefore, it is important to choose a wire that can withstand the voltage and current generated by the generator as well as environmental factors such as heat, moisture, and physical damage.In summary, wires are essential in power generation through speed breakers, enabling the efficient and safe transmission of the generated electricity to where it is needed.



BLOCK DIAGRAM



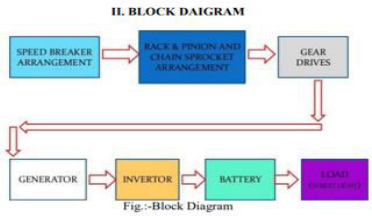


Fig.:-Block Diagram

WORKING

Converting kinetic energy into electrical energy:

Power generation through speed breakers is a technology that has the potential to revolutionize the way we generate electricity. This innovative process involves harnessing the kinetic energy of moving vehicles and converting it into electrical energy, thereby providing a sustainable and eco-friendly method of power generation.

The process of power generation through speed breakers utilizes a rack and pinion mechanism installed beneath the speed breaker. When a vehicle passes over the speed breaker, the up and down motion of its wheels causes the rack and pinion mechanism to move, which generates rotational motion that drives a generator or dynamo. This, in turn, generates electricity that can be stored or distributed to nearby devices.

One of the key benefits of power generation through speed breakers is its cost-effectiveness. Unlike traditional power generation methods that rely on fossil fuels, this technology requires no fuel input and has minimal operating costs. Additionally, the energy generated from this process is free and abundant, as it is generated from the motion of passing vehicles.

Another benefit of power generation through speed breakers is its eco-friendliness. By harnessing the energy that would otherwise go to waste as heat and friction from the vehicle's motion over the speed breaker, this technology helps to reduce carbon emissions and minimize environmental impact. Furthermore, since it does not rely on non-renewable resources, it offers a sustainable solution to our energy needs.

Power generation through speed breakers can be used to power a variety of devices, including streetlights, traffic signals, and even homes and businesses. This technology is particularly useful in remote or off-grid areas, where traditional power sources may not be readily available.

In summary, power generation through speed breakers is an innovative technology that offers a sustainable, cost-effective, and eco-friendly solution to our energy needs. With its many benefits, this technology has the potential to transform the way we generate electricity and pave the way for a cleaner and more sustainable future.

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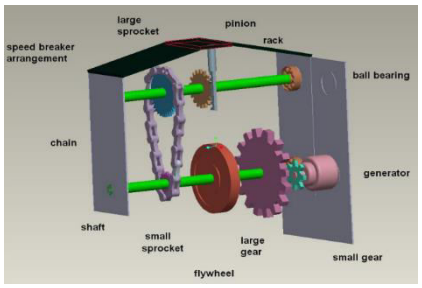
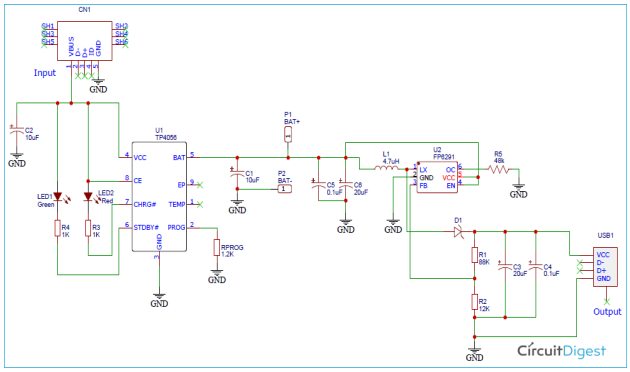


TP -4056 CHARGING MODULE:

After wind energy is converted into electrical energy, the electrical power which is generated need to be stored, so that we have to use batteries the charging capacity is limited and it is in percentage as same as mobile. Not only that, the electric power is transmitted to the vehicle, we have to use this module having usb ports and some other features like LED from the outgoing USB port, through the jumper wires it is connected to the electric vehicle. After the fully charged in the battery, we need to ON the output terminals by using the switch [closed].

TP-4056 INTERNAL CONNECTION

Figure shows the internal connection of 18650 charging module. This charging chip is very advanced, this provide us two output USB ports, two input type C and type A ports, battery pins to store energy, LED display to know the charging status of the battery18650 charging chip contains input voltage 4.5 to 5V input interface micro USB port charging method : linear charging – a full charge voltage : 4.2 V modify the on board resistor to adjust the charging current .



The newly proposed charging method had a confirmed degradation rate similar to the standard 0.3 C charging condition. The new algorithm supports rapid battery charging without changes to the cell design. The new algorithm also exhibits a charging speed to 80% SOC at 25o C, which is more than twice the rate achieved by existing algorithms. Thus, the proposed method demonstrates reduced required charge times and may be suitable for use in rapid-charging systems in low voltage forklifts. The battery pack was composed of 14S40P cylindrical cells (ICR18650-26F, Samsung). The battery specifications guaranteed a 0.5 C maximum charging current and a 500-cycle lifetime.

How speed bump charging is used in present technology:

Speed bump charging, also known as kinetic road charging or energy harvesting, is a technology that is still in the early stages of development and is not yet widely used. However, there have

been some pilot projects and demonstrations of the technology in various parts of the world.

One example is the Smart Road Gotland project in Sweden, where a 120-meter long section of a road was fitted with a speed bump charging system. The system consists of a series of hydraulic cylinders that compress and release as vehicles pass over them, generating electricity through a turbine system. The generated electricity is stored in batteries and can be used to power nearby streetlights and other infrastructure.

Another example is the Kinetic Energy Recovery System (KERS) developed by Pavegen, a UK-based company. The system uses a similar technology to the speed bump charging system, with a series of tiles installed beneath the surface of the road. When a pedestrian steps on the tiles, they generate energy that can be used to power streetlights or other nearby devices.

There are also ongoing research efforts to improve the efficiency and scalability of speed bump charging systems. Some researchers are exploring the use of piezoelectric materials, which generate electricity when subjected to mechanical stress. These materials could potentially be integrated into the road surface to generate electricity from passing vehicles more efficiently.

Overall, while speed bump charging is still in the early stages of development, it has the potential to provide a sustainable and eco-friendly way of generating electricity from the motion of passing vehicles. As the technology develops and becomes more efficient, it could become a more widely adopted solution for powering infrastructure in remote or off-grid areas.

APPLICATIONS

Speed bump charging, also known as energy harvesting or kinetic road charging, has numerous potential applications across various fields. One of the primary uses of speed bump charging is in parking lots and garages, where it can be installed to generate electricity from the motion of passing vehicles. This energy can then be utilized to power nearby infrastructure like lighting, ventilation systems, or electric vehicle charging stations.

Public roads and highways can also benefit from speed bump charging systems, as they can be utilized to generate electricity from passing vehicles. This could potentially provide a sustainable and cost-effective way of generating electricity for remote or off-grid areas, reducing reliance on grid power.

Another potential application of speed bump charging is in public transportation, where it can be used to generate electricity from the motion of

buses or trains. This would help to reduce the carbon footprint of public transportation systems and provide a sustainable source of power for onboard systems.

Finally, sports stadiums and arenas can also benefit from speed bump charging, as it can be installed to generate electricity from the motion of fans walking to their seats. This energy can then be used to power the stadium's lighting or other infrastructure.

Although speed bump charging technology is still in the early stages of development, it has the potential to be used in a range of applications to generate electricity in an eco-friendly and sustainable way.

CONCLUSION

By introducing this project we can reduce usage of fossil fuels by bringing new innovation like ' SPEED BUMP ENERGY CHARGING CENTER'. Generation of electricity increases by fossil fuels. So, by brining new innovation like 'SPEED BUMP ENERGY CHARGING CENTRE' we can reduce the consumption fossil fuels

This means that electric vehicles are considered as part of the energy system. In this way, locally produced electricity (wind power) can be stored in the batteries of the electric cars and if demanded reinserted into the grid. This can balance irregular local production of electricity and also effect imbalances of the grid in general.

In this way we conclude that speed bump energy charging centre gives a sufficient amount of power in an eco-friendly manner without any global warming.

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