



ISSN (Print) : 2320 – 3765
ISSN (Online): 2278 – 8875

International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Website: www.ijareeie.com

Vol. 7, Issue 4, April 2018

Railway Tracks Based Energy Generation Using Racks and Pinion and Its Application

Lovepreet Kaur¹, Alankrit Kumar², Aditya Lakde³, Aakanksha Sharma⁴, Ashutosh Rai⁵, Mousam Sharma⁶

¹B.E. Student, Dept. of Electrical & Electronics Engineering, Bhilai Institute of Technology, Durg, India

²B.E. Student, Dept. of Electrical & Electronics Engineering, Bhilai Institute of Technology, Durg, India

³B.E. Student, Dept. of Electrical & Electronics Engineering, Bhilai Institute of Technology, Durg, India

⁴B.E. Student, Dept. of Electrical & Electronics Engineering, Bhilai Institute of Technology, Durg, India

⁵B.E. Student, Dept. of Electrical & Electronics Engineering, Bhilai Institute of Technology, Durg, India

⁶Assistant Professor, Dept. of Electrical & Electronics Engineering, Bhilai Institute of Technology, Durg⁶

ABSTRACT In this paper, we are generated power by energy harvesting arrangement simply running on the railway track for power applications. Today there is a need of Nonconventional energy system to our nation. The energy obtain from railway track is one source of to generate non conventional energy because there is no need of fuel as a input to generate the output in the form electrical power and these is done by using simple gear drive mechanism. These mechanism carries the flap, rack and pinion, gears, freewheel, flywheel, DC generator, battery. The main focus of this arrangement is the harvesting large amount of power from railway track which can be used to power the track side infrastructures which has power rating up 8 to 10 watts or more.

KEYWORDS: Energy, Energy Harvesting, Non-conventional Method, Rail Road

I. INTRODUCTION

Man has needed and used energy at an increasing rate for his requirement. Man required energy primarily in the form of food. He derived this by eating plants or animals, which they hunted. With further demand for energy, man began to use the wind for sailing ships and for driving windmills, and the force of falling water to turn water for sailing ships and for driving windmills, and the force of falling water to turn water wheels. Till this time, it would not be wrong to say that the sun was supplying all the energy needs of man either directly or indirectly and that man was using only renewable sources of energy. World is growing at the faster rate with regards to consumption of fuel and so the scarcity of energy as the sources producing them are depletable in nature. Around the world, there were 8,06,000 cars and light trucks on the road consuming 260 billion US gallons 980000 liters of gasoline yearly. The extensive usage of energy has resulted in an energy crisis and there is a need to develop methods of optimal utilization. Which will not only ease the crisis but also preserve the environment. Commuter rail and subway are including railway transportation which play an important role in the economy and quality everyday life. Researches show that the world has already had its enough shares of its energy resources. Fossil fuels pollute the environment, Nuclear energy requires careful handling of both raw as well as waste material. The focus now is shafting more and more towards the renewable sources of energy, which are essentially nonpolluting.

In the present day scenario power has become the major need for human life. Energy is an important input in all the sectors of any countries economy. The increasing population and decreasing conventional sources for power generation, provides a need to think on non-conventional energy resources. To facilitate policymakers and transportation into making informed decisions on operating transportation systems, it is essential that railway track-side equipment (signal lights, wireless communication monitoring devices, positive train control, etc.) are well maintained



International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Website: www.ijareeie.com

Vol. 7, Issue 4, April 2018

and operated. When train moves over the track, the track deflects vertically due to load exerted by the train's bogies. The vertical displacement of the track under the weight of a passing train can be connected to regenerative devices i.e. a vibration energy harvester. The generated power can be stored into the battery and used to power track side equipments. Railroad energy harvesting is no trivial disturbance. In our project we are using these powers for irrigation system to the nearby lands and fields and for lamp lights near the track.

II. BLOCK DIAGRAM

This is a simple arrangement to show how the system will work.

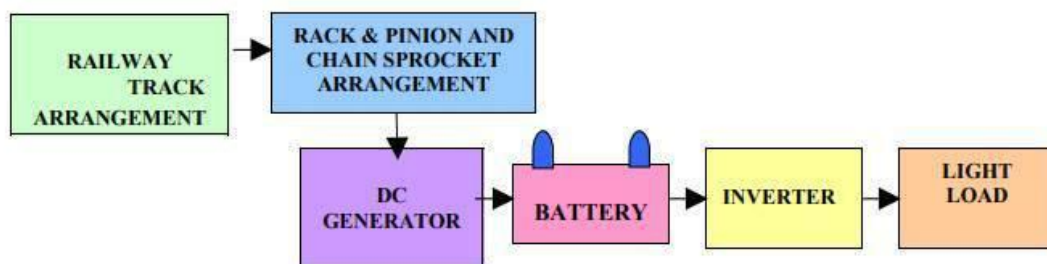


Fig.-1 Block Diagram of Generation of Power Using Railway Track

PRINCIPLE

The principle of this project is conversion of energy within the variety of force into voltage.

III. PROPOSED SYSTEM

When a train passes over the track, the track deflects in downward direction attributable to the load exerted by the train's bogies. Additionally, due to the deflection of the track, there is a deflection of timber placed below the track, and thus the flap is displaced downward. Because the flap is displaced downward, the spring that is connected to the flap gets compressed in the downward direction, and thus the rack additionally moves in the downward direction, attributable to these pinions getting rotated, and thus the larger freewheel turns as a result of each square measure mounted on the same shaft. As there is a rotation of the larger freewheel, the smaller freewheel is additionally turned through chain drive. The freewheel and regulator square measure are mounted on the same shaft, thus the regulator is additionally turned. The regulator is connected to the shaft of the generator, therefore if the regulator can turn, then there is a rotation of the shaft of the generator, and power is generated, which is kept into the battery.

ADVANTAGES

- Power generation is solely dependent on running the vehicle on this arrangement
- Power is additionally generated by running or exercising on the brake.
- No fuel input
- This could be a Non-conventional system
- Battery is employed to store the generated power



ISSN (Print) : 2320 – 3765
ISSN (Online): 2278 – 8875

International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Website: www.ijareeie.com

Vol. 7, Issue 4, April 2018

DISADVANTAGES

- Slight inclination is needed within the railway track
- Mechanical moving elements is high
- Initial value of this arrangement is high.
- Care ought to be taken for batteries

APPLICATIONS

Power generation exploitation railway track system will be employed in most of the places like

All highways road speed breaker
All Railway track

- **For Irrigation system:**

The battery will be connected to the relay which will work as a switch. This switch will be activated with the current coming from an op-amp. A comparator op-amp will be used which will work as a sensing device to sense the moisture in soil. A potentiometer will be used to set the minimal voltage. Two cross wires will be placed in the soil with a nominal distance. When the soil is dry, resistance in soil will be around 10k. This will trigger the op-amp to give an output with a low resistive path, i.e. from ground. This will connect the coil in relay and pump will be on. And on the contrary, when moisture will be enough, conduction will take place and relay will be switched off.

- **For Lamp lights near track:**

Another application which we are showcasing is lamp lights near track. The energy stored in battery can be used for lights near railway track. As we are searching for an automatic solution for every problem, hence we are using LDR sensors here to avoid manual switching. The LDR will allow electricity to flow through it when the photovoltaic cells are inactive and the resistance is low. This happens in the absence of sunlight. So during the day time, the lights connected through the sensors are switched off due to high resistance and eventually will glow in night time. One potentiometer is used for setting a reference value of resistor and a comparator IC to compare the light with the reference and allow the LEDs to glow.



ISSN (Print) : 2320 – 3765
ISSN (Online): 2278 – 8875

International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Website: www.ijareeie.com

Vol. 7, Issue 4, April 2018



IV. RESULT

- As our project is Electric power generation using railway track and according to our fabricated model we are glowing LED which indicates the power is generated this is approximately equal to 5 volts. And even we are storing energy in battery by using toggle switch. Which can be utilized to any application.
- In our project we are glowing LED instantly when the train is passing over the roller and some of energy is stored in battery at the same time. And by using toggle switch we are using the pumps for irrigation system. And over all energy generated in our model is 8volts.
- These new design leads to more generation of electricity. And also it is more optimum and reliable in usage. The compact design of the structure leads to its easy and compatible mounting wherever required. Also less number of contact pairs leads to less frictional forces developed. These will lead to non-conventional energy generation which would further be used in the nearby railway infra-structure.
- A train weighing 1,000 kg going up a height of 10 cm on a rumble strip produces approximately 0.98KW power by placing one such speed-track on a busy highway, where about 100 trains pass every minute, about one kilo watt of electricity can be produced every minute.

V. CONCLUSION

It is ascertained that the electric power is in nice demand, we tend to as applied scientist ought to be in discovered for brand spanking new plan of power generation. As energy will ne'er be created or destroyed, we should always rework it into the shape that we will want to provide for railroad station instrumentation light-weight, fan, beacon etc. we will implement this method at each entry and going away purpose within the railroad station This arrangement will be employed in completely different application like in foot step or speed breaker in school, faculties and main road for generation ways in which of voltage. so the facility production rate is raised and demand at explicit space will be consummated.



ISSN (Print) : 2320 – 3765
ISSN (Online): 2278 – 8875

International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Website: www.ijareeie.com

Vol. 7, Issue 4, April 2018

VI. FUTURE SCOPE

This arrangement is slightly changed to construct in foot step and this arrangement is mounted in • colleges, cinema theatres, • searching advanced and • several different buildings

REFERENCES

- 1) [HTTP://SHUBHAMPAREY.BLOGSPOT.IN/2008.07/GENERATION-OF-ELECTRICITY-BY-SPEED.HTML](http://shubhamparey.blogspot.in/2008.07/generation-of-electricity-by-speed.html)
- 2) [HTTP://SEMINARPROJECTS.COM/THREAD-POWER-GENERATION-USING-SPEED-TRACK](http://seminarprojects.com/thread-power-generation-using-speed-track)
- 3) [HTTP://WWW.PATENTGENIOUS.COM/PATENT/6732842.HTML](http://www.patentgenious.com/patent/6732842.html)
- 4) [http://www.IEEE.co.in/railway-track-energy-system/guide.html](http://www.ieee.co.in/railway-track-energy-system/guide.html)
- 5) E.Aboeela, W. Edberg, C. Papakonstantinou, and V. Vokkarane, “Wireless Sensor Network Based Model for Secure Railway Operations”, Proc. of the IEEE IPCCC, 2006, pp. 623–626.
- 6) Gatin and B. Lhenoret, “WSN and Energy Harvesting for Railway Applications”, Presentation at Energy Harvesting & Storage USA, Denver, CO., 2009.
- 7) H. Abramovich, E. Harash, Milogram, Amit, Azilay, “Power Harvesting from railways; apparatus, system and method”, US patent 7812508, 2008.
- 8) John J wang, G.P Penamalli and Lei Zuo, “Electromagnetic Energy Harvesting from Train Induced Railway Track Vibrations”, IEEE, 2012, pp.29-34.
- 9) P. Zhang, Masterthesis, “Study of Road Energy and Regenerative Electromagnetic Shock Absorber”, SUNY Stony Brook, 2010.