

Railway Track Based Energy Generation

Lovepreet Kaur¹, Alankrit Kumar², Aditya Lakde³,
Akanksha Sharma⁴, Ashutosh Rai⁵, Mousam Sharma*⁶

^{1,2,3,4,5}Scholar, Dept. of Electrical & Electronics Engineering, Bhilai Institute of Technology, Durg

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

¹kaurpriya063@gmail.com, ²kumar02.alankrit@gmail.com,

³adityalakde9@gmail.com, ⁴Aashia41296@gmail.com, ⁵ashutosh19960828@gmail.com, ⁶elec.mousam786@gmail.com

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.

Key Words: Energy, Energy Harvesting, Non-conventional Method, Rail Road

1.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 he 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. Commuter rail and subway are including railway transportation which play an important role in the economy and quality everyday life. 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 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 connected 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. The mechanical motion converter in our design feature a flywheel integrated along output shaft. Given typical track input, the flywheel is designed for maintain the generator speed close to optimal value. The electrical generator will

no longer operate at discontinuous speeds, producing more energy efficiently. The reduce impact force on component during operation, trading off for larger initial starting force. The flywheel is also enabling the harvester to produce more a continuous DC power output without electrical converter component when train move over the track. This type of continual power output is more easily utilized and converted. The main focus of our aim is to harvest a larger amount of power from the rail. We are harvesting large amount of energy from power track side equipment which has power rating up 8 to 10 watts or more. To accomplish this goal, an electromagnetic based harvester may be appropriate.

Block Diagram

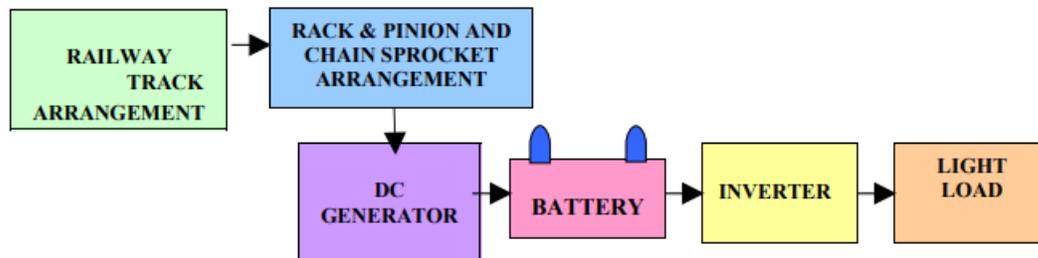


Fig.-1 Block Diagram of Generation of Power Using Railway Track

2. Principle

The principle of this project is conversion of mechanical energy in the form of force into electrical energy. The block diagram shown in Figure 1, describes the major subsystems involved in the technique. The load acting on the track due to movement of the trains is mechanically transmitted to a DC generator rotor, the output of which may be further conditioned to supply a load. The kind of load that can be supplied may vary depending upon the power generated.

3. Proposed System

When a train move over the track, the track deflects in downward direction due to the load exerted by the train's bogies. Also due the deflection of track there is a deflection of timber which is place below the track and therefore the flap is moving in downward direction as the flap is moving in a downward direction the spring which is attached to flap get compress in downward direction and hence rack is also move in downward direction and due to these pinion get rotates and therefore Bigger freewheel rotated because both are mounted on same shaft. As there is a rotation of bigger freewheel then the smaller freewheel is also rotated through chain drive. The freewheel and flywheel are mounted on same shaft therefore the flywheel also rotated. The flywheel is attached to the shaft of the generator so if the flywheel will rotated then there is a rotation shaft generator and power get generated and that power is stored into the battery

Advantages

- Power generation is simply running the vehicle on this arrangement
- Power also generated by running or exercising on the brake.
- No need fuel input
- This is a Non-conventional system
- Battery is used to store the generated power

Disadvantages

- Slight inclination is required in the railway track
- Mechanical moving parts is high
- Initial cost of this arrangement is high.
- Care should be taken for batteries

4. Realization of Model:

- The effectiveness of the model requires a busy track with train that move at average speeds, track data and effective planning of the usage or storage of the power developed.
- The flap should not cause damage to the train performance by its presence.
- Flap is to be employed where train usually go slow or the drivers are forced to go slow naturally. This can be done near railway stations.
- We have used a same realization with onto a block of wood to have the same effect.
- Presence of train is made by impulses by hands.
- Results made were satisfying

5. Applications

Power generation using railway track system can be used in most of the places such as

- All highways road speed breaker
- All Railway track

6. Conclusion

It is observed that the electrical power is in great demand, we as electrical engineer should be in discovered for new idea of power generation. As energy can never be created or destroyed, we should transform it into the form that we can used to supply for railway station equipment light, fan, signal light etc. we can implement this system at both entry and leaving point in the railway station This arrangement can be used in different application like in foot step or speed breaker at school, colleges and highway for generation ways of electrical energy. So that the power production rate is increased and demand at particular area can be fulfilled

7.Future Scope

This arrangement is slightly modified to construct in foot step and this arrangement is fixed in • schools, • cinema theatres, • shopping complex and • Many other buildings

8.References

- [1] E.Aboelela, 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.
- [2] Gatin and B. Lhenoret, “WSN and Energy Harvesting for RailwayApplications”, Presentation at Energy Harvesting & Storage USA, Denver, CO., 2009.
- [3] H. Abrammarich, E. Harash, Milogram, Amit, Azilay, “Power Harvesting from railways; apparatus, system and method”, US patent 7812508, 2008.
- [4] John J wang, G.P Penamalli and Lei Zuo, “Electromagnetic Energy Harvesting from Train Induced Railway Track Vibrations”, IEEE, 2012, pp.29-34.
- [5] P. Zhang, Masterthesis,“Study of Road Energy and Regenerative Electromagnetic Shock Absorber”, SUNY Stony Brook, 2010.