Supplementary Power Generation for Trains

Akshay Angolkar[1] Ronit Chodankar[2] Nirav Shah[3] Ajay Yadav[4] Prof. A.M. Salsingikar[5]
[1,2,3,4]U.G Student [5]Assistant Professor
[1,2,3,4,5]Atharva College of Engineering, Mumbai, Maharashtra, India

Abstract— Indian Railways connected to almost every part in India. Indian Railway alone consumes most of India's Power. Mumbai Suburban Railway suffers from some of the most severe overcrowding in the world . This has resulted in what is known as Super-Dense Crush Load of 14 to 16 standing passengers per square meter of floor space . Coal and Diesel used for generation of this power will be depleting soon. So our project describes a supplementary ease for this by generating renewable energy through concepts Solar , Wind and Piezo Electricity for running fans , lights and internal appliances for local trains. Solar Energy being available freely in the world during day time. So Power Generation through solar panels on roof tops. Wind Energy available freely almost throughout the day and night. Implementing wind harnessing systems between the 2 Boogies of train. Power harvesting by piezoelectric systems in the standing area of passengers. Use of PIR sensors inside the BOGGIE of train for switching off the lights and fans when no human inside the train. Use of Proximity sensors to avoid obstacles or accidents.

Key words: Supplementary Power Generation for Trains (SPGT) ,Renewable Energy Sources for Train Power (RESTP),Solar-Wind Train(SWT)

I. INTRODUCTION

Supplementary Power Generation for trains comprises of 5 concepts which will be implemented in the project. I]Use of Solar Panels – Solar panels placed on the roof of the train will absorb the sunlight and generate electricity. Installation of solar Panels is very easy as no extra space is required .II]Use of Wind Energy between the two Bogies of trains – The vertical axis wind mill placed between this area will start rotating and which will generate electricity. III]Use of Piezoelectric crystal systems near the wheels and in the standing area of passengers. IV]Use of 6 PIR sensors inside every boogie to ensure proper utilization of power for lights and fans. V]Use of Proximity Sensors on front side of the train.

II. EXPERIMENTAL SETUP

Considering 1 train compartment: 28 Fans, 14 tube lights , 4 indicators consume in all approx. 2100W power. We will require 1200W solar panel to power one compartment. We can fulfil the power requirement by using piezo electric sensors and windmill. The output of the total proposed circuitry is enough to power one 'BOGIEE' of the train

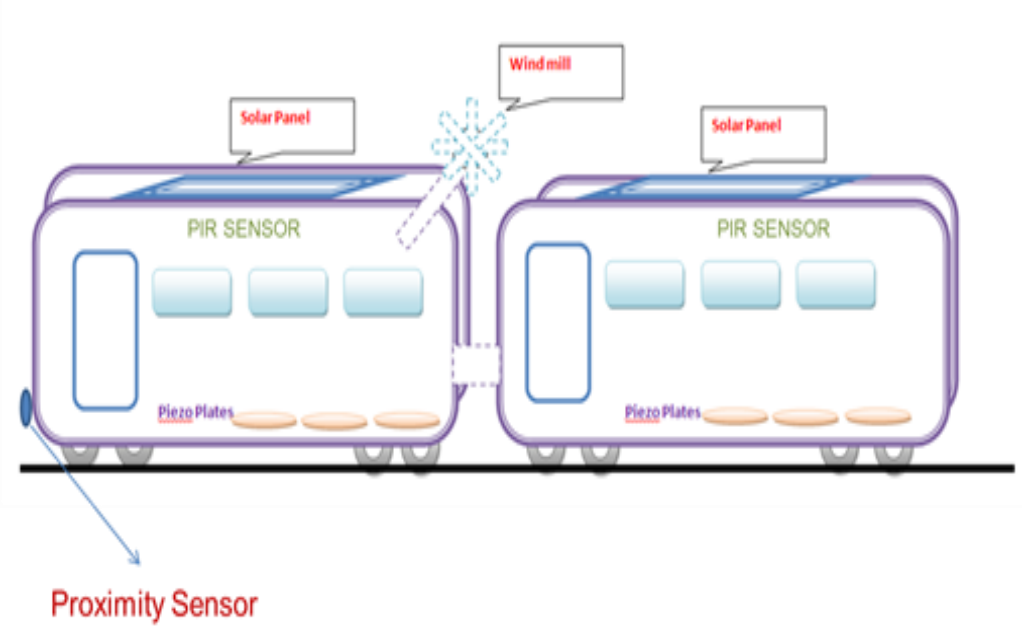

Fig. 1: Railway Unit

The above formation gives idea about the location of the sensors on the train bogie.

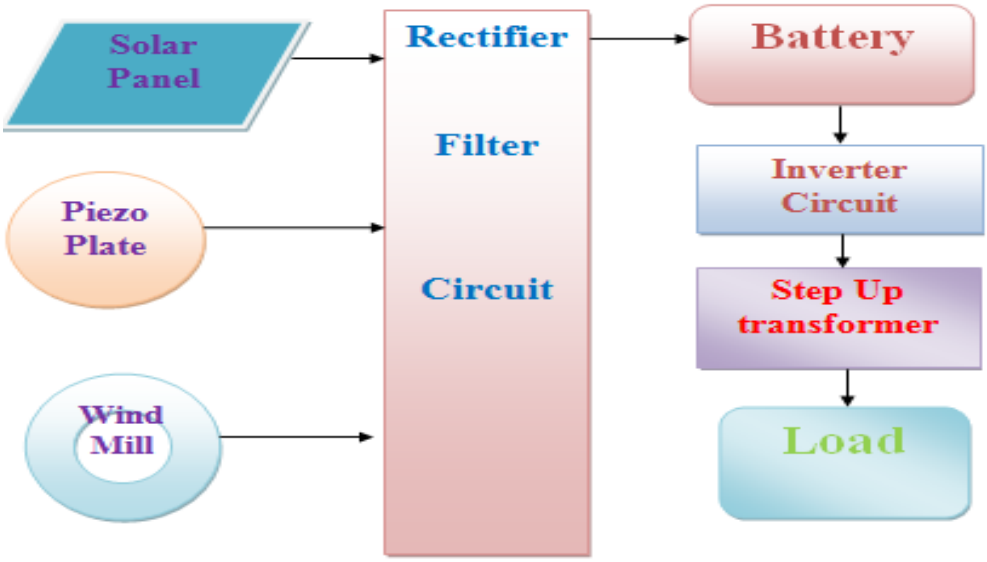

Fig. 2: Block Diagram

A. Block diagram of SPGT

The above Figure.2 shows the block diagram of the SPGT system. Here, we are using three sensors i.e. the solar panel is mounted at the top of railway boogies. Its converts the solar energy into required electrical energy.

The piezo panels are used at the base (footboard) of the train bogie . The apparent motion and movement of the traffic within the train generates the required pressure thereby creating electricity.

The wind turbine is placed between the two bogies. the wind energy generated due to the movement of train generates enough wind power to rotate the wind turbine. the power generated by this is given to the transformer and battery.

The output of all three systems is rectified and filtered.

The generated power from these sources is stored in the battery.

When required, the generated power is stepped up using step up transformer and connected to the load i.e. Lights and other appliances within the train.

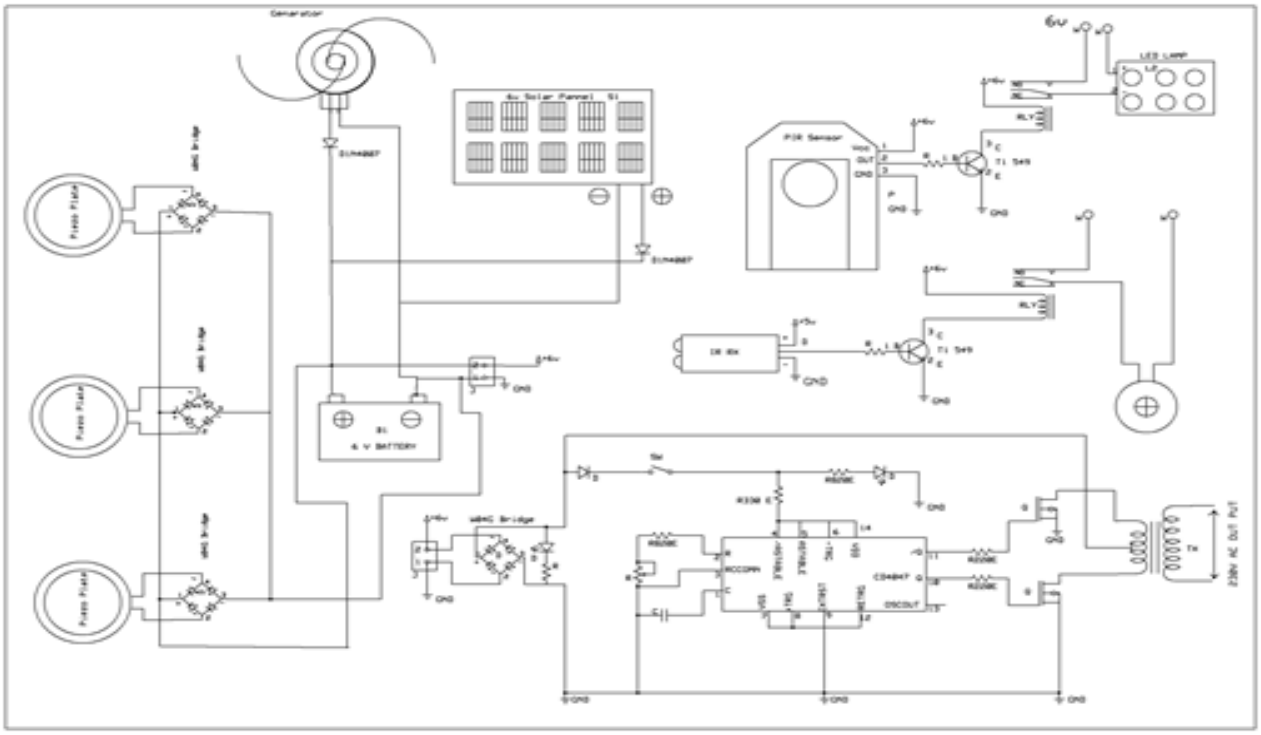

Fig. 3: Circuit Diagram

B)Fig 3 shows the circuit diagram of SPGT system. The output of all three power generating circuits is fed to the battery which gets charged. When required by the load, the charge from the battery is stepped up and provided to load. If not required the system can be shout down. Also a IR detector is placed in front of the train which checks for obstruction in front of train for a limited range. if an obstruction is present then the train movement is stopped in response. The main motto behind this circuit is to reduce the overall energy consumed by the train appliances system.

III. ADVANTAGES

a) Lot of Electricity of Railways will be saved due to this project.
b) Clean and Renewable energy usage in train will motivate people to install renewable energy systems at their houses.
c) Cost of Diesel and Coal used will be reduced
d) Lights will be on only when it is needed, hereby saving electricity
e) Motorman can run the train with more confident of being accident free.

IV. APPLICATIONS

a) Lightening solution to railways.
b) Avoid wastage of electricity.
c) Avoid railway accidents.
d) Renewable Energy Solutions.

V. CONCLUSION

Proposed project makes the supplementary power generation system for trains. Now cost of electricity will be saved as lights and fans will be powered by renewable energy. Solar Energy will be converted into electricity with the help of solar panels on the rooftops. Wind energy and use of piezo electric plates will also generate electricity which will power the internal systems of train.

Use of PIR sensors will ensure use of fans and lights only when human is detected. Use of IR sensor will lessen the accidents.

REFERENCES

[1] Active secondary suspension in Trains, ISBN 978-91-7415-144-2,Anniel Orvnas
[2] Anderson P.D.(2007). Review of Historical and Modern Utilization of Wind Power, Wind Energy Department, RISØ DTU,Denmark.Available: http://www.risoe.dk/rispubl/VEA/dannemand.html.