



ISSN 2278 – 0211 (Online)

Power Generation Using Pressure from Road Side Vehicles and Piezoelectric Pressure Transducer and Inverter

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Abstract:

Now a day's power generation and usage of power is important role in country's development. If we are having opportunity to generate power without using any input parameter in the sense that will helpful to develop our country. In this project power generation using pressure from road side vehicle. Using this pressure developing the voltage using peizo electric crystal and thus produced voltage will be used to charge the home use inverter.

Keywords: Bellows, peizo electric crystal pressure sensor, home use inverter

1. Introduction

In this project home use power will be generated by using road side vehicle's pressure. Pressure sensor setup placed next to speed breaker of road. Each and every vehicle when cross the sped breaker, pressure is obtained, this pressure is captured by using rectangular bellow setup, this pressure focused to particular place where the pressure sensor is placed, pressure sensor will capture this pressure and that will be converted into voltage according to the quantity of pressure. Thus this produced voltage is used for charging home use inverter. Using this inverter you can run four lights, one fan for 5 hours. And also we can increase this value by using different range type of peizo electric crystal pressure sensor, bellows, and inverter.

2. Related Works

2.1. Power Generation Using Mechanical Setup

Power generation from road side vehicle using generator operation. Here road vehicle's kinetic energy is used with special designed gear setup. That gear is attached with generator shaft .when ever vehicle crosses road due to kinetic energy, gear setup will operate the shaft of generator. And thus produce the energy.

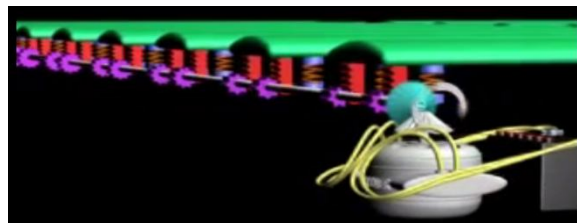


Figure 1: Experimental setup of exiting related works

In the proposed work due to using generator setup, peizo electric crystal sensor will be used to produce energy from kinetic energy of moving vehicle in the road.

2.2. Power Generation Using Air Pressure Generation Setup

In this work power generation done by pressure creation by vehicles. This pressure will be given to turbine to rotate and generate the power.



Figure 2: Experimental setup of exiting related works

3. Proposed Work

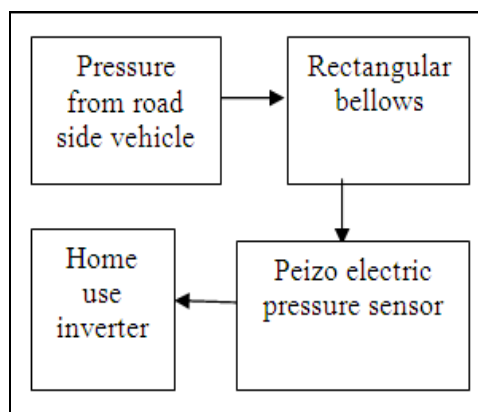


Figure 3: Block diagram

3.1. Block Diagram Description

3.1.1. Pressure Capture

Pressure from road side vehicle captured by using special designed metal setup, this set up having rectangular shape with dimension 8 feet length and 1.5 feet wide with four side standing spring support. This spring support having capability to give cuisine support to road side vehicle, and thus smoothly transmit pressure from vehicle to pressure conversion first stage that is bellow. This setup placed next to speed breaker. When vehicle crosses this rectangular metal set up, this transmit smoothly pressure to bellow without affecting conversion unit of experimental setup, thus consist of bellows, peizo electric pressure sensor, and home use inverter.

3.1.2. Rectangular Bellow

Rectangular bellow made up of stainless steel, which is having dimension of 8 feet long and 1.5 feet wide. According to material used for manufacture rectangular bellow, input range of bellows can be varied. In this project rectangular bellow made of stainless steel, which will provide the input range up to 2 bars.



Figure 4: Rectangular bellow

Since this project concentrates in capture the pressure from road side vehicle’s weight, the minimum weight of vehicle is 1350kg.

Vehicle class	Curb weight in (kg)	Pressure in (N/M ²)
Compact car	1354kg	0.115463
Midsize car	1590kg	0.135588
Large size car	1988kg	0.169528
Compact truck	1577kg	0.13448
Midsize truck	1936kg	0.165094
Large truck	2460kg	0.209778

Table 1: Pressure Value WIH Weight

3.2. Peizo Electric Crystal Pressure Sensor:

The DT Series of Piezo film sensors elements are rectangular elements of Piezo film with silver ink screen printed electrodes. They are available in a variety of different sizes and thicknesses. Lead attachment is accomplished using a riveted lug going to 12" (300 mm) of 28 AWG wire.

The DT film element produces more than 10 millivolts per micro-strain. The capacitance is proportional to the area and inversely proportional to the thickness of the element.

The DT elements are supplied with a thin protective coating over the active electrode area to prevent oxidation to the top surface of the silver ink.

3.2.1. Features

- Minimum Impedance: 1 M Ω
- Preferred Impedance: 10 M Ω and higher
- Output Voltage: 10 mV to 100V depending on Force and Circuit Impedance.
- Storage Temperature: -40°C to +70°C [-40°F to 160°F]
- Operating Temperature: 0°C to +70°C[32°F to 160°F]

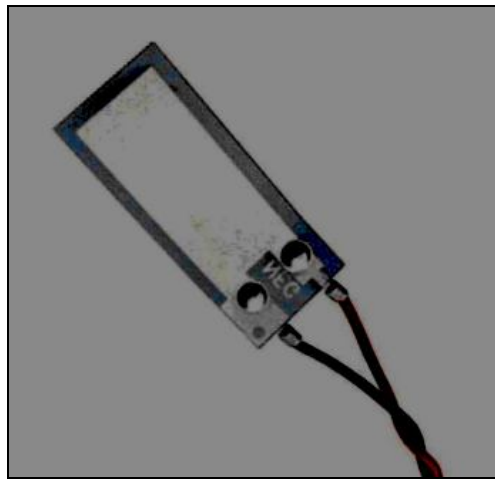


Figure 5: DTI-028K/Lw/rivets (Piezo electric pressure sensor)

Symbol	Parameter	PVDF	Units
T	Thickness	9, 28, 52, 110	Mm
d31	Piezo Strain	23	(10-12)C/N
d33	Constant -	-33	
g31	Piezo Strain	216	(10-3)V/m/N
g33	Constant -	-330	
C	Capacitance	380 for 28 μ m	pF/cm ² , @ 1KHz
Y	Young's Modulus	2-4	109 N/m ²

Table 2: Typical Piezo Properties:

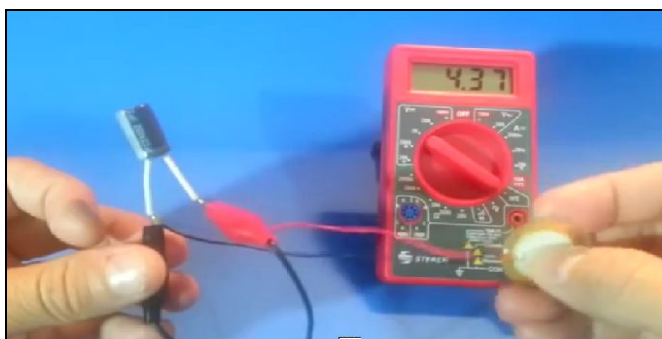


Figure 6: demonstration of charging capacitor using peizo electric sensor

4. Experimental Result

Pressure from road side vehicle given to bellow, bellow is acting as limitation bar for pressure adaptation from vehicle, whatever may be vehicle's weight limited amount of pressure only given to peizo electric crystal sensor, and thus produce the voltage more or less equal amount of voltage will be generated. That will be used to charge capacitor, for increase voltage level inverter is used.

Vehicle class	Curb weight in (kg)	Pressure in (N/M ²)	Voltage (v)
Compact car	1354kg	0.115463	~100
Midsize car	1590kg	0.135588	~100
Large size car	1988kg	0.169528	~100
Compact truck	1577kg	0.13448	~100
Midsize truck	1936kg	0.165094	~100
Large truck	2460kg	0.209778	~100

Table 3: Output Voltage with Pressure Values

5. Conclusion

This proposed project is focusing on no energy will be spent on process of power generation and also this will be very cheap. It will be very effective in colleges, since more number of vehicles passing through college road daily. Using this charge and use for class room light powering purpose

6. Future Work

This work improved to get maximum efficiency by implementing control system.

7. References

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