VEHICLE'S KINETIC ENERGY CONVERTER & INTERFACING TO SMART GRID

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ABSTRACT—*An endeavour to demonstrate how much dynamic vigour might possibly reborn through roadworthy propagation of vehicles and its utilization in night substation. A generated electric power can be easily used for lighting road in rural vicinities. The system takes mechanized tension by vehicles and transformed into electric vigour. The method incorporates a pivoted bar (rack) which impudent up and down as object travels on the route and affiliated with a circular gear-train that is pinion which revolves satisfactory when rack is getting up and down .Mechanized tension is produced by design circuit which contains pinion, sockets, flywheel and large gear to produced electrical energy. These systems also can be installed in symmetrical mode for quality improvement of smart grid station.*

KEYWORDS---- Alternator, geared wheel, speed breaker, vigour, vehicle

I. INTRODUCTION

An absolute summary overview about the vehicle's kinetic vigour converter. Normally, roots of vigour are moving to lower berth due to changing state of time period. Thus, exclusively renewable energy asset provides a method for the electrical power generation. Fuels are moneyed and make contaminated ambiance. Atomic performers are also very unsafe w.r.t manipulation and unprocessed substantial, thus centring exclusively on renewable vigour resources are silent and these are non-polluted and inexpensive [1]. A big magnitude of vigour is lost when a transport travels over the speed breaker through with the scattering of hotness. It is an assurance to alter the transport vigour into electric vigour by exploitation of mechanism. The consumption of vigour is an improved state of symbolization [2][3].

An everyday illustration of Pakistan energy situation is not fresh for us. The state of affairs for furnishing the electricity in almost portion of Pakistan is so pitiable.So in these conditions more investigation, evolution and exploitation of engineering are requisite in this field. Pakistan has really pathetic routes that are dissimilar from the formulated nations. Several routes have well-stacked in speed breakers. By commencement of a unit like "vehicle's kinetic energy converter" so much of electrical vigour might possibly earned [4].

II. PRINCIPLE OF WORKING

Here speed breaker's mutual movement is reborn to circular movement with the exploitation of framework and geared wheel collaboration. A geared wheel mechanism is conjugated to wheel set up. There is also a ratchet involved with pinion to avoid reverse rotation of all arrangements [5]. This is also useful for enhancement in the efficiency by avoiding the reverse working of sprockets as well as whole arrangements**.** The wheel set up is ready-made of two wheels [6]. A combination of large and small wheels, which both are related to a chain to provide service in sending bigger wheel's energy towards littler wheel, swiftness applied towards big one is comparatively increased at the transformation of the littler. The rotation of the littler wheel is linked to a gearing container. We have a couple of geared wheel in gearing container [7].

The big geared wheel is conjugated to small wheel. Therefore, swiftness from smaller one is travelled towards geared wheel of big conception. A big multidimensional wheel linked with a littler wheel that obtains the revolutions in aggregate variety. Instantly this fastness is enough to revolve the alternator [8]. The rotor coil which cuts the magnetized flux encompassing through a motionless magnetized stator coil. This rendered to electromagnetic force that is dispatched to an electric converter. Here electromagnetic force is organized also. This organized electromagnetic force is transported towards battery banks where it is saved and used for the dark period, illumination aim and for appreciable length [9].
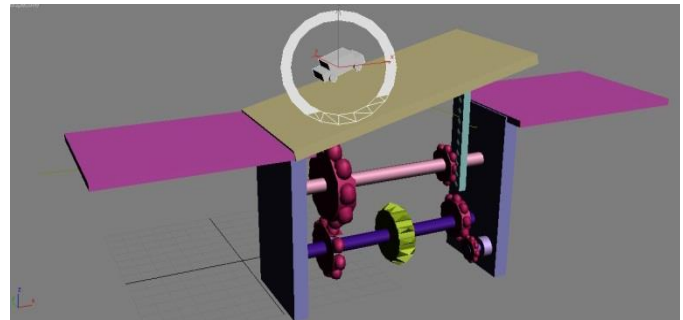
A. PHYSICAL DIAGRAM

Fig. 1. Mechanical Structure of Vehicles Kinetic Energy Converter

B. COMPLETE BLOCK DIAGRAM

Fig. 2.Block Diagram of Vehicles Kinetic Energy Converter

Reported to an actual status of Pakistan, there is an immense traffic magnitude on wayside. The transports necessarily travel over the bumps when an individual

transport is passing over the route then a bump inclined plane assists to move the framework affiliated with bump. When a vehicle passes over a speed breaker it forces the framework and framework rotates geared wheel for some level which rotates the large wheel. The large wheel revolves little wheel with a string and little wheel rotates the regulator. The regulator is affiliated with a gearing container; two geared wheels are affiliated in a mode to enhance swiftness and lessening rotary motion. The end product of gearing container is conjugated with a generator to change its mechanized vigour into electric vigour [10]

In Islamic Republic of Pakistan, routes are not so autonomous w.r.t commercialism and some regions have routes with pathetic situations. By fixture and repairing, bump should be affiliated and is installed [11].

C. CALCULATION

The vehicle's mass is 1200Kg roughly. A moving vehicle's mass over the speed breaker is 300 Kg quarterly. 10Cm is peak of bump.

$$F = m*a = 300*9.8 = 2943N \qquad (1)$$
$$W = F*d = 2943*0.1 = 294.3J \qquad (2)$$

If a vehicle travels through the bump subsequently after 5 sec then

$$P = \frac{W}{t} = \frac{294.3}{5} = 58.86Watt \qquad (3)$$

averagely it travels for dozen in a 60 sec.

$$Power/\min = 58.86*12 = 706.3Watt \qquad (4)$$

The mechanized tension that a transport can render in an individual 60 sec & considering 50% losings from this tension then roughly 350W Electrical energy is actually.

This is roughly for 60 minutes, 21KW which is enough to run illumination load. In advance, if it occurs for 16-hours in 24-hour interval then

$$P = 31.7KWh \qquad (5)$$

Distinctly,it is briefed in the tabular array affiliated to preceding process.

■CASE 1

If a Bi-Cycle of 50Kg travels through the bump at speed 8km/h which is 2.22m/s rotational speed is 12.36rps with preceding 110rpm tentatively.

$$Torque = r*F = 0.127*m*a = 0.127*50*9.81 = 62.29Nm$$
$$(6)$$

The input mechanized tension is 10.5KWh in this proceeding which is regenerated into electric vigour with 50% losings assumptive and it is 5.29KWh

■CASE 2

If a Bike of 100Kg travels through the bump at speed 8.95km/h which is 2.49m/s rotational speed is 13.86rps with

preceding 132rpm tentatively.

$$Torque = r*F = 0.127*m*a = 0.127*100*9.81 = 124.5Nm$$
$$(7)$$

The input mechanized tension is 21.18KWh in this proceeding which is regenerated into electric vigour with 50% losing assumptive and it is 10.59KWh.

■CASE 3

If a Car of 300Kg travels through the bump at speed 10km/h which is 2.77m/s rotational speed is 15.40rps with preceding 137rpm tentatively.

$$Torque = r*F = 0.127*m*a = 0.127*300*9.81 = 373.76Nm$$
$$(8)$$

Table I: Comparative Table

Type of Stress Element	Flywheel Velocity (rpm)	Rotor Velocity (rpm)	Mass (Kg)	Force (N)	Torque (Nm)	Poles	Input Power/day, KWh (Mechanical)	Output Power, KWh (Electrical)
Bi-Cycle	110	1007	50	490.5	62.2	2	10.5	5.29
Bike	122	1117	100	981	124.5	2	21.18	10.59
Motor Car	137	1235	300	2943	373.76	2	63.56	31.78

The input mechanized tension is 63.5KWh in this proceeding which is regenerated into electric vigour with 50% losing assumptive and it is 31.78KWh.
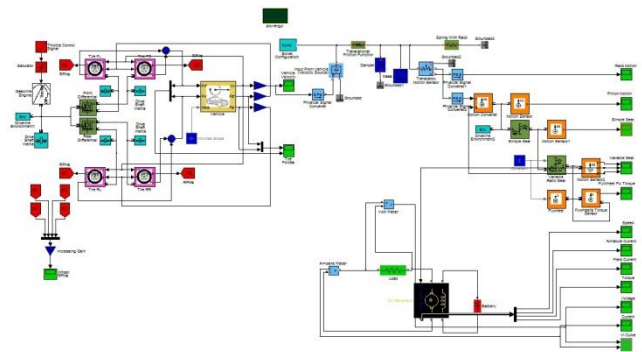
III. METHODLOGY

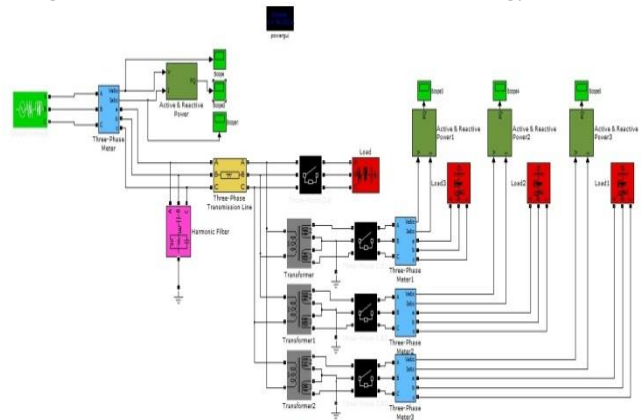**Fig. 3. Matlab Simulink Vehicle's Kinetic Energy Converter**

Fig. 4. Matlab Simulink Smart Grid Station
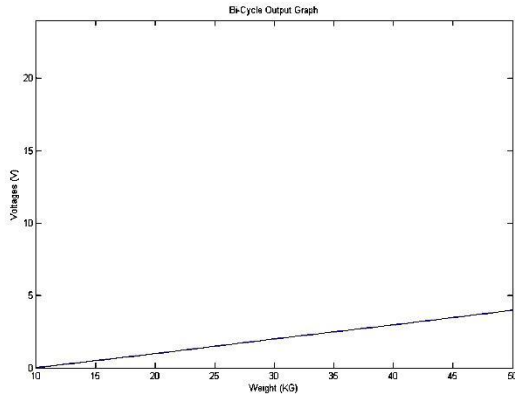
IV. INTENDED RESULTS

Fig. 5. Bi-cycle Output

In Figure 5, it is clearly shown that weight is increasing and output voltage is also increasing so as a result both weight and voltage are directly proportional according to arrangements. This is in case of Bi-Cycle.
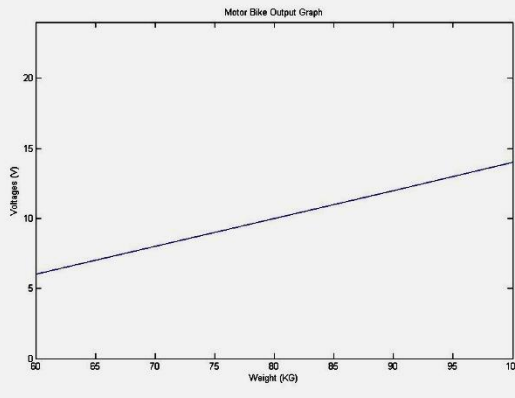

Fig. 6. Motor Bike Output

The same scenario is in case of Motor-Bike where weight is quite large as in Bi-cycle and it is defined in Figure 6.
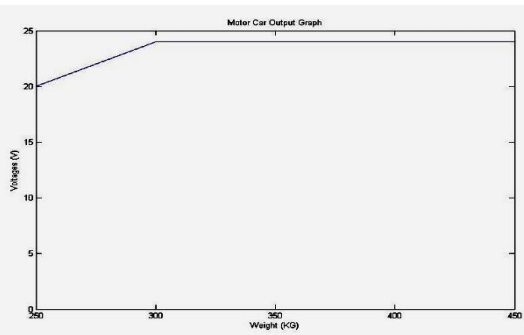

Fig. 7. Car Output

Now, in case of Car the output voltage is steady at a stage when weight is going to approach its predefined limit. When weight is above the defined limit then there is no change of output voltages as graphically depict in Figure 7.
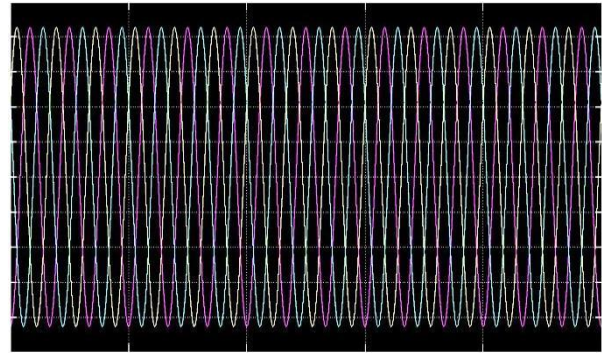

Fig. 8. 3-Phase Output

The three phase output consideration is shown in Figure 8. It is in V and is plotted along y-axis with time along x-axis. It is phase to phase combination.
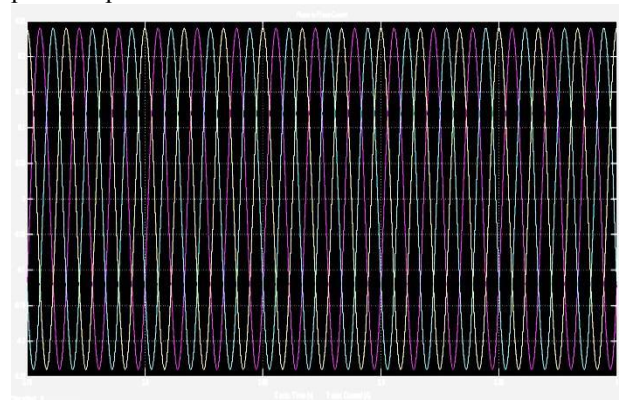

Fig. 9. Phase to Phase Current

The phase to phase current is shown in Figure 9. It is in A and is plotted along y-axis with time along x-axis.
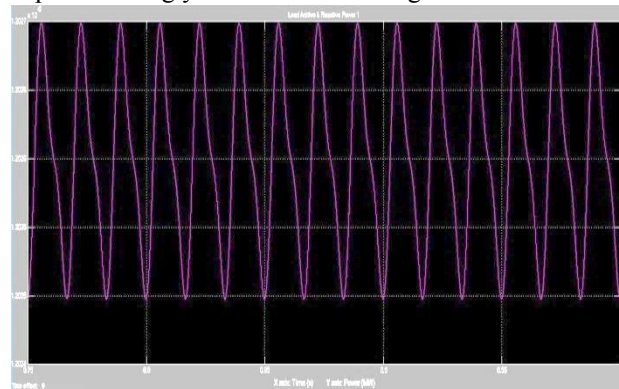

Fig. 10.Bi-Cycle Load Power

The Bi-Cycle load power is shown in Figure 10. It is in W and is plotted along y-axis with time along x-axis.
The Motor Bike load power is shown in Figure 11. It is in W and is plotted along y-axis with time along x-axis.
The car load power is shown in Figure 12. It is in W and is plotted along y-axis with time along x-axis.
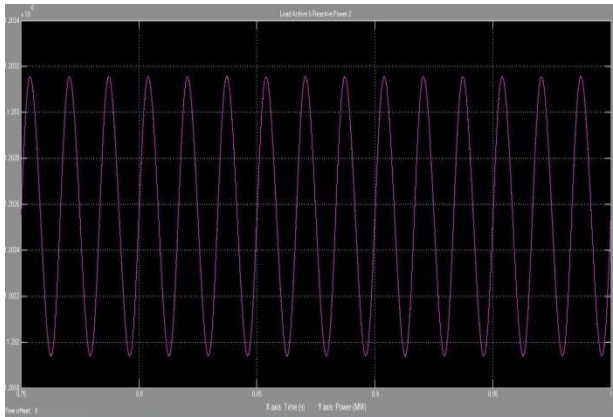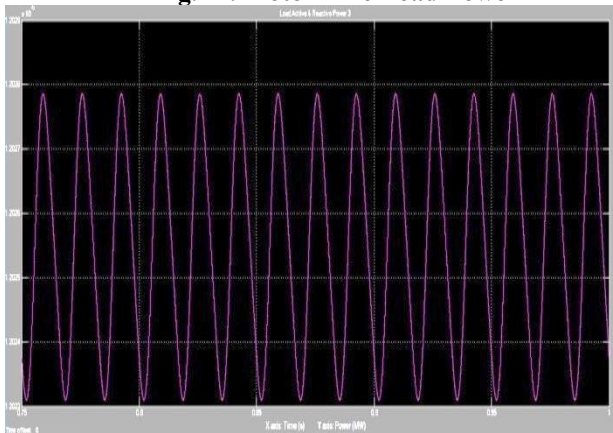
Fig. 11. Motor Bike Load Power

Fig. 12. Car Load Power 3

V. DISCUSSION

A proposed system is designed as shown in Figure 1 & 2. As the vehicle passes over the speed breaker, there is a surface contact between vehicle tyres and speed breaker arrangements, which will tend to move the rack and pinion, it is then finally alternates the alternator. Table 1 indicates the results of apparatus when a vehicle is passing through the speed breaker. Angular velocity and corresponding rotational energy is calculated in Table 1. Table 1 indicates the results of apparatus which shows the electrical power (EP) corresponding to the mechanical energy (MP). Figure 5, 6 & 7 indicate that as the weight of vehicle increases, electrical energy also increases linearly but at predetermined limit. It is also evident from Table 1 that the efficiency is adequate but it is also notable that above showed results is the outcome when only one system is being installed. In actual practice number of systems will installed so consequently the efficiency will increase.

A very firstly proposed on domestic level that a vehicle's kinetic energy converter system should be installed at shopping plazas parking, toll plazas and mostly for fuel filling stations. The proposed system provides sufficient energy for small load like tube lights, fans etc.

VI. CONCLUSION

The analytic framework of Converter is conferred in this activity. With the classification of route commercialism, it is discovered from the activity that ratio of system depends on mathematics of planning, traveling congestion and speed.

Less transport swiftness produce greater power and high ratio however in opposite, greater transport swiftness produce output, less power and low ratio simply. A Vehicle's Kinetic Energy Converter is a steady, efficient and effected of rendering sure vigour at demand because of its fabrication on Toll Square, Purchasing Center's Parking and Fuel Filling Places, which run all over the year. Designing of 21KW is conferred in *MATLAB Simulink package* with joining of Smart Grid Station and also actual period modeling in *3dsmax7 package* for already given accumulation. Chief objective of activity is to set up a freshly planned method and it's joining with active smart grid scheme in such a mode that surplus vigour from scheme is transformed to smart grid and pleasure of procedure and fixture of scheme is roughly peanut. This work can be planned for big generation or use also schemes in symmetrical form to render electric supply to an individual interior or a commercial enterprise or to charge the battery banks, cellular equipment and electric automobile.

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