DESIGN AND FABRICATION OF POWER GENERATING CARPET

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Abstract: In day today life the utilization of power turns to be necessary for each work. The power delivered in this paper will not contaminate the surroundings and it is also will not to rely upon the climate conditions. The paper proposes a novel technique for the creation of power utilizing the rack and pinion kept along the footpaths which can ready to charge the battery and ready to supply the force at whatever time of our prerequisite. Footstep power generation technique has mechanical part and in addition electrical part, however the electrical and mechanical losses are negligible. This framework additionally has the ability to store the electrical force away battery. The power produced by this technique can be utilized for helping up the road lights, additionally for activity reason, sign boards of streets. At long last the force which will be abandoned can be given to national grid for power reason.

**Keywords:** Rack and pinion, Battery, Electricity, Footstep power generation.

I. Introduction: The human body is always in motion, and therefore motion resulted from motion is released. Walking and running are the two main activities that generate much energy in the human body. While walking, the angle between Calves and thighs is not considerable, which means the leg make a little bending and the elasticity energy in negligible. However, by stepping only once, the gravity center takes the height of the person and then inclines which result in potential energy. While these ups and downs, the center of gravity decreases and acquires speed, therefore a discrepancy of the kinetic energy in mirror of the potential energy. We can no longer ignore the existence of elastic energy through the race because of the leg deferment[1]. A phase of flight happens. Unlike when walking, the center of gravity increases more. Speed is acquired during the descent. The potential and kinetic energies evolve in a mirror similarly to walking. However, with values greater than the walking due to the appearance of a phase of flight and the increase of the velocity. Mechanical energy is converted into electrical energy with the help of rack and pinion assembly. When a person claims the stair case, a force has been acted on the step which has been placed at a certain angle of inclination. When force is applied, rack which is connected to step moves down and rotates the pinion. This rotational speed has been increased using Chain.

In this paper a substitute strategy for generation of power is finished by utilizing piezoplate. In this framework when a power is connected on the piezo plate the state of the piezo plate changes which prompts the generation of voltage. Piezo electric impact is depicted as a straight electromechanical collaboration between the mechanical and the electrical state in crystalline materials with no reversal symmetry

II.Review of literature: Kumar et al. in their research paper, author studied three methods of foot step power generation namely piezoelectric method, rack and pinion method and fuel piston method comparatively and found that the rack and pinion mechanism is more efficient with moderate cost of operation and maintenance[1]. Md.Azhar et al. **i**n their research used regulated 5V power, 500mA power supply. Bridge type full wave rectifier is used to rectify the ac output of secondary of 230/12V step down transformer. The power generation using foot step get its energy requirements from Non-renewable source of energy. There is no need of power from external sources (mains) and there is less pollution in this source of energy[2]. Joydev Ghosh et al. **i**n their research used 80 volts and 40 mA from one coil have been generated from a prototype model as first invention. The second gearbox shaft which builds it 15 times (1:15) then its movement is smoothen by the help of fly wheel which temporary store the movement, which is convey to the DC generator (it generates 12V 40 amp at 1000 rpm)[3]. Yadav et al**.** used equipment's with following specification: Motor Voltage:10volt Type: D.C. Generator, RPM:1000 rpm, Gear 1-Mild

Steel, No. of teeth:59(big gear), No. of teeth:36(small gear), Type: Spur Gear, No. of gear used:2 Spring 1-Load bearing capacity:60-90 kg, Mild Steel[4]. Shiraz et al. said all about generating electricity when people walk on the Floor if we are able to design a power generating floor that can produce 100W on just 12 steps, then for 120 steps we can produce 1000 Watt and if we install such type of 100 floors with this system then it can produce 1 Megawatt. As a fact only 11% of renewable energy contributes to our primary energy[5]. Mathew et al. attempts to show how energy can be tapped and used at a commonly used floor steps. The usage of steps in every building is increasing day by day, since even every small building has some floors. A large amount of energy is wasted when we are stepping on the floors by the dissipation of heat and friction, every time a man steps up using stairs[6]. Tom Jose V. manufactured a model made from stainless steel, recycled car tires and recycled aluminum, also includes a lamp embedded in the pavement that lights up every time a step is converted into energy (using only 5 percent of the generated energy)[7]. The average square of pavement produces about 2.1 watts of electricity. And according to author, any one square of pavement in a high-foot traffic area can see 50,000 steps a day. Based on this data, only five units of Pavegen pavement can be enough to keep the lights on at a bus stop all night[8,9].

III. Methodology:
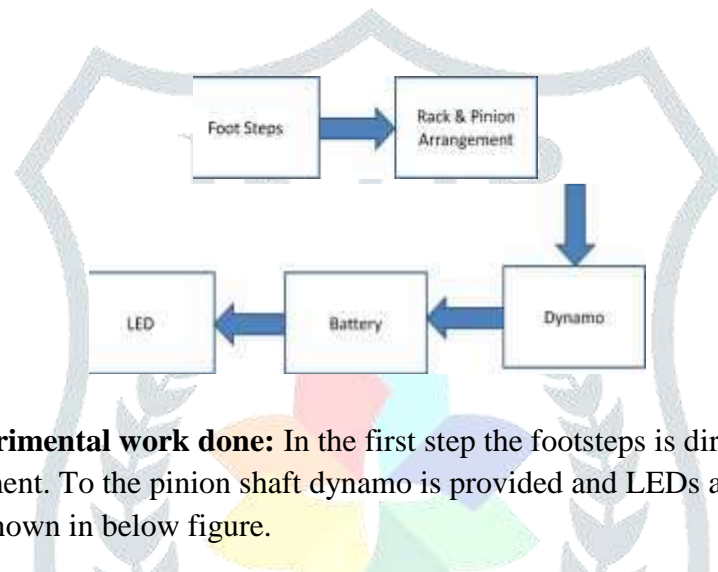
IV. Research and experimental work done:
In the first step the footsteps is directly connected to the Rack & pinion arrangement. To the pinion shaft dynamo is provided and LEDs are coupled to it. The model constructed are shown in below figure.

Fig 7: Spring setup.

Fig 8: Upper Surface

Fig 9: Dynamo with wire arrangement.   Fig 10: Rack and pinion

With the help of block diagram as show in the block diagram the working procedure is explained in step-by-step manner.

Step 1: When force is applied on the plate by virtue on stamping on the plate the force spring gets compressed.

Step 2: Due to this the rack moves vertically down.

Step 3: The pinion meshed with the rack gear results in circular motion of the pinion gear.

Step 4: For one full compression the pinion Moves one semicircle, when the force applied on the plate released the pinion reverses and moves another semi- circle.

Step 5: The intermediate gear with more number of teeth will rotate as a result of motion of pinion.

Step 6: The generator attached to the intermediate will obtain the rotating motion, hence results in the sinusoidal waveform (for single Generator).

Step 7: The obtained voltage is passed through Ac neutralizer in order to reduce the ripples that are produced due to uneven motion of generator.

Step 8: From here the power is stored directly in 12v lead acid battery.

Step 9: So the 12v DC is connected to the inverter to convert it into 230AC.

Step 10: Now the voltage obtained is used for small applications.

Step 11: The display unit takes signal from battery and converts it into digital signal by ADC and transfers its data to microcontroller.

Step 12: The voltage signal thus obtained will be displayed in LCD display about how much voltage of current is available.

V. RESULT AND CALCULATION

Specification of Pinion

Material: cast-iron

Outside diameter: 25mm

Circular pitch: 3.14/25 = 0.1256mm

Pressure angle: 21

Pitch diameter: D=N/P = 0.8mm

Addendum: 1/25= 0.04mm

Dedendum: 1.157/25 = 0.04628mm

Circular tooth Thickness: 1.57/25 = 0.628mm

Design of Rack

Pitch circle diameter of the gear is =25

Circumference of the gear is = 3.14

Pitch circle diameter= 3.14x25 = 78.5mm

Specification of Rack

Material: cast iron

Width: 1.5mm

Height: 130mm

Generator

Speed: 300RPM

Type: DC geared motor

Battery

Capacity: 12V

Output Power Calculation

Let us consider,

The mass of a body = 60 Kg (Approximately)

Height after step = 13 cm

∴Work done = Force x Distance

Here,

Force = Weight of the Body

= 60 Kg x 9.81

= 588.6 N

∴Output power = Work done/Sec

= (588.6 x 0.13)/60

= 1.27 Watts

VI. Conclusions: The project work "Power generation by foot step" is designed and developed successfully. For the demonstration purpose a proto type module is constructed with lower ratings of devices, & results are found to be satisfactory. As it is a demo module it cannot be used for real applications, but the concept is near to the real working system, to make it more realistic, higher rating power generator with suitable gear mechanism is essential to produce more energy. This concept falls under the subject of non-conventional energy resources, out of the many alternative energy resources one dependable source is solar energy, but it is quite costliest affair. Therefore, alternative cheapest source is to generate electricity from foot step. This technology proven here is the ultimate inexpensive source of all known forms of energy. When it is implemented practically, depending up on the size & traffic flow, each foot step may produce tens of kilowatts power every day, this power can be utilized for many applications. If we are used this project at very busy stairs palace then we produce efficient useful electrical for large purposes. One important advantage of producing energy through this technology is that it does not pollute the environment. Hence this foot step can be altered with this technology, there by all the street lights belongs to a particular city can be energized.

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