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FABRICATION OF FOOTSTEP POWER GENERATOR

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Abstract : ***Nowadays energy and power are the one of the basic needs in this modern world. Energy demand is increasing day by day. On the other hand, the many energy resources are getting exhausted and wasted. Proposal for utilization of waste energy of foot power with human locomotion is very relevant in populated countries like India where roads, railway stations, bus stands, temples, etc. are overcrowded and millions of people move around. This whole energy is wasted. If this energy made possible for utilization it will be a great invention. In this project we are converting non-conventional from just walking footstep into electrical energy. This project uses simple drive mechanism such as rack and pinion assembly. The control mechanism carries the rack & pinion, and D.C generator to output. In this project we are generating electrical power as nonconventional method by simply walking or running on the footsteps. Non- conventional energy system is very essential at this time to our nation. Non-conventional energy using foot step needs no fuel input power to generate the electrical power. In this project the simple drive mechanism such as rack and pinion assembly and chain drive mechanism is used for generating power by utilization of force which is obtained during the walking on steps is converted in to electrical energy with the help of mechanical L9systems. The generated power is stored by means of battery and this is used for activating the connected loads. This is one of the compact and efficient systems for generating electricity which can be easily installed in many regions.***

KEYWORDS : ***Foot step power generation, non conventional power, rack & pinion power generation, electricity generator***.

I. INTRODUCTION

This manuscript describes about generating the power by using the weight energy, one can simply shocks by knowing how much energy a person can have by simply walking on the floor with a normal speed. As people's steps (thousands upon thousands a day) utilize and channel kinetic energy too .Whenever a person walks, manages to lose energy towards the floor by means of influence, vibration, and audio and so on, a result of the move of excess weight to the floor. That energy may be used and converted into power. The actual electro-kinetic floor

is really an approach to making energy by using the kinetic energy of the person who walks on the floor. The power floor is not like traditional floor. The energy produced by this floor will be environment friendly without having smog. Producing this type of energy will be cost effective also .The power floor does not need any fuel or perhaps any sort of energy resource, simply making use of kinetic energy. Based upon your excess weight from a person moving on the floor. In This Project
We Are Generating Power As NonConventional Method By Simply Walking Or Running.

Walking is the most common activity in human life. When person walks he losses energy to the road surface in the form of impact, vibrations , sound etc..,due to transfer of his weight to the road surface through footfalls on the ground doing every step. This can be tapped and converted in the usable form such as an electric form. This device, if embedded in the footpath, can converted foot impact energy into electrical form.

II. LITERATURE REVIEW

Chun Kit Ang et.al [1] : In this paper says, a simple and yet low cost mechanism has been proposed to enhance the performance and efficiency of energy conversion from kinetic energy to electricity energy by placing a mechanical footstep power generator on the hind foot region. A total of 45 individuals were invited to participate in the experiments and the experiment results are then compared with the theoretical results.

Muhammad Asad et.al [2] In this project discuss the simple drive mechanism such as rack and pinion assembly and chain drive mechanism is used for generating power by utilization of force which is obtained during the walking on steps is converted in to electrical energy with the help of mechanical systems. The generated power is stored by means of battery and this is used for activating the connected loads. This is one of the compact and efficient systems for generating electricity which can be easily installed in many regions.

P.A. Bhosale et.al [3]: Says In this research paper authors 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. A rack and pinion is a type of linear actuator including a pair of gears which convert rotational motion into linear motion. The “pinion" engages teeth on the rack. In this paper, since 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. It is very useful to the places like all roads and as well as all kind of foot step which is used to generate the non- conventional energy like electricity

R. Sarnaik et.al [4]: Says This paper is all about generating electricity when people walk on 7 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 1MegaWattAs a fact only 11% of renewable energy contributes to our primary energy. If this project is deployed, then not only we can overcome the energy crises problem but this also contributes to create a healthy global environmental change.

Sarat Kumar Sahoo et.al [5] : Says In this project we are generating electricity just with the help of rack and pinion arrangement along with alternator and chain drive mechanism . Non conventional system for energies are very much required at this time. Energy generation using footsteps requires no any fuel input to generate electricity. In this project we are generating electricity just with the help of rack and pinion arrangement along with alternator and chain drive mechanism.

Saranya G et.al [6] : Says the power is generated by human motion while walking on the piezoelectric sensor, which is pressed and produces kinetic energy, which is then converted into electrical energy. The generated energy is stored in the battery. The energy in the battery is used to turn on the street lights using the LDR Sensor when the sun’s beam becomes dull, and to pass water to the grass using the motor with the help of the soil moisture Sensor when the soil becomes moisture. And also used for charge the mobile phones using the charging port which is installed in the park and to be used for other purposes in the park. All the data is get tracked and stored in the IOT for continuously monitoring and for future purpose.

Dr. Meena Chavan et.al [7] : Discuss This paper proposes a model that uses human walking, jumping and running as a source of energy and store it for essential use. Such a model is apt in a demography that of a country like India which has such a huge pedestrian population. This paper illustrates a method for harvesting this human locomotion energy with the use of piezoelectric sensor and demonstrates an application with the stored energy i.e. to charge a mobile phone securely using RFID

Suresh balaji.S et.al [8] : In this project says we are generating electrical power as nonconventional method by simply walking or running on the footsteps. Non- conventional energy system is very essential at thistime to our nation. Nonconventional energy using foot step needs no fuel input power to generate the electrical power.

V. Jose Ananth Vino et.al [9] : discuss The rack and pinion mechanism is more effective with a lower operating and maintenance cost, according to the author's comparison of three techniques of foot step power generation, including the gasoline piston method.

Md.Azhar et.al [10]: proposal Authors of this study employed a regulated 500mA, 5V power source. The secondary output of the 230/12V step down transformer's ac output is rectified using a bridge type full wave rectifier. An example of a linear actuator is a rack and pinion, which consists of two gears that transform rotational action into linear motion. The rack's teeth are engaged by the "pinion." Since the energy needed for the power generation process in this study comes from non-renewable sources, There is less pollution from this type of energy and no requirement for external electricity
(mains). It is really helpful to all the places. Roads and various types of foot traffic are used to produce non- conventional energy, such as electricity.

Joydev Ghosh et.al [11] :says 80 volts and 40 milliamperes were employed in this study by the authors. As a first invention, coil have been produced from a prototype model. The second idea delivers 50 mA and 95 volts from a single coil. and the energy generated can be used to run an LED array and After correcting the AC, a DC fan can charge batteries. in high They installed a powerful magnet in the second gear's axel to increase efficiency. vertically, so that the human body will cause the gear to rotate. rotates with the magnet's weight. The magnet is positioned in a form of loop. coils of copper. when the magnet begins to rotate in accordance with
According to Faraday's law of electromagnetic induction, an induced in the coil emf.

Vipin Kumar Yadav et.al [12] : discuss Authors of these research papers employed the following machinery: Voltage of motor: 10 volts Type: 1000 rpm D.C. generator Gear 1 is made of mild steel and has 59 (the main gear) and 36 teeth (small gear), Spur Gear Type, Used Gears:2 Spring 1- Mild steel with a load bearing capacity of 60 to 90 kg 5 inches total displacement Bearing 1 is a ball bearing with bearing number N35 and shaft 1 has a diameter of 15 mm. It is made of mild steel. The author came to the conclusion that these methods make energy conversion easy, effective, and pollution-free.

Shiraz Afzal et.al [13] Discuss This study focuses on creating electricity while people walk on a floor. If we can develop a power generating floor that can generate 100W in just 12 steps, we can then generate 1000W in 120 steps, and if we install such a system in 100 floors, it can generate 1MegaWatt. Only 11% of renewable energy actually goes toward providing our primary energy. If this idea is implemented, it would not only help us solve the energy crisis problem but will also have a positive impact on the worldwide environment. As the tile on the deck is pressed, a gear system coupled to a flywheel rotates the dynamo in this project. The energy generated is Additionally, we will be able to track and manage the amount of electricity generated. is created is stored in the batteries. When a person passes, it pushes the tile onto the ground, turning the shaft that is below the tile. The turn is limited by the clutch bearing, which is supported by holders. A single tile push causes the primary shaft to rotate approximately 215 times. The fly wheel, which temporarily stores the movement and transmits it to the DC generator (which provides 12V 40 amp at 1000 rpm), smooths out the movement of the predominant shaft after it has turned the gearbox shaft 15 times (1:15).

Ramesh Raja R et.al [14] Says The goal of this research article is to demonstrate how energy can be captured and applied at a frequently used floor step. Since even tiny buildings include levels, the use ofstepsis growing daily in allstructures. When we remain inactive, a lot of energy is wasted. The goal of this research article is to demonstrate how energy can be captured and applied at a frequently used floor step. Since even tiny buildings include levels, the use of steps is growing daily in all structures. When we remain inactive, a lot of energy is wasted. every time a guy climbs stairs, heat and friction are dissipated, causing him to step on the floors. By converting each staircase into a power generation unit, there is a strong chance of harnessing this energy and producing power. Batteries can be utilized to store the generated power, which will be used to weaken the building.

Tom Jose V et.al [15] Discuss In these research papers, the author created a model using recycled aluminium, tyres from old cars, and stainless steel that also features a lamp implanted in the pavement that illuminates whenever a step is converted into energy (using just 5% of the generated energy). A square of pavement generates roughly 2.1 watts of

power on average. And the author claims that any one square of pavement in a busy area can receive 50,000 steps per day. This information suggests that only five units of pavement might be required to maintain a bus stop's lighting throughout the night.

C.Nithiyesh Kumar et.al [16] Proposal In this 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.

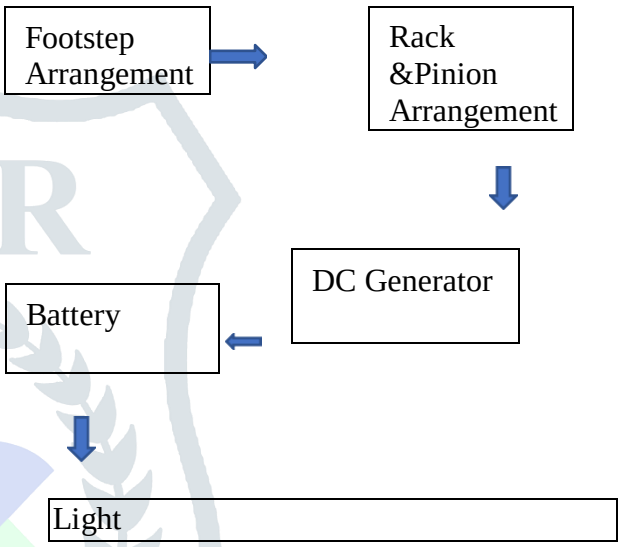
Farrukh Hafeez et.al [17] : Proposal This paper is all about generating electricity when people walk on the Floor. Think about the forces you exert which is wasted when a person walks. The idea is to convert the weight energy to electrical energy The Power Generating floor intends to translate the kinetic energy to the electrical power. Energy Crisis is the main issue of world these days. The motto of this research work is to face this crisis somehow. Though it won't meet the requirement of electricity but as a matter of fact 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 1MegaWatt. Which itself is an achievement to make it significant.

Suryaprakash Kumawat et.al [18]: Discuss This technical paper focuses on one such advanced method of energy harvesting using piezoelectric material. Piezoelectric materials can be used as mechanisms to transfer mechanical energy, usually ambient vibration, into electrical energy that can be stored and used to power other devices. A piezoelectric substance is one that produces an electric charge when a mechanical stress is applied. Conversely, a mechanical deformation is produced when an electric field is applied. Piezo- film can generate enough electrical density that can be stored in a rechargeable battery for later use.

Shubham kumar et.al [19] : Proposal In this project we are generating electrical energy by means of a non_conventional method just by walking on the footsteps. Non conventional system for energies are very much required at this time. Energy generation using footsteps requires no any fuel input to generate electricity. In this project we are generating electricity just with the help of rack and pinion arrangement along with alternator and chain drive mechanism.

B Shwetha et.al [20] : proposal From the sunrise of time, guy has required and utilised developing quantities of electricity for survival and well-being. As a result, many electricity 11 resets were depleted and wasted. The notion of the use of waste electricity from human mobility with foot energy is mainly applicable and crucial for quite populated international locations like India, in which train stations, temples, and one of type public areas are continuously congested in this paper we are authorised.

III. METHODOLOGY



The footstep arrangement is used to generate the electric power. Now a day's power demand is increased, so the footstep arrangement is used to generate the electrical power in order to compensate the electric power demand. In this arrangement the mechanical energy is converted into electrical energy. When the pressure is applied, the rack and pinion will convert mechanical energy into electrical energy. This electrical energy will be storing in the 12v rechargeable battery connected to inverter. We are using conventional battery charging unit also for giving supply to the circuitry. arrangement of footstep generation.

IV. WORKING PRINCIPLE :

The complete fabricated model picture of Foot Step is shown below. The upper plate is mounted on two springs, the weight impact is converted into electrical power with proper control unit. The spring and rack & pinion arrangement is fixed below the foot step which is mounted on base.

Spring system is used for return mechanism of upper plate after release of load. The shaft along with pinion is supported by end bearings. the generator is used here is 12Volt permanent magnet DC generator. The terminal of DC generator is connected to lightning LEDs.

FABRICATION:

Components Used :

Springs.

Rack and pinion.

Dc generator.

Wooden frame.

Dc bulb.

Springs :

A spring is characterized as a versatile body, whose capacity is to twist when stacked and to recuperate its unique shape when burden is expelled. There are many types of springs 16 but here we used a helical compression spring and there are springs used as our requirement as shown in figure: 1.1.

Fig: 1.1 springs

Rack and pinion: The gear of a shaft meshes externally and internally with gear in a straight line. Such type of gear is called rack and pinion gear. The straight line gear is called a rack and the circular wheel is called pinion. As shown in fig: 1.2.

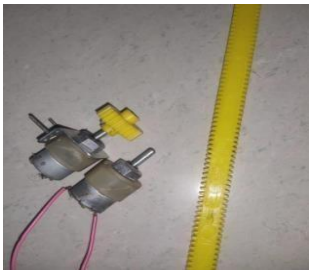


Fig: 1.2 Rack and pinion

Dc Generator : Here we are using a 12V DC generator to generate electrical power. Rated speed of the motor is 1000rpm. If we could apply the force such that the rotation of motor reaches its rated speed, then the efficiency of generation will be higher. Since the generator is Permanent Magnet type, the field excitation is not necessary d.c generator.

Dc bulb: DC light bulbs are good for remote and self-standing power supplies, such as DC batteries, cars, boats, yachts, solar off grid systems, trains, airplanes and more.

FOOTSTEP POWER GENERATOR

By Using All The Above Components,
We Fabricated The Footstep Power Generator As Shown In Figure:1.3

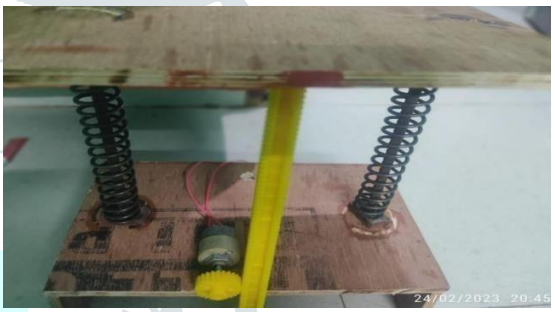


Fig : 1.3 Footstep power generator

V. RESULTS AND DISCUSSIONS

CALCULATIONS :

Calculations of footstep power generator let us consider ,

the mas of the body = 65kg(

approximately) height of the spring

=8cm workdone =force x distance

here, force =weight of the body force

=65kg x 9.81

Force, f =637.65N

Distance travelled by the body = height of the spring

Height of the spring =8cm

Height of the spring = 0.08m

Output power = Workdone /time taken for sec

Output power = (637.65x0.08)/60

output power = 0.8502 watts (for one pushing force)

RESULTS :

Graph:

The output power is represented by the y- axis,while the x- axis is based on the mass as shown in figure:1.4. As the mass rises, The output power rises along with it.

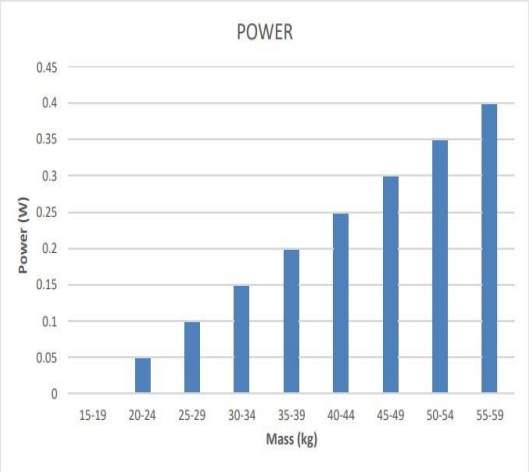


Fig : 1.4 Difference Between Mass And Power

VI. CONCLUSION

In this mini project, the power generation using foot step gets its energy requirements from the non-renewable sources of energy. There is no need of power from the mains and there is less pollution in this source of energy. It is very useful to the places like all roads and as well as all kind of stair case which is used to generate the nonconventional energy like electricity. It is able to extend this project by using same arrangement and construct in the footsteps/speed breakers so as to increase the rate of power production rate.

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