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A REVIEW ON FOOTSTEP POWER GENERATION USING RACK AND PINION MECHANISM

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Abstract: Nowadays energy and power is basic necessities of modern world . As the demand of energy is increasing day by day and the solution of that problem to use renewable sources like sun. Renewable source means to generate electricity from daily life. The objective of this work is power generation through footstep as a source of renewable energy that we can obtained while walking/stepping on to the certain arrangement like footpath, stairs, roads etc. and we are also used in public places like railway station, bus stand, parks and college campus also. The basic working principle of footstep power generation system is based on rack and pinion mechanism.

Keywords – Rack and Pinion gear, Renewable source, Footstep, Electricity.

I. INTRODUCTION

Electric energy consumption is the form of energy consumption that uses electric energy. Electric energy consumption is the actual energy demand made on existing electricity supply for transportation, residential, industrial, commercial, and other miscellaneous purpose. China, United States, and India accounted for over 50% of the global share of electricity consumption. The moto of the project is utilization of waste energy. When human walk on the roads or footpath or any certain platform he losses his energy on that platform. So we store this wasted energy and utilize it to produce renewable energy. There are lots of crowded places, so large amount of power can be obtained with the use of this technology. While we step on that certain platform, it goes down and rack and pinion arrangement works which rotate the DC motor. Through DC motor the rotational energy is converted into electrical energy. This electrical energy output will be shown by glowing the LED and Display. This project is to develop a new source of renewable energy with the help of Arduino Uno as the microcontroller. The footstep power generation system is to capture the typically wasted energy surrounding a system and transforming it into electrical energy. The technique used in gaining the energy is via rack and pinion mechanism. Non-conventional energy using footstep needs no fuel input power to generate the electrical power. This is one of the compact and efficient system for generating electricity which can be easily installed in many regions.

II. LITERATURE REVIEW

According to T.R. Deshmukh paper deals with design and modelling of parts of the model of the foot step power generation system using 3D modelling software creo. This process consist number of simple setup that is installed under the walking or standing platform. Project system works on the principle of converting the linear motion because to pressure of foot steps into rotating motion by rack and pinion arrangement. This mechanism fails if there is any occurrence of variable load leads to balancing type problems Power is not generated during return movement of rack.

We have used rack and pinion mechanism, in other projects they have used spring and chain mechanism and piezoelectric sensors. In this project rack and pinion mechanism is connected to charging circuit and this charging circuit charges the battery. Through Arduino output will be displayed on LCD in which footstep count and voltage of a battery is displayed.

III. EASE OF USE

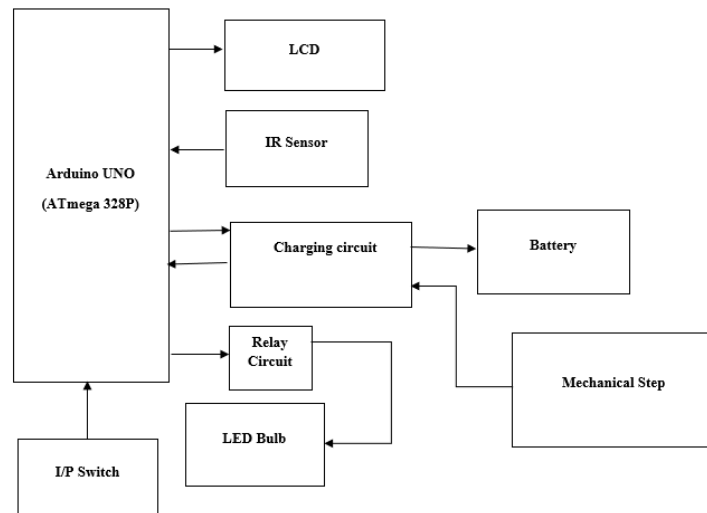


Fig.-1 Block diagram of Footstep Power Generation using Rack and Pinion Mechanism

IV. HARDWARE DESCRIPTION

i. Gear Mechanism :

A rack and pinion is a type of linear actuator that comprises a circular gear engaging a linear gear, which operate to translate rotational motion into linear motion. Driving the pinion into rotation cause the rack to be driven linearly. Driving the rack linearly will cause the pinion to be driven into a rotation.

ii. Battery :

In our paper we are using secondary type battery. It is rechargeable type. A battery is one or more electrochemical cells, which store chemical energy and make it available as electric current. There are two types of batteries, primary(disposable) and secondary(rechargeable), both of which convert chemical energy to electrical energy.

iii. Arduino :

The Arduino Uno is an open-source microcontroller board based on the Microchip ATmega328P microcontroller and developed by Arduino.cc. The board is equipped with sets of digital and analog input/output pins that may be interfaced to various expansion boards and other circuits. The board has 14 digital I/O pins, 6 analog I/O pins, and is programmable with the Arduino IDE, via a type B USB cable.

iv. Dynamo :

A dynamo is an electrical generator that creates direct current using a commutator. Dynamos were the first electrical generators capable of delivering power for industry, and the foundation upon which many other later electric-power conversion devices were based, including the electric motor, the alternating-current alternator, and the rotary converter.

v. Display :

A liquid-crystal display (LCD) is a flat-panel display or other electronically modulated optical device that uses the light-modulating properties of liquid crystals combined with polarizers. Liquid crystals do not emit light directly, instead using a backlight or reflector to produce images in color or monochrome.

vi. Sensor :

IR sensor is an electronic device, that emits the light in order to sense some object of the surroundings. An IR sensor can measure the heat of an object as well as detects the motion. Usually, in the infrared spectrum, all the objects radiate some from of thermal radiation.

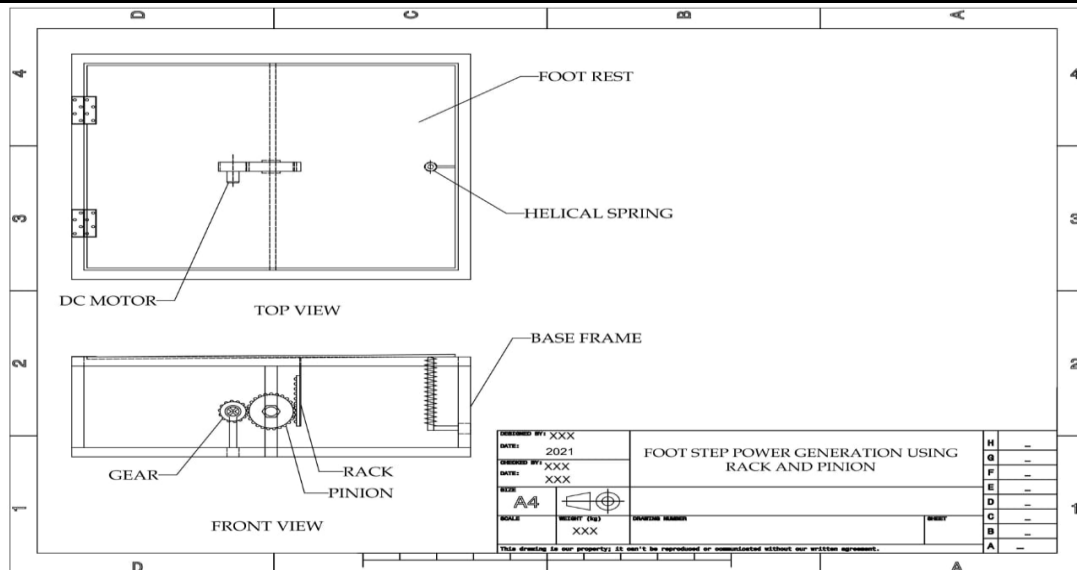


Fig.-2 Padel Energy Generate-model

V. PROPOSED SYSTEM

The Footstep Power Generation, here we proposed a power generation technique through rack and pinion arrangement the project aims to convert Mechanical energy into Electrical energy. We are trying to utilize energy in a useful way. By using Rack and Pinion arrangement we are converting to and fro motion of the steps into rotational motion of the dynamo. A rack and pinion is a type of linear actuator that comprises a circular gear engaging a linear gear, which operate to translate rotational motion into linear motion. In this we are using rack and pinion arrangement directly to rotate the dynamo. Through dynamo the rotational energy is converted into electrical energy. This electrical energy output will be shown by glowing the LEDs and Display and stored in the Battery. An IR sensor can detects the motion of the paddle.

For one Footstep approximately 10 mv electricity is generated

VI. CONCLUSION

In proposed system of power generation there is no any fuel input requirement for the generation of electrical power. Thus it can also be concluded that this mode of power generation system is eco-friendly, i.e. no pollution is caused during the generation of power using this type of model. Hence due to such advantages, this system can be embedded at any of the public places like railway platforms, busy foot-paths, malls etc.

Implementing this system, dependency on the conventional sources of energy can be reduced, thus it is considered as beneficial for nature and human life.

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