To design and develop pedal operated turnstile power generation system

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Project Guide

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ABSTRACT

Alternative approaches to sustainable energy generation are becoming more and more necessary in the current period of rising energy consumption and environmental concerns. In order to transform human mechanical effort into useful electrical energy, this project focuses on designing and developing a pedal-operated turnstile power generation system. The main concept is to use an electric generator and a mechanical turnstile with a pedal-driven mechanism to capture energy from pedestrian movement in high-traffic locations. The mechanism is constructed with a tripod-style turnstile that has pedals that users can rotate or press.

Keyword - *Pedal-operated turnstile, Human-powered energy, Mechanical-to-electrical conversion, Sustainable energy system*

1.INTRODUCTION

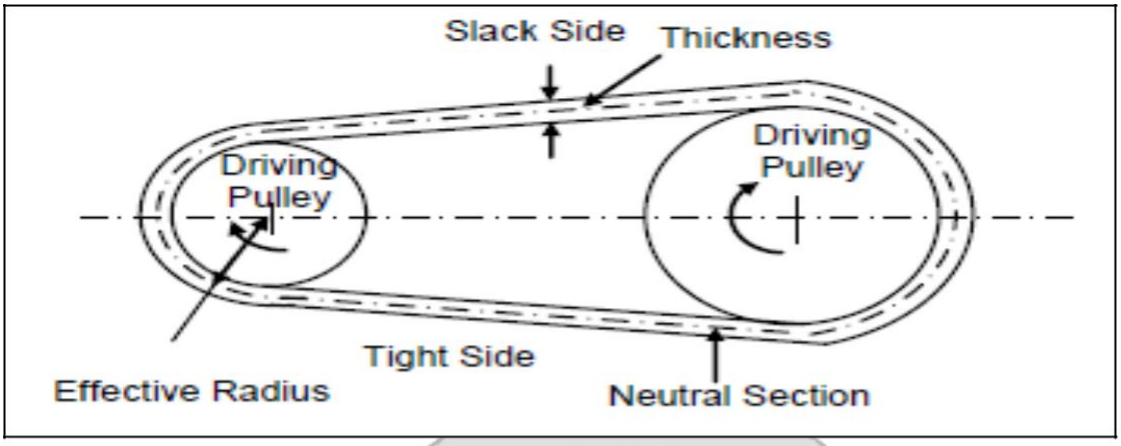
The increase in the usage of electric power and the pollution that results from its production have focused attention on the creation of green energy, which would satisfy demand without endangering the environment. Green energy comes in a variety of forms, though. The conversion of underutilized physical effort into full energy consumption in this specific context is the main subject of this study. A turnstile construction is employed for the previously described reason. Turnstile structures are usually used to control the entry of individuals one at a time and to prevent animal ingress. These turnstiles are usually found in places where people go, such train stations, parks, tourist attractions, malls, and police stations, among other places.

Every time someone enters, the turnstile will revolve, turning the effort of humans into clean electrical energy. A prototype is built and used at our workplace; electricity is generated. This technology seems to be an effective and affordable method of producing green energy. Turnstile gates typically require arms or barriers to spin in a single direction. Users must physically rotate or present a legitimate credential in order to gain access. The mechanical components and locking mechanisms are designed for long-term dependability and longevity. Turnstiles are used to generate power by harnessing the mechanical energy created when people pass through them. This energy can be converted into electrical power in a number of ways. Harvesters of kinetic energy are one such a technique. Turnstiles are a good way to generate electricity. Over the past few decades, interest in creating clean energy using unconventional ways has grown because to the massive need for power, especially in metropolitan areas. In this field, many techniques for converting mechanical energy into electrical energy have been discovered. The public transportation system can use the electricity generated by waves and a wheel. Several authors also proposed producing electrical energy with a dynamometer. created and built a power generator with a chain drive, mechanical sprocket system, and dynamometer. Due to the enormous demand for power, particularly in metropolitan areas, interest in producing clean energy using unconventional means has increased over the past few decades. Numerous methods for transforming mechanical energy into electrical energy have been identified in this context. Waves and a wheel can produce electricity that can be utilized in the public transportation system. Additionally, other authors suggested utilizing a dynamometer to generate electrical energy. designed and constructed a power generator using a dynamometer, chain drive, and mechanical sprocket system.

1.1 Working

Initially, it must be set up with a turnstile, agate at an entrance with revolving arms that only permits one person to enter at a time. To allow someone to pass through, the post with arms is positioned in a passageway and rotated on top. To generate electricity, the arms will work as an actuator for the induction generator. The turnstile must revolve and turn the DC generator each time a person crosses the gate. Electricity flows as output energy as the rotor revolves around a stator, and it is subsequently stored in the battery for later use.

With the rapid advancement of technology and the modern world, there is a great demand for energy consumption. Energy is necessary for the operation of computers, laptops, mobile phones, medical devices, educational aids, and transportation technology. These days, energy is a commodity that is necessary for our everyday existence. Pollution is rife in our day and age, harming all living things and their surroundings. Wind, solar, biomass, and geothermal energy are examples of renewable and sustainable energy sources that help meet energy consumption demands with little to no negative environmental impact. This type of product inspired us to come up with a solution that would benefit the community by giving them free, clean energy that is available in public areas. Wasted energy can be extremely beneficial and productive in a variety of settings. Public and congested spaces like stadiums, shopping centers, public markets, schools, and transit terminals are a few examples. There are people moving and exuding mechanical energy at each of these locations. There is energy in every stride, whether you are sprinting, walking, or opening and closing a door.



1.1Open Belt Drive

1.2 Design Properties

➢ **Human-Powered Mechanism**

- Utilizes a pedal system (similar to a bicycle) or rotating turnstile arms.
- Converts kinetic energy generated by foot-pedaling or pushing to rotate a shaft.

➢ **Rotary to Electrical Conversion**

- A dynamo or alternator is connected to the shaft.
- Converts the rotational motion into electrical energy (DC/AC).

➢ **Energy Storage**

- Generated power is stored in rechargeable batteries.
- Optionally connected to a supercapacitor or power bank system.

➢ **Compact & Ergonomic Design**

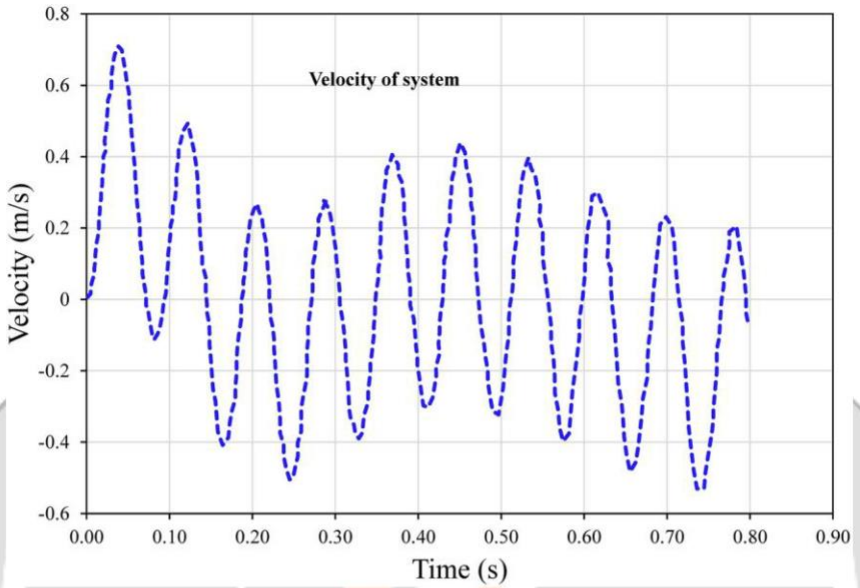
- Designed to be space-efficient and comfortable for users.
- Can be integrated in public places like railway stations, malls, parks, or gyms.

➢ **Turnstile as Access Control**

- Doubles as a security or access control system.
- Encourages users to rotate the turnstile (or pedal) to pass through.

➢ **Load-bearing Structure**

- Must be structurally strong to handle continuous human use.
- Materials like mild steel, aluminum, or reinforced polymers are often used.

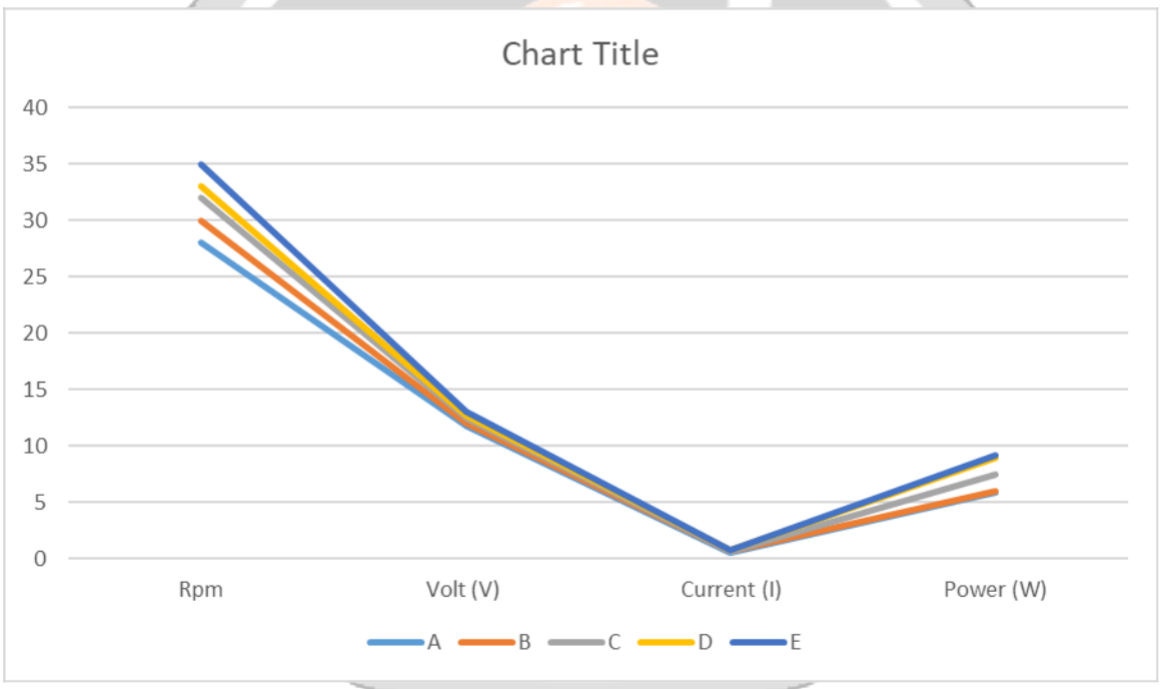


1.3 Power Generation Graph

2. RESULT

Sr. No.	Rpm	Volt (v)	Current (I)	Power(W)
1.	28	11.8	0.5	5.9
2.	30	12	0.6	6
3.	32	12.5	0.6	7.5
4.	33	12.7	0.7	8.89
5.	35	13	0.7	9.1

2.1 Output



2.2 Power Generation Chart

3.CONCLUSION

Mechanisms for turnstile gates are adaptable and crucial to security and crowd management. An great potential for sustainable energy solutions is presented by recent advancements in turnstile gate energy generation. For turnstile gate projects to be successful, proper engineering design, rigorous evaluation of energy conversion techniques, safety precautions, and maintenance planning are necessary. The potential uses and advantages of turnstile gate systems are anticipated to grow as technology advances, making them a viable field for engineering projects. Stylish half-height sensor barrier for airports and business and public facilities that require effective turnstiles. Its features include full access reader and destination control integration, elegant lighting options, visual guiding alternatives, and long-lasting, premium materials.

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