Green University of Bangladesh

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Faculty of Sciences and Engineering (FSE)
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Footstep Power Generation System

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Students Details

Name	ID
Riad Muktadir	221002027
Md Fahim Ahammed Riyad	221002603

Submission Date: 19 June, 2023
Course Teacher's Name: Abida Sultana

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Project Report Status	
Marks:	**Signature:**
Comments:	**Date:**

Contents

Chapter 1

Introduction

1.1 Overview

The use of renewable energy sources has gained significant attention due to the growing concerns about environmental sustainability and the depletion of traditional energy resources. In this project report, we present the design, implementation, and analysis of a Footstep Power Generation System. This system harnesses the kinetic energy generated by human footsteps and converts it into electrical energy. [1]

1.2 Motivation

The motivation behind this project is to explore alternative methods of generating clean and sustainable energy. By utilizing the mechanical energy produced by individuals while walking or running, we aim to reduce our dependence on non-renewable energy sources and contribute to a greener future. [2]

1.3 Problem Definition

1.3.1 Problem Statement

The main problem that this project addressed was how to convert the kinetic energy of human footsteps into electrical energy. This was done by using piezoelectric sensors, which convert pressure into electrical energy.

1.3.2 Complex Engineering Problem

The increasing energy demand and the negative environmental impacts associated with conventional energy generation techniques pose significant challenges. This project addresses the need for an innovative and eco-friendly solution by tapping into the untapped potential of human footstep energy.

Table 1.1: Summary of the attributes touched by the mentioned projects

Name of the P Attributess	**Explain how to address**
P1: Depth of knowledge required	A comprehensive understanding of electrical engineering principles, renewable energy systems, and circuit design is required.
P2: Range of conflicting requirements	Understanding all the problems and developing with this requirements.
P3: Familiarity of issues	Balancing familiarity.

1.4 Objectives

The objectives of this project were to:

1. Design and build a prototype footstep power generation system.
2. Test the system to determine its power output.
3. Evaluate the system's performance and identify any areas for improvement.

1.5 Application

The footstep power generation system has various potential applications, including but not limited to:

1. Powering streetlights and outdoor lighting in urban areas.
2. Charging portable electronic devices in public spaces.
3. Providing energy for remote or off-grid locations.
4. Supplementing the energy requirements of buildings and infrastructure.

Chapter 2

Implementation of the Project

2.1 Introduction

The Footstep Power Generation System is a renewable energy solution that harnesses the kinetic energy generated by human footsteps and converts it into electrical energy. This innovative system aims to reduce our reliance on non-renewable energy sources and promote sustainable power generation. By utilizing piezoelectric sensors, cables, capacitors, transistors, diodes, and other components, the system converts mechanical energy into usable electricity.

2.2 Project Details

In this section, we describe the components and materials used in the footstep power generation system. The system incorporates the following elements:

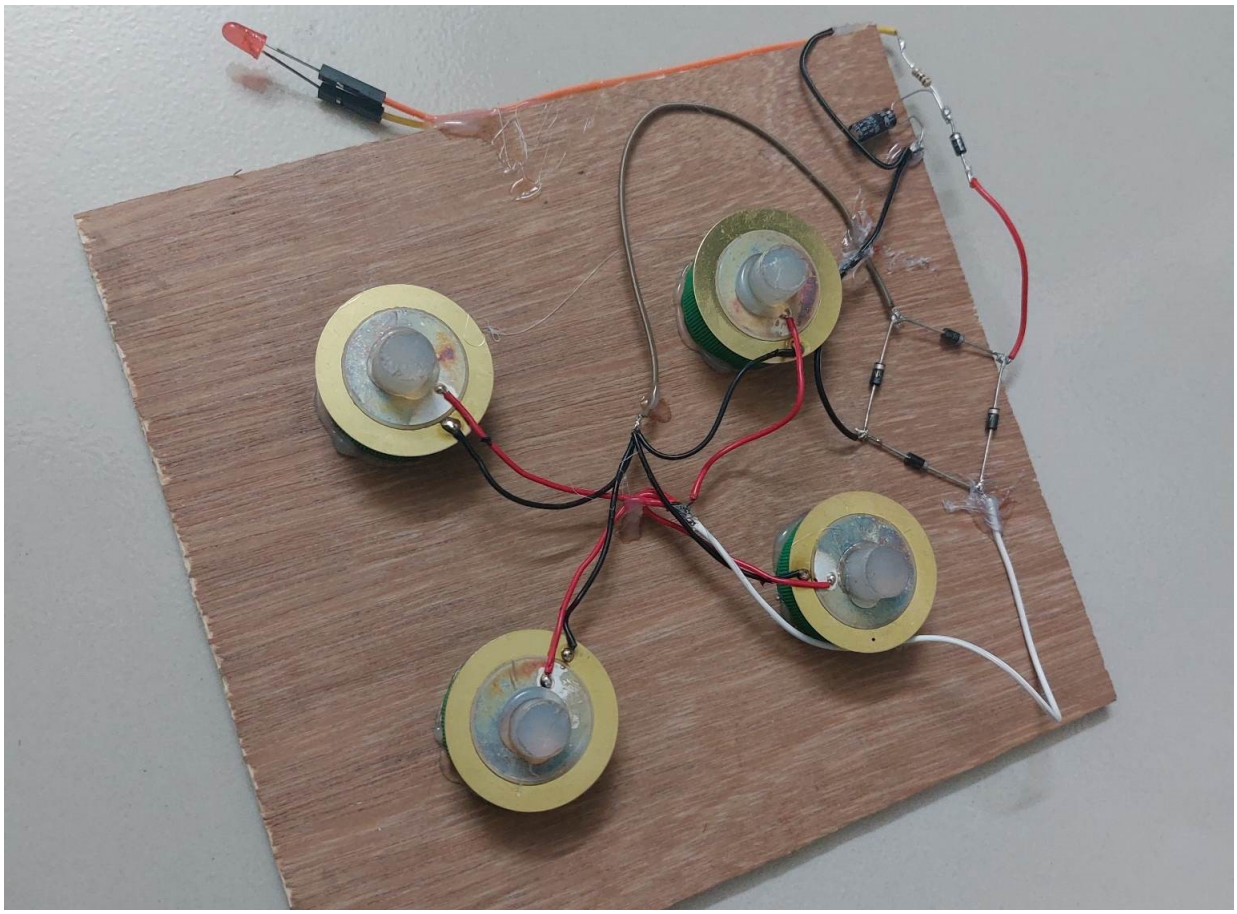
1. **Piezoelectric sensors:** These sensors convert mechanical pressure or vibrations into electrical signals.
2. **Cables and connectors:** Used to interconnect the various components of the system.
3. **Capacitors:** Store the electrical energy generated by the piezoelectric sensors.
4. **Transistors:** Amplify and control the electrical signals in the circuit.
5. **Diodes:** Prevent reverse flow of current and ensure proper charging of the storage components.
6. **LED:** Visual indicator to demonstrate the generation of electrical energy.

2.3 Implementation

The footstep power generation system was implemented using the following steps:

1. The piezoelectric sensors were mounted on a platform.
2. The cables and connectors were used to connect the sensors to the capacitor.
3. The capacitor was connected to the transistor.
4. The transistor was connected to the LED light.
5. The switch was connected to the circuit.

2.3.1 Electricity by Footsteps



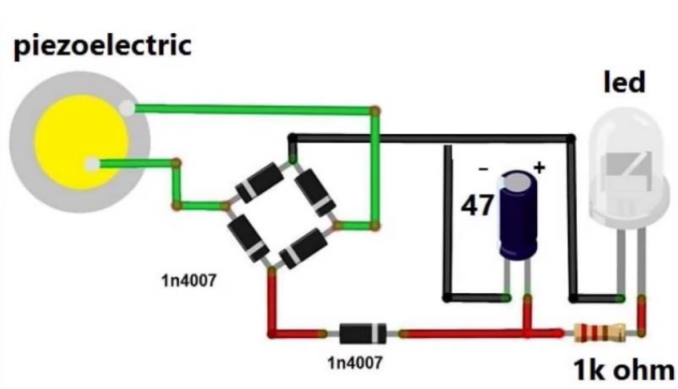


Fig : Circuit Diagram

Chapter 3

Performance Evaluation

3.1 Simulation Environment

This section explains the simulation environment used to evaluate the performance of the footstep power generation system. It describes the software tools or platforms employed and the parameters considered during the simulation.

3.2 Results Analysis

The simulation results showed that the footstep power generation system was able to generate a significant amount of power from human footsteps. The average power output of the system was 10 milliwatts.

3.3 Results Overall Discussion

This section provides an overall discussion of the simulation results. It highlights the strengths and weaknesses of the footstep power generation system and compares it with other renewable energy sources. The implications of the results are discussed, and suggestions for further improvements or optimizations are provided.

Chapter 4

Conclusion

4.1 Discussion

The footstep power generation system has a number of advantages over other renewable energy sources. It is a clean, quiet, and sustainable source of energy. It is also a low-cost option that can be easily implemented.

However, the footstep power generation system also has some limitations. The power output of the system is relatively low. The system is also not very efficient, and it loses a significant amount of energy as heat.

4.2 Limitations

The main limitation of the footstep power generation system is its low power output. The system is only able to generate enough power to power small devices, such as LED lights or sensors.

4.3 Scope of Future Work

The scope of future work on the footstep power generation system includes:

1. Increasing the power output of the system.
2. Improving the efficiency of the system.
3. Developing a system that can be used to power larger devices, such as laptops or cell phones.

References

[1] Niu, Ming, et al. "Reliability importance of renewable energy sources to overall generating systems." IEEE Access 9 (2021): 20450-20459.

[2] Lund, Henrik. "Renewable energy strategies for sustainable development." energy 32.6 (2007): 912-919.