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EcoStride Advanced Footstep Electricity Generator

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Abstract: The EcoStride Advance Footstep Electricity Generator Project is an ingenious and eco-friendly initiative aimed at harnessing the kinetic energy generated by human footsteps to produce electrical power. This project leverages the concept of piezoelectricity, a renewable energy source that converts mechanical stress into electricity, to provide a sustainable and clean energy solution. By integrating specially designed flooring systems with embedded piezoelectric materials in high-traffic areas, this project offers an innovative approach to address the ever-growing demand for clean and renewable energy sources. The key components of the EcoStride Advance Footstep Electricity Generator include piezoelectric materials, a custom flooring system, an energy conversion mechanism, and an energy storage system. When an individual steps on the flooring, the embedded piezoelectric materials generate electric charge through the piezoelectric effect. This electric charge is then efficiently converted into a usable form of electricity, and any surplus energy is stored in batteries or supercapacitors for later use.

The project presents several benefits, such as harnessing renewable energy from an otherwise underutilized source, reducing the environmental impact by lowering reliance on fossil fuels, and providing economic savings in public areas with high foot traffic. Moreover, this technology promotes green and sustainable solutions, aligning with the global shift towards a more environmentally conscious and energy-efficient future**.**

Keywords **- ecostride, electricity harvesting, power generation, piezoelectric sensor electricity generation**

I. INTRODUCTION

In a world increasingly propelled by technology, the demand for sustainable and eco-friendly energy solutions has never been more pressing. The EcoStride Advance Footstep Electricity Generator represents a groundbreaking approach to harnessing human movement for the generation of clean and renewable electricity. As we navigate the challenges of a rapidly changing climate, finding innovative ways to reduce our carbon footprint becomes imperative. This project endeavors to merge technology and sustainability by converting footsteps into a tangible source of power.

Increasing in depletion of fossil fuel and non-renewable energy has been demanded a critical needed for another alternative source of energy to replace the depletion and continuously supply the increasing of energy request. Energy is the ability to do work. Electricity is one of the commonly used energy and it is increasing in line with people. The objective in this invention is to use the increasing of human population and give high impact in increasing the energy while reducing the negative effect on the environment. This utilizes power also do not depend or rely on the climate condition.

Imagine a future where the simple act of walking not only propels you forward but also contributes to powering the world around you. The EcoStride Electricity Advance Generator seeks to transform this vision into reality. By capturing the kinetic energy produced with each step, this system aims to create an accessible and efficient means of generating electricity. From busy urban sidewalks to recreational spaces, the potential applications are vast and varied.

To generate the electricity needed, the wasted energy needs to be utilized. The energy is wasted from walking activities done by a human can be used to generate electricity. The walking energy is wasted in the form of the vibration to the surface. The average human footstep can take about 3000 -5000 steps a day. The footstep can generate more electricity to achieve the demand needed. The energy from footstep can be extracted by vibration and electromagnetic, electrostatic and piezoelectric are the three types of vibration to electrical energy conversion.

This project is not just about generating power; it's a testament to our commitment to sustainable living and the integration of clean energy into our daily lives. The EcoStride Electricity Advance Generator opens new possibilities for renewable energy sources, encouraging a paradigm shift toward greener and more environmentally conscious power solutions.

Generally, there are different techniques in generating electrical energy that are received from the people movement or vehicles movement on roads. An unfamiliar method is used for the fluctuation of pressure in the ground that is formed by crossing of people or vehicles that are exposed and resulting a fixed pressure amplitude. For an example, in the Netherland, the electromagnetic generator is apply on the dance floor to generate electricity. However, a relatively larger deflection of floor up to 10mm is needed to generate noticeable electric energy. Additionally, its have a complex structure and demand in high assembling cost. In Japan, the piezoelectric transducer had been installed in the floor of the subway ticket machine to generate electricity and only need piezoceramic without any complex mechanical structure.

II. RESEARCH METHODOLOGY

1. Project Planning and Design:
   i. Define Objectives: Clearly outline the project's goals and objectives, such as generating a certain amount of electrical energy from foot traffic.
   ii. Site Selection: Identify suitable locations with high foot traffic, such as malls, transit hubs, or public squares.
   iii. Determine Budget: Establish a budget for the project, considering the cost of materials, installation and maintenance.

2. Material Selection:
   i. Choose Piezoelectric Materials: Select appropriate piezoelectric materials like crystals, polymers, or ceramics that can efficiently generate electricity from mechanical stress.
   ii. Encapsulation: Protect and encapsulate the piezoelectric elements to make them durable and capable of withstanding foot traffic.

3. Installation:
   i. Flooring Installation: Embed the piezoelectric elements within the flooring material, ensuring a uniform and stable surface for walking.
   ii. Electrical Connections: Establish electrical connections between the piezoelectric elements and the power management system.

4. Power Management System:
   i. Rectification: Convert the alternating current (AC) generated by the piezoelectric elements into direct current (DC) using rectifiers.
   ii. Voltage Regulation: Implement voltage regulators to stabilize the electrical output.
   iii. Energy Storage: Connect batteries or supercapacitors to store excess electricity generated during high foot traffic periods.

III. Literature Review

Increasing in depletion of fossil fuel and non-renewable energy has been demanded a critical neededfor another alternative source of energy to replace the depletion and continuously supply the increasing of energy request. Energy is the ability to do work [1]. Electricity is one of the commonly used energy and it is increasing in line with people. The objective in this invention is to use the increasing of human population and give high impact in increasing the energy while reducing the negative effect on the environment.This utilizes power also do not depend or rely on the climate condition [2]. In order to generate the electricity needed, the wasted energy needs to be utilized. The energy is wasted from walking activities done by a human can be used to generate electricity. The walking energy is wasted in the form of the vibration to the surface [3, 4]. The average human footstep can take about 3000 -5000 steps a day [5-6]. This footstep can generate more electricity to achieve the demand needed. The energy from footstep can be extracted by vibration and electromagnatic, electrostatic and piezoelectric are the three types of vibration to electrical energy conversion [7].

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System Architecture

3.1 Block Diagram

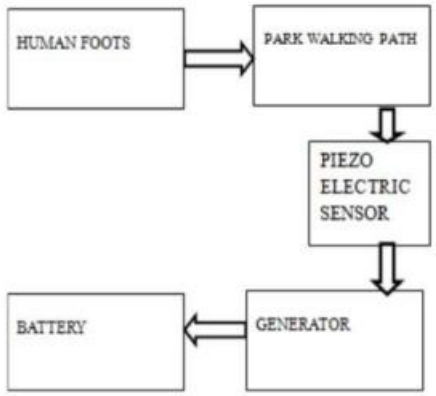

Fig 1. Block Diagram

Description of a block diagram for a EcoStride Advance Footstep Electricity Generator:

1. Footstep Energy Harvesting System:
Transducer: This component involves piezoelectric sensors placed strategically on the floor or walking surface. Piezoelectric materials generate electrical voltage in response to mechanical stress, such as footsteps.
Energy Harvesting Circuit: Converts the generated voltage from the piezoelectric sensors into usable electrical energy. This circuit typically includes a rectifier to convert alternating current (AC) to direct current (DC) and a storage element, such as a capacitor or battery, to store the harvested energy.

2. Power Conditioning Module:
Voltage Regulator: Maintains a stable output voltage to ensure compatibility with downstream electronics.
Power Management System: Monitors the energy storage level and regulates the distribution of power to connected devices or the electrical grid.

3. Energy Storage:
Battery: Stores the harvested energy for later use, providing a continuous power supply even when footsteps are not actively generating electricity.

4. Output Interface:
Inverter: Converts the DC power stored in the battery into AC power if the application requires alternating current.
Load Connection: Connects the generated electricity to power electronic devices, appliances, or feed it into the electrical grid.

5. Monitoring and Control System:
Microcontroller: Monitors the system parameters, such as energy production, storage levels, and overall system health.
User Interface: Displays information about the electricity generation, energy storage, and other relevant data. It can include indicators, LED displays, or a user interface for configuration.

6. Safety Systems:
Overvoltage/Overcurrent Protection: Safeguards the system and connected devices from potential electrical issues.
Emergency Shutdown: A mechanism to shut down the system in case of any malfunction or emergency.

7. Grid Connection (Optional):
Grid Interface: If applicable, a connection to the electrical grid allows excess energy to be fed back into the grid, contributing to the overall energy supply.

8. Energy Usage Monitoring (Optional):
Smart Meter: Monitors and records the electricity usage and generation data for analysis and optimization.
This block diagram outlines the key components and their interconnections in a Footstep Electricity Generator project, illustrating how the kinetic energy from footsteps is captured, converted, stored, and utilized.

V. SUMMARY

4. Summary of Descriptive Statics of Study Variables EcoStride Advance Footstep Electricity Generator Results:

1. Improved Energy Efficiency: Advanced designs of footstep electricity generators were expected to increase energy efficiency, making it possible to generate more electricity from each step.

2. Optimized Piezoelectric Materials: Researchers were working on developing more efficient and durable piezoelectric materials to enhance the conversion of mechanical energy into electrical energy.

3. Enhanced Energy Storage Solutions: Research was focused on developing advanced energy storage systems, such as high-capacity batteries and supercapacitors, to store and utilize the generated energy more effectively.

4. Wireless Energy Transmission: Advanced systems might incorporate wireless energy transmission technology, enabling the generated electricity to be transmitted over short distances to power nearby devices or grids.

5. Integration with IoT Technology: Integration with the Internet of Things (IoT) to enable real-time monitoring, data collection, and remote management of footstep electricity generators.

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VII. References

1. Nitashree, *et.al*., "Foot Step Power Generation Using Piezoelectric Material," *International Journal of Advanced Research in Electronics and Communication Engineering*, vol. 4, pp. 2503-2506, Oct 2015.

2.D. Marshiana, *et al*., "Footstep Power production using Piezoelectric Sensors," *Research Journal of Pharmacy and Technology*, vol 9, pp. 831-834, Jul 2016.

3.V. Panneerselvam, *et al*., "Portable DC Regulated Power Supply from Footsteps," *International Journal forScientific Research & Development*, vol 5, pp. 916-918, April 2017.

4.R. Prabaharan, *et.al*., "Power Harvesting By Using Human Foot Step," *International Journal of InnovativeResearch in Science, Engineering and Technology*, vol 2, pp 3001-3009, Jul 2013.

5.P. Madhu, *et al*., "Electrical Power Generation by Foot-steps using Piezo-electric Transducers," *International Journal of Recent Trends in Engineering & Research (IJRTER)* vol. 2 pp 108 – 115, June 2016.

6.C. Gautam, *et.al*., "Power Harvesting Through Human Locomotion," *International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering*, vol 6, pp. 2277-2282, April 2017.

7.R. M. Mahidur and R. Sarker, "Vibration Based Piezoelectric Energy Harvesting Utilizing Bridgeless Recitifier Circuit," *Jurnal Kejuruteraan*, pp. 87-94, 2016.

8.E. Bischur, and N. Schwesinger, "Energy harvestingfrom floor using organic piezoelectric modules," *2012 PowerEngineering and Automation Conference*, 2012, pp 978-981.