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Research on Power Generating Tiles

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Abstract: ***In the modern era, the escalating demand for energy underscores the need for groundbreaking innovations. This paper seeks to capitalise on this necessity by transforming non - conventional energy generated through the simple act of walking into a sustainable source of electrical power. The Electricity Generator Tiles, a novel and eco - friendly energy harvesting system, is designed to leverage human motion for power generation. Two 12V DC motors, integrated into the mechanical structure beneath a walking surface, efficiently convert the mechanical energy from footsteps into electrical energy. The generated power is stored in a compact and lightweight 3.7V LiPo battery for convenient storage. Visualising the power generation process is facilitated by the incorporation of two LEDs, providing a real - time display of electricity generation. This portable solution presents a practical means of harvesting energy from human movement, holding promise for diverse applications requiring off - grid power sources. With its innovative design, the Electricity Generator Tiles stands as a sustainable solution to address the ever - growing global energy demand, especially in areas where traditional power sources are limited or unavailable.***

Keywords: Human motion energy harvesting, Electrical energy conversion, Pressure - triggered mechanism.

1. Introduction

In our contemporary society, the indispensability of energy and power is more pronounced than ever. As the global demand for energy continues its upward trajectory, the depletion and wastage of numerous traditional energy resources pose significant challenges. Addressing this concern, there is substantial merit in proposing a paradigm shift towards harnessing the overlooked energy generated from foot power during human locomotion. This proposition gains particular significance in densely populated nations such as India, where high - traffic locations like roads, railway stations, bus stands, and temples consistently witness overcrowding, with millions of people in perpetual motion. Despite the vast potential inherent in this kinetic energy source, it currently goes untapped, making it a prime candidate for a transformative invention.

The Electricity Generator Tiles emerges as a pioneering solution, introducing a fresh perspective on sustainable energy by capturing the kinetic energy produced through human footsteps. Employing two 12V DC motors ingeniously integrated into the system, this technology adeptly converts mechanical energy generated during walking into a valuable source of electrical power. The harnessed energy finds a home in a lightweight 3.7V LiPo battery, while the incorporation of two LEDs offers a visually compelling real - time display of the power generation process. This innovation, with its portability and efficiency, not only advocates for eco - friendly practices but also establishes itself as a viable off - grid power source—empowering individuals to contribute to energy production through the simple and everyday act of walking.

2. Literature Review

1) **Design of Footstep Power Generation Machine** - 1] Bhosale Prof. P. A., et al. In this paper, the author uses simple drive mechanisms such as rack and pinion assembly. The control mechanism carries the rack & pinion; D. C generator, battery and LED strip to show output. They have discussed the various applications and further extension. **Paper published in**: June 2017. **Reference**: www: //ijritcc. org
2) **Mechanical Footstep Power Generation** - Munaswamy B., Prudhvi Ch., et al. In this paper, the author generates electricity just with the help of rack and pinion arrangement along with alternator and chain drive mechanism. For its proper functioning such that it converts Force into electrical energy, the mechanism consists of rack & pinion, chain drives, alternator and battery. They have discussed its various alternate applications with extension also. **Paper Published In:** Mar - Apr 2018. **Reference:** www.ijetajournal. org
3) **Power Generation Using Foot Step** - V. Jose Ananth Vino, In this paper, the author introduces the conversion of force energy into electrical energy, presenting a novel approach to sustainable power generation. The intricate control mechanism, featuring the rack and pinion system, D. C generator, battery, and inverter control, collectively forms an innovative system poised to address the increasing demand for efficient energy utilisation. **Paper Published In**: May 2011. **Reference**: htttp: //ijettjournal. org
4) **Footstep Power Generation System** - Dhimar, Mrs. Krupal, Patel Krishna, et al. In this paper, the author has conceived the idea of harnessing human walking power for electricity generation and has innovatively developed a method known as the footstep power generation platform. This ingenious approach not only taps into the untapped energy potential of human locomotion but also presents a sustainable solution to meet the rising demand for electricity in populated environments. **Paper Published In**: Apr 2017. **Refrence**: www.irjet. org
5) **Footstep Power Generation using Piezoelectric Sensor** - Prof. Namrata J. Helonde, Punam Suryawanshi, et al. In this paper, the author demonstrates the transformative integration of piezoelectric technology into flooring, showcasing a remarkable advancement in energy harvesting. The intricate process involves capturing the electrical energy generated by pressure through floor sensors and efficiently converting it into an electrical charge using piezo transducers. This innovative mechanism not only enables sustainable energy production but also

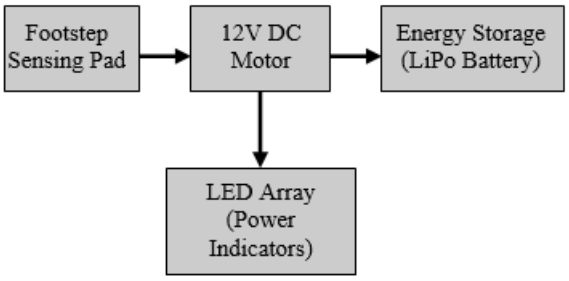
establishes a practical and eco - friendly solution for powering various applications by storing the generated energy for later use. **Paper Published In**: Dec 2021. **Reference:** www.Ijraset. org

6) Motey, Yogesh, Pooja Dekate, et al. In this paper, the author describes the use of piezoelectric materials in order to harvest energy from people walking vibration for generating and accumulating the energy.
7) Kamboj, Akshat, Altamash Haque, et al. In this paper, the author presented the design of power generation using footstep based on available piezoelectric sensors. using such a concept the power can be availed and deployed by converting mechanical energy to electrical energy.
8) Nandan, Shivendra, Rishikesh Trivedi, et al. In this paper, the author converted non - conventional from just walking footsteps into electrical energy. This project uses simple drive mechanisms 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 a nonconventional method by simply walking or running on the footsteps.
9) Sarnaik, Mr Vishwanil V., et al. In this paper, the author introduces a project consisting of rack and pinion assembly as a driving mechanism. In this project, force energy is converted into electrical energy. The control mechanism consists of the rack & pinion, D. C generator, battery and inverter control. We have discussed the various applications and further extension also.
10) J Ishidha, Abhay Manmadhan, In this paper, the author introduces a project in which force energy is converted into electrical energy. When a person walks particularly on the tiles fixed releasing kinetic energy. Hence the piston fixed to the tile will compress the air allowing the air to flow to the tank. This tank will store the pressurised air. As the tank outlet is connected to the motor, this pressurised air will be passed through the outlet, which enables the air motor to run. This motor is coupled to the generator which produces electricity. The electricity produced in this project will be stored using batteries.

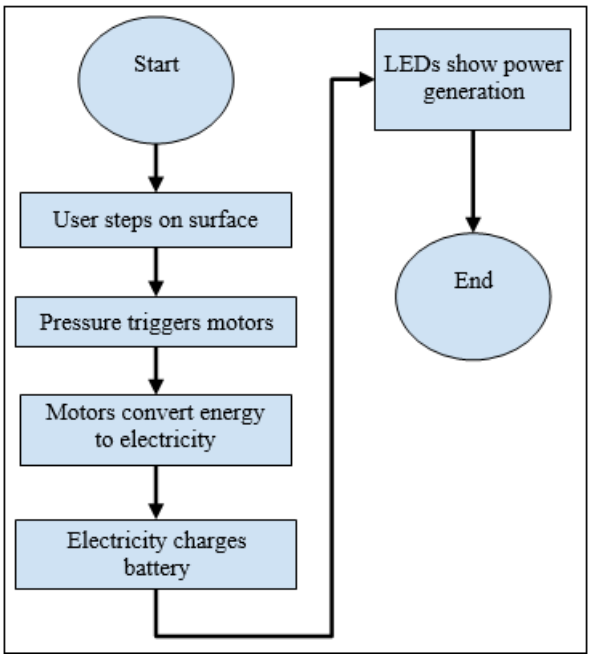
3. Methodology

The proposed Electricity Generator Tiles operates through a step - by - step process that efficiently converts human motion into electrical energy. As an individual takes a step on the designated surface, the pressure triggers two 12V DC motors strategically placed beneath the walking area. These motors are equipped with mechanisms that transform the mechanical energy from each step into electrical power. The generated electricity is then directed to charge a 3.7V LiPo battery, serving as an energy storage unit for convenient use. Simultaneously, two LEDs are integrated into the system to visually represent the ongoing power generation, offering users immediate feedback on the effectiveness of their energy contribution. This user - friendly and sustainable system not only encourages environmentally conscious practices but also provides a tangible and interactive way for individuals to actively participate in generating clean energy through their daily activities.

Block Diagram



Flow Chart



Working

In this paper, we developed Electricity Generator Tiles that convert human motion into electrical energy. The system will utilize pressure - sensitive mechanisms embedded in the walking surface, which trigger two 12V DC motors upon each step. These motors will efficiently convert the mechanical energy from footsteps into electrical power. The generated electricity will then be directed to charge a 3.7V LiPo battery, serving as an energy storage unit for convenient use. Additionally, visual feedback will be provided through integrated LEDs to indicate the ongoing power generation process. Through this innovative approach, we aim to provide a user - friendly and sustainable solution that encourages environmentally conscious practices and active participation in clean energy generation.

4. System Requirement

Hardware Requirement

1) 12V DC Motor
2) 3.7V Li - Po Battery
3) LED

5. Experimental Setup & Result

5.1 Experimental Setup

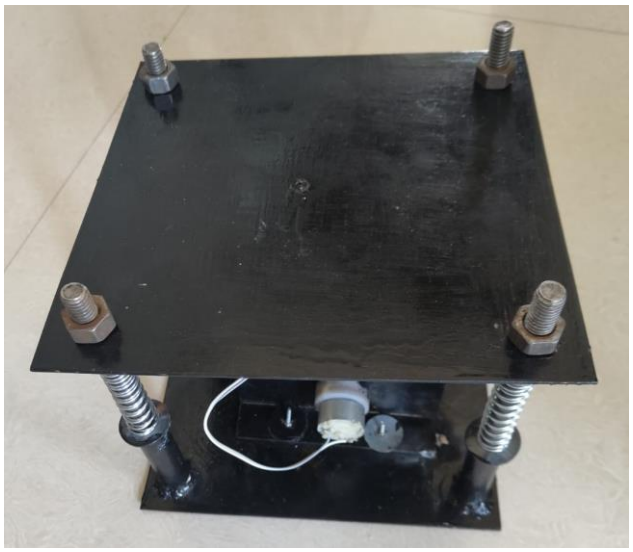


Figure: Shows the Experimental Setup of the system

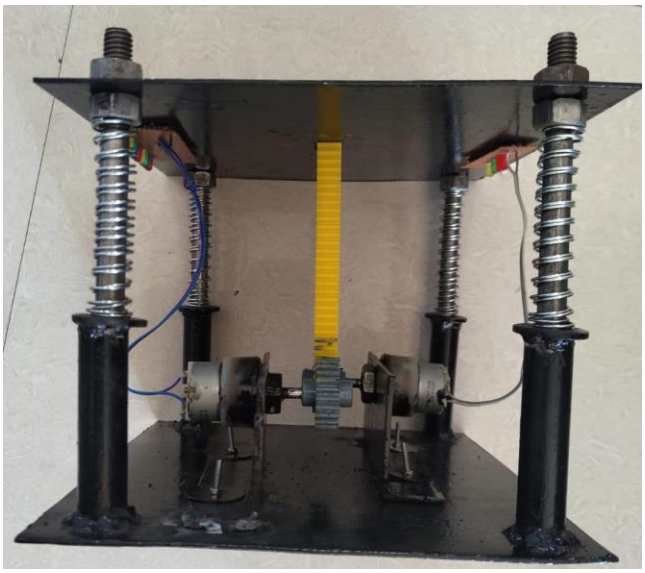


Figure: Shows the Front View of Hardware Setup

5.2 Result

The results of implementing the Electricity Generator Tiles reveal a promising advancement in sustainable energy generation technology. Through the innovative integration of pressure - sensitive mechanisms and DC motors, the system effectively harnesses human motion to produce electrical power. The successful conversion of mechanical energy from each step into usable electricity, stored in a LiPo battery, demonstrates the feasibility of incorporating renewable energy sources into everyday activities. Moreover, the inclusion of visual indicators, such as LEDs, offers real - time feedback, enhancing user engagement and promoting awareness of energy conservation efforts. Overall, these findings underscore the potential of the Electricity Generator Tiles to not only contribute to environmental sustainability but also to foster a culture of active participation in clean energy generation among individuals.

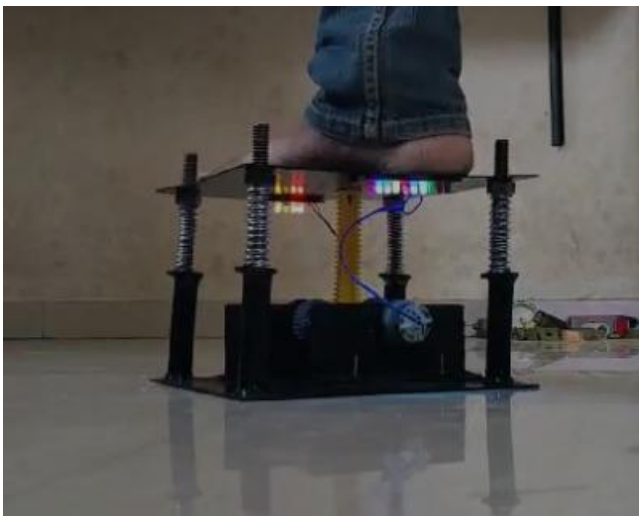


Figure Shows the Output of the project

The above image depicts an output of a proposed electricity generator tile system. The system utilizes pressure - sensitive mechanisms embedded in the walking surface to trigger two 12V DC motors upon each step. The rotation of the motors converts mechanical energy from footsteps into electrical power. The generated electricity is then directed to charge a 3.7V LiPo battery which serves as an energy storage unit. The system also includes LED lights to provide visual feedback on the ongoing power generation process.

This design exemplifies a potential solution for harnessing clean energy through human motion in everyday activities.

6. Conclusion

Non - conventional energy system is very essential at this time to our nation. Non - conventional energy using foot steps needs no fuel input power to generate the electrical power. The Electricity Generator Tiles presents a promising solution for sustainable energy harvesting, utilising the kinetic energy from human footsteps. This innovative system seamlessly converts mechanical motion into electrical power through strategically placed 12V DC motors, storing the generated energy in a 3.7V LiPo battery. The incorporation of LEDs not only enhances user engagement but also serves as a visual indicator of the ongoing power generation. By offering a practical and interactive means of harnessing energy from everyday activities, this eco - friendly solution contributes to the broader goal of promoting clean and renewable energy sources, making it a compelling option for applications requiring off - grid power generation.

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