FOOTSTEP CHARGER

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Abstract - – Footstep Charger is a project based on a basic human activity I.e. walking. As it is a daily human activity process, the conventional sources of energy are fossil fuel, CNG, coal, oil, natural gas are examples of the conventional sources of the energy. And the non-conventional sources of energy are solar energy, wind energy, bioenergy, hydro energy, tidal energy, ocean energy. The use of waste energy of foot power with human motion is important for growing populated countries.

***Key Words*: Renewable Energy, Footstep, Electricity, Generator, Charger.**

1. INTRODUCTION

In this project, we are producing electrical energy as a non-conventional method by simply walking on the footstep. walking is the most general activity in human life, when a person walks, he loses energy to the road, this energy can be tapped and converted into a usable form such as an electrical form. More populated countries where the railway stations, roads, bus stations, temples, etc are all crowded and millions of people move around the clock. In this context, foot power is an excellent source of energy and has been in use since the 19th-century making use of the most powerful muscles in the body. 95% of the exertion put into pedal energy is converted into electrical energy. However, human kinetic energy can be useful in several ways but it can also be used to generate electricity based on different approaches and many organizations are already implementing human-powered technologies to generate electricity to power small electronic Appliances Human-generated transport has been in existence since time immemorial in the form of walking, running, and swimming. However modern technology has led to machines to enhance the use of human power in more applications. Piezoelectric Effect or Piezoelectricity is the ability of certain materials to generate an AC voltage when subjected to mechanical stress or vibration. This effect is shown by materials such as Berlinite (AlPO4), Quartz (SiO2), Tourmaline Barium Titanate(BaTiO3)Galliumorthophosphate(GaPO4), various other solids. Piezoelectricity has both direct and converse effects i.e. mechanical stress results in AC voltage generation and vice-versa The reason why piezoelectric materials create a voltage when mechanical stress is applied is that the crystalline structure is disturbed and it changes the direction of the polarization of the electric dipoles.it generates the conversion of the force energy into electrical energy the control mechanism carries the A.C ripple neutralizer, unidirectional current controller, and 12v,1.3Amp lead-acid dc rechargeable battery, and an inverter is used to drive AC/DCloads.the battery is connected to an inverter .this inverter is used to convert 12 volts DC to 230-volt A.C this 230Volt A.C voltage is activate loads. we are using a chargeable battery charging unit also for giving supply to the circuitry. in the last, the USB port is there to charge mobile phones. A mobile phone battery is rated at 4.2V output, while for a battery, it's a little over 12V. Let's assume 12V. So the total energy stored in a car battery is 70*12 VAh; and for a mobile battery, it's 4.2*4 VA. it can be charged 70*12/(4*4.2)= 50 times.

2. METHODOLOGY

the piezoelectric sensor will play an important role in this project, our challenge is to convert footstep energy to electrical energy And the solution is to perform this project using piezoelectric material. this is the cheapest project to build on .this project contains many advantages but one disadvantage, following temperature if it rises it may affect the output of the process so for covering it we will use thermostat which will maintain the output. the battery is connected to the inverter .this inverter is used to convert the 12v DC to the 230v AC voltage .this 230v AC voltage is used to activate the loads we are using a rechargeable battery charging unit also for giving supply to the circuitry

The piezoelectric material gives an output that is not constant. Therefore, to convert this variable voltage into a linear voltage a bridge circuit is utilized. AC ripple filter is used to filter the remaining fluctuations in the output. The output DC voltage is stored in a rechargeable battery. This battery can then be used to charge the mobile using RFID access.

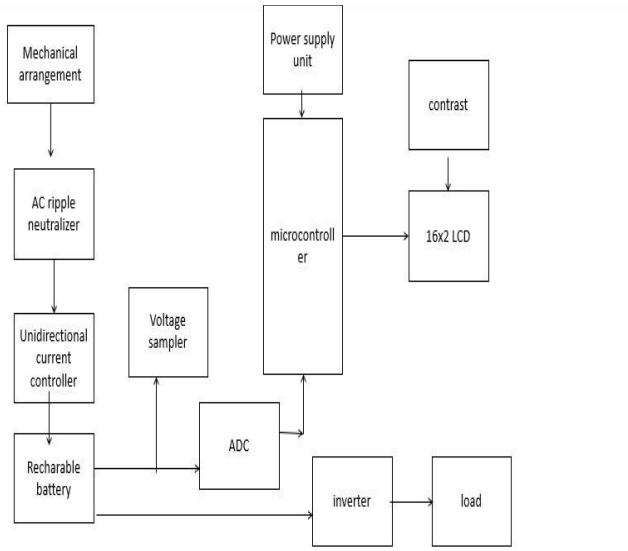

Fig -1: block Diagram

. In this project, we are generating electrical or running on the footstep. The non-conventional energy system is very important at this time for the nation non-conventional energy footstep is converting mechanical energy into the electrical energy .here in this project a mechanical arrangement is made .use of embedded technology makes this system efficient and reliable .micro controller Allows dynamics and faster control. liquid crystal display (LCD) makes the system user-friendly. a microcontroller is the heart of the circuit as it controls all the functions.

2.1 Future Scope

- Trying to make it more cost-effective.
- footstep generator power can be used for agriculture.
- To increase the efficiency and make it more user-friendly.
- home applications, street lighting.it can also be used in emergency power failure situations.

2.1.1 Advantages

- Zero side effects on the human body.
- Can be easily used in malls, roadways, or areas with frequent locomotion.
- Easy to install.
- The output is proportional to several steps.
- User-friendly and easy-to-go utility.

2.1.2 Applications

It can be used to charge a large number of devices such as Mobile Phones Electric Torch Smartwatches With a simple swipe and charge mechanism it can be easily used by anyone. The pressure generated by footsteps is stored in the rechargeable batteries for a long time and can be used by multiple users. The RFID will help keep a track of the usage and the display unit will help better understand the mechanism in the real world.

2.1.3 Results

In this project, the conversion of the force energy into electrical energy the control mechanism carries the A.C ripple neutralizer, unidirectional current controller and 12v,1.3Amp lead-acid dc rechargeable battery and an inverter is used to drive AC/DCloads.the battery is connected to an inverter .this inverter is used to convert 12 volts DC to 230-volt A.C this 230Volt A.C voltage is activate loads. we are using a chargeable battery charging unit also for giving supply to the circuitry. in the last, the USB port is there to charge mobile phones.

2.1.4 Calculation and output

Power generated varies with different steps in a piezoelectric array that is used. Based on practical results voltages obtained are Minimum voltage = 1V per step Maximum voltage = 8V per step Considering the average weight of the person stepping on the system to be 53 Kg the average calculation is: Steps are required to increase 1 V charge in battery = 700 To increase 12 V in battery: Total steps needed = (12 × 700) =8400 steps Considering the implementation of this system in places like college biometrics where footsteps as the source are easily available if Time required for 2 steps is 1 second Time required for 8400 steps = 8400/(60 × 2) = 70 minutes

3. CONCLUSIONS

The project "footstep charger" is successfully tested and implemented which is the best cost-efficient, affordable energy solution to common people. . This can be used for many other applications in rural areas where power availability is low or total absence. India is a developing

country where energy management is a big obstacle for a huge population. with the help of this project we can use both A.C.and D.C loads by the force we applied on the piezoelectric sensor. A piezo tile capable of producing 40V has been devised. Comparison between various piezoelectric materials shows that PZT is greater in characteristics. Also, by comparison, it was found that a series-parallel combination connection is more efficient. The weight applied on the piezo tile and corresponding voltage produced is studied and they are found to have linear relation. It is especially best for implementation in populated areas. This can be used in a crowded area without the use of long power lines. It can also be provided charging ports, lighting of pavement side buildings. As a fact, only 11% of renewable energy contributes to our primary energy. If this project is deployed then not only we can overcome the energy crises problem but this also contributes to creating a healthy global environmental change.it Has a life of approx. 5 years.it is Durable. and Smart charging system

REFERENCES

[1] Mazin Mazlan and Mohamad Hazlami Abd Manan, “Modelling and Analysis Road Energy Harvester Using Piezoelectric Transducer”, International Journal of Engineering & Technology, 8 (1.7) (2019), PP 94-100

[2] Amitha V Menon, Anjana K M, Anjana S Ravindran, Divya S, “Piezoelectric Wireless Mobile Charger”, IOSR Journal of Engineering (IOSRJEN), ISSN (e): 2250-3021, ISSN (p): 2278-8719 PP 31-35

[3] Mervyn Fernandes, Minal Patil, Vedant Desai, Asawari Dudwadkar. “Implementation of Piezoelectric Sensors for Generation of Power”, International Journal of Innovative Research in Science, Engineering and Technology, Vol. 6, Issue 4, April 2017.

[4] Phagna Esha Singh, Siddhakar Bhumi, Rami Monika, “Real-Time Battery Charging System by Human Walking”, International Journal of Innovative Research in Science, Engineering and Technology, Vol. 4, Issue 2, February 2015.

[5] Marshiana. D, Elizabeth Sherine. M, Sunitha. N, Vinothkumar. C, “Footstep Power production using Piezoelectric Sensors”, Research Journal of Pharmacy and Technology · July 2016, DOI: 10.5958/0974-360X.2016.00157.8

[6] M. Ferrari V. Ferrari, D. Marioli and A. Taroni "Modeling, fabrication and performance measurements of a piezoelectric energy convertor for power harvesting in autonomous microsystem", IEEE Trans. Instrumentation Measurement vol.55, no.6'pp.2096-2101, Dec 2006. [7] P.D. Mitcheson, E.M Yeatman, G.K. Rao, A.S Holmes and T.C. Green "Human and machine motion for wireless electronic devices" Proc. IEEE vol. 96, no. 9, pp.1457-1486, Sep 2008.