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Advanced Footstep Power Generator

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Abstract: *Power generation and its use is one of the issues. Now-a- days numbers of power sources are present, nonrenewable & renewable, but still we can't overcome our power needs. Among these human population is one of the resources. In this project we are doing generation of power by walking or running. Power can be generated by walking on the stairs. The generated power will be stored and then we can use it for domestic purpose. This system can be installed at homes, schools, colleges, where the people move around the clock. When people walk on the steps or that of platform, power is generated by using weight of person. The control mechanism carries piezoelectric sensor, this mechanical energy applied on the crystal into electrical energy. When there is some vibrations, stress or straining force exert by foot on flatplatform. It can be used for charging devices e.g. laptop, mobile, etc.*

Keywords: Power utilization, Power generation, piezoelectric material, energy utilization

I. INTRODUCTION

Energy is nothing but the ability to do the work. In day to day life, Electricity is most commonly used energy resource. Now-a-days energy demand is increasing and which is life-line for people. Due to this number of energy resources are generated and wasted. Electricity can be generated from resources like water, wind etc. to generate the electricity from these resources development of big plants are needed having high maintenance cost. Some other energy resources are also costly and cause pollution. They are not affordable to common people. Electricity has become important resources for human being hence, it is needed that wasted energy must have to utilize, walking is the most common activity done by human being while walking energy is wasted in the form of vibration to the surface. And this wasted energy can be converted into electricity. Using the principle called piezoelectric effect. Piezoelectric effect is the effect in which mechanical vibrations. Pressure or strain applied to piezoelectric material is converted into electrical form. This project gives idea about how energy is used on stepping on stairs. The use of stairs in every building is increasing day by day even small building has some floors when we are stepping amount of this wasted energy is utilized and converted to electricity by Piezoelectric effect. Piezoelectric effect is the effect of specific materials to generate an electric charge in response to applied mechanical stress..

In this electric power is generated as non-conventional method. Thus the generation of power is by walking or running on foot step. At this time non-conventional energy is very important. This system introduces power generation using nonconventional energy which does not need any input to generate electrical output. In this conversion of force energy into electrical energy takes place. This system uses voltmeter for measuring output, LED lights, weight measurement system and a battery for better demonstration of the system. In another way, we are also saving natural energy resource

II. LITERATURE REVIEW

Earlier developments in the piezo electric circuitry involved concentration on small vibrations and hence small strains. Also, few of them required external voltage supply and there were number of losses in the system which amounts to low voltage output.

In December 1929, scientists in U.S Navy perfomed various researches on piezoelectric crystals.

Their focus was primary on the dimensions of crystals. This research proved that by changing the dimension and orientation of crystal the output. considerably changed. They designed the crystal named "Curie cut' or 'Zero Cut based on the changes made in the angles of the crystal. Thus, this proves that the crystals designed with such dimensions are effective in controlling oscillations of a 50watt vacuum tube. So, they act as a voltage controlling device too. In 1985, the

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concept of using handwriting dynamics for electronic identification was performed in Sandia Laboratories A piezoelectric sensor pen for obtaining the pen point dynamics during writing was studied

In 2005. United States Defense Advance Research Project Agency (DARPA) initiated an innovative project on Energy harvesting which attempts to power battlefield equipment by piezoelectric generators embedded in soldiers' boots. However, these energy harvesting sources put an impact on the body.

DARPA's effort to harness 1-2 watts from continuous shoe impact while walking was abandoned due to the discomfort from the additional energy expended by a person wearing the shoes.

In this project the concentration is mainly on use of the piezoelectric crystals and films in high vibration system with efficient arrangement to get higher efficiency. Moreover, the amplification level designed will be such that the output rating of system will be considerably higher than previous system.

"Footstep Power Generation Using Piezoelectric Sensors" (2020) - Journal of Renewable and Sustainable Energy.

"Design and Development of a Footstep Power Generator" (2019) - International Journal of Energy Research.

"Energy Harvesting from Footsteps Using Electromagnetic Induction" (2018) - IEEE Transactions on Magnetics

III. PROPOSED SYSTEM

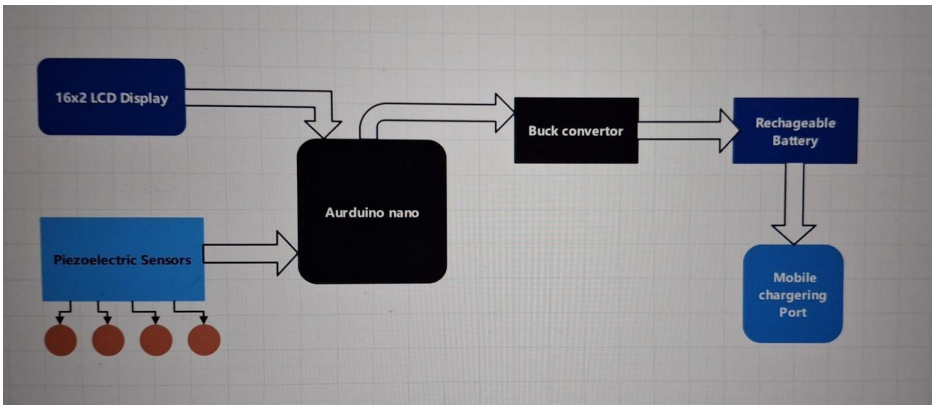

Fig. Block Diagram

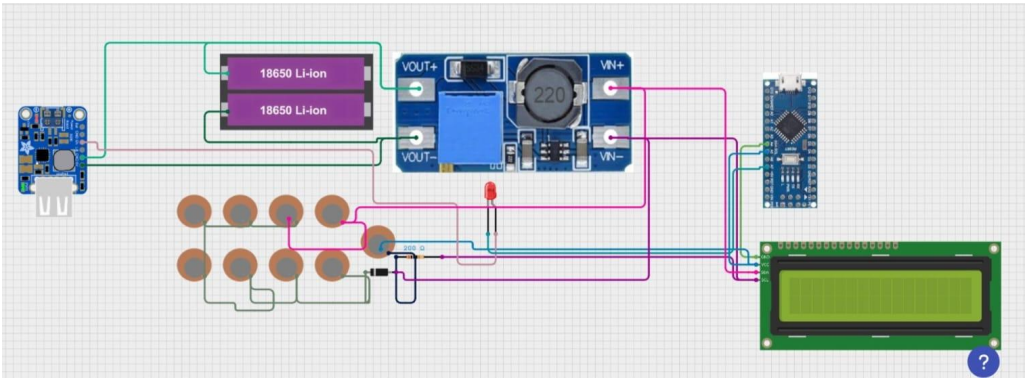

Fig. Circuit Diagram

HARDWARE SELECTION:

Following are the major components used for developing the propose system:

Piezo electric Sensors

16x2 LCD Display

Rechargeable Battery

Arduino Nano

USB's (To charge multiple device)

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IV. RESULTS

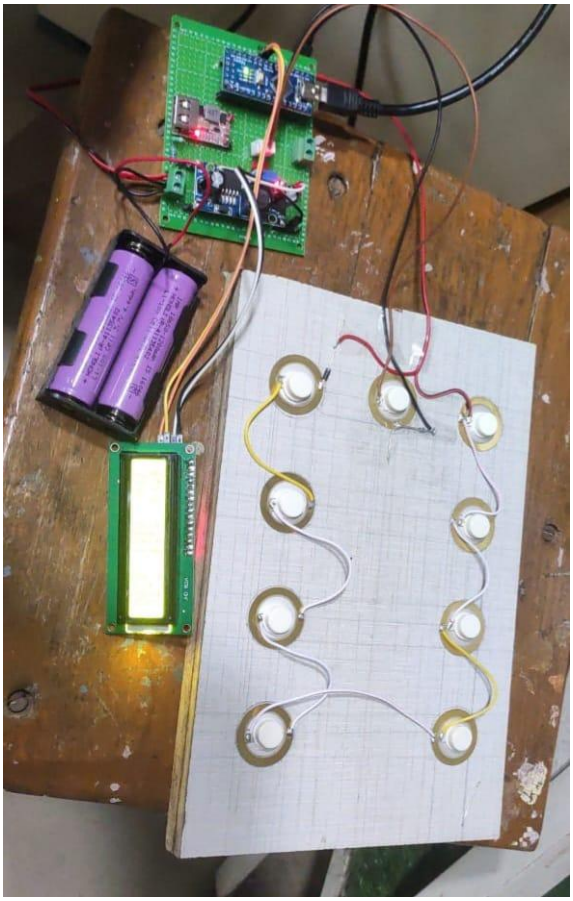

Fig. Output of Project

V. CONCLUSION

The Footstep Power Generator has the potential to transform the way we generate energy, reducing our reliance on fossil fuels and promoting sustainable development. Further research and development are necessary to overcome challenges and ACHIEVE WIDESPREAD ADOPTION. In this project, we are generating electrical power as non-conventional method by simply walking or running on the foot step. Non- conventional energy system is very essential at this time to our nation. Non- conventional energy using foot step is converting mechanical energy into the electrical energy. By using this energy conservation theorem and Piezo sensor we are proposing a new method for power generation. Proposal for the utilization of waste energy of foot power with human locomotion is very much relevant and important for highly populated countries like India and China where the roads, railway stations, bus stands, temples, etc. are all over crowded and millions of people move around the clock. he Footstep Power Generator is an innovative, sustainable technology that harnesses kinetic energy from human footsteps to generate electricity. This technology has the potential to revolutionize the way we think about energy production, reducing reliance on fossil fuels and mitigating climate change.

VI. FUTURE SCOPE

The Footstep Power Generator is an innovative, sustainable technology that harnesses kinetic energy from human footsteps to generate electricity. This technology has the potential to revolutionize the way we think about energy production, reducing reliance on fossil fuels and mitigating climate change.

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The Footstep Power Generator has a promising future, with commercialization and integration into smart buildings expected by 2025-2030. Large-scale deployment, advancements in materials and sensors, and expansion into industrial applications will follow by 2030-2035.

By 2035-2050, piezoelectric roads, autonomous vehicle integration, nanotechnology, and energy-harvesting flooring are anticipated. Potential applications include smart cities, rural electrification, industrial automation, transportation, and consumer electronics.

Emerging technologies such as advanced piezoelectric materials, triboelectric effect, electromagnetic induction, nanogenerators, and AI-optimized energy harvesting will drive innovation.

With a view of future prospect in case of densely populated nations. The optimum use of energy wasted is of very much importance.

1) Japan is one of the first liner to use electric principle for generating mechanical energy from Flooring tiles i.e. by using these plates on bus stairs. When someone step in the energy is Generated which leads to increase of steps as well as energy also increased.

2) Secondly Europe is setting another milestone in the field by using such plates on dance floors, so if anyone step on to these tiles and dance again the energy is released with which even one can charge their mobile and other handy gadgets.

Potential Applications – Smart cities, Rural electrification, Industrial automation, Transportation

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