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Foot Step Power Generation

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Abstract: ***The aim of these project is to The demand for electrical energy is expected to rise steadily in near future. Contemporary methods of generating electrical power are harmful to the environment. Footstep power generation is one of the sustainable electric energy generation technique which is environment friendly***

I. INTRODUCTION

For an alternate method to generate electricity there are number of methods by which electricity can be produced, out if such methods footstep energy generation can be an effective method to generate electricity. Walking is the most common activity in human life. When a person walks, he loses energy to the road surface in the form of impact, vibration, sound etc, due to the transfer of his weight on to the road surface, through foot falls on the ground during every step. This energy can be tapped and converted in the usable form such as in electrical form. This device, if embedded in the footpath, can convert foot impact energy into electrical form. Human powered 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 efficient manner. In this context, pedal power is an excellent source of energy and has been in use since the nineteenth century making use of the most powerful muscles in the body. Ninety five percent of the exertion put into pedal power is converted into energy. Pedal power can be applied to a wide range of jobs and is a simple, cheap, and convenient source of energy. However, human kinetic energy can be useful in a number of ways but it can also be used to generate electricity based on different approaches and many organizations are already Implementing the human powered technologies to generate electricity to power small electronic appliance s. Energy is the ability to do work. While energy surrounds us in all aspects of life ability to harness it and use it for constructive ends as economically as possible is the challenge before mankind. Alternative energy refers to energy sources which are not based on the burning of fossil fuels or the splitting of atoms. The renewed interested in this field of study comes from the undesirable effect of pollution (as witnessed today) both from burning fossil fuel and from nuclear waste by products. fortunately there are many means of harnessing energy which less damaging impact on our environments in India. The alternatives are solar, wind power generation, geothermal tides, hydroelectric In addition to these we have developed a new methodology orgy ofgeneration power using human energy and the name of this alternative is foot step power generation.

The working of the Foot Stop Electric Converter (FSEC) is demonstrated inphotographs in The right side photograph shows the foot touching the top plate without applying weight. The left side Photograph shows the foot when full weight of the body is transferred to the top plate. A 6 W, 12V bulb connected to the outputof the alternator glows, to indicate the electric output when foot load is applied. The unit is designed to generate full power pulse when actuated by a person weighing nearly 60 kg. An experimental plot of voltage vs. time was generated, by using an oscilloscope. Using voltage data and the load (a resistor), a typical plot of power vs. time was generated. The power generated by the foot step generator can be stored in an energy storing device. The output of the generator was fed to a 12 lead acid b attery, through an ac-dc converter bridge. Initially, the battery was completely discharged. Then, the FSEC was operated by applying foot load and energy was stored in the battery. A 100 W, 230V bulb was connected to the batterythrough an inverter. The arrangement is shown in Fig. 4. The duration of ligh ting,the bulb for number of footsteps and corresponding energy stored, are given in Table 1.

II. OBJECTIVE

A. Harvesting System

To measure the electrical energy output from the selected piezoelectric material and design.

To develop a cost effective and working prototype of the energy harvesting module based on the best piezoelectric material and design.

In this paper , brief explaination of all our work is depicted.

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III. METHODOLOGY

A working model of Footstep Power Generation is demonstrated in this project, the basic working of this model has been presented as a block diagram (Fig.1). To implement this
model four piezoelectric sensor that are connected in series to increase the voltage output, this sensor generates AC voltage which is transferred to the bridge rectifier. The output voltage
from the sensor can be of two types because it produces AC voltage: Positive: When positive voltage is received then it is passed into the forward bias mode which will in turn charge the battery.Negative: When a negative voltage is received then it is transferred to the reverse bias of the bridge rectifier. This way no voltage loss is observed during a complete cycle. An additional resistor of 470 Ohm is placed in series along with a capacitor of 4.7 mF with the LED to make the glow more noticeable**.**

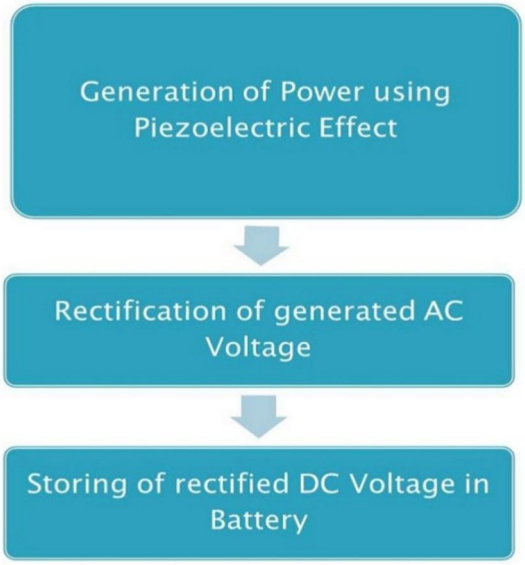

Figure 1: Block Diagram for generation of electricity

IV. WORKING

The Footstep power generator works on the principle of piezoelectric effect impact. Piezoelectric Effect is the ability of certain materials for generating electric charges in response to applied mechanical stress on the piezoelectric plate.
Thus, squeeze certain crystals and you can make electricity flow through them. In most crystals, the unit cell is symmetrical in piezoelectric crystals. Normally, the piezoelectric crystals are electrically neutral and atoms inside the piezoelectric plate may not be symmetrically arranged, but their electrical charges are perfectly balanced, the positive charge in one place cancels out a negative charge nearby them. However, if you squeeze or stretch the piezoelectric crystal, you deform the structure, negative, and causing net electrical charges to appear. This effect carries through a whole structure so net positive and negative charges appear on the opposite, outer faces of the crystal. Normally, the charges in the piezoelectric crystal are exactly balanced, even if they are not symmetrically arranged. If you squeeze the crystal (massively exaggerated in this picture!), you force the charges out of balance piezoelectric crystal are exactly balanced, even if they are not symmetrically arranged. If you squeeze the crystal (massively exaggerated in this picture!), you force the charges out of balance.

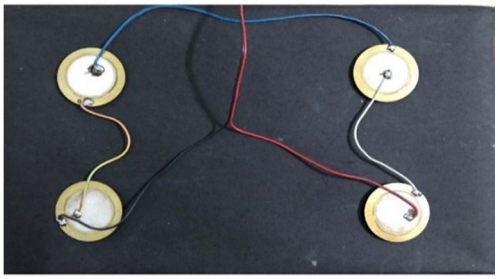

Figure 4: Piezoelectric Sensors in series connection

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Now the effects of the charges are no longer eliminated one another out and net positive and negative charges appear on opposite crystal faces. By squeezing a crystal, you have produced the voltage across its opposite faces and that's piezoelectricity.
In this project, we have used the same phenomenon of producing piezoelectricity from the piezoelectric crystal in the form of a coin shape disc.

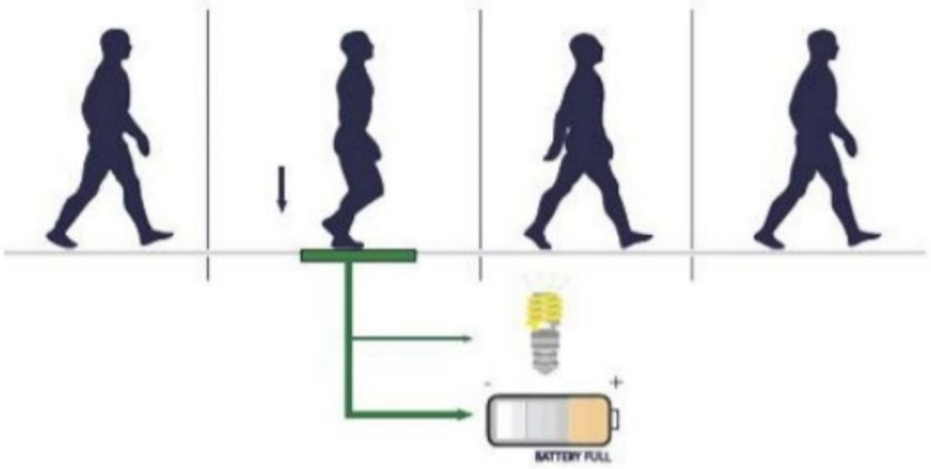

Figure 2: Schematic representation of the working model [7]

V. RESULT

We have successfully developed a working model to produce power by applying pressure imitating walking situations, this can also be done by physically walking on the setup of
piezoelectric sensors. This model effectively demonstrates the use of power which was previously neglected, the developed model is extremely simple and highly useful. This system can output a good amount of power which can further be used for providing huge areas with electricity.

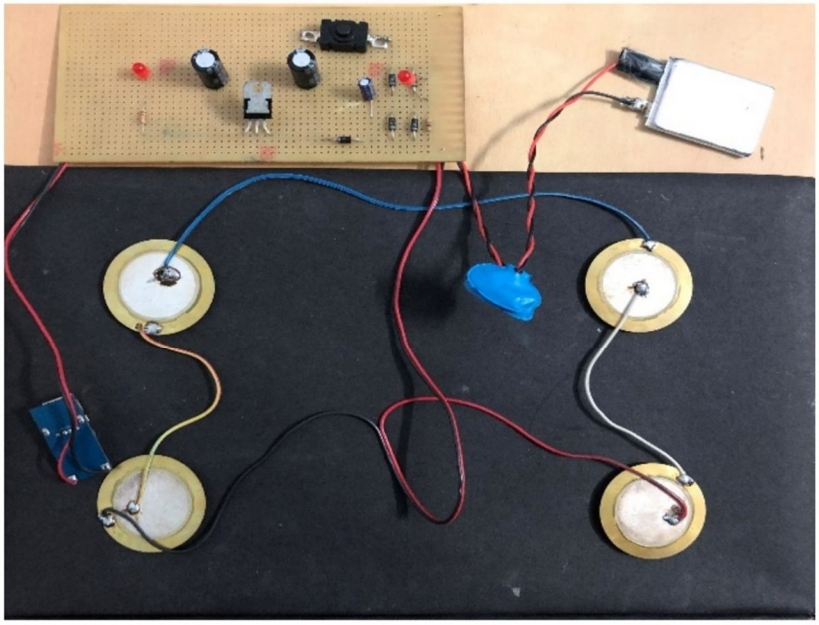

Figure 5: Developed model

VII. CONCLUSION

The project "POWER GENERATION USING FOOT STEP" is successfully tested and implemented which is the best economical, affordable energy solution to common people. 2. This can be used for many applications in rural areas where power availability is less or totall y absence As India is a developing country where energy management is a big challenge for huge population . Comparison betweenvarious piezo electric material shows that PZT is superior in characteristics. Also, by comparison it was found that series - parallel combination connection is more suitable. The weight applied on the tile and corresponding voltage generated is studied and they are found to have linear relation. It is especially suited for implementation in crowded areas. This can be used in street lighting without use oflong power lines. It can also be used as 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 ene rgy crisesproblem but this also contributes to create a healthy global environmental change smart system. Produce 2000 watts of electricity.Durable. Have a life of approx. 5 years.

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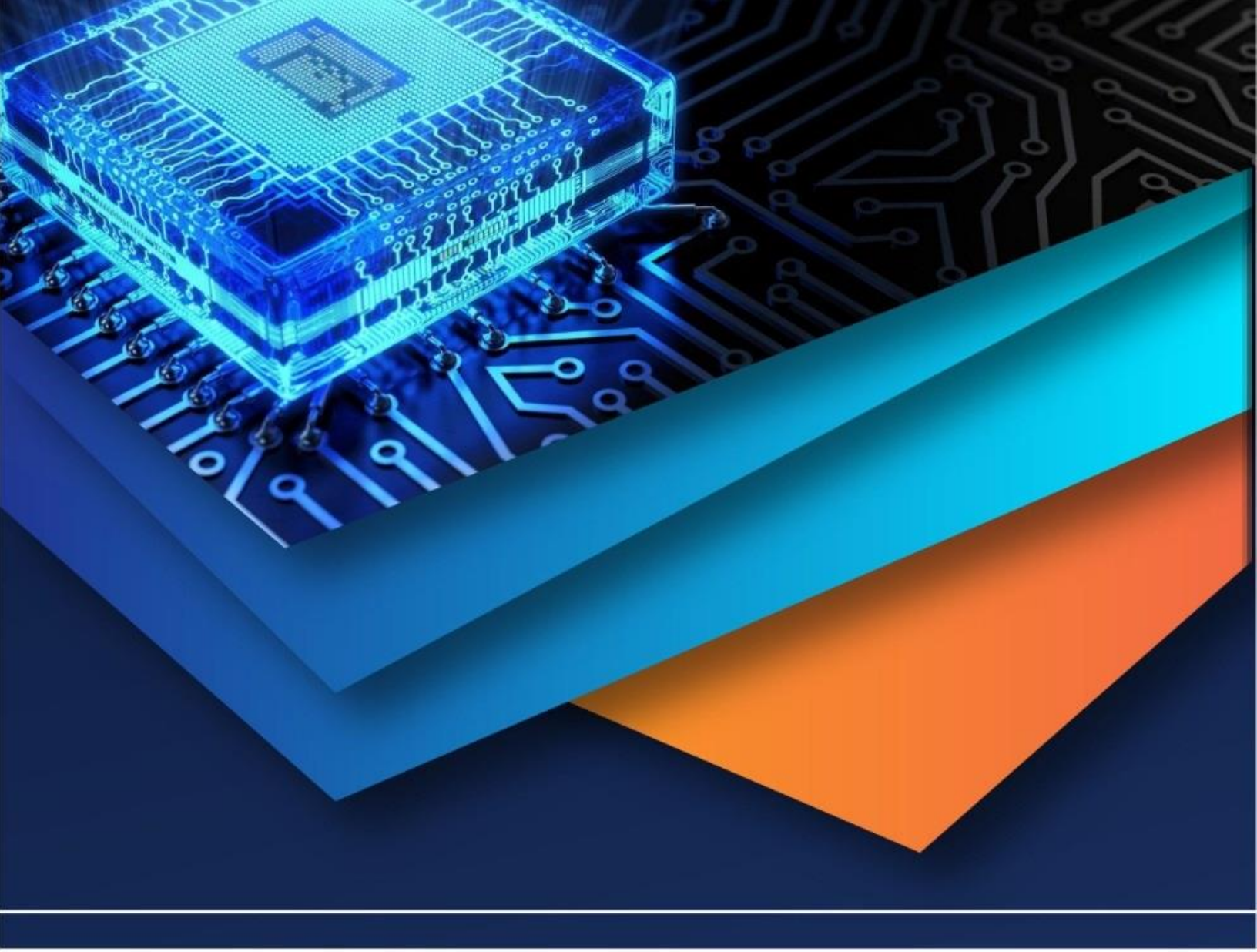

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