

Design and Development of Footstep Power Generator

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ABSTRACT

In today's era necessity of non-Conventional energy has increased as the requirement of power is also increasing gradually. Renewable sources such as solar, wind etc. are used to deal with this human necessity of power. However, these sources are not enough and alongside the wastage of energy is increasing by several means. To overcome this problem, we intent to employ the power released by human locomotion by engineering the floors with piezo electric sensors specially in more populated areas. These sensors sense the pressure of footsteps and convert the same into electrical energy. This will neither adulterate the environment, nor the change in climatic conditions can affect this. This kind of technology is an economical way of power generation and has ample of applications.

Keywords: - Piezoelectric sensor, AT MEGA 16.

1. Introduction

Electricity has become such pivotal part of our modern life that one cannot think of a world without it. Almost all essential items are the product of electricity hence modern technology desires an enormous amount of electrical power for its numerous operations. Since electricity is the most valuable thing, it is important that any squandered energy must be utilized. Walking is the most common activity done by humans which releases energy in the form of vibration to the surface. This wasted energy can be metamorphosed into electrical energy using the principle called piezoelectric effect.

This non-conventional technique will help to generate wattage in Usable form. Piezoelectric effect is the ability of some materials to Kindle an electric potential in response to applied pressure. Piezoelectric material will transmogrify the pressure exerted by the Human locomotion into an electric current. A tile is made from piezo Material for walking on it. The voltage generated across a piezo tile is furnished to a battery for it to get recharged and impart the wattage to the dc loads. The same generated voltage is given to a microprocessor as well. ALCD is interfaced to the tile employing a PIC microcontroller to display the voltage induced across the piezo tile. This project is used to generate voltage using footstep force. The proposed system works as a medium to generate power using force. This project is very useful in public places like bus stands, theaters, railway stations, shopping malls, etc. So, these systems are placed in public places where people walk, and they must travel on this system to get Through the entrance exists.

The process of producing electrical power from different types of energy sources is called electricity generation. This type of energy is an essential part of nature. We generate electricity (secondary energy source) by converting primary sources of energy like atomic, gasoline, coal, and other natural sources. Fossil fuels pollute the environment. Atomic power plant requires careful handling of both raw as well as waste material. From the birth of earth, man has needed and used energy at an increasing rate prior to his existence. The world has already used large amount of energy resources for power production.

The extensive usages of available resources in recent years created a demand for the future generation (Magdum, Chikhale, Rajole, & Jedhe, 2017). After realizing the availability issues of the non-renewable sources, the renewable sources of energy like wind, water, and sun are being consistently and increasingly used by people to generate power. Therefore, European Scientific Journal July 2018 edition Vol.14, No.21 ISSN: 1857 – 7881 (Print) e - ISSN 1857- 7431 319 our focus now is on the renewable energy, which is essential and nonpolluting. Have we ever thought that we could generate electricity with our footsteps? Walking is a widespread practice every day. A person transfers energy through impact or vibration to the road surface. This energy can be converted to electrical energy by subsequent conversion of mechanical energy. Whenever we move on our feet, our kinetic energy is wasted as heat energy. In this project, we have originated electricity through the human powered mechanical energy.

2. Working Principle of Footstep Power Generator

In this arrangement we are using two steps. The rack and pinion, spring arrangement is fixed below the step. We are using four springs for each step in same position by releasing the load. The rack is coupled to the footstep from rack a shaft is provided in which the larger sprocket lies. The larger gear is coupled with rack, so that it is running at the same speed of rack. The larger gear is coupled to the smaller gear below in the other shaft. This larger gear is used to transfer the rotation force to the smaller gear on the same shaft.

The smaller gear is running in same direction for forward and reverse direction of rotational movement of the larger gear. It runs at same speed also it the larger gear is provided on the shaft on which the smaller gear is present. The dynamo capacity used here is 12V. This is the line diagram of footstep power generator. It describes different components of the system in proper manner. In which rack moves downward as human weight Applied which cause rotation of pinion On shaft one which is attached to the small gear on shaft two which is in contact in gear Of DC generator. The piezoelectric material converts the pressure applied to It into electrical energy. The source of pressure can be Either from the weight of the moving vehicles or from the Weight of the people walking over it. The output of the Piezoelectric material is not a steady one. So, a bridge circuit is used to convert this variable voltage into a linear One. Again, an AC ripple filter is used to filter out any Further fluctuations in the output. The output dc voltage is Then stored in a rechargeable battery. The energy also Produced by heat using the peltier sensor at load. An Inverter is connected to battery to provide provision to Connect AC load. The voltage produced across the tile can Be seen in a LCD. Super capacitors also called ultra capacitors and electric Double layer capacitors (EDLC) are capacitors with Capacitance values greater than any other capacitor type Available today. Capacitance values reaching up to 400 Farads in a single standard case size are available. Super Capacitors have the highest capacitive density available Today with densities so high that these capacitors can be Used to applications normally reserved for batteries. Super Capacitors are not as volumetrically efficient and are more Expensive than batteries, but they do have other advantages Over batteries making the preferred choice in applications. Requiring a large amount of energy storage to be stored and delivered in bursts repeatedly. A relay is an electrically operated switch. Current flowing Through the coil of the relay creates a magnetic field which Attracts a lever and changes the switch contacts. The coil Current can be on or off, so relays have two switch Positions, and they are double throw (changeover) Switches. Relays allow one circuit to switch a second circuit which Can be separate from the first. For example, a Low voltage battery circuit can use a relay to switch a 230V AC mains circuit.

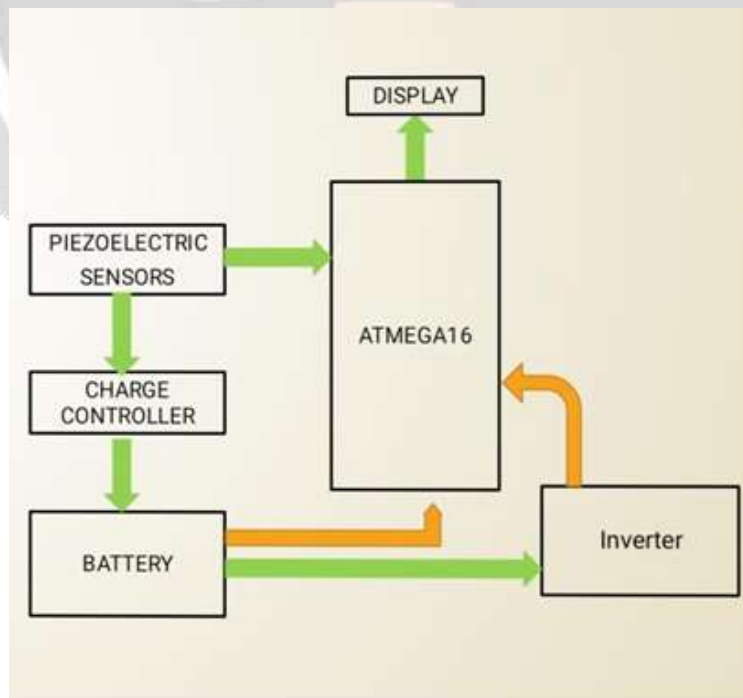


Fig 1: Flow Chart of Working Principle of Footstep Power Generator

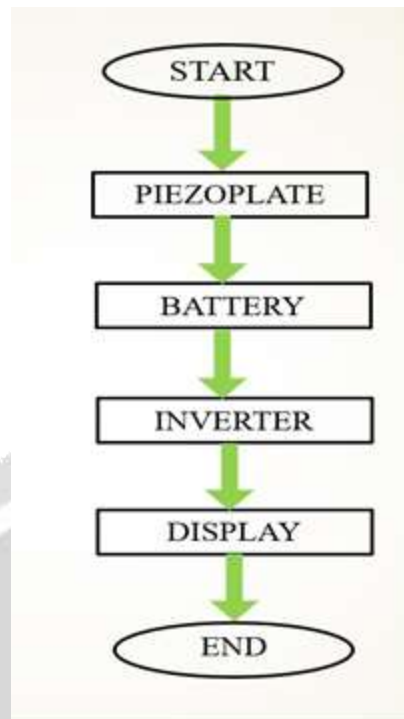


Fig 2: Block Diagram of Footstep Power Generator

3. Conclusion

The project “Power Generation Using Footstep” is Successfully tested and implemented which is the best Economical, affordable energy solution to common people. This can be used for many applications in rural areas where Power availability is less or totally absence as India is a Developing country where energy management is a big Challenge for huge population. By using this project, we can Drive both AC as well as DC loads according to the force we Apply on the piezo electric sensor. A piezo tile capable of generating 40V has been devised. 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 of long 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 we can Overcome the energy crises problem by some extent. Moreover, this also contributes to create a healthy global Environmental change.

4. References

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