FOOTSTEP POWER GENERATION SYSTEM

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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 sensors, Inverter, Microcontroller, Power conversion.*

1) INTRODUCTION

Electricity has become such pivotal part of our modern life that one cannot think of a world without it. Almost every 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. A LCD is interfaced to the tile employing a PIC microcontroller to display the voltage induced across the piezo tile.

2) OBJECTIVE:

- The objective is to convert foot step, walking and running energy into electrical energy by using transducer and use it in an electronic device that requires low power.
- Utilize the power for helping up the road lights, additionally for activity reason, sign boards of streets and in other public places.

3) LITERATURE SURVEY

Harvesting kinetic energy of footsteps on specially designerd floor tiles.
Daifallah Dalabeih; Batool Haws; Sawsan Muhtaseb
This paper introduces an exploratory model for utilizing the kinetic energy of footsteps. The model consists of three wood layers. The bottom and top layer having the same dimensions are connected through springs. The use of springs

makes walking on the tile flexible. The middle layer is installed with the 35 Piezoelectric units connected in series/parallel connection.
A practical examination was performed at the University of Jordan to compute the expected energy generation if commercial tiles are lodged.

Maximum energy harvesting from electromagnetic micro generators by footsteps using photo sensor
R. Manasa Veena ; B. Harika Reddy ; S.M. Shyni
The root aim of this project is to harvest utmost energy from electromagnetic micro generators. Most electromagnetic generators uses the process of electromagnetic induction while some of these use renewable energy sources such as water power and wind power to create the initial mechanical energy. This project uses the principle of electromagnetic induction and converts the pressure energy into the electrical energy. The control mechanism carries the copper coil and bar magnetic to generate voltage, and a rechargeable battery is used to store this generated voltage. The idea is to utilize the unused energy released by footsteps at populated places such as roads, railway stations, temples and bus stops.

4) BLOCK DIAGRAM

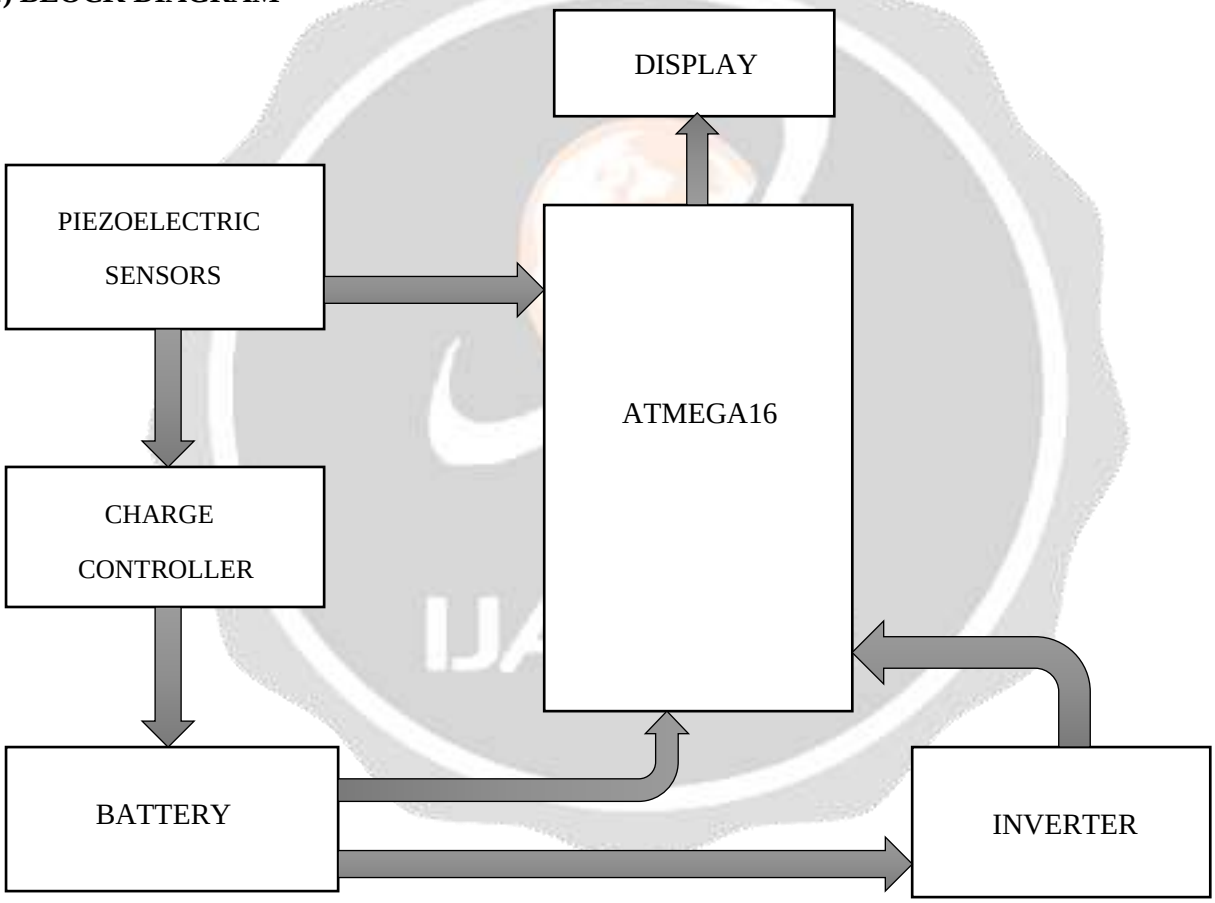


Fig.3 Block Diagram

4) FLOW CHART

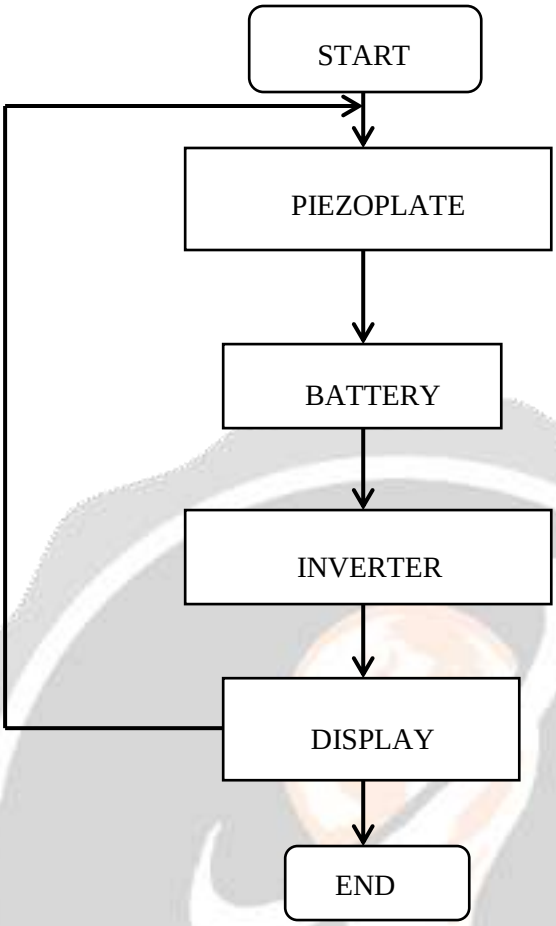


Fig.4 Flow Chart

5) WORKING

The basic working principle of our project is based on the piezoelectric sensors and to implement this we adjust the wooden plates above and below the sensors. When the pressure is applied on the sensors , it will convert mechanical energy into electrical energy. The Step-up transformer is used to provide power generation to the circuitry, where the MOSFET is used for switching purposes and to boost up the power. Here the polyster capacitor, diode , resistances and L293D IC is being used . The main purpose of foot step power generation is to provide more power by using piezo. A piezo film is capable of generating 40V. To store this generated power we require a 12 v rechargeable battery which will be connected to the inverter. This inverter will convert the 12v DC to the 230v AC. This 230v AC voltage is used to activate the loads. By using this AC voltage , AC loads can be operated.

To monitor the supply from the circuitry we need the AVI GPO Board which provide the 5volt to the controller and the 16*2 LCD Display . it consist of P-N junction diode, filters, voltage regulator i.e. IC 7805 which is used to process.

ATmega 16

Fig.1 ATmega 16

ATmega16 is an 8-bit high performance microcontroller of Atmel's Mega AVR family which has low power consumption. Atmega16 is based on enhanced RISC (Reduced Instruction Set Computing) architecture which includes 131 powerful instructions. Most of the instructions execute in only one machine cycle. Maximum frequency of Atmega is 16MHz.

ATmega16 has 16 KB programmable flash memory, static RAM of 1 KB and EEPROM of 512 Bytes. ATmega16 is a 40 pin microcontroller. There are 32 I/O (input/output) lines with four 8-bit ports designated as PORTA, PORTB, PORTC and PORTD.

Piezoelectric Sensors

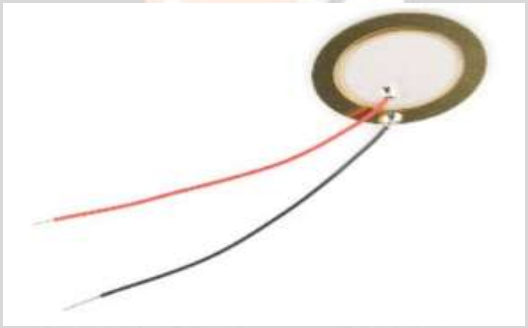


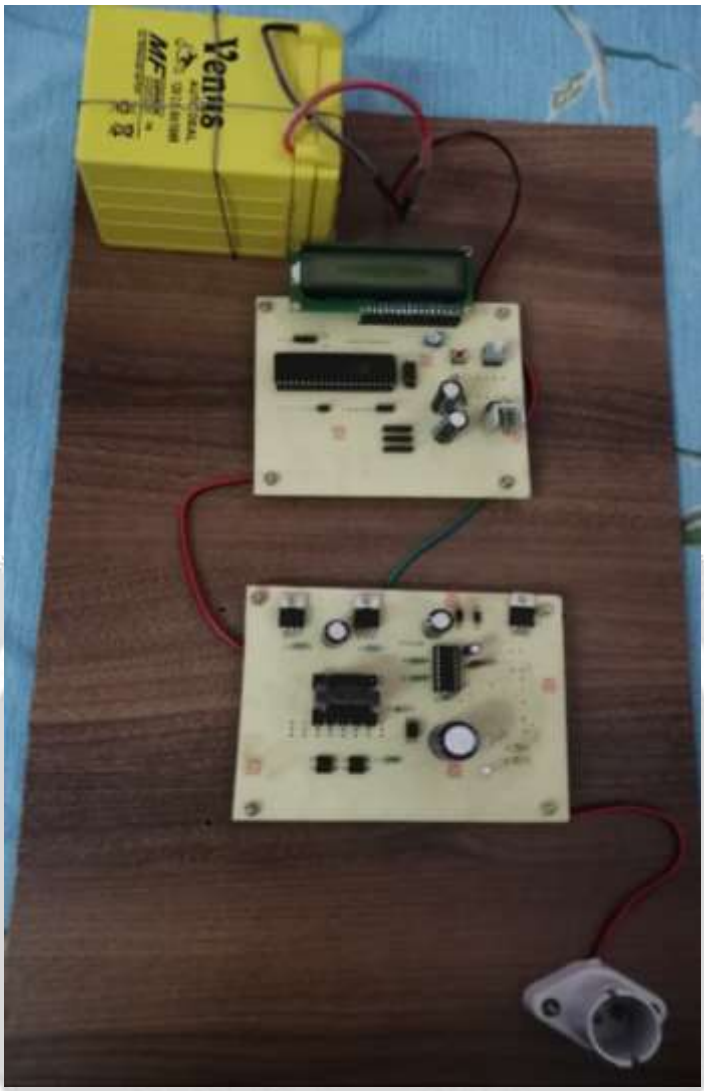
Fig.2 Piezoelectric Sensors

It is a sensor which converts force applied on sensor into voltage with the help of mechanical vibrations. It basically converts kinetic energy into electrical energy. Array of sensors should be connected in series to generate reasonable amount of electrical power. Two types of such sensors majorly used are lead zirconate titanate (PZT) and PVDF. The output voltages of these sensors are controlled by filters.

6) ADVANTAGES

- This is a Non-conventional energy system.
- Power is generated by simply walking or running.
- No fuel input or external power required.
- Easily applicable at places experiencing pressure.
- Easy maintenance
- Less moving parts hence long service life.
- Generated electricity can be stored in a battery.
- Extremely wide dynamic range , almost free of noise.

7) PROJECT MODEL



8) CONCLUSION

A comparison between various piezo electric material shows that PZT (Piezoelectric Lead Zicronate Titanate) has superior characteristics. The voltage is generated by applying pressure on any surface engineered with piezo materials hence this project can utilize the energy from areas experiencing pressure by some or the other means. It can be used in street lighting without the help of power lines or charging ports and in the rural areas having low power accessibilities.

Thus in all we conclude that this technology can prove to be an efficacious system of generating power from human footsteps. In highly populated countries like India or China this system will prove to be a Panacea. One can also satisfy his own energy needs with this system as the energy can be altered into electrical energy by just walking or running on piezo installed tiles in a very cost efficient and effective way.

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