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Advanced Foot Step Power Generation Using Piezo-Electric Sensors

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Abstract: ***Day by day, the population of the country increased and the requirement of the power is also increased. At the same time, the wastage of energy also increased in many ways. So reforming this energy back to usable form is a major concern. As technology is developed and the use of gadgets, electronic devices also increased. Power generation using conservative methods becoming deficient. There is a need arises for a different power generation method. At the same time, the energy is wasted due to human locomotion. To overcome this problem, the energy wastage is converted to usable form using the piezoelectric sensor. This sensor converts the pressure on it to a voltage. By using this energy saving method, foot step power generation system we are generating power.***

Keywords: Piezoelectric Transducer, PVDF (Polyvinylidene Fluoride),

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1. INTRODUCTION

An alternate method to generate electricity there are a 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 a common activity in human life. When a person walks, he loses energy to the road surface in the form of vibration, sound etc, due to the transfer of his weight onto the road surface, through footfalls on the ground during every step. This energy can be converted to the usable form such as in electrical form.

2. LITERATURE SURVEY

Electricity has become a lifeline for the human population. The need for electricity is increasing day by day. Some technology needs enormous of electrical power to perform various operations. As we know electricity is generated by some sources like water, wind etc.

Piezoelectric transducer has following advantages:

- High electromechanical transformation efficiency.
- High machinability.
- A broad range of characteristics can be achieved with different material compositions
- High stability.

In another proposed system the Faraday's law of induction is used for cutting the flux by coils. In this, the spur gear mechanism with magnet attached to the shaft is used to generate AC voltage [1]

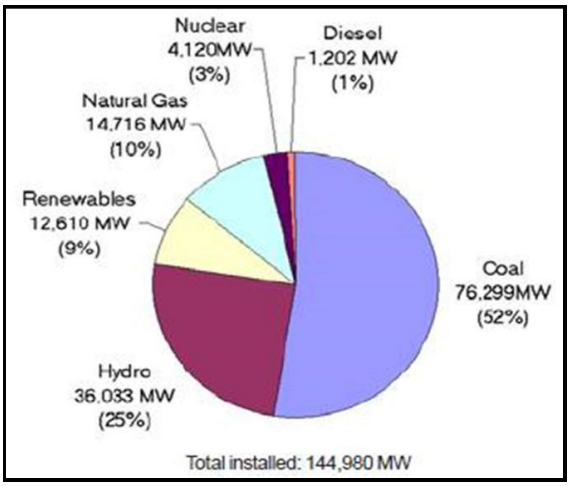

Fig.1 Power Generation Pie Chart

3. OBJECTIVES

In this foot step, power generation project is to convert foot step, walking and running energy into electrical energy. It is used to generate electricity from by walking on foot step. The need of electrical energy is increasing day by day. But power generation conventional resources are not enough for a total demand of electrical energy. Therefore many researchers are working on non-conventional ways of electrical power generation. Footstep power generation system is also a non-conventional electrical energy production system. It converts mechanical energy of footsteps into electrical energy by using transducers. This power generation system can become very popular among countries like Pakistan, china, India. It can be implemented on roads, bus stations, and many public places.

4. METHODOLOGY

The working of the foot step power generation system involves:

1. Interface and transducing
    - Consists array of piezoelectric sensor
    - Kinetic energy is converted into electrical energy
2. Processing
    - Here the generated degraded vibrating voltage will be fed to different blocks of a circuit element to get a proper output.
3. Storage
    - Resultant output will be stored in battery
4. This wastage of energy can be converted to usable form using the help of piezoelectric sensor
5. The piezoelectric sensor is a device which can convert pressure into voltage.
6. We know that energy can be neither be created nor be destroyed but can be transformed from one form to another.
7. By using this energy conversion theorem and Piezo theorem sensor we are proposing a new method for power generation.

5. BLOCK DIAGRAM DESCRIPTION

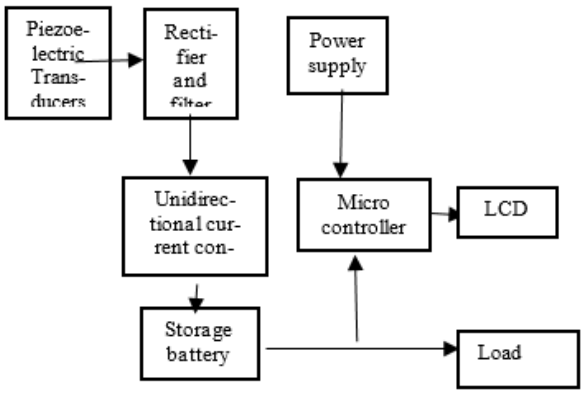

Fig. 2 Block diagram of the proposed system

PIEZOELECTRIC SENSOR

The piezoelectric transducer work on the principle of the piezoelectric effect. When mechanical stress or forces are applied to some materials along certain planes, they produce electric voltage. It basically converts kinetic energy into electrical energy. An array of

sensors is connected in series to generate a reasonable amount of electrical power. For example, 10 piezoelectric sensors are connected in series; they generate 9 volts and 100mA current. Two types of sensors are available in market PZT and PVDF. Filters are used to control the output voltages.

FILTERING

Capacitors are used as a filter to remove AC components from sensor's output voltage. Capacitors act as a short circuit for AC voltages and an open circuit for DC voltages. The output of the filter is given to unidirectional current controller.

UNIDIRECTIONAL CURRENT CONTROLLER

Diodes are used as unidirectional current controllers. It will make the flow of current in one direction only by conducting in one direction only. It is used to protect back current to the array of sensors.

BATTERY

The battery is used to store electrical energy. It is consists of electrochemical cells. In foot step, power generation system battery is used to store the electrical energy of sensors.

PIC18F4550 MICROCONTROLLER

PIC18F4550 microcontroller is the main part of the foot step power generation system. It is also used to measure battery voltage with the help of pic microcontroller. 10MHz crystal is used in this project.

LCD DISPLAY

16 * 2 LCD (Liquid Crystal Display) is interfaced with microcontroller LCD interfacing with PIC microcontroller is a very simple task. It is used to display the status of sensors and battery voltages.

6. ADVANTAGES

1) Simply walking on the step it generates power.
2) No need fuel input.
3) This is a Non-conventional system.
4) The battery is used to store the generated power.

7. DISADVANTAGES

1) Only applicable for the particular place.
2) The initial cost of this arrangement is high.
3) Care should be taken for batteries.

8. APPLICATIONS

Footstep power generation system have many applications, but some of them are given below:

- Mobile Charging
- Street Lighting
- Bus station lighting
- Emergency power failure stations
- Colleges.
- Schools.
- Cinema theaters.
- Shopping complex

CONCLUSIONS

The project "FOOT STEP POWER GENERATION" 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 a huge population. By using this project we can drive both AC and DC loads according to the force we applied on the Piezoelectric sensor.

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