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Footsteps Power Generation Using Piezoelectric Sensors

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***Abstract*: Day by day the population of the country increased and the requirement of the power is also increased. Of same time the wastage of energy also increased in many ways. So, regenerating this energy back to usable form is the solution. this developed and the use of energy, electronic devices also increased. Power generation using conservative methods becoming deficient. There is a necessity arises for a different power generation method. At the same time the energy is wasted due to human steps and many energy resources are getting exhausted and wasted Millions of people move around ways. To overcome this problem, from just walking foot step into converted electrical energy the energy wastage can be converted to usable form using of the piezoelectric sensor.**

***Keywords*: Footsteps power generation.**

1. Introduction

This footsteps power generation project design is a system that Generates voltages by the humane footsteps force. Using piezoelectric sensors sources and stores it for usage. The system will have piezoelectric sensors that will convert the footsteps force and pressure into electrical signals. It will fully depend on the human footsteps pressure and convert it into useful power. This project uses simple walk mechanism such as steps by human. The electronic devices also increased. Power generation using conservative methods deficient. 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: There is a necessity a different power generation method. At the same time the energy is wasted due to human locomotion and many ways. To overcome this problem, the energy wastage can be converted to usable form using the piezoelectric sensor his sensor converts the pressure on it to a voltage. So, by using this is energy saving method that is the footstep power generation system we are generating power. This project is used to generate electricity voltage using footstep force So, these systems are placed in public places where people walk and those have to travel on this system to get through the entrance or exists. Then, these systems may generate voltage on each and every step of a foot. 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

2. Software Implementation

This project we are using software a program for Arduino hardware may be any programming language with compilers that produce Atmel provides a development environment for their 8bit ADC and 32-bit ADC based microcontrollers: The Arduino IDE supports the languages C and C++ using special rules of code structuring. We are using software in Arduino because of total input and output show in display how much voltage produced by the human steps to help of c Arduino software.

3. Need of System

A day by day the population of the country increased and the requirement of the power is also increased. The peoples at the same time wastage of energy that also increased in many ways. So, reforming this energy back to usable form is the solution. That's why we want new types of technology to be developed.

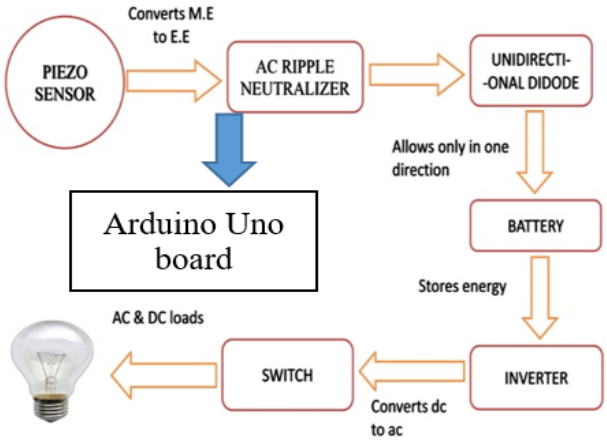

Fig. 1. Block diagram of system

4. Literature Survey

According to the author P. Venkatesh, In this paper, we have presented the design of power generation using footstep based on available piezoelectric sensors. Human race requires energy

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at very rapid rate for their living and wellbeing from the time of their arrival on this planet, because of this reason the power resources have been worn out and enervated. Proposal for the employment and application of extravagant energy in foots of human is very much to the purpose for extremely populated nations like China and India. Sarat Kumar Sahoo discussed about the foot step power generation. Creating electrical energy in this project using a non-traditional way of just stepping on the footprints. At this time, non-conventional energy systems are desperately needed. Steps-based energy generating does not require any fuel input to create power [1]. This for system according of R. Jai Rajesh: this article it is suggested that voltage should be produced using footstep power. The proposed device acts as a tool by using pressure to generate electricity for public locations, this article is very useful. Therefore, these devices are installed in public situations where people are walking, and they have to ride on this device in order to pass through or live. Such systems will then produce voltage about each and every move of a foot alternative source must be discovered, many people propose for solar energy, but it is going to be a costliest affair, those moreover availability of solar energy is poor particularly in rainy & winter seasons, as a result it is not dependable. Hence an alternative cheapest electricity generated by the sensors [2].

5. Components

A. Piezoelectric Sensors

This sensor is most important part in project without these components we are can't generate and convert this pressure energy into the electrical energy this sensing element that works on the principle of piezoelectric effect is thought as a electricity sensing element A measuring unit for measuring single crystal crystals and bones, which can be obtained from artificial proposals, purchased at stores such as PZT ceramics. Electrical detector features electrical detectors typically measure a combination of physical quantities acceleration and pressure.

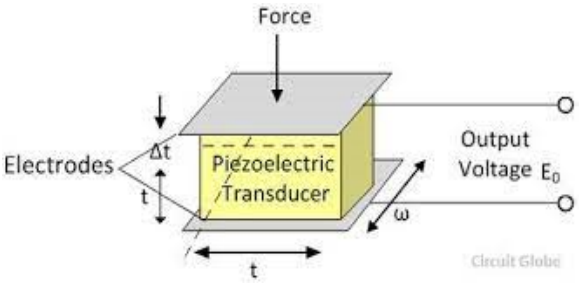

Fig. 2. Piezoelectric sensor working

The Piezoelectric ceramics are a type of multi-crystal dielectric with a high dielectric constant and are formed by two processes first, high temperature firing. After 12 firing, they have the characteristic crystal structure shown in, but do not yet exhibit the piezoelectric property because the electrical dipoles within the crystals are oriented at random and the overall the moment of the dipoles is canceled out. To make ceramics piezoelectric they must be polarized.

Fig. 3. Piezoelectric sensors

A sensing element that works on the principle of piezoelectric effect is thought as an electricity sensing element. Wherever piezoelectric effect could be a development wherever electricity is generated if mechanical stress is applied to a fabric. Not all materials Flex motions, touch, vibrations, and shock measurement all use piezoelectric sensors. They are used in sectors such as healthcare, aerospace, consumer electronics, and nuclear instrumentation pressure sensor to transfer the applied force to the electrical element. As soon as pressure is applied to the existing thin film the electrical material is charged and voltage begins to be generated. The voltage generated is proportional to the pressure applied

B. Arduino Uno Board

We are using This Arduino Uno board is a microcontroller board based on the ATmega328. This board using mainly reasons for input output voltage counting in display How much Data can we produced by the walk and how much power we have that's reason using this Arduino uno board. Basically, in Arduino board. It has 14 digital input/output pins of which 6 can be used as PWM outputs 6 analog inputs, the board have 16 MHz crystal oscillator, a USB connection, and a power jack, a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with take a USB cable or power with an AC-to-DC adapter or battery and few seconds to get started.

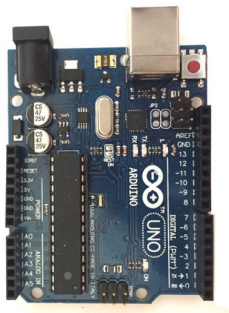

Fig. 4. Arduino uno board

The input voltage to the Arduino board when it's using an external power source You can supply voltage through this pin, or, if supplying voltage via the power jack, The regulated power supply used to for the on condition The Arduino memory of this Atmega328 Arduino microcontroller have a flash memory-32 KB for storing code SRAM-2 KB EEPROM-1 KB first the Arduino IDE tool is installed in the PC, attach the Arduino board to the computer with the USB cable. This make Arduino

board function easy making it available everywhere these boards come with a USB cable for power requirements well as functioning programmer.

Features of Arduino Uno Board

- Board of microcontroller: ATmega328
- Board operating voltage: 5v
- Microcontroller clock speed: 16 MHZ
- Digital i/o pins: 6 is Ip /6 is Op
- Dc current per I/O pins: 40mA
- SRAM: 2KB
- EEPROM: 1KB
- Input Voltage: 7-12 v
- Flash Memory is: 32 KB

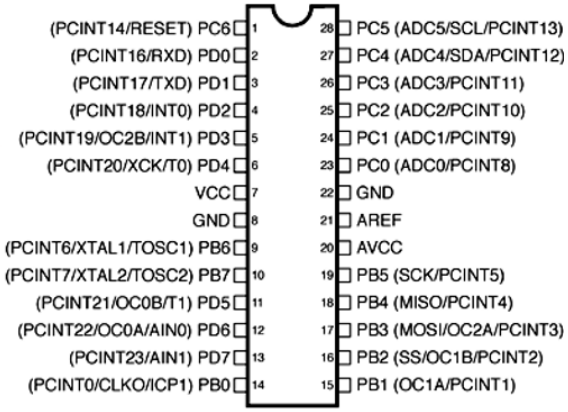

Fig. 5. Atmega 328 pin diagram

C. *Lead Battery 12V*

We are using the lead–battery is a type of rechargeable battery first It is the first type of rechargeable battery ever rechargeable batteries, lead–acid batteries have relatively low energy density. These batteries operate within a very wide range of temperatures, between the freezing point of aqueous H2SO4 solutions and close to the boiling temperature. When operated within this temperature range, they do not need any special temperature control. This is a great advantage of this 12v battery and his most major advantages its save more times power save and low amount of power store from piezoelectric sensors.

Fig. 6. Lead battery

The storage battery or secondary battery is such a battery where electrical energy can be stored as chemical energy and this chemical energy is then converted to electrical energy as and when required. The conversion of electrical energy into chemical energy by applying external electrical source is known as charging of battery.

D. *Voltage Regulator*

We used a voltage regulator. This voltage regulator is a circuit that creates a and maintains a fixed output voltage, irrespective of changes to the input voltage or load conditions. Voltage regulator keep the voltages from a power supply within a range that is compatible with the other electrical components. While voltage regulators are most commonly used for DC/DC power conversion, some can perform AC/AC or AC/DC power conversion. The battery in your car that gets powered from the alternator, the plug in your house that supplies all the energy you want, the mobile phone that you probably have on hand every minute of the day, all of which require a particular voltage to operate.

Fig. 7. Voltage regulator

This are the constant and rated output voltage can be given by the 78XX and 79XX ICs only if the input voltage is at least 2.5 V or higher than the output voltage. For starters, if it is powered by a 9 V Li-Ion battery, you can't obtain a 9 V output from an LM7809 IC.

E. *Capacitors*

In this project we are using many types of capacitors A capacitor is a two-terminal electrical device that can store energy in the form of an electric charge. It consists of two electrical conductors that are separated by a distance A capacitor is a passive electronic component that stores energy in the form of an electrostatic field. In its simplest form, a capacitor consists of two conducting plates separated by an insulating material called the dielectric. The capacitance is directly proportional to the surface areas of the plates, and is inversely proportional to the separation between the plates.

There are three main types of capacitors:

- Ceramic,
- Tantalum
- Electrolytics

Fig. 8. Capacitor

An electrical energy storing for the few seconds is know is called a capacitor stores energy in an electric field. In other words, it's a device that can store electricity. How does it do that? Using two metal plates usually made of aluminum and copper separated by

The insulator. When electricity is applied, the plates are charged with electrons The capacitor then stores that energy until it's needed. The capacitor releases that energy to power your device when you need in system projects or others gadgets appli follow below

Application of capacitors:

- Audio equipment
- Camera Flashes
- Power supplies
- Magnetic coils
- Lasers

F. 12V DC to 220V AC Inverter

Inverters are often needed at places where it is not possible to get AC supply from the Mains. An inverter circuit is used to convert the DC power to AC power. Inverters can be of two types True/pure sine wave inverters and quasi or modified inverters. These true /pure sine wave inverters are costly, while modified or quasi-inverters are inexpensive.

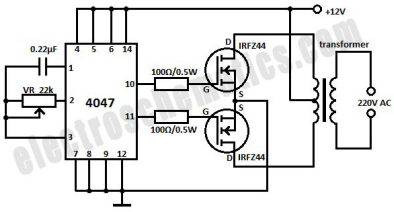

Fig. 9. Inverter 12v DC to AC

This is a quite simple DC to AC inverter that provides 220VAC when a 12VDC power source is provided. It can be used to power very light loads like night lamps and cordless telephones, but can be modified into a powerful inverter by adding more MOSFETs. It uses 2 power IRFZ44 MOSFETs for driving the output power and the 4047 IC as an astable multivibrator operating at a frequency of around 50 Hz. The 10 and 11 pin outputs of the IC directly drive power MOSFETs that are used in push-pull configuration. The output transformer has a 9V-0-9V, 2 Amps on the secondary and 230V on the primary for system.

G. AC Led Bulb

Fig. 10. AC LED bulb

This ac blub is one types of demonstrate output of generated free of cost energy this blub is the output energy the AC LED is an LED that operates directly out of AC line voltage instead of utilizing a driver to transform the line voltage to direct current dc.

H. Application

Power generation by footstep can be used in most of the places

- Colleges
- Schools
- theatres
- Shopping complex
- Metro and airport security
- check in ¬ Speed breakers
- Railway stations
- Bus depots

I. Advantages

- No fuel transportation problem.
- This is a non-conventional system
- It does not pollute the environment.
- Simple construction, mature technology.
- Reliable, Economical, Eco-Friendly.

J. Disadvantages

- Only applicable for a particular place
- Initial cost of this arrangement is high
- High care must be taken during construction
- The device is relatively heavy

6. Conclusion

This foots steps power generation using piezoelectric sensor is most valuable and demanding system and one of the most renewable energy approaches is the transformation of kinetic energy from human foot steps into the electricity power The contribution of Nonconventional energy to our primary energy is 11% that is a common fact. This project is activated, it will not only add and overwhelm the energy difficult problems we have but this will also form energy is produced by human steps is one of the features of free cost energy. The Advanced Foot Step Power Generation Using Piezo Sensor has been successfully tested and deployed, and it is the most cost-effective and accessible energy solution available to the general public.

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