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Proposed Method of Foot Step Power Generation Using Piezo Electric Sensor

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Abstract: Nowadays energy and power are the one of the basic necessities regarding this modern world. As the demand of energy is increasing day by day, so the ultimate solution to deal with these sorts of problems is just to implement the renewable sources of energy. The objective of this work is power generation through footsteps as a source of renewable energy that we can obtained while walking on to the certain arrangements like footpaths, stairs, plate forms and these systems can be install elsewhere specially in the dense populated areas. We can implement this foot step power generation system by generating the additional power by the heat it can be obtained by the load using the peltier effect. As a result of completing the above procedure or technique we made ourselves able to design such compatible system through which we could run our home appliances through AC output. As our main purpose was to charge the battery through DC output and then by inverting it into AC for normal common usage. Thus as a result we have concluded that these types of designs and techniques of power generating systems are very useful and handy in order to match the supply and demand of energy globally as well.

Keywords: renewable energy, foot step, peltier effect

I. INTRODUCTION

Energy harvesting also known as power harvesting or energy scavenging is the process by which energy is derived from external sources e.g. solar power, thermal energy, wind energy, salinity gradients, and kinetic energy, captured, and stored for small, wireless autonomous devices, like those used in wearable electronics and wireless sensor networks. Energy harvesters provide a very small amount of power for low-energy electronics. While the input fuel to some large-scale generation costs money (oil, coal, etc.), the energy source for energy harvesters is present as ambient background and is free. For example, temperature gradients exist from the
operation of a combustion engine and in urban areas, there is a large amount of electromagnetic energy in the environment because of radio and television broadcasting. Over the past two decades, there has been significant interest in converting mechanical energy from human motion into electrical energy. This electrical energy can then be used to Recharge batteries in electronic devices or directly power small scale, Low-power circuits. A number of commercial devices use human power to produce Electricity such as hand-crank generators (for powering Flashlights, radios, and recharging mobile devices), and pedal Generators (that can be used to power larger electrical devices typically generating between 100 and 1000W and can be as high As 1000 W). However, these generators require concentrated human Effort for long periods of time, which might preclude the User from doing other tasks. It is desirable to scavenge or harvest Energy from human movement, while the user is performing His/her everyday activities. Some of the earliest work to harvest energy from human gait Dates back almost 250 years and include the self-winding Watch and closely related modern electromechanical (or so called Electrical) self-winding watches, and various shoe mounted Foot cranks Driven by the potential to power small, portable electronic devices, the first work in self-powered electrical Energy harvesting included electromagnetic vibration in A device carried on the hip, and piezoelectric strain energy Harvesting by a device mounted in the heel of a shoe. This Initial work has lead to substantial interest in gait powered energy Harvesting.

II. PIEZO ELECRIC TRANSDUCER

In Existing system piezoelectric sensor only used. A piezoelectric plate is a device that uses the piezoelectric effect to measure pressure, acceleration, strain or force by converting them to an electrical charge.

Piezoelectricity, also called the piezoelectric effect, is the ability of certain materials to generate an AC (alternating current) voltage when subjected to mechanical stress or vibration, or to vibrate when subjected to an AC voltage, or both. The most common piezoelectric material is quartz. Certain ceramics, Rochelle salts, and various other solids also exhibit this effect.

When a sound wave strikes one or both of the plates, the plates vibrate. The crystal picks up this vibration, which it translates into a weak AC voltage. Therefore, an AC voltage arises between the two metal plates, with a waveform similar to that of the sound waves. Conversely, if an AC signal is applied to the plates, it causes the crystal to vibrate in sync with the signal voltage. As a result, the metal plates vibrate also, producing an acoustic disturbance.

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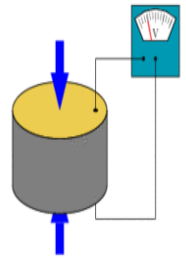

Fig 1 Piezoelectric sensor testing

Fig 2 Piezoelectric sensor testing

III. PELTIER SENSOR

In proposed method in addition to use the peltier sensor. A thermocouple consists of two conductors of different materials (usually metal alloys) that produce a voltage in the vicinity of the point where the two conductors are in contact. Commercial thermocouples are inexpensive, interchangeable, are supplied with standard connectors, and can measure a wide range of temperatures. In contrast to most other methods of temperature measurement, thermocouples are self-powered and require no external form of excitation. The main limitation with thermocouples is accuracy; system errors of less than one degree Celsius (°C) can be difficult to achieve. hermocouples for practical measurement of temperature are junctions of specific alloys which have a predictable and repeatable relationship between temperature and voltage. Properties such as resistance to corrosion may also be important when choosing a type of thermocouple. Where the measurement point is far from the measuring instrument, the intermediate connection can be made by extension wires which are less costly than the materials used to make the sensor. Thermocouples are usually standardized against a reference temperature of 0 degrees Celsius; practical instruments use electronic methods of cold-junction compensation to adjust for varying temperature at the instrument terminals.

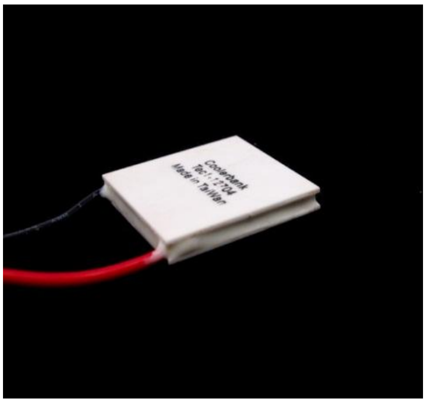

Fig 3 Peltier sensor

IV. BLOCK DIAGRAM

A.Existing Block Diagram

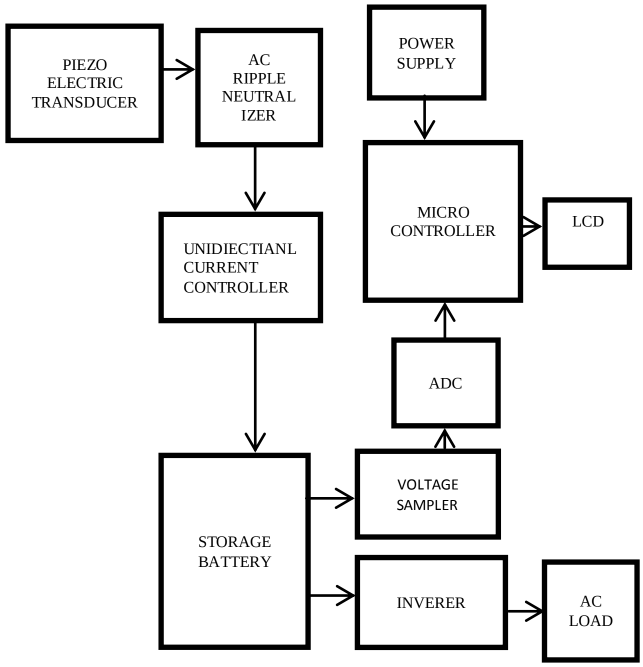

Fig 4 Existing block diagram

B.Proposed Block Diagram

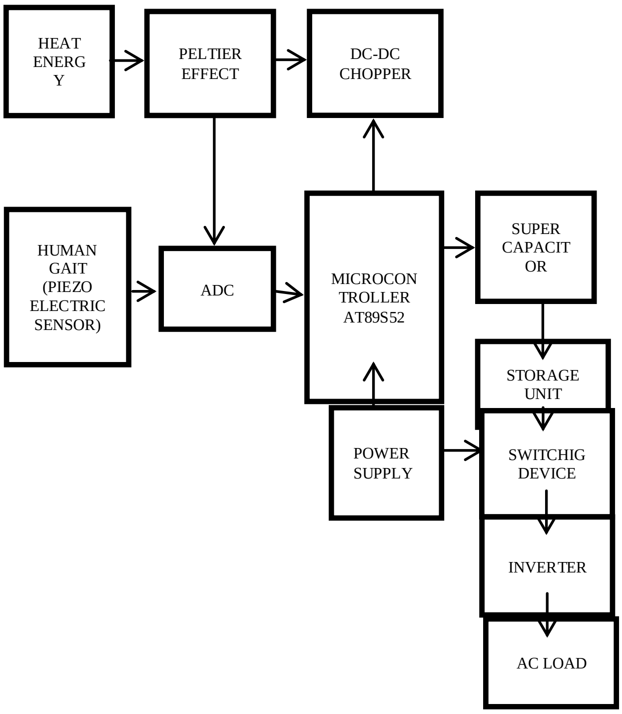

Fig 5 Proposed block diagram

V. WORKING PRINCIPLE

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

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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. For this purpose microcontroller AT89S52 is used.

A. Super Capacitor

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.

B. Relay:

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 completely separate from the first. For example a low voltage battery circuit can use a relay to switch a 230V AC mains circuit. There is no electrical connection inside the relay between the two circuits; the link is magnetic and mechanical

C. Battery:

Battery consists of electrochemical cells to store electricity house in a single unit. In battery stored chemical energy is transformed into electrical energy. Some batteries are used once and some of them are rechargeable. Large batteries also provide stand by operation i.e. mobile, laptops etc.

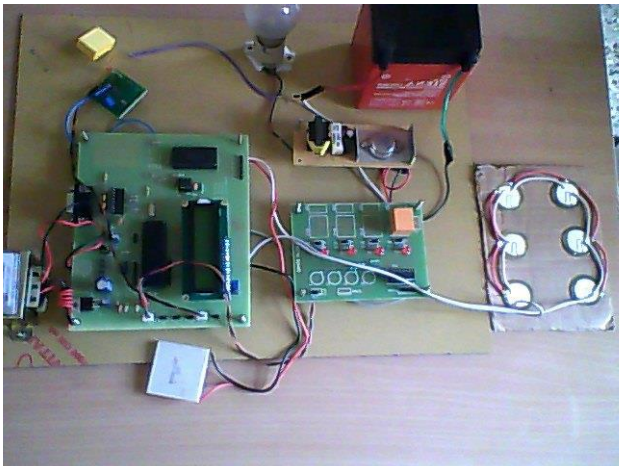
D. Inverter:

A inverter is an electrical power converter that changes direct current (DC) to alternating current(AC). The input voltage, output voltage, and frequency are dependent on design. Static inverters do not use moving parts in the conversion process. Some applications for inverters include converting high-voltage direct current electric utility line power to AC, and deriving AC from DC power sources such as batteries.

E. Voltage Regulator:

A voltage regulator is designed to automatically maintain a constant voltage level. A voltage regulator may be a simple "feed-forward" design or may include negative feedback control loops. It may use an electromechanical mechanism, or electronic components. Depending on the design, it may be used to regulate one or more AC or DC voltages. Electronic voltage regulators are found in devices such as computer power supplies where they stabilize the DC voltages used by the processor and other elements. In automobile alternators and central power station generator plants, voltage regulators control the output of the plant. In an electric power distribution system, voltage regulators may be installed at a substation or along distribution lines so that all customers receive steady voltage independent of how much power is drawn from the line.

VI. HARDWARE KIT



VII. CONCLUSION

The project "POWER GENERATION USING FOOT STEP AND HEAT" is successfully tested and implemented.it provides the affordable energy solution. India is the developing country where energy management is big challenge for huge population. By using this project we can derive both A.C and D.C drive according to force we applied. India is the developing country where energy management is big challenge for huge population. By using this project we can derive both A.C and D.C drive according to force we applied

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BIOGRAPHY

A.ADHITHAN was born in 1989 in Tamilnadu, India. He received his B.E-EEE degree from SRR college of engineering under the control of Anna University, Chennai in 2011 and M.E-PSE Degree from Annamalai University, Chidambaram in 2013. Now he is working as an Assistant professor of EEE department in Adhiparasakthi Engineering College, Melmaruvathur, Tamilnadu, India. His research area of interest includes power system, electrical machines, FACTS.