

Power Generation System by using Piezo Sensors for Multiple Applications

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Abstract— Generally there is huge demand for power production. So going for alternative energy source is the best way to harvest electricity. We have proposed that piezo sensors produce electricity when pressure is applied on them. These sensors are then connected in series and parallel combination and placed in a tile like structure. This tile can be used in any place wherever pressure is applied. The harvested power can be stored in a battery and used for AC or DC loads and also voltage generated by a single tile can be displayed on display devices like LCD located at a different location using zigbee technology for smart analysis.

Keywords-; *alternative energy, Piezo sensors, zigbee, LCD.*

I. INTRODUCTION

Man has needed and used energy at an increasing rate for his sustenance and well-being ever since he came on the earth a few million years ago. [9] Primitive man required energy primarily in the form of food. He derived this by eating plants or animals, which he hunted. Subsequently he discovered fire and his energy needs increased as he started to make use of wood and other bio mass to supply the energy needs for cooking as well as for keeping himself warm. With the passage of time, man started to cultivate land for agriculture. He added a new dimensions to the use of energy by domesticating and training animals to work for him.

With further demand for energy, man began to use the wind for sailing ships and for driving windmills and the force of falling water to turn water wheels. Till this time, it would not be wrong to say that the sun was supplying all the energy needs of man either directly or indirectly and that man was using only renewable sources of energy.

II. MOTIVATION

In developing countries like India the demand for power is increasing day by day. Due to increase in population there is lot of power cut-off. Human being uses power generators which requires fuel to produce electricity which has harmful effect to the environment.

So we got motivated to harvest power using an alternative source of energy and also doesn't have any negative effect to the environment and to see India without any power cut-off.

III. LITERATURE SURVEY

There are few methods to generate electrical energy from footsteps. Gear wheel and fly wheel are techniques to generate electrical power.

BARC group in Mumbai proposed a device using mechanical parts that when a pedestrian steps on the top plate of the device, the plate will dip down slightly due to the weight of the pedestrian. The downward movement of the plate results in rotation of the shaft of an electrical alternator, fitted in the device, to produce electrical energy.

The top plate reverts back to its original position due to negating springs provided in the device.[7].Hence they conveyed that the power can be harvested and can be utilized or stored for future use.

Piezoelectric materials transfers mechanical energy into electrical energy that can be stored and used to power other devices.

The power supply in most cases is the conventional battery, the problems can occur when using batteries because of their less capacity and less life.

The goal of this study is to develop a model of the piezoelectric power harvesting device. This paper determines the appropriate size and vibration levels of the piezo sensors. They investigated the power generated when a free-falling steel ball impacted a plate with a piezo-ceramic wafer attached to its underside.

They also investigated the energy storage characteristics of a power harvesting system consisting of a full-bridge rectifier and a capacitor[3].Hence we can store harvested power for longer life and for long many days.

IV. OBJECTIVES

The principle of project has few steps in it regarding which generate power through footsteps using piezoelectric sensor. We start with the proper arrangement of electrical components and equipment which transforms the mechanical energy in to electrical energy.

The second part of piezoelectric sensor is mechanical part, which involves spring connection to piezo, so by movement of footsteps up and down spring is giving vibration to piezo which generate electrical power and this power will be in the form of electric current. And these two arrangements that is electrical and mechanical combined together which transforms mechanical energy to electrical energy.

When producing power with footsteps on piezo there is some load placed at the end which used power, then power stored in battery is decreased so more footsteps on spring which vibrate the step and due to vibration force power generated.

Voltage which produced from piezoelectric sensor is A.C voltage while we need D.C voltage to store in the battery, so for this purpose rectifier circuit is used. In rectifier circuit we can use either half wave rectifier or full wave rectifier. Our concern is with full wave rectifier because it gives full value. So now A.C voltage are converted in to D.C voltage. Now by placing next the battery charger circuit and battery, battery charger circuit is charging the battery and this D.C voltage is stored in the lead acid battery of 12 volts.

Li-On battery of 12 volts which is charged is now further connected to the inverter. As we have D.C voltage stored in the battery but we need A.C voltage because most

of the load needs A.C voltage so by using the inverter circuit that it inverts the voltage from battery which is 12 volts D.C to 220 volts A.C voltage.

So this A.C voltage is used in different appliances such as for charging the laptop battery and also to charge the handset, it can also be used to lightening up the energy saver. If we need more power from this technique then we can use more steps for more electric current, and also increase the connection of piezoelectric sensors which is connected parallel and series combination and by vibrating with the help of footsteps gives electrical power which is in the form of electric current. Then ability of battery and inverter should be increased, battery should be of high current and high voltage and inverter has designed that it converts the electrical power to A.C voltage and also no loss in it, then output power will be increased and can be used more electrical appliances and also can be used such appliances which need more electric current.

V. METHODOLOGY

Implementation of piezo sensors in a tile to get optimum power. Reconfigurability is achieved by using different piezo sensors with different compositions of piezo materials. Performance evaluation of piezo tiles wirelessly using zigbee for smart analysis. Comparison of piezo sensors with other micro energy harvesting devices.

VI. BLOCK DIAGRAM

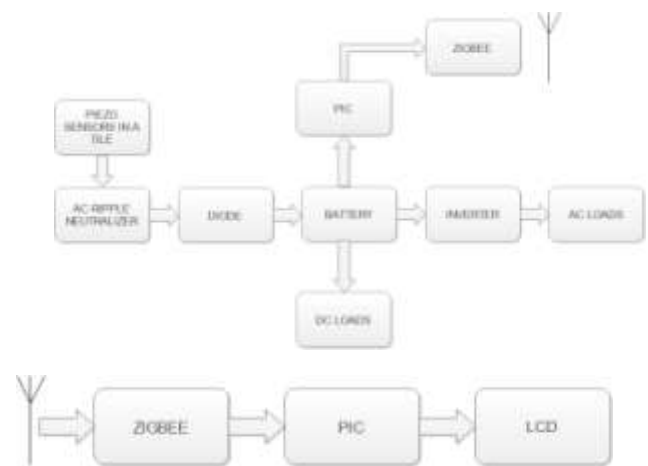


Fig a: transmitter section of power generation by piezo

Fig b: Receiver section by Zigbee

In above diagram, fig a shows power generation and transmitter section, where power is harvested by piezo sensors which are connected in a tile. The produced power is supplied to ripple neutralizer in order to remove ripples and passed to diode where it allows current to flow in only one direction and then stored in a battery. The stored power can be used to Dc as well as AC loads through inverter. The

amount of power production in converted to digital and transmitted wireless for smart analysis.

Fig b shows the receiver section. The received signal is displayed in a LCD display

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