Earth Tile – Mechanical Energy to Electricity

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ABSTRACT

In order to achieve electrical energy from mechanical energy we have constructed a model where, when someone applies force on model then it creates pressure on the piezoelectric sensors, which are present in between two tiles. Single piezoelectric sensor will produce few watts of energy and to create more amount of energy we have a series and parallel connection as to get required output voltage and current. These sensors convert's the mechanical energy (force) into electrical energy. The produced energy is in the form of ac which is rectified by the rectifier circuit and then the rectified voltage is regulated to get the constant dc. Then this dc voltage can be used to light the streetlights, traffic signals.

Keywords – Piezoelectricity, Mechanical to electrical energy conversion, PIC18F2550, AC to DC conversion

I. INTRODUCTION

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 use of Piezoelectric sensor and efficient diode rectifier circuit along with filter circuit. 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 DC output. As our main purpose was to charge the battery through DC output. When piezoelectric sensors are connected in series combination then output voltage is large but output current is low and when piezoelectric sensors are connected in parallel combination then output current is large but the voltage is low. We need a combination where output voltage as well as output current is high. We have to do connection in such a way that it should match the required current and voltage. So a combination of series and parallel connection of piezoelectric sensors is made.

III. METHODOLOGY

When anyone walks or run on any platform or surface they exert their weight force to ground. This is purely wastage of energy. To overcome this wastage and to create an energy source which is not harmful for environment we introduce this idea. In order to achieve electrical energy from mechanical energy (weight) we have constructed a model where, when someone applies force on model then it creates pressure on the piezoelectric sensors, which are present in between two tiles. Single piezoelectric sensor will produce few watts of energy and to create more amount of energy we have a series and parallel connection as to get required output voltage and current. These sensors convert's the mechanical energy (force) into electrical energy.

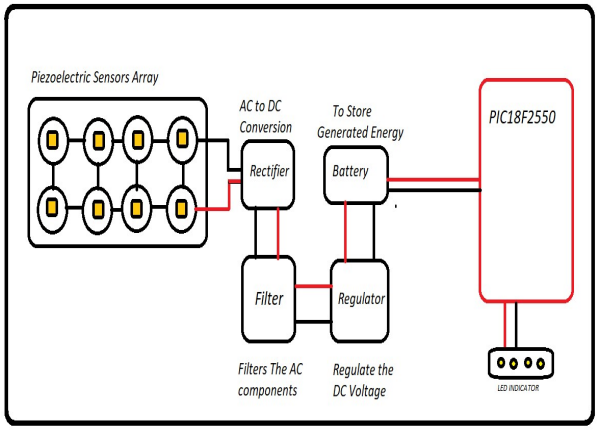

Fig. 2 Block Diagram

The produced energy is in the form of Alternating form which is rectified by the rectifier circuit. Then this rectified voltage is filtered by capacitor filter and regulated to get the constant DC signal. In this way we can convert unused mechanical energy to Electric signal. This Electrical signal is fed to battery and with help of PIC microcontroller battery level is watched. If battery is charged above certain level then LED will glow indicating charging of battery

IV. PSIM CIRCUIT

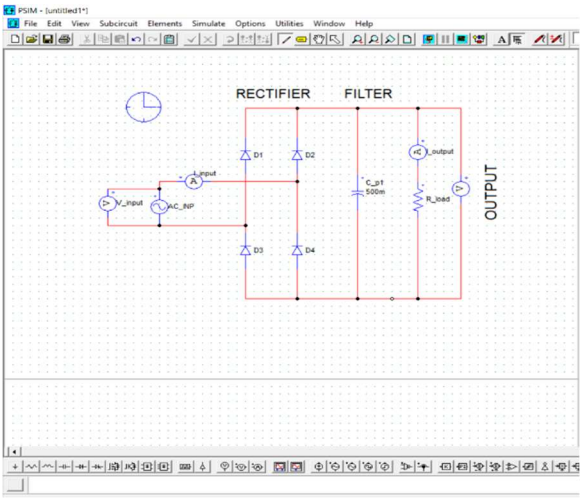

Fig. 2 PSIM Circuit

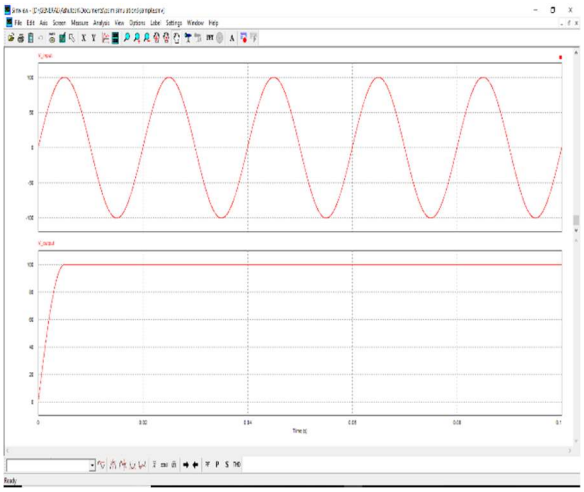

Fig. 3 PSIM circuit Simulation

The above Fig 3 shows simulation results of circuit. Thus, we can state that alternating signal coming from piezoelectric transducer is converted to DC signal with help of combination of bridge rectifier and capacitor filter.

As shown in above Fig 2 We have considered the alternating current coming from piezoelectric crystals as AC source for the simulation purpose. We have used the rectifier and capacitor filter circuit. This circuitry is used to convert the output of piezoelectric sensor which is in alternating format and to charge different electric components we need to change this alternating signal form into Direct form.

V. PROTEUS SIMULATION

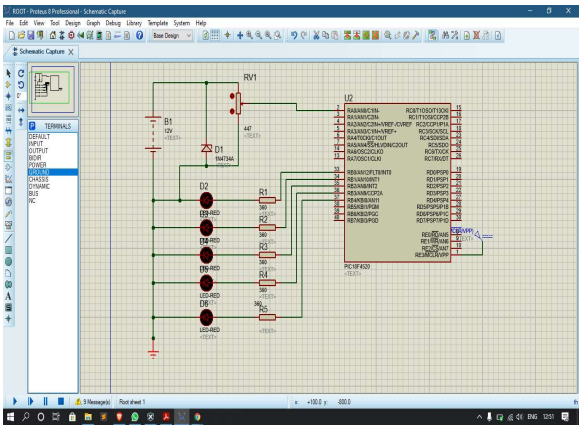

Fig. 4 Battery at 0 charge

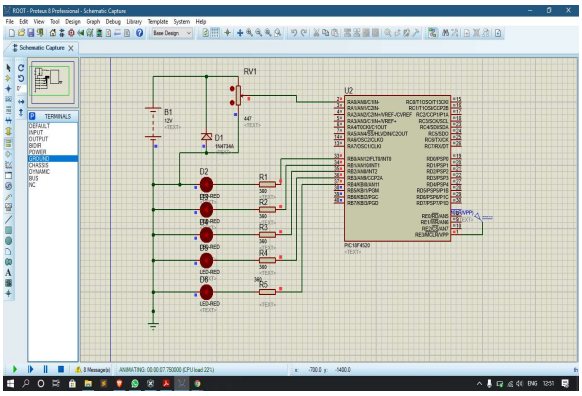

Fig. 5 Battery charged (indicated by LED)

We have used PIC18F2550 for management of Battery level. The potentiometer here is a significance to battery. As resistance of potentiometer rises up to certain level the LED will glow indicating that battery is charged. Fig 4 shows the initial condition of battery level when there is no DC supply coming from rectifier and filter circuit. Later when we step on piezoelectric sensors it produces electric energy which

is passed through rectifier and capacitor filter circuit and fed to battery. Battery is started to charge and this charge level of battery is indicated by glowing LED's controlled by PIC18F2550. When battery is charged to required level then LED will be glowing. In our case we kept that level to 50%. Fig. 5 shows this condition specifically.

The functionality of this project is shown in Fig. 6 with help of flowchart. Flow of battery charge condition is also shown.

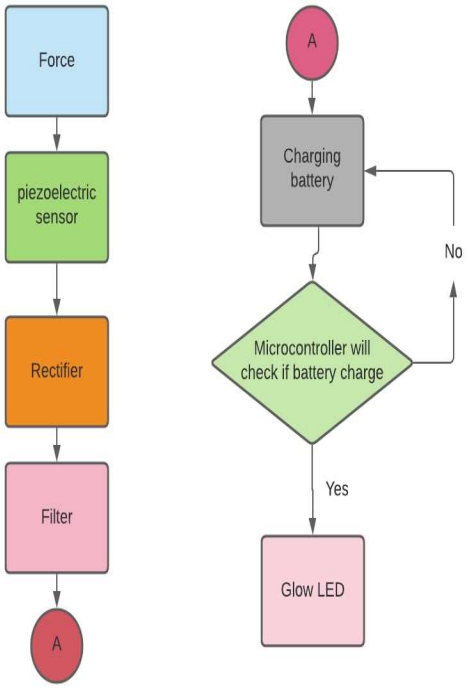

Fig. 6 Flowchart

VI. APPLICATION

[1] It can be used in the area where there is crowdy it can be used as pedestrian and the energy produced will be used to light the streetlights

[2] It can be installed in the lift and the energy produce can be used to open and close the door of the lift.

[3] It can be used in the shoes and the energy produced can charge the mobile phones

[4] It can be used in the malls and energy produced will be used in the lighting of the mall

VII. ADVANTAGES AND USEFULNESS

[1] The demand of electricity keeps increasing to follow population growth, prosperity improvement, and economic growth as a whole.

[2] Despite the importance of electricity and the greater demand of it, many countries still lack access of electricity.

[3] Most of the reason is about the amount of electricity payment. Then, the piezoelectric tile is the promising option to overcome the greater demand of electricity as well as the lack access of electricity. Besides, the tile also can overcome the electricity problem as the survival electricity generation when such disaster or extreme weather causes power loss.

[4] The piezoelectric ceramic tile is not only renewable electricity source but also unique, safe, reliable, geographically, and economically.

[5] This project is simple and easy to access.

[6] There is low power consumption. It can be operated from a long range.

VIII. RESULT

We are successfully able to convert mechanical energy into pure electric energy. Also, we are successfully able to generate a system which is converting a form of energy to electricity and which is not harmful to environment in any form.

IX. CONCLUSION

A resource of electricity is produced with mechanical energy i.e. force as input and electricity as output .This source in no matter harms environment and its implementation can be done all over world provided, human's force will act upon it in any method (walking or any vehicle passing above it)

X. REFERENCE

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