

### DESIGN OF FOOTSTEP POWER GENERATION SYSTEM FOR GREEN ENERGY INITIATIVE

Sonal Mukadam<sup>a</sup>, Shweta More<sup>b</sup>, Manali Gawde<sup>c\*</sup> and Jayesh Rane<sup>d</sup>

<sup>a,b,c,d</sup>EXTC, Pillai HOC College of Engineering & Technology/ Mumbai University.

Article Received on 21/11/2018

Article Revised on 11/12/2018

Article Accepted on 01/01/2019



\*Corresponding Author

Manali Gawde

EXTC, Pillai HOC College  
of Engineering &  
Technology/ Mumbai  
University.

#### ABSTRACT

The system generates voltage using footstep force. The system serves as a medium to generate electricity using non conventional sources and store or use it. The project is designed to be useful at public places like railway stations where a lot of people keep walking through all day. At such places these systems are to be placed at any entry points where people travel through entrance or exits and they have to foot press on this device to get through. These devices may then generate a voltage on every footstep and

when mounted in series they will produce a sizeable amount of electricity. For this purpose we here use piezoelectric sensors that use piezoelectric effect in order to measure acceleration, force, pressure by its conversion into electric signals. We here attach a voltmeter in order to measure its output and small led lights for demonstration. We also use a battery and weight measurement unit for better manifestation of the system.

#### I. INTRODUCTION

In this project we are generating electrical power as non-conventional method by simply walking or running on the foot step. Non- conventional energy system is very essential at this time to our nation. Nonconventional energy using foot step is converting mechanical energy into the electrical energy. Man has need and used energy at an growing rate for his nourishment and well-being ever since he came on the earth a few million years ago. Due to this a lot of energy resources have been worn out and wasted. Proposal for the utilization of waste energy of foot power with human locomotion is very much relevant

and important for highly populated countries like India and China where the roads, railway stations, bus stands, temples, etc. are all over crowded and millions of people move around the clock.

This whole human bio-energy being wasted if it can be made possible for utilization it will be great invention and crowd energy farms will be very useful energy sources in crowded countries. This project uses piezoelectric sensor. In this project the conversion of the force energy into electrical energy. The control mechanism carries the piezo electric sensor, A.C ripples neutralizer, unidirectional current controller and 12V, 1.3Amp lead acid dc rechargeable battery and an inverter is used to drive AC/DC loads.

## II. BASIC CONCEPT

The piezoelectric effect was discovered in 1880, by two French physicists brothers Pierre and Paul. They took the name from the Greek word piezo, which means "to press. Conventional & Non-conventional Energy Sources Energy produced by coal, petroleum, natural gas etc. are called conventional sources. Whereas the sources like biomass, wind, solar etc. are called non conventional energy sources. The confront to convert foot step energy to electrical energy. Its solution is using piezoelectric material.

## III. NEED AND SCOPE

The utilization of waste energy of foot power with human motion is very important for highly populated countries. India and China where the roads, railway stations, temples, etc. are all over crowded and millions of people move around the clock. Our main goal is to harvest as much energy as possible that to without compromising the reliability.

## IV. DESIGN METHODOLOGY & DESCRIPTION

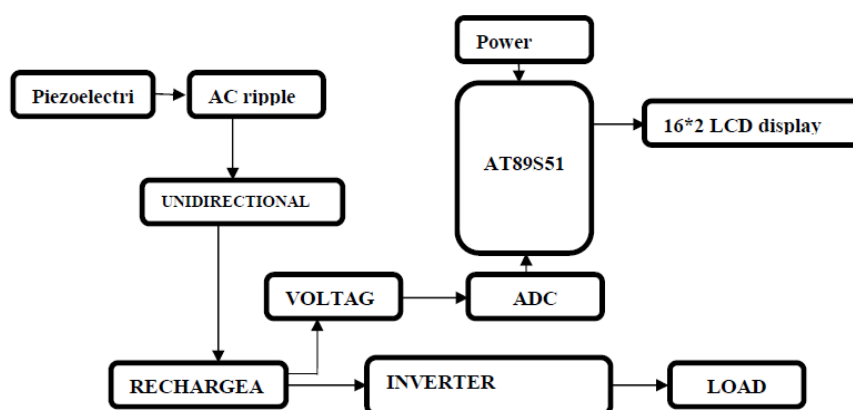
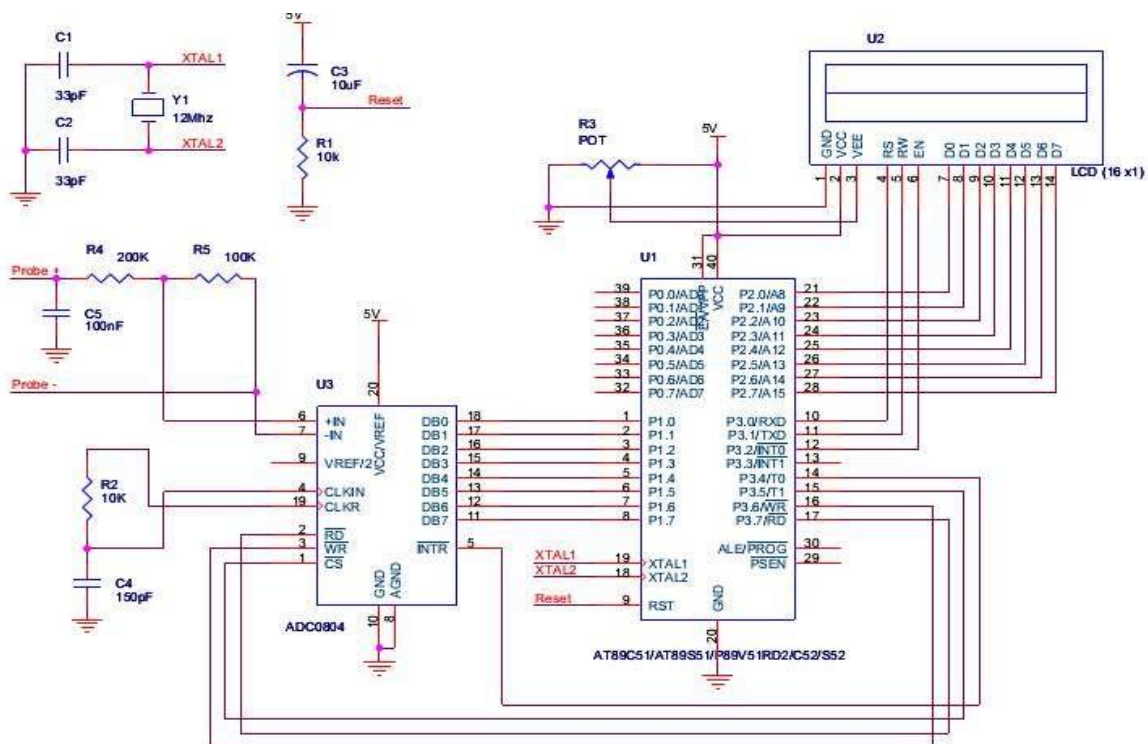
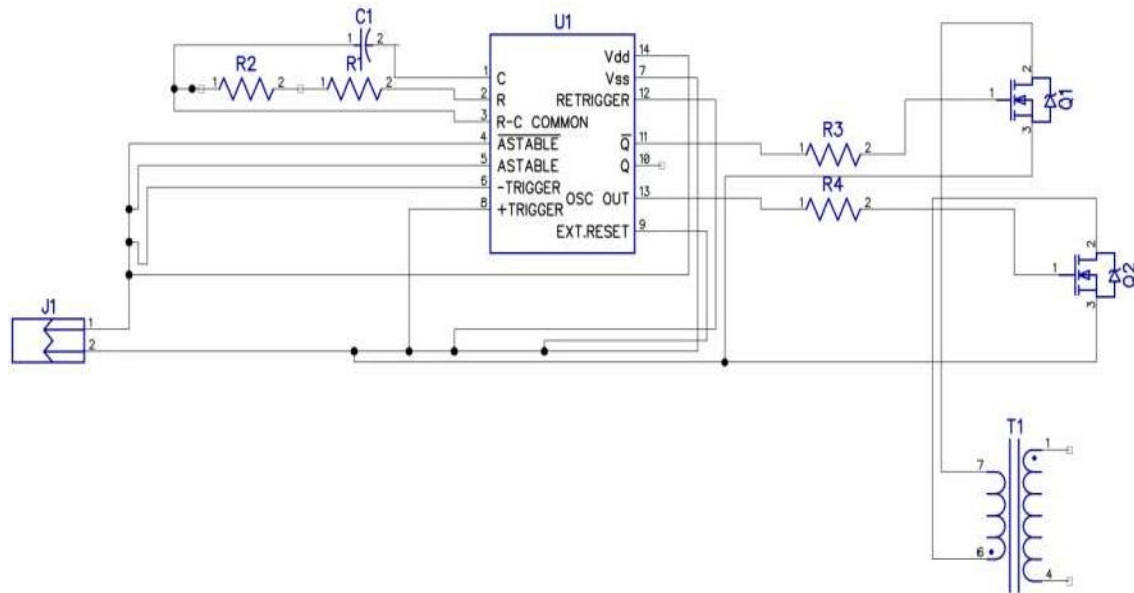


Fig. 1

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 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. As the power output from a single piezo-film was extremely low, combination of few Piezo films was investigated. Two possible connections were tested - parallel and series connections. The parallel connection did not show significant increase in the voltage output. With series connection, additional piezo-film results in increased of voltage output but not in linear proportion. So here a combination of both parallel and series connection is employed for producing 40V voltage output with high current density. From battery provisions are provided to connect dc 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 AT89S51 is used. The microcontroller uses a crystal oscillator for its operation. The output of the microcontroller is then given to the LCD which then displays the voltage levels.

## V. SCHEMATIC DIAGRAM





**Fig. 2: Schematic Diagram.**

## VI. CONCLUSION

This statement of Albert Einstein is true “Energy can neither be created nor be destroyed it can be transferred from one form to another.”

A piezo tile competent of generating 40V has been devised. Comparison between various piezo electric material shows that PZT is superior in characteristics. Also, by comparison it was found that series- parallel combination connection is more suitable. The weight applied on the tile and corresponding voltage generated is studied and they are found to have linear relation. Use of piezo-electric material is eco-friendly causes no pollution. It is an inexpensive way of generating electricity and is easy to install.

This project can be successfully implemented in airports, railway stations and the technology can be incorporated to generate power in the following applications

- ✚ In car tyres
- ✚ In speed breaker
- ✚ Discos
- ✚ Staircases
- ✚ School / colleges
- ✚ Trade mills
- ✚ Below railway station
- ✚ In boxing panel

Following are the advantages & disadvantages:

- ✚ Harvest small, but still significant amounts of energy.
- ✚ An innovative approach to a device that people use every day.
- ✚ No compromise to safety or reliability.
- ✚ There is no pollution with this technology as compared to other power generating technologies, hence it is eco- friendly in nature
- ✚ No requirement of fuel for generation
- ✚ Marketing and appearance could encourage people to take the stairs instead of energy intensive alternatives such as an elevator or escalator.

## VII. FUTURE WORK

In future aspects we can use this principal in the speed breakers at high ways where are rushes of the vehicles too much thus increase input torque and ultimate output of generator. If we use this project at very busy stairs palace then we produce efficient useful electrical for large purposes.

In future this method will be a promising method for generating eco-friendly electricity. We also contribute this method at common places It is especially suited for implementation in crowded areas. This can be used in street lighting without use of long power lines. It can also be used as charging ports, lighting of pavement side buildings.

## VIII. ACKNOWLEDGEMENTS

This dissertation report would not have been come into reality without the able guidance, support and wishes of all those who stand by using the development. We wish to give our special thanks to our guide Prof. Jayesh Rane for his timely advice and guidance. We acknowledge all the staff members of the Department of Electronics and Telecommunication Engineering for their help and suggestions during various phases of this project work.

## REFERENCES

1. International Journal of Scientific & Engineering Research Volume 2, Issue 5, May-2011.
2. K.Ramakrishna, GuruswamyRevana and Venu Madhav Gopaka International Journal of Multidisciplinary and Current Research 20 Sept 2014, Vol.2.

**Books**

3. Electrical Power Generation Using Piezoelectric Crystal Anil Kumar
4. Vibration Based Energy Harvesting Using Piezoelectric Material, M.N. Fakhzan, Asan G.A. Muthalif, Department of Mechatronics Engineering, International Islamic University Malaysia, IIUM, Kuala Lumpur, Malaysia.