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A novel method to convert gravitational potential energy into electricity using piezo transducers

***Abstract*--This paper discusses a novel method to convert gravitational potential energy into electricity using piezo transducers. Piezo transducers produce electricity when the pressure applied on them changes. In this method, we use a water column with varying length to change the pressure applied on a piezo transducer. Major advantage of this technique is that there is no running resource being consumed.**

***Index Terms*--Piezo transducer**

I. Introduction

For over a decade now, there has been emphasis on generating electricity using renewable energy sources like sun, wind and tides as they are more environment friendly than fossil fuels. However, energy from fossil fuels can act as non-random sources of energy (from energy transmission point of view) making them relatively easy to deal with. Energy from renewable energy sources are random in nature and can vary widely depending on environmental factors like time of day and time of year [1].

This paper presents gravitational potential energy as a source of renewable energy. Gravity is present everywhere on earth and nearly constant at most places. Hydel power plants convert gravitational potential energy into electricity but require water as a running resource.

This paper deals with a new approach to convert gravitational potential energy into electricity with no running resource being consumed.

II. Pressure variation

Consider a vertical pipe ”A” firmly held by a hinge as shown in the Fig. 1. It is separated by a few millimeters from another similar pipe B which is resting on a piezo transducer. The two pipes are connected using a non-rigid material like a plastic cover and the joint is sealed such that there is no water leakage. Entire arrangement is placed inside a vacuum chamber.

Pipe A has a valve which can be opened or closed. Open the valve and fill the pipe combination with water. Now the pressure on the piezo transducer is due to the weight of bottom pipe and the entire length of water in the pipe combination. If the valve is closed, the pressure on the piezo transducer is due to the weight of bottom pipe and reduced length of water column. Hence, by opening and closing the valve, the pressure on piezo transducer can be changed.

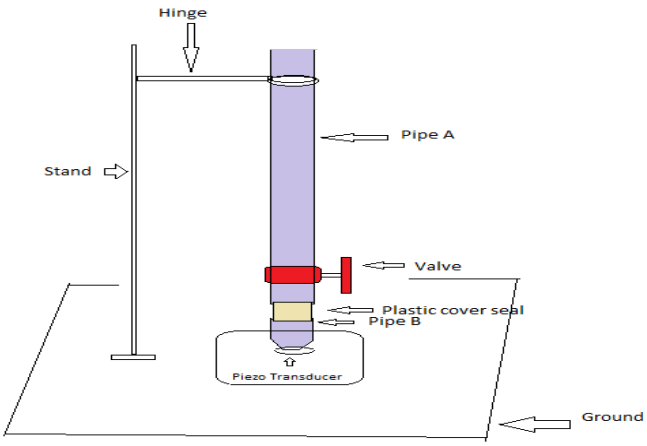

Fig. 1. Basic construction of the pipe and piezo transducer combination

III. Energy generation

When the pressure on piezo transducer is varied, it produces energy but opening and closing the valve also requires energy. In order to build a net energy generator, we need to operate several piezo

transducers in parallel while restricting the number of valves to 1 as shown in Fig. 2.

When several bottom pipes B1, B2, B3... are connected to top pipe A as shown in figure, using a single valve, the pressure on all the piezo transducers can be varied in parallel. When sufficiently large number of piezo transducers are used, energy generated from the transducers is greater than the energy consumed by the valve.

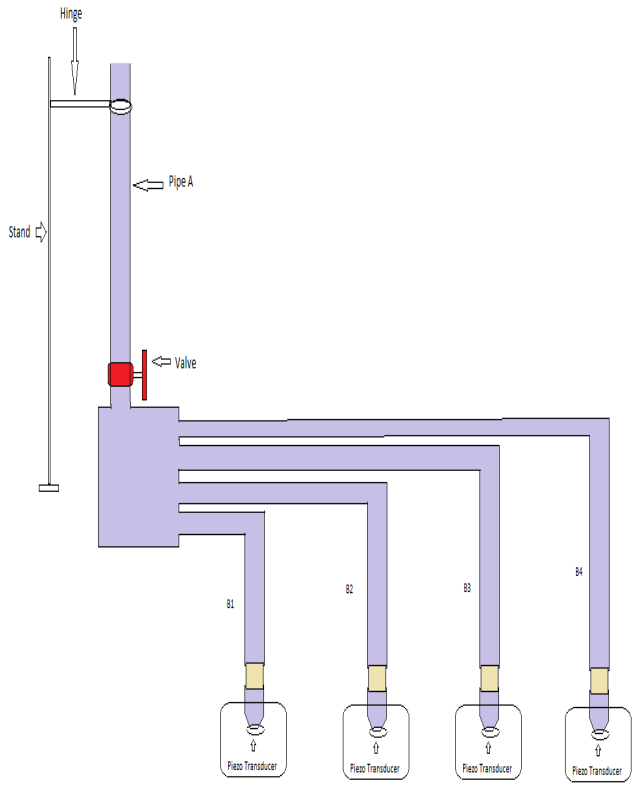

Fig. 2. Parallel operation of transducers

IV. Conclusion

A renewable energy generator using piezo transducers was presented. This paper shows the feasibility of converting gravitational potential energy into electricity without using a running resource. However, commercial viability of this design is questionable. Even for generating 1 watt of power, several thousands of transducers may be required and the size of the generator may be big.

V. References

[1] A. S. Anees, "Grid integration of renewable sources: Challenges, issues and possible solutions," *2012 IEEE 5th India International Conference on Power Electronics (IICPE)*, pp. 1-6, 6-8 Dec. 2012.

VI. BIO

B R V Sumith Kumar did his Bachelor's degree in Electrical Engineering and Master's degree in Communication Systems from Department of Electrical Engineering at IIT Madras from 2004 to 2009. Currently, he is the CEO of Magworks, Hyderabad (India) and can be reached at sumithiitm@gmail.com