

A Smart-Shoe

Harsh Pankajkumar Pujara¹ Shyam Mansukhbhai Modi² Prof.Manish. B. Kumar²

^{1,2}B.E. Student ³Assistant Professor

¹Department of Mechanical Engineering ²Department of Electronics & Communication Engineering

^{1,2,3}Government Engineering College, Bhavnagar

Abstract— A SMART-SHOE is important to relief a layman from disease like diabetes and other Ortho-pain disease related to joints of legs. Security and safety of small children's is also an issue nowadays. Energy sources are also decreasing and are also becoming costly. Passers are day by day increasing. Energy sources (Electricity) availability is one of the most important challenges that traffic are trying to address. This project "A Smart-Shoe" helps the parents to locate their children. We can also charge our cell phones and save electricity. People can stay free from the orthopedic disease. They can have a good, stylish, comfortable and an energy producing shoe. In this paper, I present footwear with piezo based solution for various and vast applications for each and every age groups.

Key words: Piezo-Electricity Concept, Energy Saver Footwear, Footwear with GPS System Embedded, An Ortho-Free Footwear

I. INTRODUCTION

In this project, I am going to make a smart -shoe that helps user for multi-tasking applications. This will be done through the concept of piezo - electricity. Based on the concept the shoe itself is capable of producing the electricity which is sufficient for the personal usage. The idea behind this project is that after long working day I reached to home I was fully exhausted still my parents said to me "Go and purchase some grocery". When I reached the mall, during shopping I was confused. I had to call my mother but my cell phone battery was dead. My project is to produce electricity with various other applications. I want to achieve following goals in this project.

- User friendly and eco-friendly with green technology.
- Make it available with minimum cost and with mobile resources.
- Focus to make it maintenance free.
- To help adult to be free from orthopedic disease
- To locate the children using GPS and work for safety assistance.
- To generate electricity.

II. THE ALGORITHM

Generation of electricity and its scope in future:

In [2], the basic concept is to prepare and integrated circuit using small piezo.

- First, we need to take a power-bank to store generated electricity.
- We need to check the efficiency of the power-bank.
- Now we will take the small piezo transducers which are capable of producing electricity.
- We also need to join a rectifier, an I.C. 7805 and GPS embedded micro circuit.

In [3], the basic idea behind the innovation is to produce the electricity which will be stored in the power-bank and can be used when ever needed on the way. It does

not have any harmful effects on the orthopedic parts as it is embedded with the Ortho-free soul. It can be directly connected to the GPS system and the current location can be found out by it.

This accuracy is reached by carrying out similar tests on different electro-generating materials and tweaking the sensitivity and making other small changes in the piezo-circuit implementation. In this situation the possible best circuit and the design with high flexibility and mobility, good tracking sensors with location have to be detected, and thus reduce the loss of electricity.

In [3], the circuit with multiple function is to be implemented. The capacity of each piezo-transducer we take is 6 Volts, 1.7 milliampere and 2 pFarads value is to be taken. A 7805 I.C. is to be installed in order to get 5 V output.



Fig. 1: A systematic overview of the circuit

Here we connect an GPS embedded circuit. The circuit is too complex but I tried to make it as flexible as possible.

Parameters include:

- 1) 'Object Polarity' - Specifies the polarity of the person with respect to the globe ad current location. Available options are:
 - 'Current location': The object is at the current place or location. (Default)
 - 'Last location': The object was at which place or position before it lost its connection.
- 2) 'Method' - Specifies the technique to generate he electricity by walking. Available options are:
 - 'walking generation': As we start walking and there is pressure on circuit by our feet.(Default)
 - 'Location tracker': The method like GPS to know and track the location.
- 3) 'Sensitivity '- Specifies the sensitivity factor in the range according to the capacity of the piezo and the force applied by our feet at that instant. A high sensitivity value leads to produce more electricity at that instant, including weak or partially obscured ones, at the risk of a higher false production rate.

III. MODEL DIAGRAM

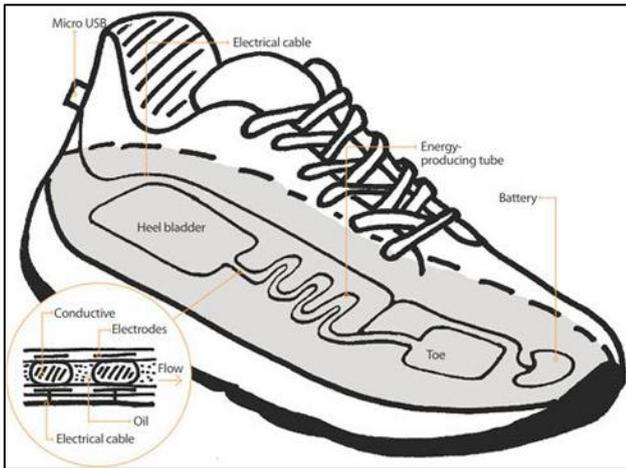


Fig. 2: Model Diagram

IV. BLOCK DIAGRAM

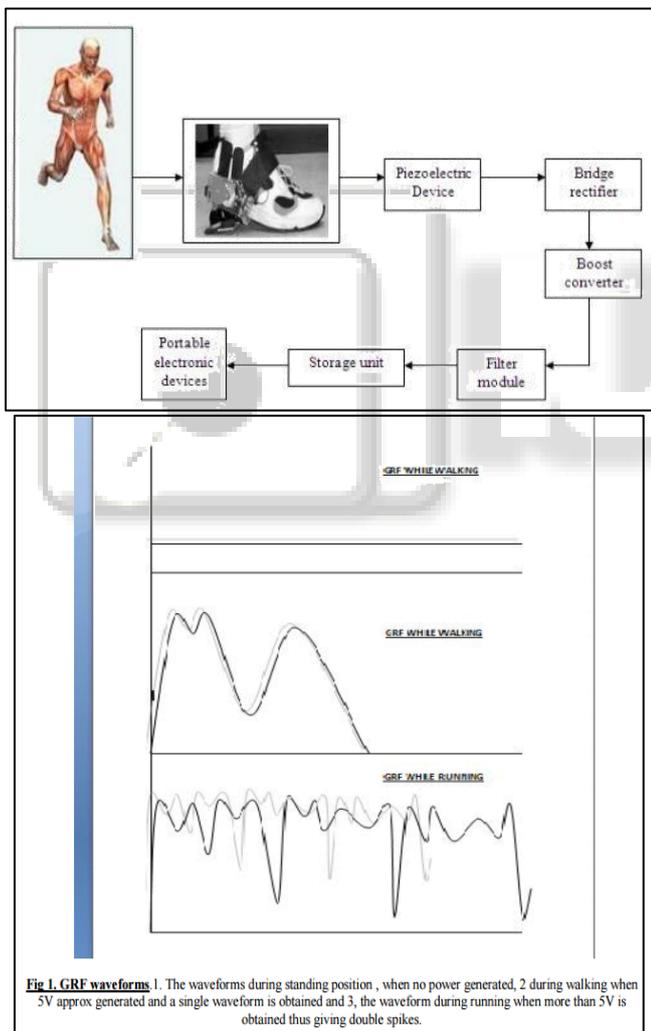


Fig. 3: Practical output Diagram

V. FEATURES

Our Project “A SMART-SHOE” has some features which made our app unique and more useful from others. Some of them are listed below.

- User friendly materials
- Less hardware resources

- Less maintenance
- GPS system embedded
- Ortho-free footwear
- Cheap in cost
- Non-Bulky
- Portable charging
- Inbuilt LED lights for stylish look

VI. SIMULATION RESULTS

In order to present the performance of proposed method, we used a digital oscilloscope on Proteus software and obtain the waveform.

VII. CALCULATIONS

Li-ION battery: 3.7 V

Input of power-bank: 5 V

Output of power-bank: 3.7 V

Efficiency of power-bank: 74%

Power loss while charging is taken into consideration. So, it is 65%-70%.

$$E = 1/2 CV^2$$

$$E = 1/2 * 22\mu F * 5^2$$

$$E = 2.75 J$$

$$4.7Wh = 16.92 kJ$$

$$4.7Wh = 1692 J$$

$$16,920 J / 0.55 J = 30,736.63 \text{ steps}$$

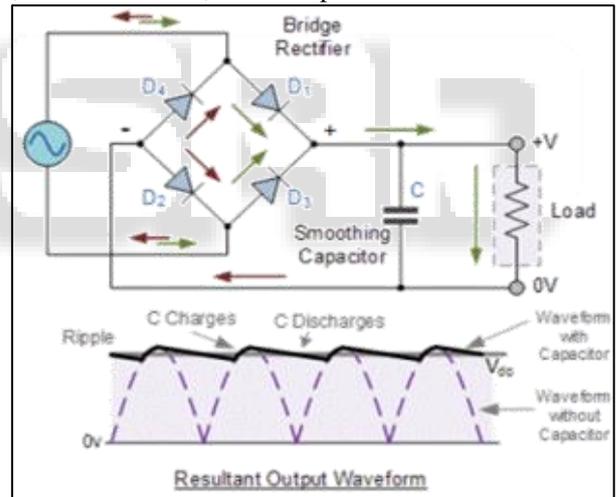


Fig. 4: Simple Schematic Diagram

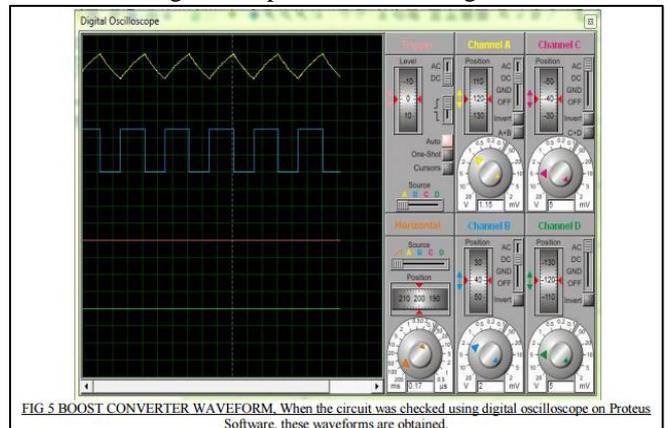


Fig. 5: Snapshot of oscilloscope Wave Form

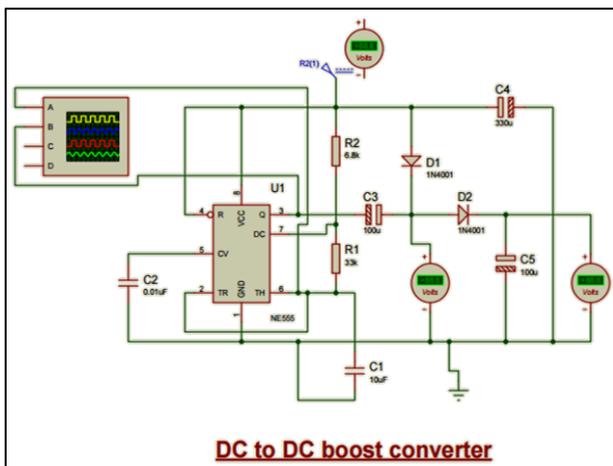


Fig. 6: Resultant circuit

VIII. CONCLUSION AND FUTURE SCOPE

We can conclude that based on the working model that the smart-shoe is a kind of an energy harvesting device. It can produce the energy which is sufficient for a person of every age group. It has many advantages for every age groups and during any of the climate changes or situation. It is a positive step towards the green technology which is to be essential nowadays.

Future research will be focused on producing more electricity and to enhance the security feature as an added advantage to make the intelligent system with minimum wireless interfacing hardware at low cost. We would try our best to work for the safety purpose and completely digitize it.

ACKNOWLEDGEMENT

Most successful system is team efforts. We could have accomplished nothing without the moral support and guidance from our institute, organization, friends and family members. The successful completion of this project work stands on the shoulder of many persons who have helped us directly or indirectly. We take this opportunity to express heartiest gratitude to those people.

REFERENCES

- [1] www.instructables.com/id/Electricity-Generating-Footwear/
- [2] https://www.youtube.com/watch?v=FGQ_7fMXBf8
- [3] <http://www.iflscience.com/technology/teenager-invents-energy-generating-shoe-insoles/>
- [4] <http://www.memsjournal.com/2010/04/microstructured-piezoelectric-shoe-power-generator-outperforms-batteries.html>
- [5] <http://www.explainthatstuff.com/piezoelectricity.html>
- [6] <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4168512/>
- [7] <http://ieeexplore.ieee.org/document/5196774/>
- [8] <https://www.youtube.com/watch?v=dKEW2LIPWao>
- [9] www.play.google.com