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MOBILE PHONE CHARGING USING WALKING MOVEMENT

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ABSTRACT

In today's hectic lifestyle, health has been seriously hampered due to sedentary work. Our project represents an idea of walking based wearable piezoelectric device that provides an alternate means for powering mobile phone batteries. Since, the mechanism of the device is based on walking; the device promotes human metabolism as well as physical fitness. Hence, it can be seen as an e-health gadget that encourages walking exercise as a means to charge mobile phone batteries. Walking is the best and common activity in day to day life. As per the study of biomechanics, we came to realize that ground reaction force (GRF) exerted from the foot, when converted into voltage gives enough power supply to run a device. While walking the person loses some energy from foot in the form of vibrations which are sensed and converted into electric form. Piezoelectric crystal does the work of generating output out of foot moment. Piezoelectric materials have the capability of absorbing mechanical energy from surroundings, especially vibrations and transform it into electric energy that can be used as power supply in real time to other appliances like mobile phones, power banks, various small handy biomedical instruments etc.

Keywords: Piezoelectric disc, Energy harvesting, DC conversion circuit, Alternate energy source.

I. INTRODUCTION

The busy lifestyle of today's world has made people neglect their health. As people are working very hard, and have a sedentary lifestyle, they are falling prey to many health and coronary problems. Researchers have shown that walking is one of the most important and health enhancing exercise. Development of technology has made us lazier and physically unfit. Here we propose a walking based mobile phone charging device that enhances physical exercise from the user and also provide for alternate source of energy. Also, mobile phones have become an integral part of one's life. Charging mobile phone is a time consuming process. It requires user constraints in charging mobile phones. The increase in energy consumption in mobile phones is in alarming rate. A problem arises when such an enormous use of mobile phones is not completely supported by their fast discharging batteries. Charging mobile phone requires user attention, it requires appropriate socket and electrical connectivity. Particularly for tourists, mountaineers and villages, it provides specific constraints in charging mobile phones. These difficulties are encountered in charging mobile phone from time to time.

II. LITERATURE SURVEY

International journal of Innovation Research in Science, Engineering and Technology, "Real Time Battery Charging System by Human Walking",2 Feb 2015.Piezoelectric Disc is used which converts vibrations of feet into electrical signals. Signal is in AC which is converted into DC and then boosted by using DC to DC boost convertor. For storing the electrical signal, 'Lithium Batteries' are used.

III. PRINCIPLE

The basic principle involved is the conversion of human mechanical power into electrical signals. This mechanical power comes from human walk. Now, this mechanical energy in terms of vibrations is fed to the piezoelectric disc that transforms these vibrations into useful electric power. This output of the transducer is rectified and regulated to a value sufficient enough to charge a mobile phone battery. The input energy is purely a mechanical one that comes from user's motion and gets converted into the required signals via piezoelectric harvesting system. The charging time of the mobile phone depend on the frequency and amplitude of vibration provided to the transducer. So, if the speed of user's motion is increased the output of the device can be enhanced. For measuring this output we have develop an Android app which gives information about the input of solar and piezoelectric transducer and the output of battery.

IV. DESIGN

The circuit of the device mainly consist of a piezoelectric harvesting system, Solar cell , regulating IC. A apacitor (1000 uF) is used to store the electric charge so that when the person is not in motion the power is continually supplied. The piezoelectric disc is equipped in the interface between the bottom and upper part of the sole. The whole circuit is made on a small chip and is fitted at the back part of the shoe. Different connectors for charging mobile phone batteries can be taken out from the shoe. A switch is also provided in the circuit for the user to decide whether he wants to charge his mobile phone.

V. BLOCK DIAGRAM

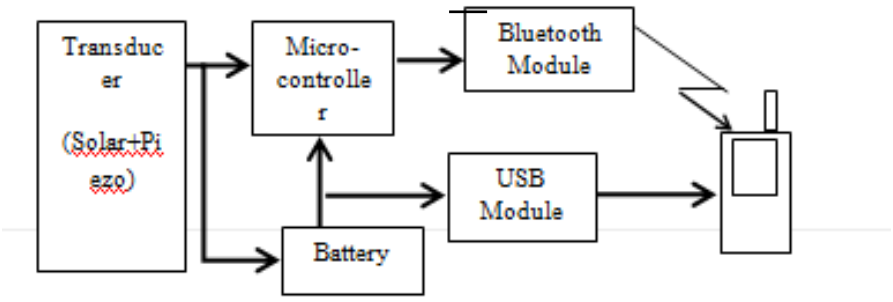

Fig. Block diagram

5.1 Piezoelectric disc:-

Piezoelectric disc is a transducer which converts the vibrational pressure into electricity.

We have connected three piezoelectric discs in parallel. Each generates an output of maximum 8-9V.

Fig. Piezoelectric disc

5.2 Solar Panel:-

A Solar panel turns the suns light into electricity. One solar panel consists of many small solar cells. Each of these solar cells uses light to make electrons move which generates electricity.

In our Project we are using three solar panel of 4v and 100mA current which are connected in parallel with the piezoelectric disc. We get a total output of 4V and 300mA current which is sufficient to charge a battery of 4V. The Coin is given only to compare the size of solar panel.

Fig. Solar Panel

5.3 Battery:

For storing the charge, we are using a Lead Acid Rechargeable DC Battery of 4V 1A. It is a maintenance free sealed battery used as a Power bank in our project.

Fig. Storage Device

5.4 Bluetooth Module:

HC-05 module is an easy to use Bluetooth SPP (Serial Port Protocol) module, designed for transparent wireless serial connection setup.

Serial port Bluetooth module is fully qualified Bluetooth V2.0+EDR (Enhanced Data Rate) 3Mbps Modulation with complete 2.4GHz radio transceiver and baseband. It uses CSR Bluecore 04-External single chip Bluetooth system with CMOS technology and with AFH(Adaptive Frequency Hopping Feature). It has the footprint as small as 12.7mmx27mm. Hope it will simplify your overall design/development cycle.

Fig. Bluetooth Module

5.5 ATmega 328 microcontroller:-

TheATmega48A/48PA/88A/88PA/168A/168PA/328/328P is a low-power CMOS 8-bit microcontroller based on the AVR enhanced RISC architecture. By executing powerful instructions in a single clock cycle, the ATmega48A/48PA/88A/88PA/168A/168PA/328/328P achieves throughputs approaching 1 MIPS per MHz allowing the system designed to optimize power consumption versus processing speed.

We are using Pin no. 23 ADC0 as Input of Battery and Pin no. 24 ADC1 as input of solar and piezoelectric transducer and RXD and TXD, Pin no.2 and 3 for serial communication with Bluetooth Module.

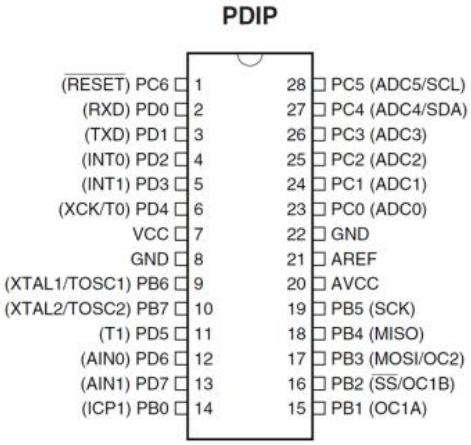

Fig. Pin Diagram of Atmega328

5.6 DC to DC converter:-

The output from the battery is further feed to DC to DC booster which functions as Step-up booster. If the voltage level is above 1.5V which is its threshold level, it will give a constant output of 5V which is given through the USB port to the Mobile Phone.

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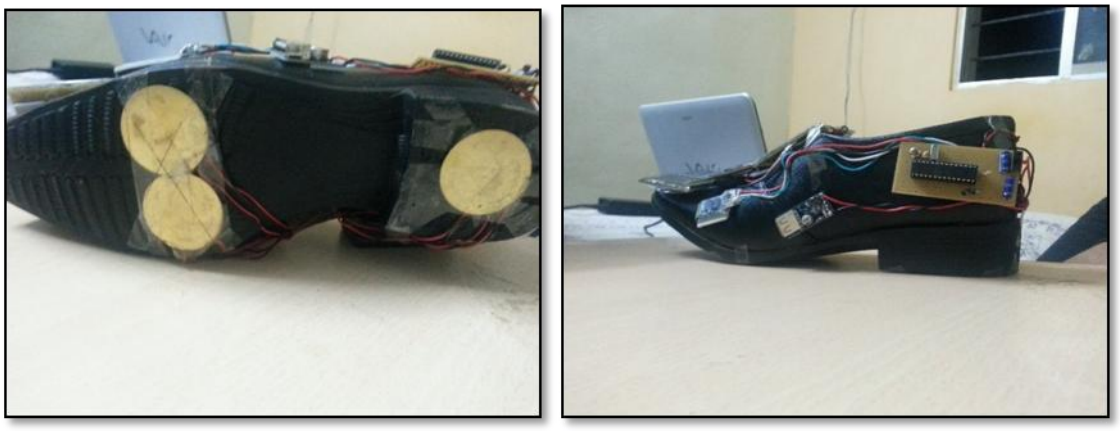
Fig. DC Step-Up Boost Module with USB Port

VI.COMPONENT LIST

Components	Specifications
Piezoelectric metal type disc	10hz
Solar Panel	4V 100mA
Atmega328	8-bit microcontroller
Storage Unit	Lead Acid Battery (4V)
Diode(1n4148)	0.4V
Crystal oscillator	16Mhz
Capacitor	22uf
Resistor	100k
Led	5V
Bluetooth Module	HC-05
DC Step-up boost module with USB Port	5V 600mA

VII. PROJECT PROTOTYP



VIII. REAL TIME APPLICATION

1. Mobile Phones
2. Electronic Torch

3. Cell Charger

IX. ADVANTAGES

1. Can be used anywhere.
2. Portable charging.
3. No side effect on Human Body.
4. Can be used in different shoe.
5. Gives the power supply in real time.
6. The extra power generated can be stored and used for further purpose.

X. CONCLUSION

When we connect the piezoelectric disc in parallel instead of series for better results, we obtain more current instead of voltage which is desirable for charging the battery. , Thus in all we conclude that with this process, we can extract the energy from the human feet, convert it into electric energy and use it in real time application of charging the devices.

XI. RESULT

The output of piezoelectric disc is up to 8-9V and that of solar is 4V and 100mA. The input given to the battery is up to 3.8V using solar and piezoelectric disc. By using piezoelectric disc the time required to charge 1000mAh battery is 2 hours while walking and same while running is 1.40 hours. By using Piezoelectric and solar together time required is 1.30 hrs.

XI.ACKNOWLEDGMENTS

We have opportunity to say thank to all who have helped us directly or indirectly to make the project successful which is “MOBILE PHONE CHARGING USING WALKING MOVEMENT”.
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