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SMART SHOES

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Abstract: It is a wearable shoe, which is designed by which it has wireless interfacing with the embedded system, known as Smart Shoe. The standard is exceptionally simple, when you apply pressure on piezoelectric devices, electricity is generated over the gem grid. In this study work, a smart phone based system for analyzing characteristics of smart shoe is proposed. The system employs piezoelectric devices, which generates electricity by walk to measure the pressure distribution underneath a foot. With this stored electricity is used for heating purpose for our soldier who killed by weather Life is tough at the Siachen glacier, spread over a 76 km area, due to sub-zero temperatures that dip below -60 degrees, constant threat of avalanches, crevasses on the glacier, high-speed winds and a range of potentially fatal altitude-related ailments.

Index Terms **– Multi utility shoe , Piezoelectric Devices, Smart Shoe, Wearable shoe , heating shoe.**

I.INTRODUCTION:-

With the conventional source of generation of electricity being either polluting or non reusable (example. Coal, fossil fuels etc) search for a clean, reusable source of energy has caused a spike an interest in the exploration of piezoelectricity.[1]

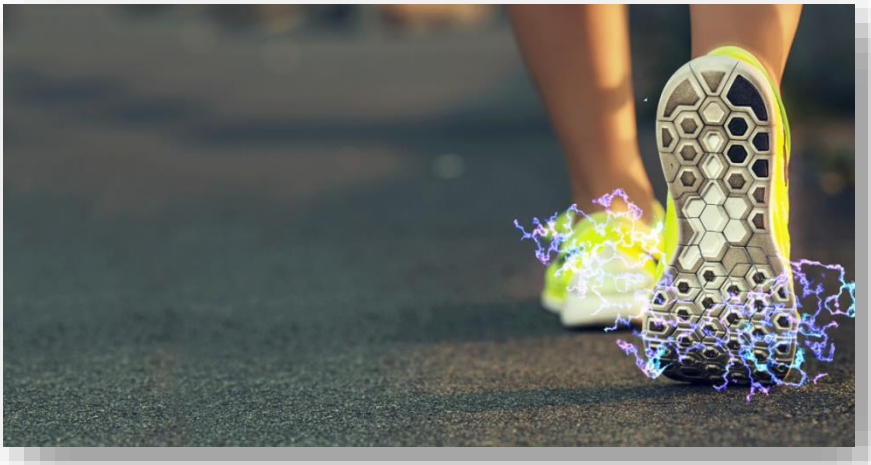
Unused power exists in various forms such as industrial machines, human activity, vehicles, structures and environment sources. Among these, one of the promising sources of recovering energy is from the vibrations generated by the key depressions of any keypad integrated device such as a mobile phone. Primarily, the selection of energy harvester as compared to other alternatives such as battery depends on two main factors, cost effectiveness and reliability. In recent years, several energy harvesting approaches have been proposed using solar, thermoelectric, electromagnetic, piezoelectric and capacitive schemes which can be simply classified into two categories, (i) power harvesting for sensor networks using MEMS/thin/thick film approach, and (ii) power harvesting for electronic devices using bulk approach [4],[5]

Walking is a fundamental and daily activity that permits people to seek after their day-to-day lives and to function as productive individuals in society. The walk, with the smart shoe on our feet would be highly beneficial. Keeping in mind, the smart shoe is designed as a necessary day-to-day article to anyone. When we walk, the energy produced in walking is wasted. What if we utilize the energy by converting it into electricity by the extraction of electrical energy from human body through movement, which is obtained by piezoelectric devices[3]

In the current era, which is witnessing a skyrocketing of energy costs and an exponential decrease in the supplies of fossil fuels, there arises a need to develop methods for judicious use of energy which lay emphasis on protecting the environment as well. One of the novel ways to accomplish this is through energy harvesting Energy harvesting, or energy scavenging, is a process that captures small amounts of energy that would otherwise be lost as heat, light, sound, vibration or movement. It uses this captured energy to improve efficiency and to enable new technology, like wireless sensor networks. Energy harvesting also has the potential to replace batteries for small, low power electronic devices. Piezoelectric materials can be used as a means of transforming ambient vibrations into electrical energy that can then be stored and used to power other devices. With the recent surge of micro scale devices, piezoelectric power generation can provide a convenient alternative to traditional power sources used to operate certain types of sensors/actuators, telemetry, and MEMS devices. [1]

The advances have allowed numerous doors to open for power harvesting systems in practical real world applications. Much of the research into power harvesting has focused on methods of accumulating the energy until a sufficient amount is present, allowing the intended electronics to be powered. We have cited implementation of piezoelectric materials in harvesting energy from tapping of keys of keyboard and use it for various applications like charging the mobile phones.

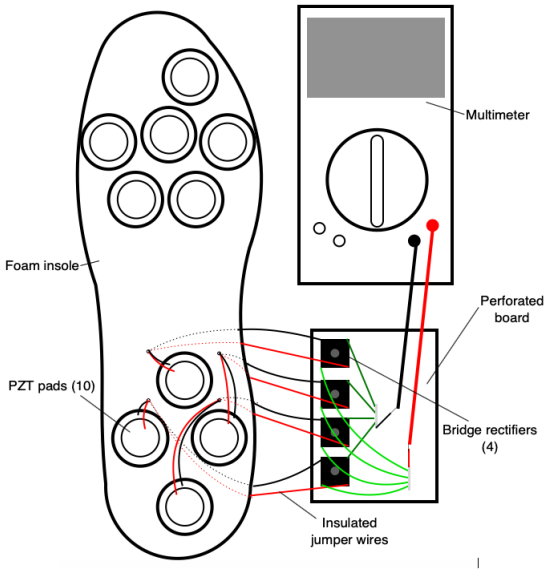
With the decrease in energy consumption of portable electronic devices, the concept of harvesting renewable energy in human surrounding arouses a renewed interest. This technical paper focusses on one such advanced method of energy harvesting using piezoelectric material.[6]



The aim of our project is to build a system that can generate power from that energy which was previously used to get lost. Our project is extremely simple but highly useful. This system when applied on large scale can generate very high amount of power this power then can be used for up liftmen of the civilization. In today's era, energy is die hard need of the world. For which various methods of energy generation are developed. But methods employed for these purposes are expensive, space consuming, material consuming and hazardous to environment. The Power plants need large amount of land for which deforestation and rehabilitation of settlements is to be done, which in turn affects entire ecosystem and entire social system. Also these power generation leads to depletion of resources. Thus piezoelectric power generation can be a good alternative for fossil fuels. It is clean, nonhazardous, easy implementable, inexpensive and eco-friendly source of energy. There is no by product in this power generation. It occupies less space and is easily portable. We can implement this piezoelectric effect in various ways to generate energy. This system can be used at domestic level as well as at the high industrial level. We are implementing this at small level for power generation using keyboard and charging small gadgets like mobile phones.

II. Litreture Review :

2.1 Energy Harvesting using Piezoelectric Materials Parul Dhinga from dept. Of E.C E of M. I T Manipal has explained theoretical model for energy harvesting system using piezoelectric materials have been presented . It is evident that harnessing energy through piezoelectric materials provider a cleaner way of powering lighting systems and other equipment. It is a new approach to lead the world into implementing greener technologies that are aimed at protecting the environment Piezoelectric energy harvesting systems are a one time installment and they require very less maintenance, making them cost efficient. One of the limitations of this technology is that its implementation is not feasible in sparse populated areas as the foot traffic is very low in such areas. Further experimentation has to be carried out for its implementation on a larger scale, with an efficient interface circuit at a low cost in universities.



2.2 Power Harvesting System in Mobile Phones and Laptops using Piezoelectric Charge Generation: Karthik Kalyanaraman has proposed energy conservation system for mobile phones and laptop keyboards have been presented in this paper. The design presented here will be quite effective in providing an alternate means of power supply for the mentioned devices during emergency Further, the approach presented in this paper can be extended to many other applications where there is scope for similar kind of energy conservation. The material used for the current application is a PZT with 1.5 Mba lateral stresses

operating at l5Hz. The volume of the material used is 0.2cm3, The output power produced is 1.2W The energy/power density is 6mW/cm3.The output voltage is 9V. This voltage can be used to produce the required amount of charge after being processed.

2.3 Electrical Power Generation Using Piezoelectric Crystal: Anil Kumar has proposed that the technology is based on piezoelectric materials that enable the con-version of mechanical energy exerted by the weight of passing vehicles into electrical energy. As far as the drivers are concerned, the road is the same, she says Edery-Azulay added that expanding the project to a length of one kilometer along a single lane would produce 200 KWh, while a four-lane high-way could produce about a MWh sufficient electricity to provide for the average consumption in 2,500 households. As the results shows that by using double actuators in parallel we can reduce the charging time of the battery and increase the power generated by the piezoelectric device. In second research where a piezoelectric generator was put to the test and generated some 2,000 watt-hours of electricity.

2.4 Piezoelectric Crystals: Future Source of Electricity Pramathesh T has explained that in India, maximum public movements is observed in railways stations and holy places, hence, such places can be exploited for use of piezoelectric crystals for generation of electricity. Gathering ranging from thousands to millions are observed in holy places, thus installation of piezoelectric crystals at floorings would generate enough power to light up lights of houses as well as air circulation systems. Use of piezoelectric crystals has being started and positive results are obtained. With further advancement in field of electronics, better synthesized piezoelectric crystals and better selection of place of installations, more electricity can be generated and it can be viewed as a next promising source of generating electricity.

Working:

Piezoelectricity is the electricity created when a **mechanical force** is applied to a crystal. This effect is depicted below, when pressure leads to **a difference in charges** creating voltage. Within a piezoelectric crystal there are polar covalent bonds that exist in equal and opposite directions meaning that the overall structure is a **non-polar** structure. A mechanical force applied to the piezoelectric crystal will force the charges out of balance so that one face of the crystal is positively charged and the other face is negatively charged.With use of this charging we can create heating effect on leg fit and also creating heating effect in tent with use of heating fan.

1) LOW POWER HEATING COILS WATERPROOF :

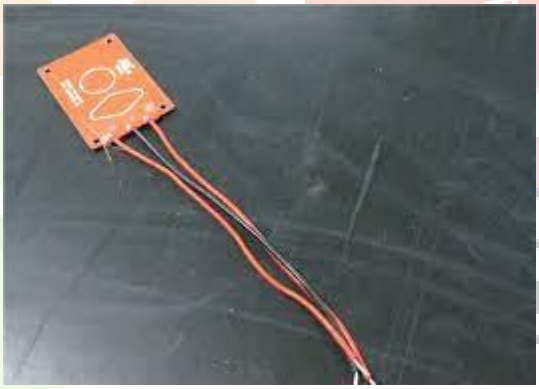


Fig:- 2.1 heating coils

Power heating coils use for creating heating effect on leg fit side by using small voltage .

2) ELECTRIC GENETATOR TRANSDUCER

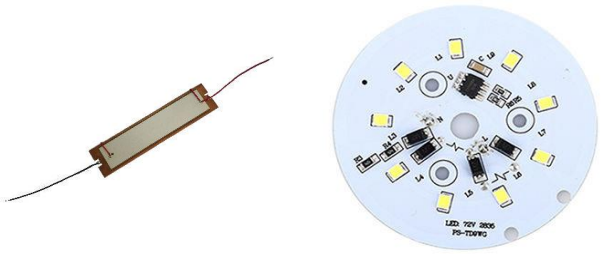


Fig 2.2 Waterproof Low Power Smd Pcb

The conversion of mechanical energy into electrical one is generally achieved by Dynamo - a convertor alternator. But there are other physical phenomena that can also convert mechanical movements into electricity, one of which is piezoelectricity. A transducer converts some sort of energy to sound (source) or converts sound energy (receiver) to an electrical signal. [1]

Acoustics, piezoelectric and magnetostrictive transducers are commonly used; the former connects electric polarization to mechanical strain and the latter connects magnetization of a ferromagnetic material to mechanical strain.

3) **Battery**

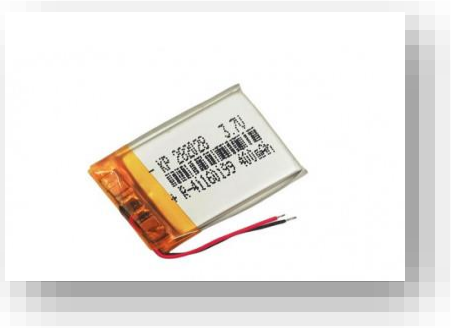


Fig 2.3 LiPo battery

We utilize LiPo (Lithium-Polymer) battery in this venture. Each cell of LiPo battery has a voltage of 3.7V, which works splendidly with Arduino Pro smaller than expected. There are numerous sorts of batteries as far as the measure and the limit. For a battery with current capacity under 100 mAh, it doesn't ensure stable power, which is too low to boot the framework. The battery should have circuit protection towards overcharging and overdischarging. The system is better to have a removable attachment. For the comfort, you can include LiPo charger module in underneath connection. It underpins accusing of USB and control out pins for Arduino. For this situation, some of source code must be adjusted.

III. AUTOCAD DRAWING:-

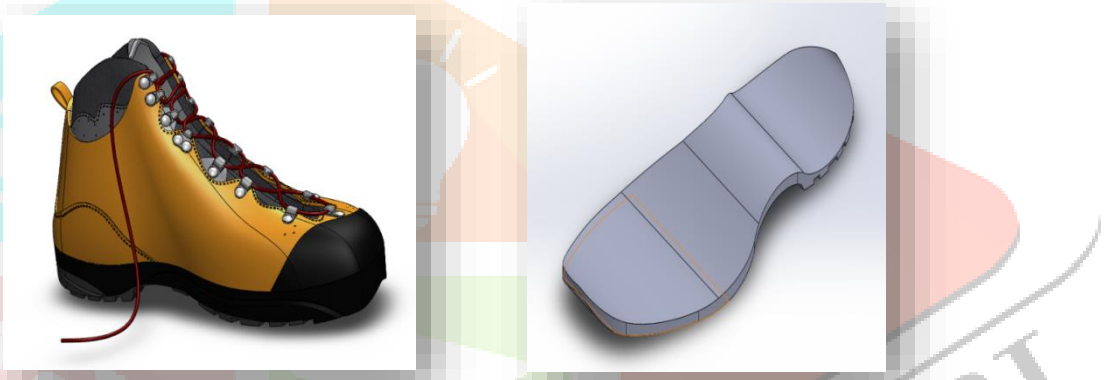


Fig:- 3.1 Pizeelectric transducer

Fig:- 3.2 Assembly Drawing

IV. CONCLUSION:-

The design of the proposed energy conservation system for mobile phones and laptop keyboards has been presented in this paper. The design presented here will be quite effective in providing an alternate means of power supply for the mentioned devices during emergency Further, the approach presented in this paper can be extended to many other applications where there is scope for similar kind of energy conservation.

V. FUTERSCOPE:-

1. Inertial-magnetic measurement units made up of an accelerometer, a gyroscope, and a magnetometer are used for gait analysis.
2. Satellite navigation systems such as GPS, GLONASS, and GALILEO are used to provide information for the real-time location.
3. Pressure sensors are used to provide information on the distribution of body weight mid-gait.
4. Ambient environmental sensors, including atmospheric pressure, light, and sound sensors, are used for acquiring data from altitude-dependent activities and the surrounding environment.
5. Internal status sensors are used to provide information on battery and memory capacity.

VI. HARVESTING ENERGY FROM HUMANS

The human body contains enormous quantities of energy, for e.g. an average adult has a one-ton battery in the form of fats in present in the body. This energy is used as fuels for all activities. Piezoelectric effect can be used to generate electricity using such body energies to run smaller gadgets which consume less power. [3]

VII. ACKNOWLEDGMENT

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