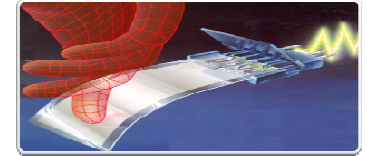




Possible Uses For Piezoelectric Power

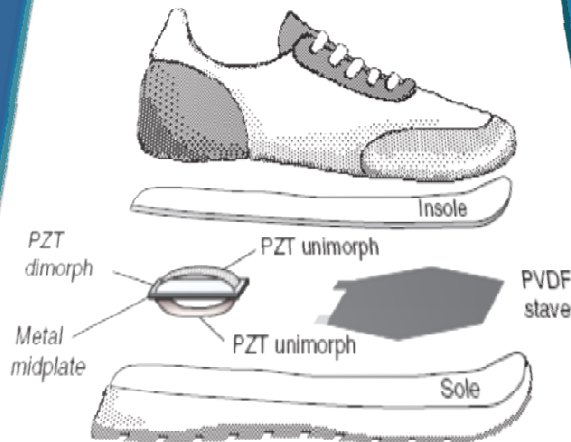
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Abstract

Piezoelectricity allows us to capture wasted kinetic energy from everyday tasks and transform it into useful electrical energy. By researching piezoelectricity in terms of both wants and needs in life, we identified many potential applications. Piezoelectrics might fulfill consumer desires by powering small scale portable electronic devices. Areas of application to basic human necessities might also include: helping to provide enough energy to power personal water purification systems, or to power the monitoring of vital signs of those with pre-existing medical conditions (such as first responders and military personnel). We found the life monitoring vest to be the most practical and beneficial of these three possibilities.

Shoe Mounted Piezoelectronics



Goal

The goal of our project is to assess the feasibility of creating a need based piezoelectric device for use in locations and situations where the production and delivery of energy is limited.

We will need to explore and evaluate a basis for why this technology is needed and prove that it is going to be more than just a convenient way for privileged citizens of affluent societies to charge their cell phones. We must determine the most efficient system for capturing energy from the daily activities of an individual who lives in a developing nation without a reliable source of energy. Next we will have to assess whether we will have enough energy to accomplish said task. As another possible use we will assess the feasibility of using piezoelectrics to power life monitoring vests. We will then evaluate what further research will be most beneficial.

PiezoWHAT?

Piezoelectric are a means of converting "wasted" kinetic energy into useful electrical energy. The basic principal behind the piezoelectric effect is when two or more sheets of a ceramic material are moved along each other there is a difference in there electric potential.

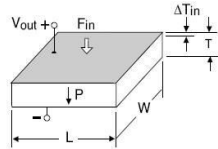


Fig 1] Longitudinal Generator

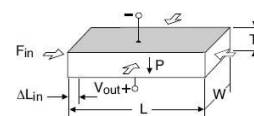


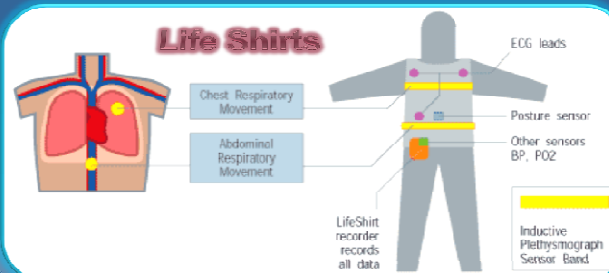
Fig-2 Transverse (d31) Generator, Compressed on sides.

Methodology

The Piezoelectric system harvests energy from the world around us, thus far piezoelectricity has been used in sensory equipment. Our project has explored multiple possibilities in an attempt to find another application for these systems. The first step we took towards discovering piezo-systems and opportunities offered with this unique power source were in the direction of easily chargeable small appliances.

*"In general, we want to accumulate the power before using it; for example you could walk for 20 minutes then have enough power to talk for 2.5 minutes on your cell phone."
- Henry Sodano.*

After researching the amount of power available through the generators we took our knowledge and applied it to water purifying systems. We realized our power supply may not be feasible because of cost issues. Then we discovered an article about life vests, which can monitor vital signs. These vests were less power hungry than the purifying generators. The project evolved into the possible applications for the electricity piezo-systems produce, applications that would provide for under developed countries.



Results

- The most efficient placement of piezoelectric material is in the shoe.
 - Due to the compression of the heel and flex of the toe.
- Batteries today are inadequate.
 - More research must be done on storage devices.
- Water purification systems are not feasible.
 - Better alternatives currently exist.
- The possibility of charging consumer electronic devices is real.
 - More research must be funded.
- There is enough constant power to run a vital sign monitoring system.
 - Military interest may fund more Research & Development.
- Research could build upon power production possibilities.



Conclusions

Not only would this help save lives of those in the military, but also it could help people prone to medical conditions such as heart attacks.

Further research and funding should be put into the life monitoring vests. Once the technology has been perfected for powering this device it will be able to be used for any other means. One such means would be for use with portable electronic devices. This would then make piezoelectrics a consumer driven product allowing its continued research and development.

Piezoelectricity will not save the world from its current energy crisis, but it will provide a constant and reliable energy source in places that energy is not otherwise available.

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