Piezoelectric Footstep Energy Harvesting System

Opportunity and Significance

To help avoid some of the most dire situations, the goal is to utilize energy created by human motion. A portion of that energy is wasted and waiting for someone to tap into that wasted energy and convert it into a usable, meaningful source that can help power people’s lives.

Technical Objectives

- Go green - renewable source of energy
- Utilizes wasted kinetic energy
- Passive device
- Universal power source
- Less waste – recharging batteries.

Technical Approach, Accomplishments and Results

Next Steps for Development and Test

Development:
- Waterproofing the shoe
- Exterior mounting of the device
- Expanding interchangeability between individuals
- Easily power various devices
- Optimize system to take up less space

Planned tests:
- High fatigue cycle test
- Waterproof testing
- Load distribution
- Comfort and ergonomics testing

Commercialization Plan & Partners

- Commercial Plan would include Footwear companies (Nike, Puma, Under Armor, and Adidas)
- Foot-Step Electric Generation will be used for multiple purposes as generating electricity and powering sensors.
  - Movement Sensors-gathers data to get complete analysis of impact force, fatigue posture, step size, and more
  - Heating System.
  - Tracking System.

References

http://www.nanomotion.com/piezo-ceramic-motor-technology/piezoelectric-effect
https://en.wikipedia.org/wiki/Category:Shoe_brands
http://www.nanomotion.com/piezo-ceramic-motor-technology/piezoelectric-effect

Related Work and State of Practice

- The group is not aware of any similar projects done in WSU.
- Build on the go green aspect that the world is attempting to achieve by finding an alternative energy source.
- Future Plans/Projects:
  - Adding features to the shoes.
  - Making the shoe as efficient and effective as possible
  - Making the system available to 3rd world countries
  - Keeping the production and manufacturing cost low

Technical Objectives

- Go green - renewable source of energy
- Utilizes wasted kinetic energy
- Passive device
- Universal power source
- Less waste – recharging batteries.

Technical Approach, Accomplishments and Results

Next Steps for Development and Test

Development:
- Waterproofing the shoe
- Exterior mounting of the device
- Expanding interchangeability between individuals
- Easily power various devices
- Optimize system to take up less space

Planned tests:
- High fatigue cycle test
- Waterproof testing
- Load distribution
- Comfort and ergonomics testing

Commercialization Plan & Partners

- Commercial Plan would include Footwear companies (Nike, Puma, Under Armor, and Adidas)
- Foot-Step Electric Generation will be used for multiple purposes as generating electricity and powering sensors.
  - Movement Sensors-gathers data to get complete analysis of impact force, fatigue posture, step size, and more
  - Heating System.
  - Tracking System.

References

http://www.nanomotion.com/piezo-ceramic-motor-technology/piezoelectric-effect
https://en.wikipedia.org/wiki/Category:Shoe_brands

Funded by Mechanical Engineering department of CoE and course ME 4500/5500.