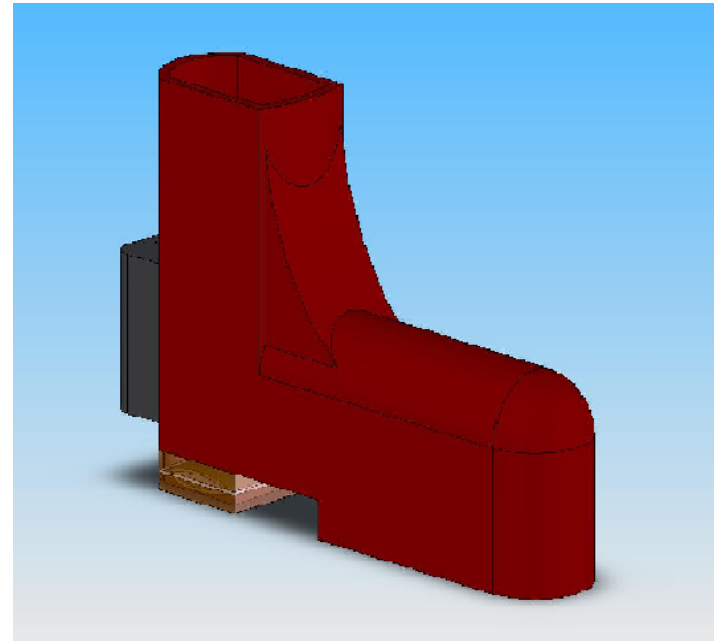
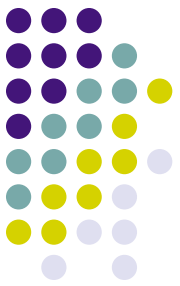


Concept #2: Piezoboot Charger

- Many outdoor electronics require AA batteries.
- In the backcountry, more batteries means more weight.
- Additional energy is required. It can be supplied through existing technology.

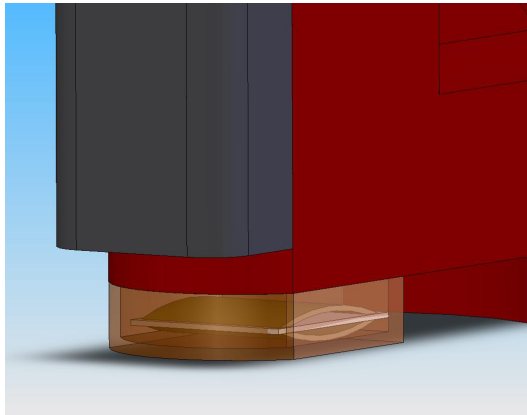
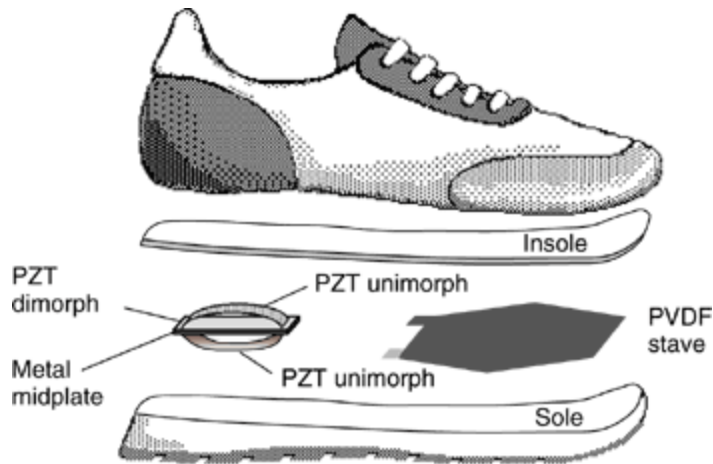
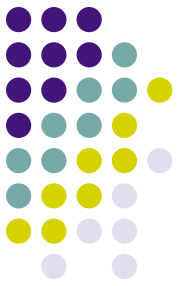




Customer Needs

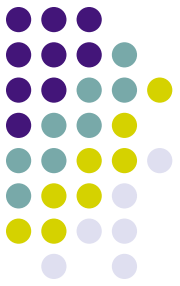
Questions	Customer Statement	Interpreted Need
Typical Uses	<ul style="list-style-type: none"> • I prefer to use the same boots to hike all year round. • I use my hiking boots in the mountains and city. 	<ul style="list-style-type: none"> • The PH operates in all weather conditions • The PH is suitable for every day walking
Likes- Current Boot	<ul style="list-style-type: none"> • I like my boots ankle support. • They perform well in wet environments. 	<ul style="list-style-type: none"> • The PH provides ankle support • The entire boot including the PH electronics are waterproof.
Dislikes- Current Boot	<ul style="list-style-type: none"> • The sole of my boots are peeling off. 	<ul style="list-style-type: none"> • The different parts of the PH are permanently sealed together.
Suggested Improvements	<ul style="list-style-type: none"> • I would like a shoe that lasts for at least two years. • A lighter boot. 	<ul style="list-style-type: none"> • The PH has a two year warranty. • The weight of the PH is comparable to a regular boot.
Concerns- New product	<ul style="list-style-type: none"> • The obstruction to strap on ice climbing spikes, etc. • Weight distribution. 	<ul style="list-style-type: none"> • The PH accommodates strap on equipment. • The PH is balanced appropriately.

Kinetic Harvesting Technology

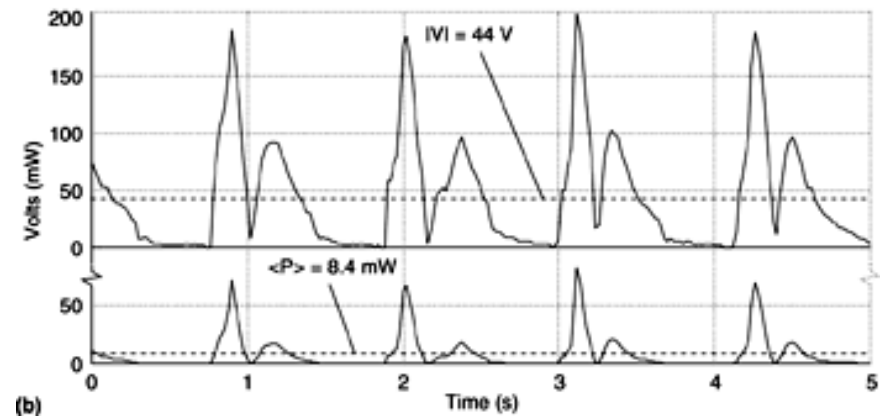
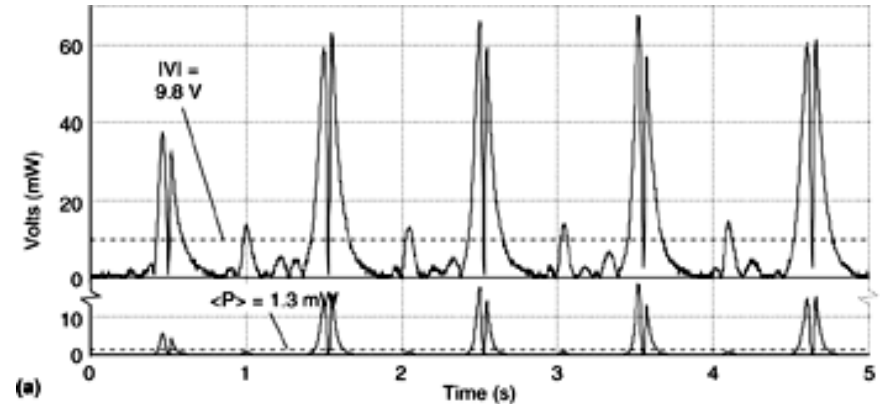


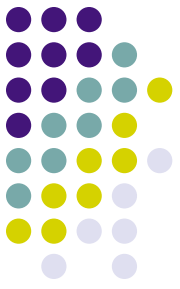
- Inserted piezoelectric devices convert mechanical strain into electrical energy.
- Research at the MIT MediaLab shows effective electrical output of PZT dimorph is 8.4mW.
- Also gives signal rectifying circuit.

Power Output from Walking



- PVDF stave – 1.3 mW
- PZT dimorph – 8.4 mW

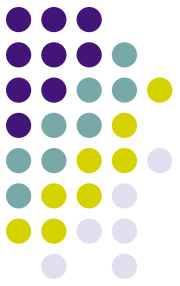




Hiking Market

- In 2000, a total of 73.1 million people participated in hiking, and 23.4 million went backpacking at least once.
- By the year 2050, the number of people backpacking is expected to increase 25 percent.
- Manufacturer's sales of hiking boots totaled over \$413 million.

References



- American Hiking Society. The Economic Benefits of Trails. Retrieved September 30th, 2004 from <www.AmericanHiking.com>.
- AZ network: Trail Journals. 2004. Retrieved September 29th, 2004 from <<http://www.trailjournals.com/journals.cfm>>.
- IEEE Computer Society. 2001-2004. Energy Scavenging with Shoe-Mounted Piezoelectrics. Retrieved October 4, 2004 from <http://www.computer.org/micro/homepage/may_june/shenck/01.htm>.
- NightStar Technical Specs. 2004. Retrieved October 4, 2004 from <<http://shakelight.notanumberinc.com/flashlight/techspecs.shtml>>.