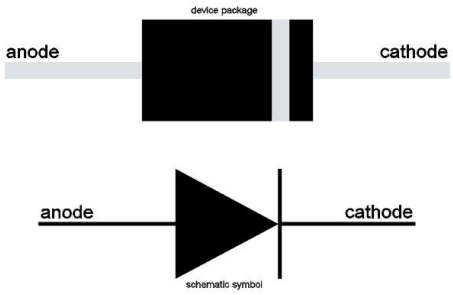
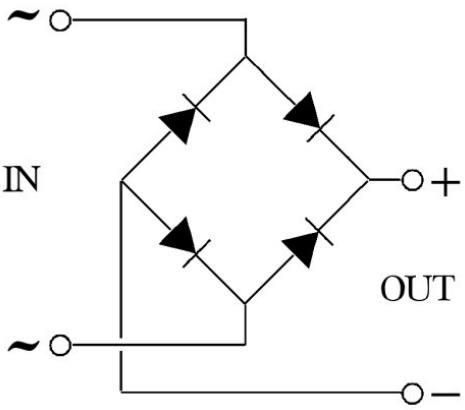
Sustainable Energy: Energy Harvesting Project

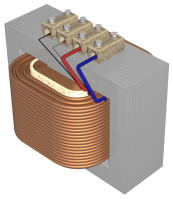
Project Goal: Using a motor, piezo, or magnetism, design a small kinetic/mechanical electricity harvesting system. Build and demonstrate your project. Get creative about how to produce energy: **Use Wind, Water, Human, Hamster or other!**

Required Circuit:
Rectifier (4 Diodes)





Energy Producing Mechanisms at your disposal:

Transformers	Magnets	Magnet Wire	Piezoelectric elements	Motors
				

Other Available materials:

- LEDS and Resistors
- Capacitors / Super capacitors
- Wood, Metal, Plastics
- Laser Cutting, 3D printing, Wood and Metal Tools

Possible Research Areas:

- Micro wind turbine
- Micro water turbine
- Micro-motion energy harvester
- Crank device
- Animal powered device

Project Grading Rubric

Design Process (25%):
- Exploration of ideas (5)
- Drawings and/or prototype (5)
- Presentation (5)
- Reflection (photo on dportfolio) (5)

Build/Making (25%):
- Project management: meets deadlines, organized (5)
- Problem Solving: displays self-sufficiency and initiative, flexibility (5)
- Competency with Tools: understanding and safe use of tools (10)
- Craftsmanship: attention to detail, quality of finish (5)

Conduct (50%):
- Safety: clothing, technique, respect for tools (5)
- Participation: attentive and engaged with course work (5)
- Effort: self directed, efficient use of class time (5)
- Stewardship: Workspace cleanup (5)
- Respect for other's learning, ideas, identity, and projects (5)

Ideas:

Backpack as Generator:
http://www.technovelgy.com/ct/Science-Fiction-News.asp?NewsNum=452

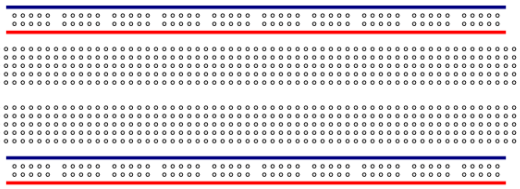
Micro Hydro:
http://otherpower.com/otherpower_hydro.html

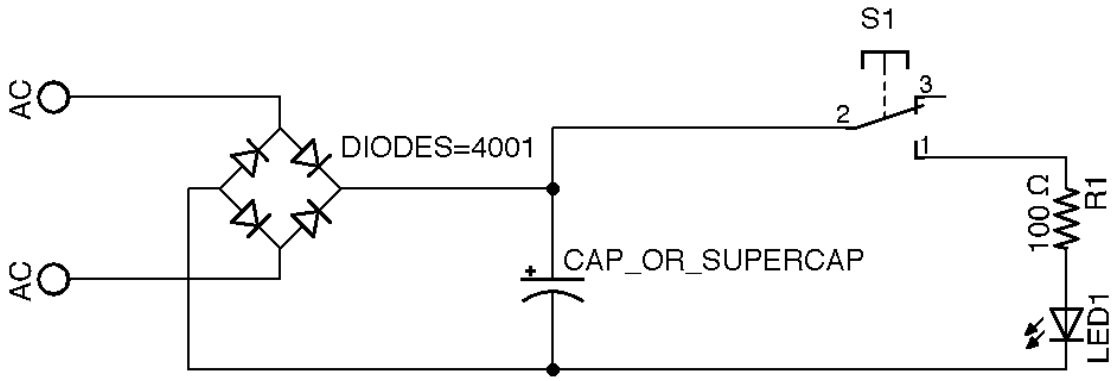
Creative Wind:
http://www.youtube.com/watch?v=5xgZPR4Y6io&feature=related
http://www.youtube.com/watch?v=ITXqFe_aG1I&feature=related

Sports to Energy:
http://www.unchartedplay.com/new-products

Energy Harvesting Dance Floor:
http://www.studioroosegaarde.net/stories/club-watt/#195

Build the rectifier and storage circuit on the Breadboard

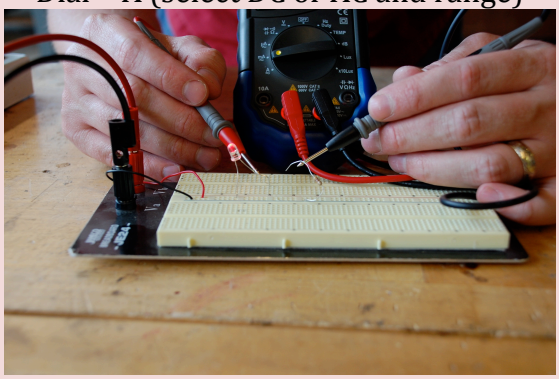




Do a series of tests to see how much electricity you can produce.

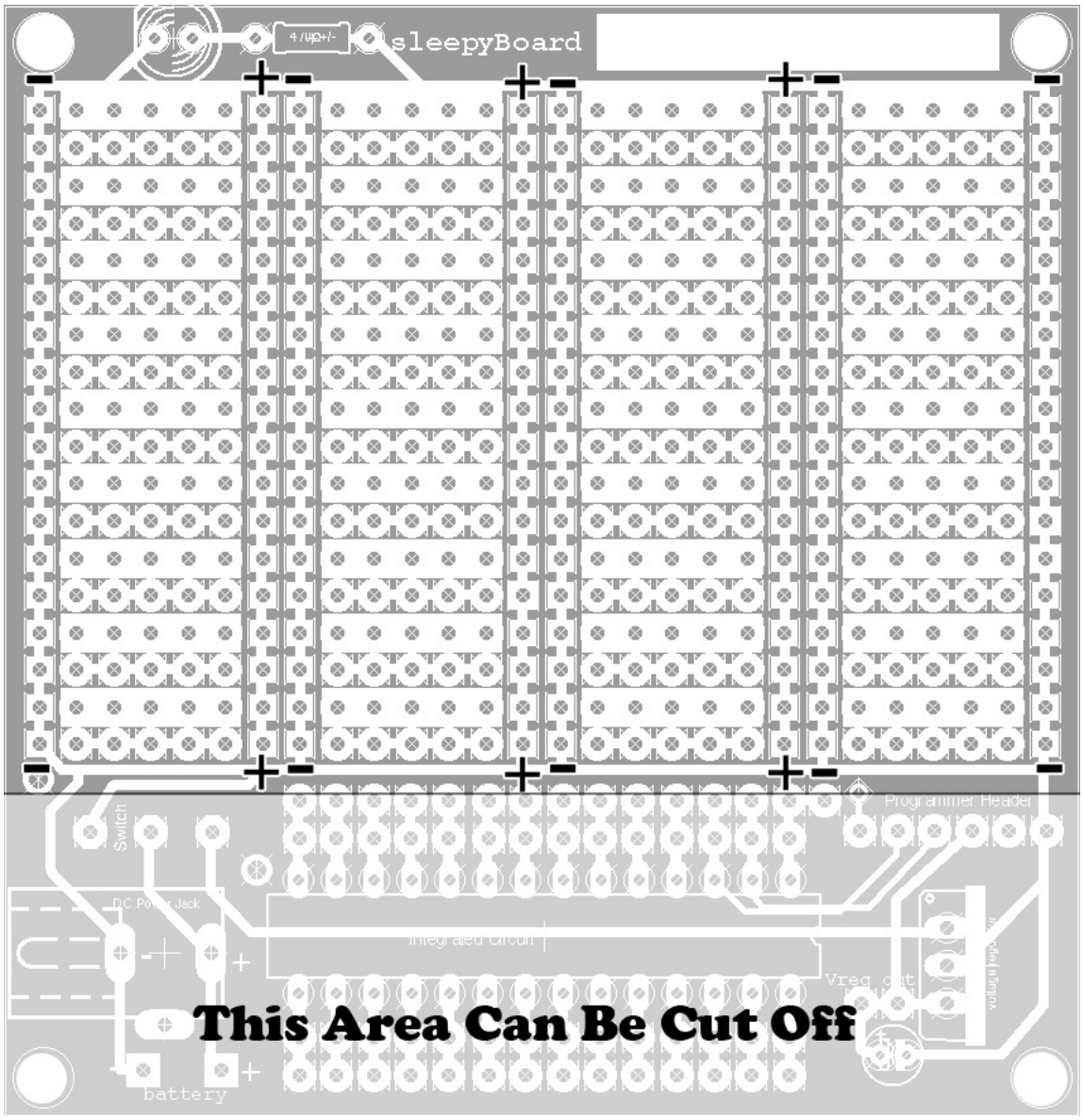
Measuring DC Current

Circuit power = ON
Black lead = COM
Red Lead = mA
Dial = A (select DC or AC and range)



Break the circuit somewhere and then let the multimeter complete it. The current will travel through the meter.

Solder your circuit together: Soldering Map



Build Your Prototype Structure or Container
Material Choices and Characteristics

1/8" Acrylic:
Advantages: Can be laser cut, over 20 colors available, can bend with heat, easy to tab fit, good against the elements
Disadvantages: Somewhat fragile (can crack when impacted), not the most eco efficient choice.

1/8" Plywood
Advantages: Can be laser cut, very sturdy
Disadvantages: Doesn't tab fit very well but can be wood glued, requires a finish or paint

1/4" Plywood
Advantages: Super sturdy
Disadvantages: Cannot be easily laser cut but can be cut on saws, requires a finish or paint

1/2" Plywood
Advantages: Unbreakable
Disadvantages: Cannot be laser cut but can be cut on saws, requires a finish or paint
Heaviest of all the materials.

1/8th MDF (fiberboard):
Advantages: Very eco-efficient, can be laser cut, tab fits easily
Disadvantages: Not extremely sturdy, requires a finish or paint

Aluminum:
Advantages: Fairly eco-efficient, will not rust, easy to cut and bend
Disadvantages: Cannot be laser cut, cannot be welded (must be riveted or screwed), conductive

Steel:
Advantages: Fairly eco-efficient, easy to cut and bend, can be welded
Disadvantages: Cannot be laser cut, must have a paint or finish to stop rust, conductive

PLA (3-D Print)
Advantages: Eco-efficient, can make a variety of shapes
Disadvantages: Can be very time consuming. Limited colors: (clear, gray)
Not all shapes will work / can be tricky.