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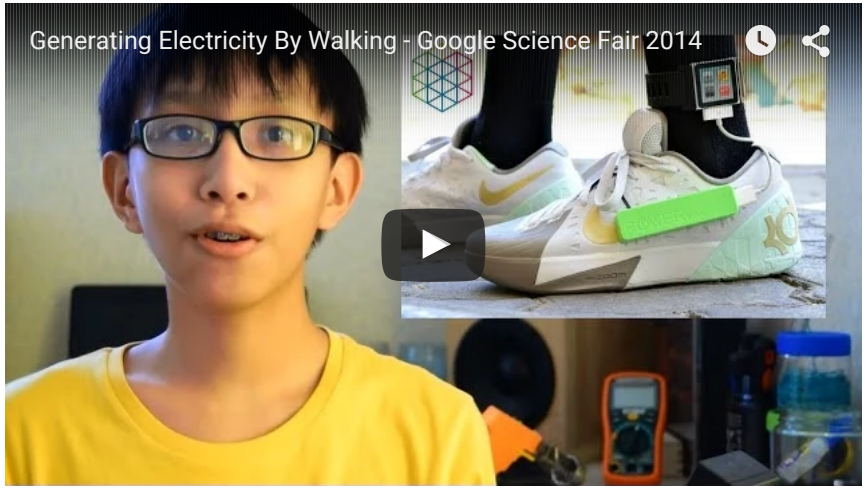
Did you know that you can produce electricity by just walking? Here's a little science experiment that will show you a little secret on making insoles that can charge USB devices! The challenge is to make a slip-on insole that can produce enough electricity to charge batteries/ USB devices.

Google Fair 2014:

This is my entry for Google's 2014 science fair. Please support us by hitting the

like and share button on our YouTube video. The contest is YouTube based so getting a fair amount of likes and viewers would help a lot in getting us through the competition.

Thank you guys for the support! The project has qualified for the regional finalist and won a local award in GSF 2014! :D



Development of The Project:

The power generating soles are one of my first concept projects. I started my first prototype last five years ago although it was a very primitive, compared to my current design. My old prototype had two TO-3 plastic spacer sandwiched between two piezo discs. It produces a fair amount of current, enough to charge a Nokia 3310.

electricity (/tag/type-id/category-technology/keyword-electricity/)
generating (/tag/type-id/category-technology/keyword-generating/)
shoe (/tag/type-id/category-technology/keyword-shoe/)
insole (/tag/type-id/category-technology/keyword-insole/)
DIY (/tag/type-id/category-technology/keyword-diy/)
homemade (/tag/type-id/category-technology/keyword-homemade/)
green (/tag/type-id/category-technology/keyword-green/)
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5 years later, I came back with the idea of using the sandwiched piezo setup, this time integrated to a charge collector and powerbank. So I thought, why not add 2 more pairs? After all, more is better.

Concept Behind The Project:
Piezoelectricity was present ever since mid-18th century. Piezoelectricity is the electric charge that accumulates in certain solid materials (such as crystals, certain ceramics in response to applied mechanical stress. This sounds familiar! Yes they do, you can actually find those piezo elements in your old/ outdated earphones from the 90's.

Why Not Use Dynamos?
As much as possible, I tried to avoid using dynamos. Yes dynamos produce more electricity but it will feel like you've stuffed a rock in your shoe. Don't forget dynamos will create a lot of noise.

Any Practical Uses?
As funny as it sounds, charging a phone with your shoe isn't really joke. Who knows maybe someday shoe companies like Nike could use these insole generators to power fitness chips (inside shoes) that would sync to your phone wirelessly. This way, you don't have to charge your smart-shoes just to sync them with your phone.

Disclaimer: This is just a little science experiment. It will show you the concept of producing electricity using piezoelectric elements. Don't assume that is close in becoming a product.

GMA News Network/ Channel Coverage:

Step 1: This Project Was/ Will Be Featured In

People told me to post a list of pages/ shows where the project was featured/ aired.

_____

National Television/ TV Shows/ News Channels:

- Jimmy Fallon Tonight Show (Pending)

- ABS-CBN Rated-K Show (June 15)

- GMA News & Unang Hirit

Daily Newspaper (National):

- Manila Bulletin Newpaper (June 18)

Newsletters And Blogs:

- I.F.L. Science Newsletter & FB (http://www.iflscience.com/technology/teenager-invents-energy-generating-shoe-insoles)

- TV5 Interaksyon Newsletter (http://www.interaksyon.com/article/88509/galing--angelo-casimiro-submits-electricity-generating-footwear-to-google-science-fair-2014)

- Philnews Newsletter (http://philnews.ph/2014/06/05/angelo-casimiro-filipino-teen-invent-electricity-generating-shoe-video/)

- GMA News Network (https://www.google.com.ph/webhp?sourceid=chrome-instant&ion=1&espv=2&ie=UTF-8#q=gma%20angelo%20casimiro)

- Yahoo Homepage (http://news.yahoo.com/blogs/trending-now/filipino-teen-creates-shoes-that-can-charge-a-phone-by-walking-181805265.html)

- Yahoo News PH (https://ph.news.yahoo.com/pinoy-teen-invents-electricity-generating-shoes-034836180.html)

- DamnGeeky (http://www.damngeeky.com/category/art-design)

- TreeHugger (http://www.treehugger.com/slideshows/gadgets/make-your-own-electricity-generating-sneakers/)

- GIZMODO (http://gizmodo.com/teen-invents-footwear-that-will-charge-your-phone-as-yo-1587816116)

- Yugatech (http://www.yugatech.com/the-internet/a-boy-from-ph-invents-shoes-that-charge-smartphones/)

- etc...

Step 2: Science Fair Project - Coverage

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I'm using Google's science fair format. This is my instructable version. It's written in a less formal manner so that hobbyist could have a better understanding over this topic.

A Question That Bothers Me A Lot:
Why not use traditional renewable energy sources? Yes I know piezoelectricty is not as well develop as of those solar powered devices but as a curious being, I am open to discovering potential energy sources. Yes, footwear generators may sound crazy and ridiculous but there's more than what meets the eye! These thin insole generators have enough power to supply low current devices.

Problem:
Coal power is the most common energy source used in the Philippines ,also in the world. For the past decade, our country has been tapping to renewable sources of energy although it's not rendered free and its price continuously changes (Philippine Star, January 2014). Most undeveloped areas, specially provinces, have no access to electricity. For the people who are living in the suburbs, charging a phone or a lamp is a big deal for them

Over the past years, my science experiments were mostly about renewable energy. I started my first science fair experiment when I was in third-grade, it was my first miniature model of a solar car. The receding years of my science fair entries were mostly about wind, solar, hydro and chemical energy.

My goal is to find a new source of renewable energy, something that does not depend on wind, water or sunlight. I did some random research and I came through tons of eco-energy production articles. I told myself, if I'll go with another solar/ wind experiment, there won't be enough innovation by just remaking a project from the internet. Like all scientists, I had to think out of the box.

Questions To Ponder On:
- Does it have enough power to supply electricity for low consumption modules?

- Will it produce enough power to charge USB devices?

- Can it reach the USB standards?

- Can it power a series of LEDs?

Future Practical Applications:
- Supply on-board/ independent power for smarts shoes and clothing.

- Aid outdoorsmen/ hikers, with GPS tracking shoes,in their journey into the vast wilderness.

- Great for areas where electricity is scarce. - Self-powering rescue chips in shoes.

Research:
The project is be accomplished by using piezoelectric materials. Piezoelectricity, also called the piezoelectric effect, is the ability of certain materials to generate

an alternating current voltage when actuated.Certain ceramics, Rochelle salts, and various other solids exhibit this effect. For example, (Pb[ZrxTi1−x]O3 where,0≤x≤1), also called PZT, will generate measurable electricity when their structure is deformed by about 0.1% of the original dimension(International AAAI Conference on Social Media and Weblogs, 2012). In this project, the generated electricity on a specific time will be recorded and determine if it would be enough to completely charge a Li-ion battery or a high capacity capacitor.

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The piezoelectric effect, by which a material generates an electric potential in response to a temperature change, was studied by Carl Linnaeus and Franz Aepinus in the mid-18th century. Drawing on this knowledge, both René Just Haüy and Antoine César Becquerel posited a relationship between mechanical stress and electric charge; however, experiments by both proved inconclusive. The first demonstration of the direct piezoelectric effect was in 1880 by the brothers Pierre Curie and Jacques Curie. They combined their knowledge of pyroelectricity with their understanding of the underlying crystal structures that gave rise to pyroelectricity to predict crystal behavior, and demonstrated the effect using crystals of tourmaline, quartz,topaz, cane sugar, and Rochelle salt (sodium potassium tartrate tetrahydrate). Quartz and Rochelle salt exhibited the most piezoelectricity.

A piezoelectric disk generates a voltage when deformed (change in shape is greatly exaggerated) The Curies, however, did not predict the converse piezoelectric effect. The converse effect was mathematically deduced from fundamental thermodynamic principles by Gabriel Lippmann in 1881. The Curies immediately confirmed the existence of the converse effect, and went on to obtain quantitative proof of the complete reversibility of electro-elasto-mechanical deformations in piezoelectric crystals. For the next few decades, piezoelectricity remained something of a laboratory curiosity. More work was done to explore and define the crystal structures that exhibited piezoelectricity. This culminated in 1910 with the publication of Woldemar Voigt's Lehrbuch der Kristallphysik (Textbook on Crystal Physics), which described the 20 natural crystal classes capable of piezoelectricity, and rigorously defined the piezoelectric constants using tensor analysis.

Method/ Testing And Redesign:

Please refer to section #3 to section #14

Results:

An Arduino development board was used to establish a simple oscillocope setup. It was plugged to the computer, the built-in TTL was used to establish serial communication between the Arduino and PC. A sketch was uploaded, using the Arduino IDE, to monitor the Analog pin where the insole generator was connected. A separate program, called "processing 2.0", was used to monitor the ripple given off by the converted AC►DC output of the generator.

Conclusion/ Report:

The current results showed that the product has potential to charge lithium batteries. Though there are room for improvements, it showed positive signs for it to be further developed. Based from the results, the insole generator has enough power to supply voltage for low powered circuits such as MCUs (Micro Controller Units - ex. ATtiny) and TTL Bluetooth transmitters. I can now say that the product is ready for production and is highly usable for smart clothing/ shoes. Charging USB devices won't suffice just yet, the charging time just isn't ideal.

FURTHER PLANS:

If a whole insole was to be made with a thin flexible sheet of metal and glazed with double-sided piezoelectric elements then it would probably produce enough power to charge a phone. A standardized opensource 3D printed design will certainly introduce a new energy-production concept to the DIY community. When everyone has access to an opensource project great ideas flourish!

Glossary/ Terms That You Will Encounter:

- **Piezo Electricity** - is the ability of certain materials to generate an AC (alternating current) voltage when subjected to mechanical stress or vibration, or to vibrate when subjected to an AC voltage, or both. The most common piezoelectric material is quartz. Certain ceramics, Rochelle salts, and various other solids also exhibit this effect.
- **Actuated** - cause a machine to operate/ work/ generate.
- **Piezo** - shorthand for piezoelectric
- **AC Current** - the flow of electric charge periodically reverses direction. Piezo elements produce these currents.
- **DC Current** - the flow of electric charge is only in one direction. Batteries produce these currents
- **Bridge Diode** - usually is composed of four rectifier diodes that filter AC currents and turn them into DC currents.
- **Piezo Disc/ Element/ Transducer** - they are all the same, it refers to the

discrete component that produces current when actuated. They are also known as ceramic transducers and are usually found in outdated pairs of earpiece.

Step 3: The Concept Behind (Understanding The Key Principles)

Step 4: Parts And Materials

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Parts/ Ma

(http://cdn.instructables.com/F0V/14MX/HTKXZHVD/F0V14MXHTKXZHVD.LARGE.jpg)

- Cheap/ (
- Piezoele
- 1N4007
- Hookup
- Old Pair
- Contact

Tools & Equipment:

- Digital Multimeter
- Multitool (w/ pliers)
- Rotary Tool

Optional:

- 100nF Mylar Capacitor (for testing)
- Hoop & Loop Fastener (Velcro)
- LED Indicators (for testing)
- Superglue (for fixing wires)
- Smartphone Sport Strap
- 5v Switching Regulator (w/ supercap)

Alternatives: (since not all can afford them)

- PowerBank > Old phone batteries + Recycled 5v Inverter
- Peizo Transducers > A pair of old & outdated earpiece
- Rotary tool > Hot Nail (for melting plastic)
- Multitool > A pair of pliers will do

Step 5: Measuring Your Sole

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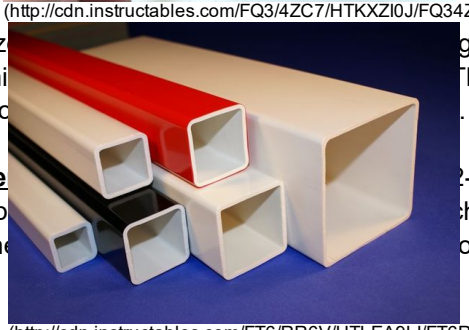
Get the siz get a pair of heavy-duty shears/ sni The plate will act as the primary mo .

Remembe -5mm. If your material is too thick, the p ch flexing. If your material is too thin, the onverting less power.



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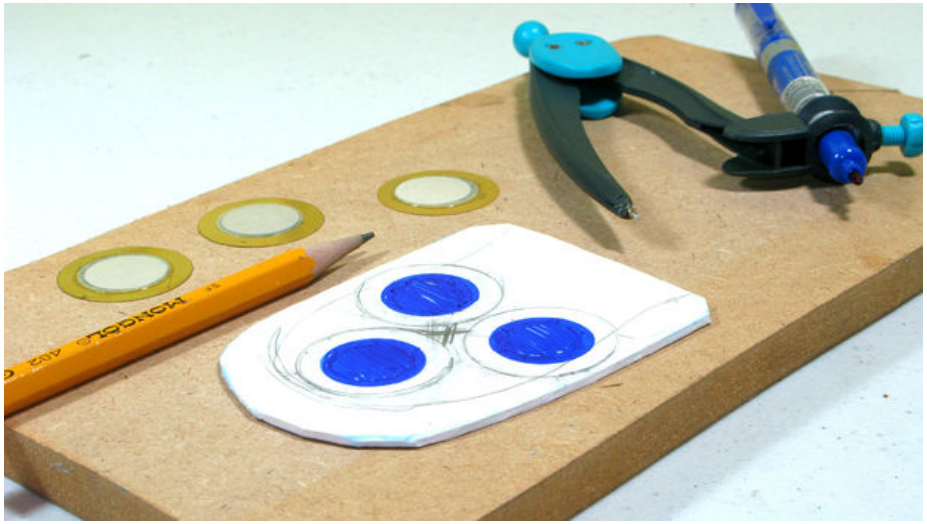
Step 6: Find And Cut An Ideal Material (Sheet/ Plate)



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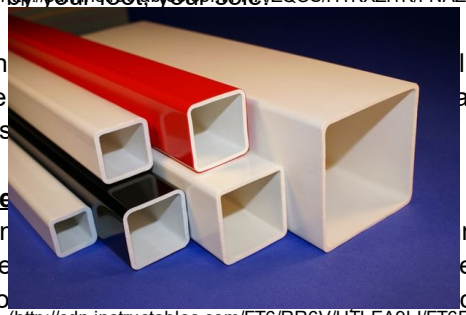
Now surro cs. How do I know where the center is? a where all the pressure is withdrawn by your foot, your sole.
(http://cdn.instructables.com/FNA/ZQOS/HTKXZI1K/FNAZQOSHTKXZI1K.LARGE.jpg)

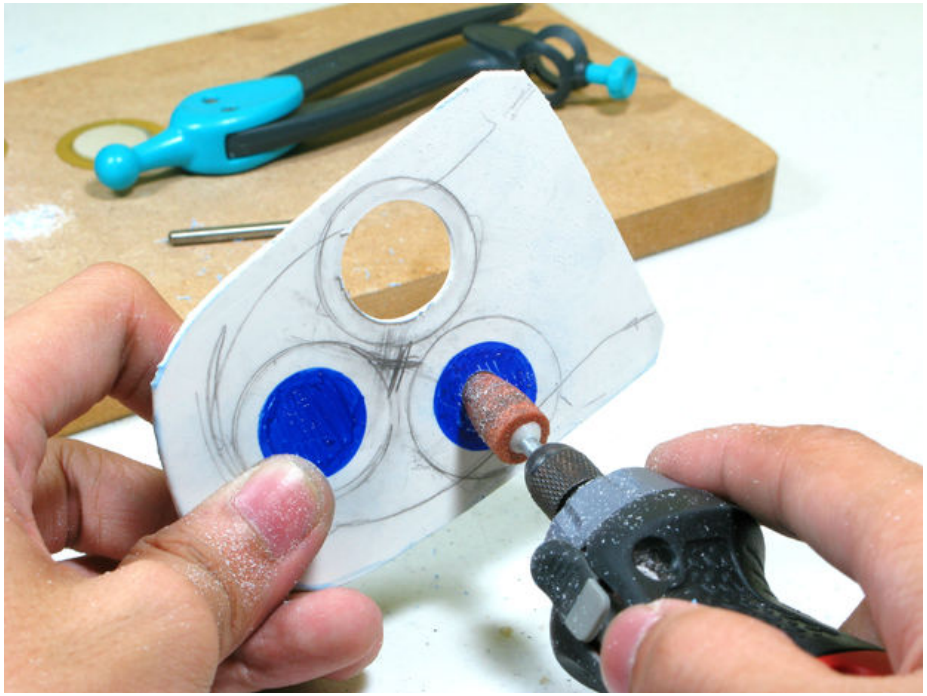
After gettin l and trace the piezo discs. Finally use about 2mm smaller in radius. The 2mm s



What mate
Based on r m thick, lightweight, stiff and can endure e carbon fiber is too thin. After playing aro d out that PVC fits best in my application.
(http://cdn.instructables.com/FT6/RR6V/HTLEA9LI/FT6RR6VHTLEA9LI.LARGE.jpg)

Were did you get the PVC material?
PVC materials are all around us. You can find them in your local hardware store but in the form of pipes. I got mine from our excess supply of PVC pipes when our house was built. Recycling means free $$$ for me! :)

Step 7: Grinding Holes On PVC Pads



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In this step, grinding is required to bore/ drill round holes. Since I don't have large drill bits (as large as the marked area), I've thought of way to cleanly cut the holes and that's by using my handy rotary tool.

If you don't have a rotary tool, you can still cleanly cut the plastic by doing it "the old fashioned way", by heating an iron nail and melting the plastic.

Step 8: Gluing The Piezoelectric Elements

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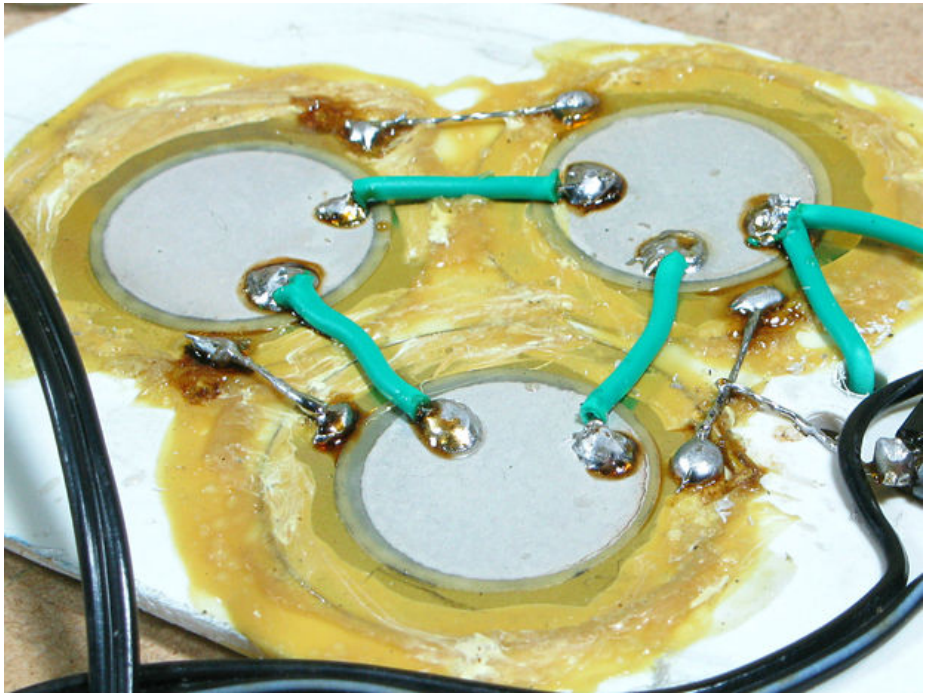
These piezo discs must endure a lot of flexing since you'll be stepping on them repeatedly! Never use superglue, if you do, the moment you step on your insole the piezo discs will snap off the PVC pad. Instead, use those quick setting "contact adhesives". Their rubbery characteristic makes them ideal for this project since they stretch whenever they are bent.

Step 9: Soldering The Piezos Together



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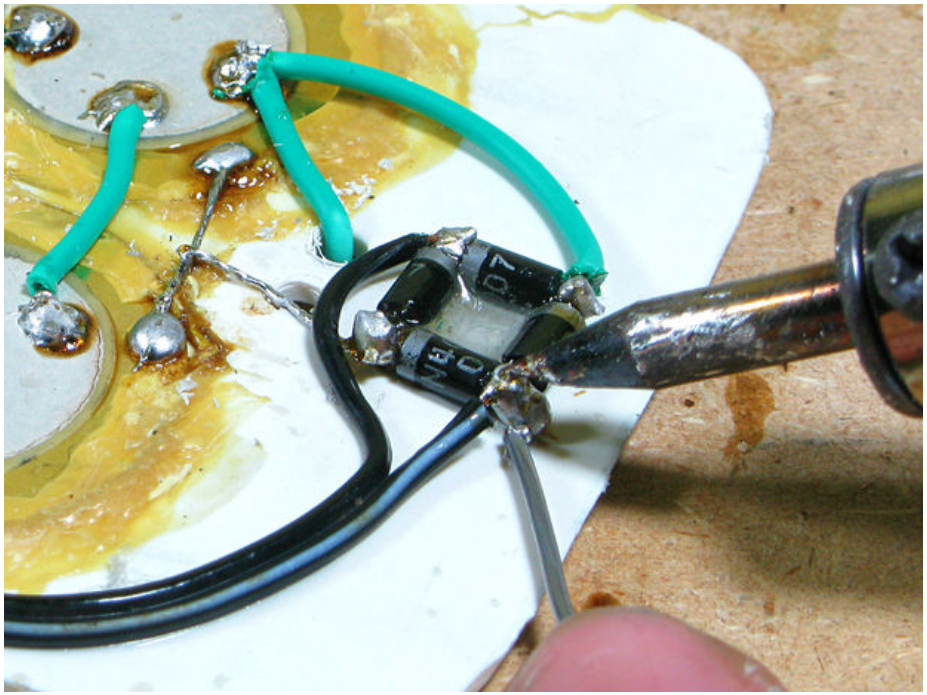
Solder all piezo elements together in parallel. Don't solder them in series because you'll need more current than voltage and those piezoelectric discs will cancel each other's power output when not actuated at the same time.

Piezo elements produce AC currents. Unlike DC currents, you can't just tap in the line. since AC currents are always alternating polarities. Just like power generators, whether it may be solar or petrol, you can't just tap directly to the powerlines without aligning the AC wave's phase otherwise the generator will cancel each other. (Ex. Negative meets Positive - Positive meets Negative). This infers that parallel works best for our project.

Improvements:

Through this process of experimentation, I've realized that even if they are hooked in parallel the piezoelectric elements can still cancel each other's output off (when not actuated simultaneously). This leads to conclusion that you'll need to add one bridge diode per piezo element/ disc.

Step 10: Building A Bridge Diode



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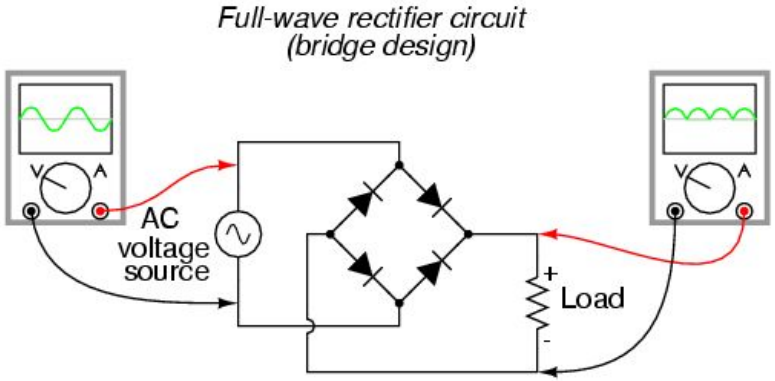

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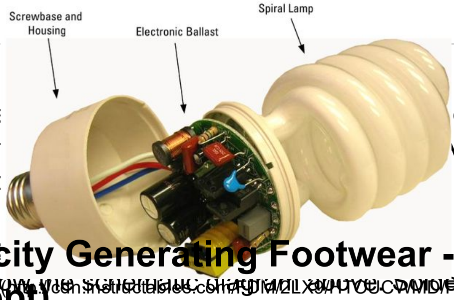

Peizoele cted to mechanical stress.
Unfortur C. A bridge diode is required to
filter and

Electricity Generating Footwear - Generate Electricity By Walking (Concept)

by ASCAS (/member/ASCAS/) (/contest/greendesign2014/) (/contest/scientificmethod/) (/contest/greenelectronics/)

Download (/id/Electricity-Generating-Footwear/?download=pdf) (/id/Electricity-Generating-Footwear/) 16 Steps

Collection I Made it! Favorite Share

Schem

Just follow the schematic ... power the piezo discs to your bridge
diode. R ... vert the wires either way. The
load (sho ...

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Recyclin

CFL bulb st contains at least six to eight
rectifier d h our project. Please be careful
in disass of you get injured.

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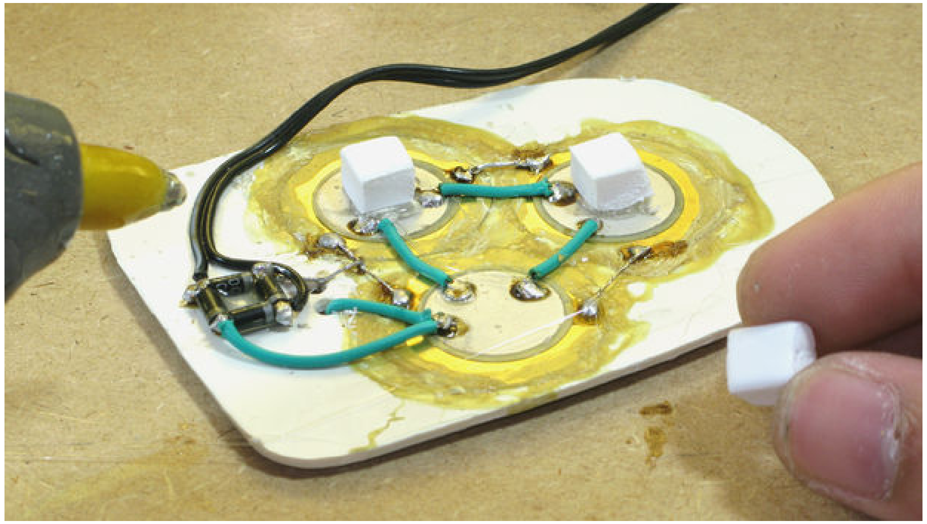
Step 11: Adding Foams Pushers



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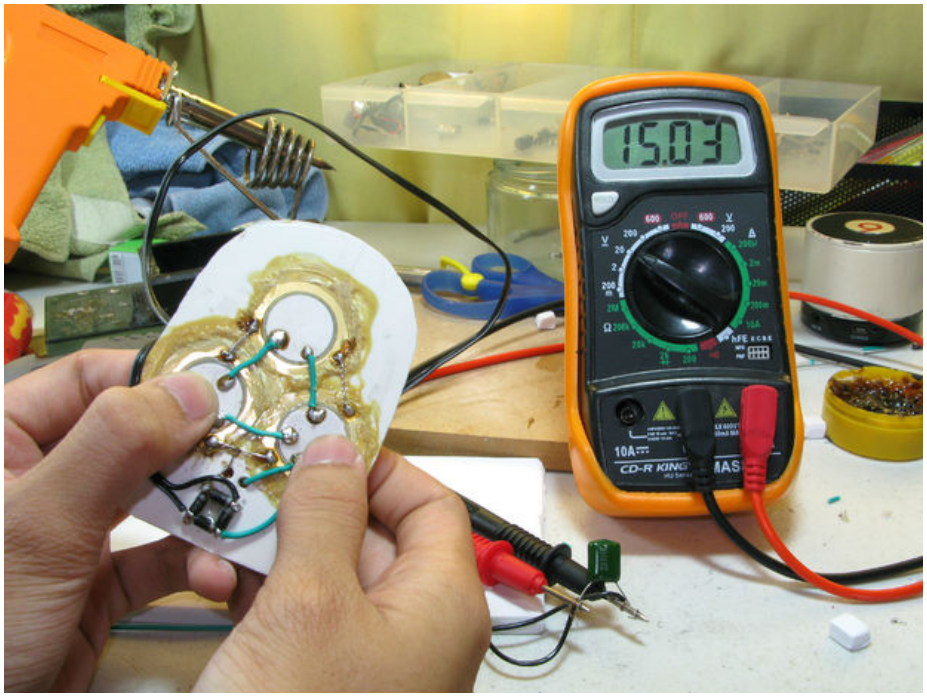
Now glue small a small piece of foam on the very center of each piezo disc. These foams will act as pushers. These foams will squeeze the piezo discs inwards (like sandwitches) while walking.

Step 12: Observation And Testing



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Finally, we are going to test the validity of or theory. Start by getting a digital-tester and switch it to the 2 digit DC range. Remember, piezo elements produce a short burst of current the moment you push them so adding a 100nF capacitor should make the readings much more readable.

My volt meter displayed:
Pressing By Hand = 15.03 volts (2mA)
Walking By Foot = 18.53 volts (5mA)
Running By Foot = 27.89 volts (11mA)

Step 13: Installing The Insole

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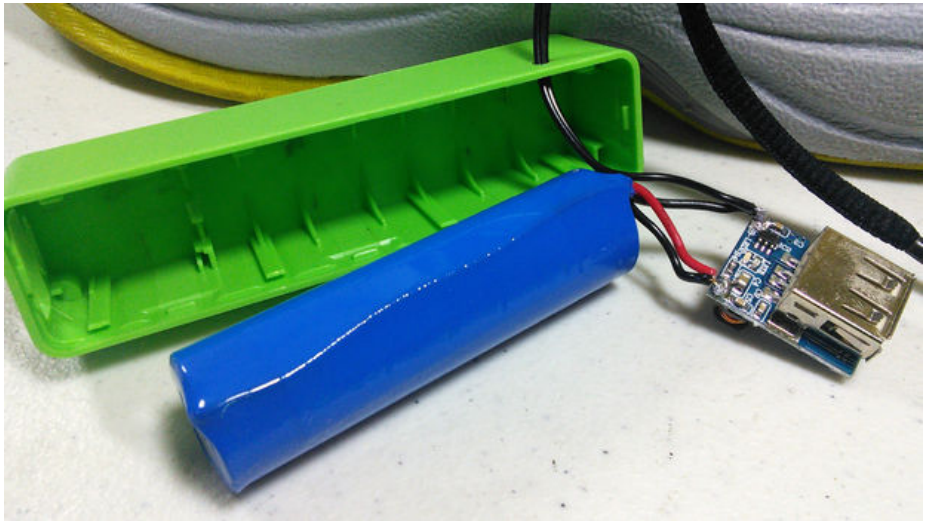
Slip the insole generator between the shoe and the insole.

Step 14: Adding A Powerbank + Soldering



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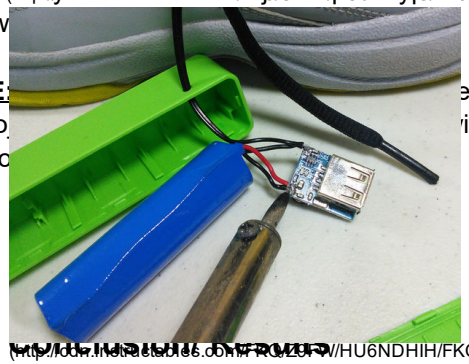
The insol the current may be small but
the voltag 5v charger (circuitry). I won't
be using nt. Right now, my insole
generator lithium battery. It works but it's
not compl
tutorial/ w

UPDATE erbanks! I have a newer version
of the pro ith the insole. I also added a
charge co



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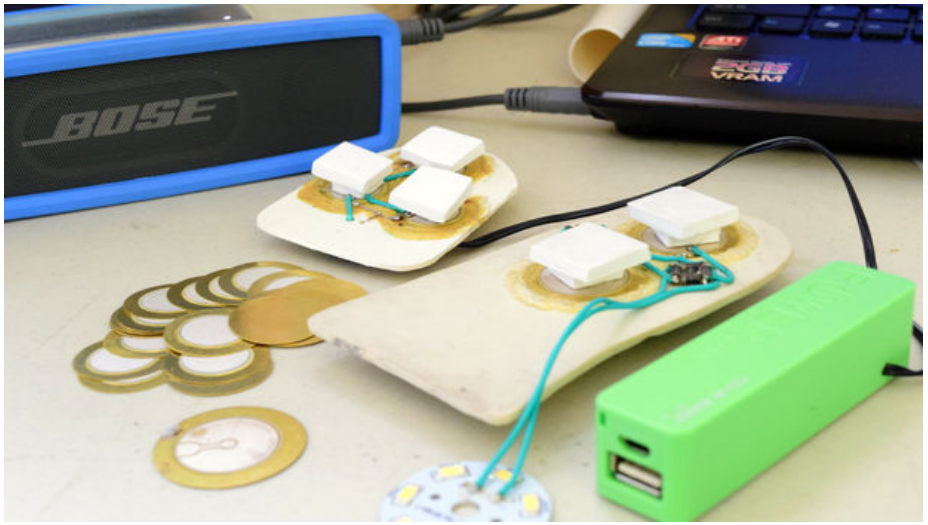
Step 15:

Step 16: Future Prototypes - Developing Better Ones



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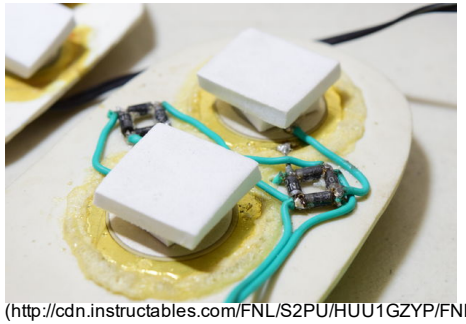

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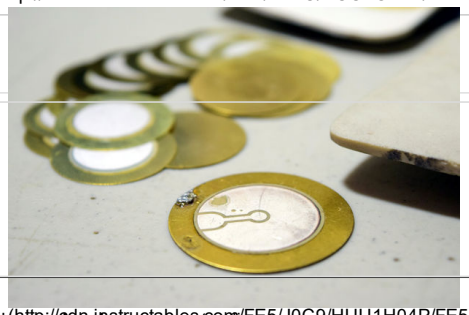

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Please be positive and constructive.

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efahrenholz (/member/efahrenholz/)

1 year ago Reply

(/member/efahrenholz/)

I'm curious, since one side is somewhat elevated, how did you feel after the two hours? Any back pain or stress in the ball of the foot? Does it feel more spring like?

I certainly like the concept, piezos are definitely difficult to make work.

(/member/ASCAS/)

ASCAS (/member/ASCAS/) (author) efahrenholz 1 year ago Reply

Surprisingly, it feel comfortable. The foams are squishy enough to make the insole feel like a gel slip-on. When jogging a 10-20% energy loss is expected due to the gaps of energy production. Jogging for at least for 3-4 hours should charge the battery full. A walk should take 5-6 hours to charge a 400mAh full, due to the 40% energy loss.

Don't forget that these peizo elements produce more energy when jumping. The weight of the user/ subject also affects the amount of energy produced. The heavier the subject, the higher the current.

(/member/Pratyush+Pareek/)

Pratyush Pareek (/member/Pratyush+Pareek/) ASCAS 4 months ago Reply

Congrats for your prize in GSF 2014. I am also thinking of a project associated with piezoelectricity. But I don't know which piezoelectric transducers to use. I found the one in the link on internet, is it good?

http://www.aliexpress.com/item/Free-Shipping-1pcs-diameter-50mm-40K-35W-ultrasonic-transducer-ceramic-chip-piezoelectric-ceramics/32228054695.html

(/member/ASCAS/)

ASCAS (/member/ASCAS/) (author) ASCAS 1 year ago Reply

feels*

(/member/priandoyo/)

priandoyo (/member/priandoyo/) 4 months ago Reply

Thank you for sharing, it is inspiring project

Crazynventor (/member/Crazynventor/)


(/member/Crazynventor/)

2 months ago Reply

Can you explain me how it can charge a powerbank after walking for 5-6 hours where it generates only 0.093 joule per steps while walking?

The powerbank you mentioned needs 7200 joule to charge fully

(/member/Benadski/)

Benadski (/member/Benadski/) Crazynventor 7 days ago Reply

You need to run for that! 80000 steps in 6 hours equals 3.7 steps per second. :)


(/member/IshanP/)

IshanP (/member/IshanP/) 9 days ago Reply

can we use anything else as a substitite for pvc


(/member/VinayakR1/)

VinayakR1 (/member/VinayakR1/) 10 days ago Reply

Hey i am just engaged in creating Electo-Magnetic shoes which will also generates electricity from shoes.
So kindly please send me the productivity, fixation and the maintenance cost of your shoes to ovvinn.com@gmail.com or vinayak3k@gmail.com.i will remain greatfull to you.

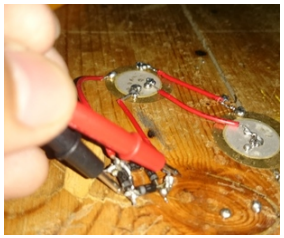
Thanking you,

- Your follower


(/member/Favour7dave+/)

Favour7dave (/member/Favour7dave+/) made it! 11 days ago Reply

yahh I made it!!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Favour7dave (/member/Favour7dave+/)

yahh I made it!!

11 days ago Reply

(/member/Favour7dave+/)

hriddhi (/member/hriddhi/) 15 days ago Reply

WILL IT WORK WITH 4 PIEZO DISKS???

(/member/hriddhi/)

AstrophyScience (/member/AstrophyScience/) 1 month ago Reply

Thanks Kuya Angelo now we can work in our investigatory project ..... (Your older than me) . Thanks !

(/member/AstrophyScience/)

T0BY (/member/T0BY/) 1 month ago Reply

Genius!

(/member/T0BY/)

yasmi praba (/member/yasmi+praba/) 1 month ago Reply

when we took one step,how many voltage does it charge?

(/member/yasmi+praba/)

kingkaushal (/member/kingkaushal/) 2 months ago Reply

is this really work or not??? please tell friends!!!!!

(/member/kingkaushal/)

Ansh Aggarwal (/member/Ansh+Aggarwal/) 2 months ago Reply

From where can I get piezo discs and what is the diameter taken...?
I need it plzzz...!

(/member/Ansh+Aggarwal/)

Primian (/member/Primian/) 2 months ago Reply

Hi, only one question: have you done a brevet?

(/member/Primian/)

grupoinstruc (/member/grupoinstruc/) 3 months ago Reply

I am trying to reproduce it using 12 transducers , but i am only generating 100 micron.

(/member/grupoinstruc/)

i soldered then in paralell

rajsingh2 (/member/rajsingh2/) 3 months ago Reply

can you send the parrellel circuit on rajsingh7892@gmail.com plz

(/member/rajsingh2/)

rajsingh2 (/member/rajsingh2/) 3 months ago Reply

mine is not produsing 1v also ipeizo disks are cutting there current can you plz help me plz

(/member/rajsingh2/)

Pratyush Pareek (/member/Pratyush+Pareek/) 4 months ago Reply

Congrats for your prize in GSF 2014. I am also thinking of a project associated with piezoelectricity. But I don't know which piezoelectric transducers to use. I found the one in the link on internet, is it good?

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(/member/Pratyush+Pareek/)

YogeshD3 (/member/YogeshD3/) 4 months ago Reply

what is foam ? please reply

(/member/YogeshD3/)

AndreasO1 (/member/AndreasO1/) 4 months ago Reply

A regulator eat to much power, and the Powerpack will not Charge, because of the voltage break. I think also the direct contact bring milli seconds to charge. (My powerpack is blink a little bit.) the concept is great but the Efficiency is to low.

Have anybody a regulated system?

(/member/AndreasO1/)

AndreasO1 (/member/AndreasO1/) 4 months ago Reply

It works and generate with my 20mm piezos 6 of it ca. 5-6Volts. I will put a regulator behind (µa78s05) and try to charge my 1000mAh powerpack in a run. Thanks for the great idea.

(/member/AndreasO1/)

AndreasO1 (/member/AndreasO1/) 4 months ago Reply

(/member/AndreasO1/)

dengd (/member/dengd/) 5 months ago Reply

is there a specific Piezoelectric Transducers you used... there is various online or does it not matter?

(/member/dengd/)

kennard2000 (/member/kennard2000/) 5 months ago Reply

hi im also a filipino (the one who believes you) can you tell me where did you buy the piezo

(/member/kennard2000/)

mayur satani (/member/mayur+satani/) 5 months ago Reply

which parts are used in this project(name of parts) and how much cost of this all parts?

send me on : mayursatani7@gmail.com

pls send me, thnx...

(/member/mayur+satani/)

karan.virk.31 (/member/karan.virk.31/) 5 months ago Reply

can u please tell me how to get better current rating to charge up my phone . I am only getting 2.40 v after my regulator which is not 7805 plz tell me brother how to get 3.7 v to charge up my phone

(/member/karan.virk.31/)

davy.thibau (/member/davy.thibau/) 5 months ago Reply

we made it but we could get only 0.5mA out of the piezo elements, this is not enough to charge a battery. Did we do something wrong? how dig you get 5mA out of your piezo's?

(/member/davy.thibau/)

IshanP (/member/IshanP/) 7 months ago Reply

are these ok?
http://www.ebay.com/itm/6x-piezo-disc-piezoelectric-transducer-20mm-diameter-/321661806438?pt=LH_DefaultDomain_0&hash=item4ae489a766
(http://www.ebay.com/itm/6x-piezo-disc-piezoelectric-transducer-20mm-

(/member/IshanP/)

diameter-/321661806438?pt=LH_DefaultDomain_0&hash=item4ae489a766)

xXDasAniketXx (/member/_xXDasAniketXx_/) IshanP 6 months ago Reply

(/member/_xXDasAniketXx_/)

Yes, they will work, in fact, those are what I am using. Keep in mind that twenty mm is really small, so it might be hard to work with!

xXDasAniketXx (/member/_xXDasAniketXx_/) 6 months ago Reply

(/member/_xXDasAniketXx_/)

Hey, Angelo, I need help with the testing part, I want to test how much electricity is generated by only one piezo disc. Do I still need the Mylar capacitor? And how do I connect the piezo disc to the Mylar capacitor then to the digital multimeter?

If you need to send me an Email, then send it to: dasaniket.15@gmail.com

Thanks!

Javier Corado (/member/Javier+Corado/) 6 months ago Reply

(/member/Javier+Corado/)

I think that someway that would work even better is to plug every piezo in parallel just like you did and then connect it to a 1000mF 50v capacitor then into a voltage regulator and then just add some more capacitors only to regulate the voltage, and i think that if you put a switch you may charge a cell phone directly from the circuit, because the voltage will be already regulated and control, or if you want to avoid to a fail in a circuit plug it into the powerbank

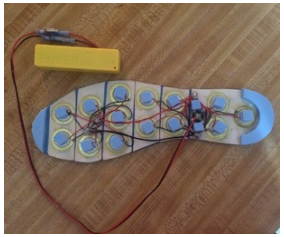
abhishek.banik.9 (/member/abhishek.banik.9/) 6 months ago Reply

(/member/abhishek.banik.9/)

Carlos321fm (/member/Carlos321fm/) made it! 6 months ago Reply

(/member/Carlos321fm/)

I create it and not work



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xXDasAniketXx (/member/_xXDasAniketXx_/) Carlos321fm 6 months ago Reply

Maybe take away some of the piezo disks, see if that works.

(/member/_xXDasAniketXx_/)

Carlos321fm (/member/Carlos321fm/) 6 months ago Reply

Angelo, i need contact you, my email is carlos321fm@gmail.com

(/member/Carlos321fm/)

Carlos321fm (/member/Carlos321fm/) 6 months ago Reply

Angelo, i need help, i create one of it and not work

(/member/Carlos321fm/)

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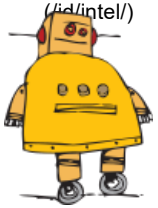

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