Turn an exercise bike into an energy bike

by **wingsinger** on January 1, 2008

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Intro: Turn an exercise bike into an energy bike

Why pedal a stationary exercise bike for exercise? Put all that sweat equity to good use while getting into shape. Turn you exercise bike into a power generator to run lights, a TV, stereo, blender, etc. Recharge a 12V battery or drive appliances directly. This is an excellent educational tool for science and technology classes. There are several options for how you design and build it. I'll show you how to build this one and point out other options along the way.

Here's a list of parts you'll need to get started:
- exercise bike, with cast iron flywheel or rubber tire type
- DC motor or generator with magnets, 12Vdc or 120Vdc recommended
- 1/2" plywood, 3/4" will also work
- 6' - 2"x 4" pine lumber
- 4' link belt (or fan belt)
- 1/4" Lag bolts
- assorted screws
- 3/4" water pipe and end caps
- screw band
- wire DC volt meter
- DC amp meter
- 14 ga. wire
- 2' of 1-1/2" PVC pipe
- 1-1/2" sheave (pulley)

Tools you'll need:
- jig saw
- hand saw or chop saw
- router (optional)
- drill and bits
- hacksaw
- file
- wire cutters and strippers
- screw driver
- socket set and ratchet
- carbide cutter
- vise grips

Image Notes
1. 23W compact fluorescent
2. 90V DC tape drive motor
3. old halogen lamp stand
4. alternate handles for smaller kids
5. DC volt meter 0-150V
6. DC amp meter 0-2A

Image Notes
1. 100W incandescent lamp
2. outlet on side

Step 1: Prepping the exercise bike

I prefer to use Tunturi or Vitamaster exercise bikes for conversion. They are well built with a heavy flywheel and good bearings. The frame is solid, but the handlebars may wobble a bit on some models

Start prepping you exercise bike for conversion by removing unnecessary equipment. Most exercise bikes have either brake pads or a web strap that rides on the perimeter of the flywheel. This one has a watt meter hooked to the drag brakes.

On this model, you'll also need to remove the rubber banding from the perimeter of the flywheel.

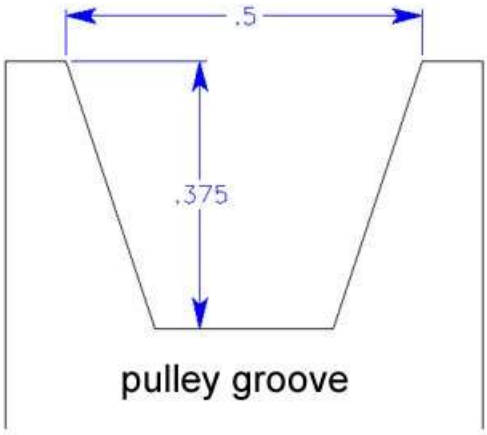
Step 2: Turn a groove on the flywheel

The flywheel needs a groove to receive a drive belt. Some models have a wide shallow groove, others have a narrow, deep groove. The easy way to do this is clamp a carbide-tipped square shank cutting tool in a pair of vise grips and hold it securely against a base with the tip against the fly wheel.

Have someone pedal the exercise bike while you gradually turn the metal groove to the desired width and depth. This can take a little while, especially if your human motor is out of shape. Take your time and take light cuts.

An approximate width and depth as shown in the second picture will work adequately. Test fit your belt periodically to ensure you are getting an appropriate fit.

I like to use a link belt available from numerous sources, one of them being Woodcraft.com Woodcraft.com. It's easy to add or remove links to get just the length you want.



Step 3: Creating a base for the generator

There are many ways to mount the generator. I created a base and an adjustable cradle for the generator.

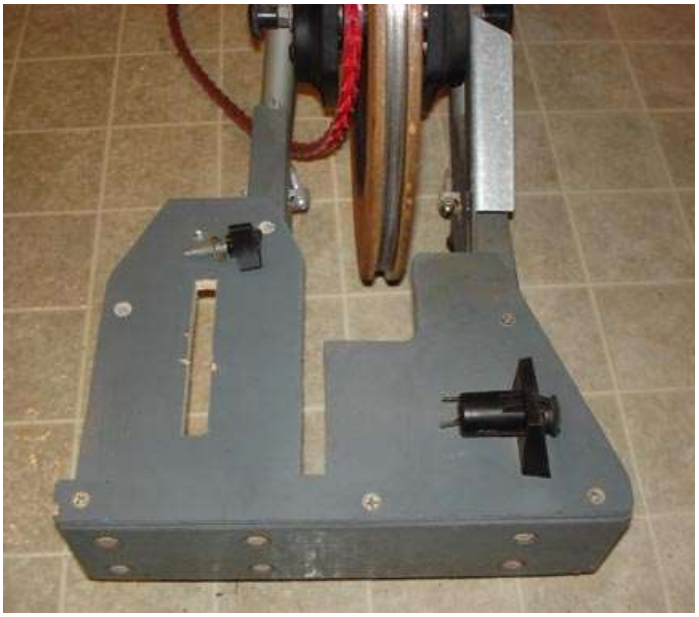
Cut a piece of 1/2" birch plywood large enough to hold the generator cradle reach the frame of the exercise bike on each side of the flywheel. Drill a hole for a 5/16" T-nut which will be used to fasten the cradle. Cut and screw 2x4's to the base on the underside the plywood.

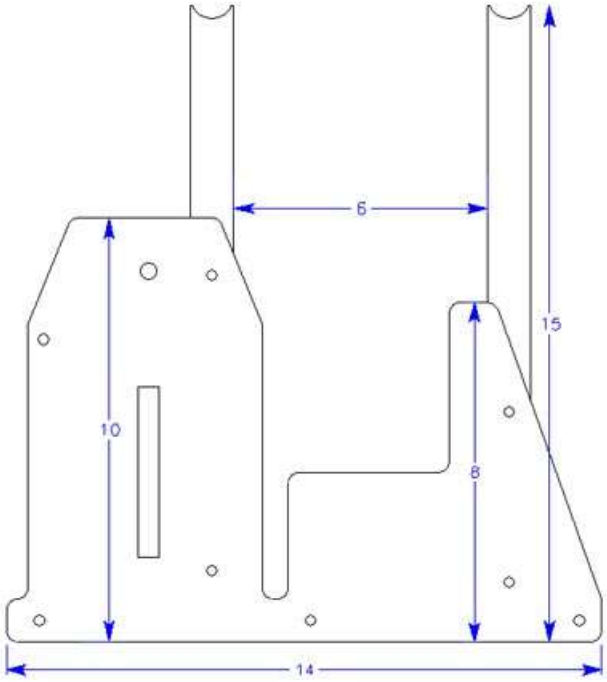
Attach 2x4 boards to the bottom of the base using glue and screws. Lag bolt the cross piece 2x4 to the ends of the other 2x4's at the front of the base.

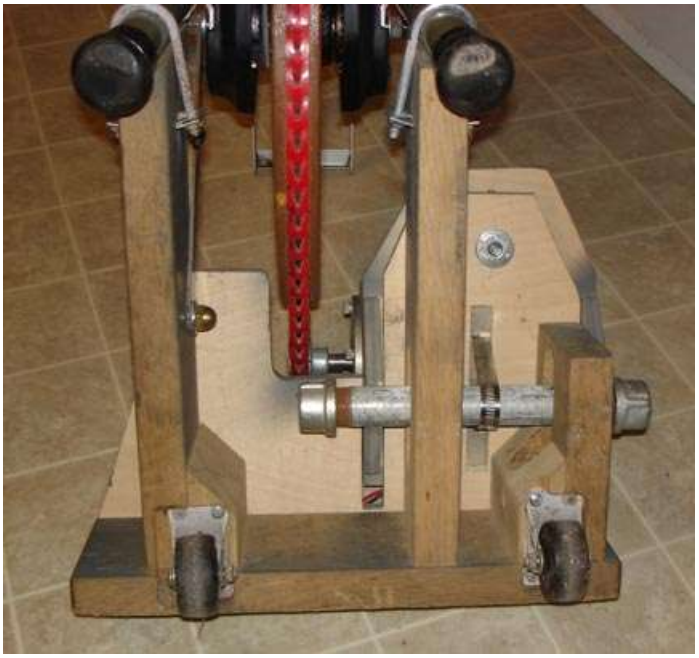
The two long boards need to have the ends cut to match the angle of the exercise bike frame. I chose to use a U-bolt to attach the base to the frame by drilling a series of small holes to create a slot for the U-bolt tang. An easier way would be to drill a 1/4" hole through the frame and into end of the 2x4's. You could use a lag bolt or a machine bolt into a cross dowel nut.

I chose to attach wheels to facilitate rolling the energy bike around. Because I used 1-1/8" x4 boards rather than 2x4's, I needed to add wood to support the wheels as shown in the picture.

Two of the boards need slots cut in them for the pipe section. You can drill and jigsaw slots or use a router for this task.



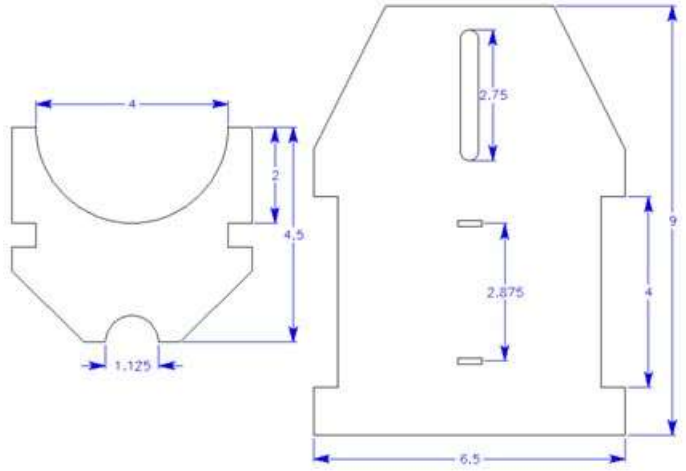




Step 4: Making the generator cradle

Cut two pieces of 1/2" plywood to fit the diameter of your generator. Cut slots in the cradle base by drilling a series of small holes close together. An 1/8" router bit could also be used to cut a slot.

Glue and screw the two sides to the cradle base.



Step 5: Assemble the parts

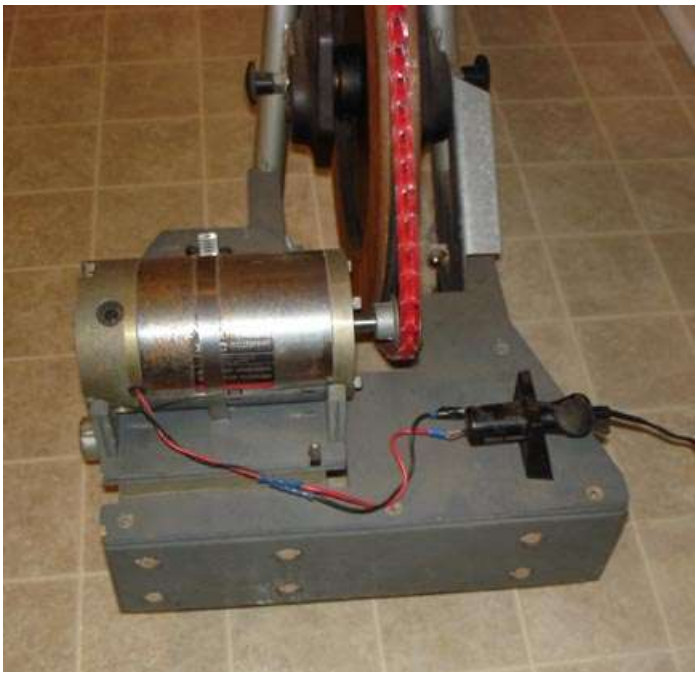
Attach the base to the exercise bike frame. If you attached wheels, make sure the base is level when attached to the frame.

Attach the generator cradle to the base. Insert a hard sheet of plastic such as Plexiglass or clear acetate between the base and the cradle. This will help the cradle slide easier for adjustment. Lay the generator in the cradle and insert the 1"x8" pipe section through the base. Insert the 18" pipe strap through the slots, around the pipe and around the generator. Tighten the strap to hold the generator to the cradle. Insert a 5/16" by 1" T-bolt through the slot into the T-nut.

You may find you need to cut a piece of angle iron or strap and attach it between the base and the axle for the flywheel to make the assembly more rigid. (See the second picture).

Place the link belt around the flywheel and around the 1-1/2" pulley on the generator. Add or remove links as necessary to get the length correct. Slide the cradle assembly back until the belt is tight. If you reach the end of the adjustment slot, take another link out of the belt.

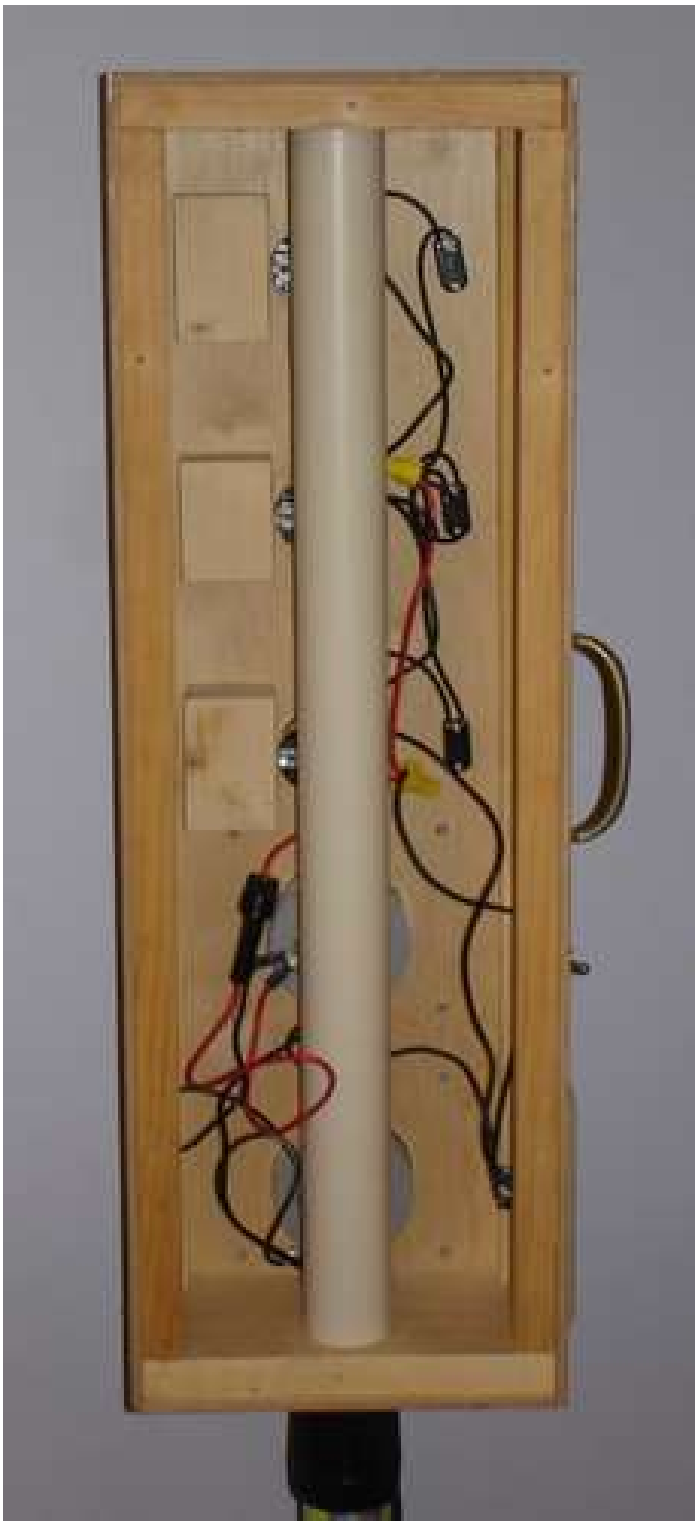
Attach the 12V power jack (a regular out let is recommended if using a 120V generator). Radio Shack Radio Shack catalog # 270-1556 is shown in the picture.

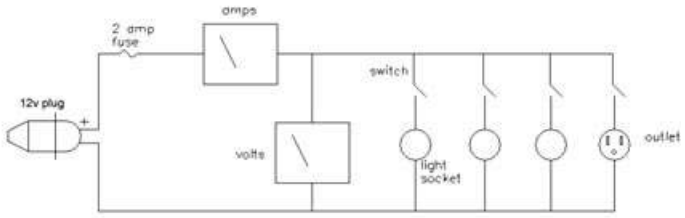


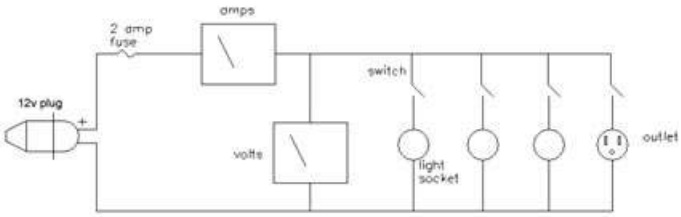
Step 6: Build a meter and light display

This display has 3 switched light sockets, a switched outlet, and two meters. It is 24" tall, 8" wide, and 5" deep. Use 1/4" birch plywood to build the box with 3/4" x 3/4" pine for the internal frame. Drill holes for the sockets, switches, and meters.

I used 3/4" x 5" pine for the top and bottom with holes drilled for a 1-1/2" PVC pipe. After installing and wiring the meters, switches and sockets, install the pipe. After the pipe is in place, the top piece of 1/4" plywood is installed. Drill a 1-3/8" hole in the bottom plywood and attach. This will hold the PVC pipe captive.




amps
2 amp
fuse
switch
12v plug
+
volts
light
socket
outlet



Step 7: Start pedaling power!

With the meter display plugged in, starting to pedal should start to deflect the volt meter. If the meter moves the wrong way (negative), reverse the leads connecting the generator to the 12V socket. Screw in an incandescent and a compact fluorescent.

If you're using a 12V generator, you'll need to use 12V rated bulbs. These are available at most RV centers. If you use a 120V generator, you'll need to use resistive loads or appliances with magnets in the motors. Many compact fluorescents will work on 120Vdc, but not all.

If you find that you have to pedal to slow or too fast to get the desired voltage, change the size of the pulley on the generator. A larger pulley will turn the generator more slowly and generate a lower voltage for a given pedal speed.

I added a smaller handlebar for smaller kids. An 8-year-old on frost sugar pops can crank out an amazing amount of energy, over 200 Watts!

Have fun pedaling different DC appliances. Read a book with pedal-powered lights. Hook a 12V TV to the Energy Bike. Make your kids pedal if they want to watch TV. They can rest during the commercials. If you have a laser engraver, make a side plate with a picture of an Energy Bike cranking out lighting bolts!

Image Notes
1. 23W compact fluorescent
2. 90V DC tape drive motor
3. old halogen lamp stand
4. alternate handles for smaller kids
5. DC volt meter 0-150V
6. DC amp meter 0-2A

Related Instructables

V10 (vawt,savonius,ve axis,windturbine, by faroun

Bike generator for Tufts Kid's Day Fair 2008 (Photos) by musing mumbler

How To Build A Bicycle Generator by saullopez52

Contactless dynamo bike wheel lights by vbnicolau

Simple ways to be Energy-Efficient by UbuntuNinja

Stationary Bike Generator from Washing Machine by andrew.spencer.2

Comments

50 comments **Add Comment** **view all 99 comments**

porcupinemamma says: Feb 28, 2011. 7:25 PM **REPLY**

Excellent. Well written Instructable! We lose power a lot at the island I spend my summers on. I am going to try and rig our stationary bike to work like yours. Ed Begly Jr. would be very proud of you. He is a major supporter in projects that help to improve our environment. Perhaps you could send him a link to your Instructable (he has a T.V show devoted to cool inventions such as yours)

japetopan says: Nov 9, 2009. 12:54 PM **REPLY**

I don't get to find the generator motor. Does an alternator of a car work for this?

longhairedartist says: May 16, 2010. 9:57 AM **REPLY**

car alternators are incredibly inefficient. All they need to do is trickle charge a 12 volt battery. They have all that horsepower from the 200 horses ICE engine to kick it around, so auto manufacturers are more concerned with longevity than maximizing electrical output. Plus look at the gear ratio an alternator is on, smaller pulley wheel from a larger one on the engine, means it rotates at thousands of RPMs
You can buy a stepper motor from $35, or visit radio shack for a small toy motor more appropriately sized for one person, rather than 200 horses.

gladys45 says: Feb 28, 2011. 12:24 PM **REPLY**

alternators achieve about 50-60% efficiency.
dc generators achieve from 50-80% efficiency.
the rotational speed of the alternator is not important as this instructable already uses a pulley and belt to turn the DC motor(generator) faster than the crank speed of the 'bike'.

airecrist says: Apr 2, 2010. 8:26 PM **REPLY**

yes it should, though I was talking about this type of set up to my father the one day and he suggested a old chevy generator (1950 or so i believe it was) which would work better..... though chances of finding one would be hard or more likely impossible....at least for a decent price

gladys45 says: Aug 19, 2010. 5:47 PM **REPLY**

the hair? has no-one noticed it yet? have i entered some sort of time warp?

porcupinemamma says: Feb 27, 2011. 6:30 AM **REPLY**

You are looking at a child who is obviously involved in a very cool project. Isn't it wonderful that creative and clever people share their ideas at Instructables?

gladys45 says: Feb 28, 2011. 12:12 PM **REPLY**

that poor bedraggled child, needs more fun in their life.
being used as a human powered generator seems a little harsh....
also, time travel has most definitely occurred.

twighahn says: Sep 7, 2010. 11:02 AM **REPLY**

i noticed

twighahn says: Sep 7, 2010. 10:59 AM **REPLY**

how would u hook it up to batteries? or an ac inverter?

hedwood says: Oct 31, 2009. 7:22 AM **REPLY**

Hello and nice work - the practical and the informational!
Have you considered or experimented with a flywheel in the loop?
I'm a cyclist and we're used to taking advantage of the 'freewheel' effect a rolling momentum brings about.
I've seen a four person static bike that powered a small stage at a festival - that was more than a decade ago - and I still often wonder if this idea is worth merit...
Obviously gears would enable a start up - perhaps even for a very heavy flywheel spinning eventually at quite a clip!.. good bearings being a must.
Basically any experience on a bike and you'll remember - that flush of energy one feels at the mere hint of 'powering off' as it were.
Must say - apart from this fine example and others like it, I've never liked exercise bikes - monotony!.. hence the above....
Any thoughts?

Golem100 says: Apr 3, 2010. 8:19 AM **REPLY**

I once read in a bike mag that riding an exercise bike is like watching paint dry. And watching TV while riding an exercise bike is like watching colored paint dry. Being a cyclist, I have to agree.

andribikes says: Sep 6, 2010. 12:53 AM **REPLY**

Wow... so creative ideas using such used stationary bikes to get more valuable thing like the energy, can we find like that in market?

gladys45 says: Aug 19, 2010. 5:49 PM **REPLY**

what TV shows do u watch? watch Tour de France? if u like cycling

haunted_lady says: Apr 3, 2010. 8:42 AM **REPLY**

You are an awesome person for posting this..we all need to power our own computer at least then we would not gain weight..all the health clubs should be doing this I have said this for years!! I used to make jokes I would get a bunch of foster children and put them on bikes not I have the instructables to do this and sell power to third world countries :)

You are helping the planet one person makes a difference!

shockware says: Aug 18, 2010. 11:45 PM **REPLY**

I agree, this is truly an awesome post. I'm currently doing some research with a similar topic. I'm planning on adding this idea on my article about used stationary bikes http://www.dogengine.com/us/used-stationary-bikes.php and did you know that this is being implemented in a City Jail here in the Philippines where prisoners are asked to take turns and used stationary bikes to recharge a battery so that they could have their share with the power that provides their lights at night. That article can be found here http://newsinfo.inquirer.net/inquirerheadlines/metro/view/20100619-276504/Jail-guards-invention-saves-on-power and it has some photos that you guys might be interested in. They used a normal outdoor bicycle and not a stationary bike.

allenmark007 says: Jul 5, 2010. 7:58 AM **REPLY**

thanks for ur commend about tis article. that gave me one tip to explain to my friends because i gonna write a paper about this invention...my mail is allenmark007@gmail.com

Jameson2000ad says: Jun 16, 2010. 8:06 PM **REPLY**

Big up for the design. Although I'm not a gym-goer, I have been entertaining the idea of setting up a 'generator gym', in which each device generates power. One way to go about it would be to set up universal power connectors as outputs of each piece of equipment, thereby allowing members to come in, work out, and charge their mobile phone at the same time. Another way would be to have all the units connected up to the gym's (low-voltage DC) electricity system, with a battery (linked to the grid via a transformer) to accumulate generated power and supply consistent voltage to the gym. In this case members would come in, work out and collect energy credits. Each member would own a card, which would have to be inserted into a machine before use to record the amount of electricity generated, thereby earning them tradeable credits and/or a reduced membership bill. Does anyone think this is a realistic/workable idea or would the equipment dwarf the forseeable profits? Does one of these already exist? Would the generated electricity be worth all the hassle and cost?

meowtigora says: May 16, 2010. 8:02 AM **REPLY**

would it be possible to run multiple generators using pulleys to distribute the tension in a way that would not create more energy output on the riders part? just a thought... i may be completely full of it. thanx.

airecrist says: Jun 15, 2010. 6:25 PM **REPLY**

gears might work better

rlcanfield says: Mar 6, 2010. 6:20 PM **REPLY**

THis is just to cool and I am going to add an link to this article for Home Fitness Equipment on Fitness Exercise Bikes

javierchen says: May 22, 2010. 2:55 AM **REPLY**

Hi, I have been searching over Internet for any kind of DIY-Energy bike since last Jul. for our company to develop it, but almost all of them are still in the labs. so we have developped the DIY-Energy & -CO2 bike with sine wave -http://www.innofit.com.tw . charging can be dobe via the USB connector of the bike console or battery power sucket, more applications can be found in the above hyperlink.

MattySmithhh says: Feb 4, 2010. 6:53 PM **REPLY**
Im not sure if some one has already asked this but could you hook it up to power a tv?

OmiSan says: Oct 6, 2009. 11:16 AM **REPLY**
Hello, Many years ago I thought I saw where you could feed the power from on of these into your power grid of your house through one of the regular outlets. Is this possible? Does anyone know where I could find further information on how to accomplish this. It seems better to feed it in somewhere then just trying to power a toaster or tv.

Tenz says: Sep 18, 2009. 2:15 AM **REPLY**
Could this set up be used to charge a car battery? I have plans for another project the need them but charging them from a wall outlet kinda defeats the propose there being used for lol

wingsinger says: Oct 1, 2009. 3:35 PM **REPLY**
Yes, you can use it to charge a battery. You'll need to add a very important component, though. A power rectifier is needed in one of the wires between the battery and the generator, otherwise the battery treats the generator as a motor and it starts running! A Radio Shack #276-1661 or #276-1143 rectifier would work. If you put it in backwards, the motor runs. If it is installed correctly, the motor doesn't run, but it will charge the battery when pedaled.

mspark400 says: Jan 2, 2008. 8:13 AM **REPLY**
nice Instructable, and good picture very high quality job, btw, the boy in the picture wouldn't happened to be named Charlie would he? just a vague guess

wingsinger says: Jan 2, 2008. 8:36 AM **REPLY**
Nope, her name is Alexandra. She was nice enough to push a few Watts through my lights for this demo, but she had no interest in pedaling hard enough to run a big screen TV for the Superbowl.

mulfinger says: Jul 31, 2009. 11:29 AM **REPLY**
Could you give me exact specs on the motor that you used? I'm new at this and need a little more guidance. Thanks.

darkmuskrat says: Jan 2, 2008. 10:09 AM **REPLY**
Lol, that name was way off :P

mspark400 says: Jan 2, 2008. 10:21 AM **REPLY**
yes it know i should have at least been closer by guessing a girls name(i DID think that the person in the picture is a girl) but the guy i know who is named Charlie looks eerily similar
sorry about the mix up lol =)
(eerily similar though, i think he even has that shirt)

wingsinger says: Jan 2, 2008. 12:52 PM **REPLY**
Alexandra is my 14 y.o. daughter. Now I'm curious to see what Charlie looks like.

SWalls says: Apr 14, 2009. 8:54 AM **REPLY**
good one mspark400...

mspark400 says: Jan 9, 2008. 10:06 AM **REPLY**
i don't think he will pose for a pic sorry It's not that she looks like a guy, its that he looks like a girl lol

luptonicedtea says: Feb 27, 2009. 4:36 PM **REPLY**
Nice save... =/

WereCheetah says: Apr 22, 2009. 6:58 PM **REPLY**
just a little hint mspark, when in confusion look at the shoes.

rlcanfield says: Jun 10, 2009. 11:49 AM **REPLY**
http://www.fitnessexercisebikes.org This site is cool. Myaybe with these bikes they are making you money instead of costing you. Maybe they should be on fitness exercise bikes resource page

dombeef says: Apr 23, 2009. 2:57 PM **REPLY**
... And then use it to make toast. (lol for who knows what I ment)

sansconformist says: Apr 22, 2009. 8:10 PM **REPLY**
I'm sure there are tonnes of folks with way more experience than me *cough* none *cough* wondering and working on brilliant stuff like this, but if you or anyone else ever figure out a way (cheaper and more fun than just buying a generator) to use people-power immediately, as with the lightbulbs, OR to store it, I would give you my money. I had a treadmill in Florida, and was always torn between wanting it to power my way through an episode of Futurama, or charge a Really Big Battery, so that the next time the damn power went out in a storm I could still run a fan and make coffee.

maaschops says: Apr 6, 2009. 6:25 PM **REPLY**
I don't know much about electricity but really want to build this. The 1LWK8 Grainger motor that others have used has been discontinued. Would https://www.surpluscenter.com/item.asp?UID=2009040619250832&item=10-1564&catname= work?

Also, what is a good, inexpensive source for the volt and amp meters?

Thank you!

wingsinger says: Apr 6, 2009. 10:46 PM **REPLY**
The motor you reference is a bit lightweight, but would work for 12 Vdc loads less than 1 amp. I expect it would drive a 10 Watt load at 1900 rpm. You may need to change the drive ratio to get the right rpm. In my setup, I think I had 3600 rpm when pedaling at 100 rpm.

There are many surplus motors available, it's just a question of how you want to use it. Permanent magnet dc brushless is primarily what you want to look for. 1/2 hp is plenty. I used a motor rated for 90V and pushed it to 120Vdc. You might prefer 12Vdc to keep the voltage at a safe level.

You can find a good selection of meters at http://www.surplusinstruments.com/page/page/3315703.htm .

PKTraceur says: Feb 1, 2009. 10:11 AM **REPLY**
I noticed you have two belts, one going from pedals to larger wheel, then larger wheel to motor. Wouldent it be easier to remove the larger wheel, not buy that red belt, and attach the pedals directly to the motor?

PKTraceur says: Feb 1, 2009. 10:08 AM **REPLY**
Sorry if these are already awnsered in the instructable, (Nice job btw.) Where did you get the motor? Where did you get the belt? Can you do this on a regular bike that doesnt have the front wheel? If so how? PM or reply a comment to awnser please. I've looked all over the internet to find out how to do this on a regualr bike, and found nothing. Now that I've found something close, please help on this.

luptonicedtea says: Jan 31, 2009. 4:50 PM **REPLY**
I really think this bike's a cool idea. I've got a motor picked out, but I have a question. How do you attach a fitting to the motor to make it accept the belt tightly? All of the motors I find have a simple rod with grooves dug into the rod.

wingsinger says: Feb 1, 2009. 8:37 AM **REPLY**
I may have misread your post. If you have a motor with a rod on the side parallel to the motor shaft, you can pivot the motor on the rod to tension the belt. Make two brackets to support each end of the rod and mount the brackets to the base. The grooves in the end of the rod are to accept an e-clip or c-clip. Any hardware store can match a pair of clips to the rod. To pivot the motor on the rod and tension the belt, attach a spring or bungee to the side of the motor opposite the pivot rod. The closer you connect the spring to the belt end of the motor, the better.

wingsinger says: Feb 1, 2009. 7:47 AM **REPLY**
Sounds like you have a motor with a shaft machined for the newer style belts. Whether it is a 1/2" shaft or 5/8" shaft, you should be able to mount a pulley on top of it. Note that I made a cradle to hold the motor and can slide the cradle back to tighten the belt.

luptonicedtea says: Feb 2, 2009. 1:30 PM **REPLY**
The Motor

That's the motor I was looking at. What I was talking about was the fitting that goes onto the rod sticking out of the motor. I didn't know what I would need to make it accept the belt at all. I was hoping to make it pivot-able, so I could tighten and loosen the belt. Thx!!! =)

joey2542667 says:
um, why do you run a lightbulb?! it's kinda useless...

Jun 23, 2008. 10:41 AM **REPLY**

THE_laux says:
have you ever tried biking in the dark!?!? it's not fun... ;)

Jan 6, 2009. 8:19 PM **REPLY**

joey2542667 says:
lolz

Jan 7, 2009. 7:29 AM **REPLY**

view all 99 comments