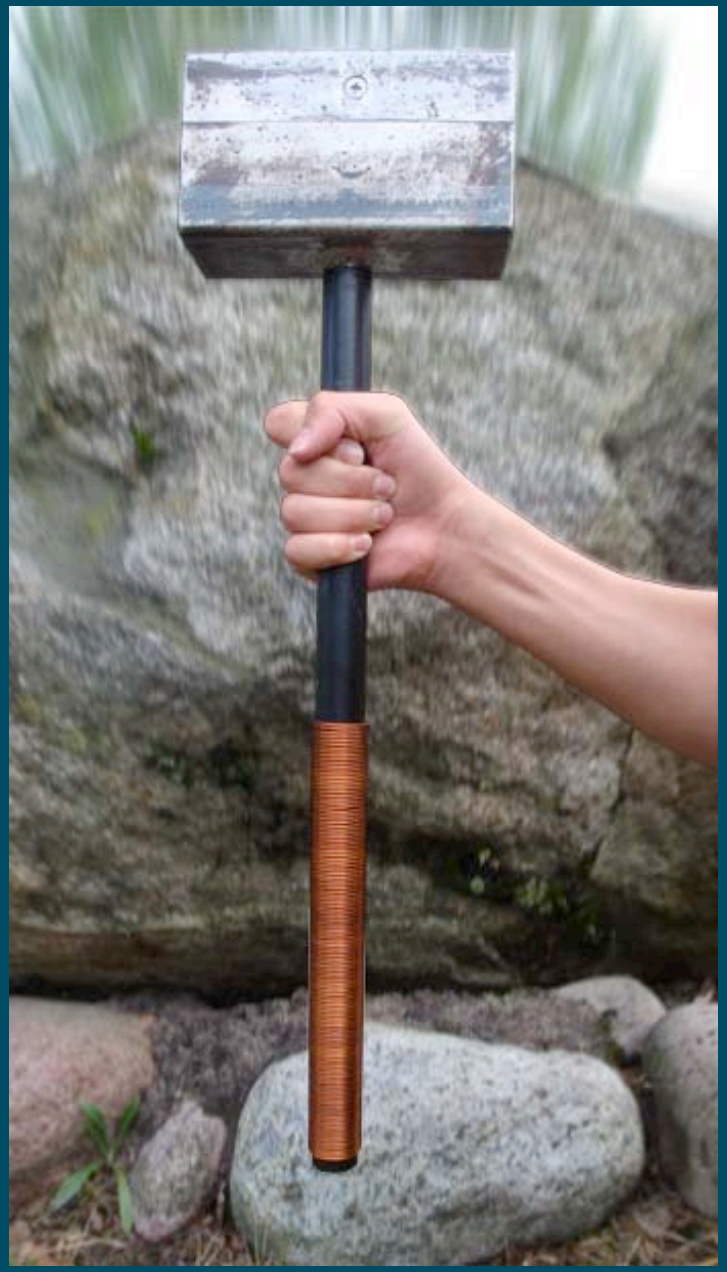


"Whoever holds this hammer, if he be worthy, shall possess the power of...THOR"

Hi, welcome to my instructable.
For me, super hero movies were always an inspiration. I always wanted to build technical toys which could help me feel alike to those heros. When I saw the feature "THOR" for the first time, I very much liked his hammer. That's why I decided to build one for myself and of course share with you the full step by step instructable.
I hope you will enjoy it!

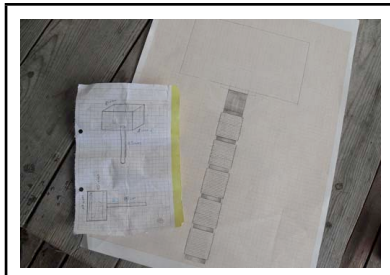
The real Thor hammer allows you to fly, throw lightnings and so and so on. Ours will be a bit simpler compared to the original, but it will meet a few points. Throwing my hammer wouldn't be very efficient, since it would (probably) not return to its master by itself.

That is why I found another solution:
Instead of throwing Mjolnir, I'm throwing pieces of metal that are connected to the hammer. How? By means of an electro magnet.
Switched on it will "grab" metal objects, and when switched off – release them again.
If one circles around oneself, you build up a lot of momentum (like in the Olympic hammer throw), but you won't let go of the hammer, but of the metal pieces temporarily connected.

Enough of theory,
lets collect the parts and build it!

Marvel Rules!!!

created by Jeremiasz Hauck





created by Jeremiasz Hauck

Like every good project, this too started off on the designing table. The original plans are a bit crude, though some ideas (copper wire, meassures) were already sketched out. See the included PDF file for a more refined layout.

The metal used here is steel (3mm), bent to specifications (see PDF file).
One can see the added tongues to later close the body of the hammer head. The side walls aren't fixed yet.

Two more tongues fixed to connect with the side walls. A hole to connect the hammer head (holding the electronic gear) with the handle (carrying the switch).

Here you can see better the side walls – plus the 8 holes (4 tongues, 4 sides) for the screws, to keep the gear inside accessible. Later it came to my mind that one could have used a C-beam (half an I-beam) to build this structure,too.

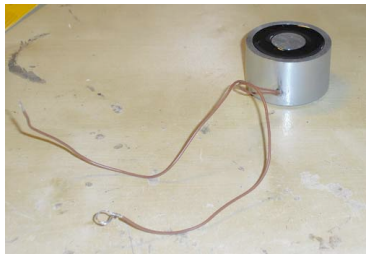
The hammerhead assembled, it's a tight fit, with almost no gaps to be seen. On this picture you can see the handle connected to the body, it's a 27 mm metal tube, 50 cm long.

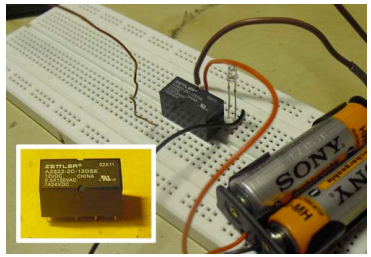
Refering to my initial idea to make stripes of copper decoration on the handle, I started to pre-bend 8,8 metres of 2mm wire into shape. Use tape to fasten your starting point.

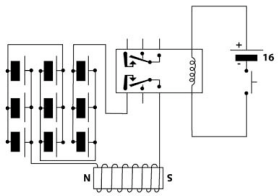
Then it's just pure handwork – turn the hammer and try to keep the wire as snuggly to the handle's wall as possible. At that moment I had no plan yet how to keep the wire fixed to the handle.

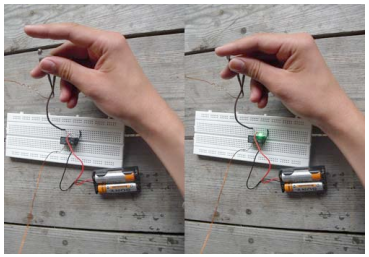
At that moment the hammer has already got it's cool look!

Now let's go on for its functionality.









created by Jeremiasz Hauck

To make our hammer magnetic, we need to have a power supply. I chose to use 9x 9V batteries, they are small, cheap and easy to get.

This is the electro magnet. You can buy one, like I did, or you could build one yourself (using similar copper wire I used for the outside deco, but thinner). This one cost around $30.

Small picture shows a switch relay. It works on the basis of another electro magnet, Since I'm using an altogether voltage of 27V and a few Amperes, I didn't want to risk to destroy the simple push button (later fixed to the handle).

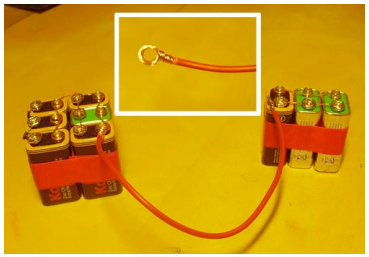
This is the circuit layout (see PDF). One can see the 3 blocks of batteries, linked to the e-magnet and the relay. The relay is fed by its own battery circuit, (seen on the previous picture) and switched on by a push button.

A test of the circuit: instead of the magnet there is a control lamp, the switch is not the switch later to be used on the handle – but the lit diode showed the system worked.

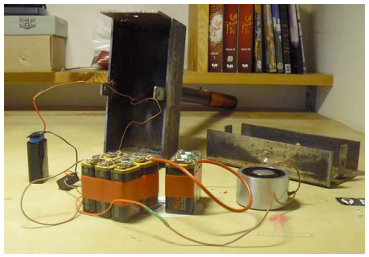
Before connecting the 9V batteries together, I tried different locations for them – this one in the end didn't get used, but it gave me a good sense of the space available.

The batteries are bundled in 3x3 blocks, they are separated to leave a center space for the electro magnet. The batteries in each block are connected in paralleles. This way the Amperes are rising – thus the power of the electro magnet.

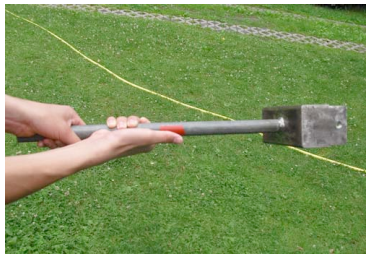
To get a higher voltage, the blocks are now connected in series. The little loop in the small picture connects minuses (3) of one block with the pluses (3) of the second block.



The last block to be connected in series needs a longer cable to cover the gap (because the magnet goes in between).
Now we have 27V (9+9+9V).
And a few Amperes (don't own an ammeter :-)).



The complete circuit waiting to be packed. From left to right:
The battery for the relay, the relay, the power unit (27V) and the electro magnet.



created by Jeremiasz Hauck

Let‘s take out the hot glue to make every part at home where it belongs. In the head of the hammer you can see the real placement of the power unit. I tried to use the hot glue on the e-magnet itself too, but it kept falling off. A different solution (later more) had to be called for.

Locate the place for your switch. The hammer is supposed to build up centrifugal force, so both hands should always sty in contact with the handle. The red tape indicates the place under my thumb that I can easily manipulate without losing control of the hammer.

Here‘s the real switch, it‘s a micro switch. Once the hole is drilled, the body of the switch vanishes in the tube. But it can‘t be pressed in completely, so there‘s a resistance needed, here provided by inserting a plastic tube, that perfectly fit into the handle.

After drilling, there is the time to do some cosmetic work. I wanted the head to be of a clean metal look, the handle contrasted with black and copper. This was the final color from these spray cans, so to avoid the usual speckles I covered the head completely.

I‘m painting the handle. It‘s a nice black matte finish.

Let‘s see how we can fix the copper wire. How about providing a start and an end hole on the handle – like this the wire won‘t slide up or down, and is kept from unwinding itself, too.

This is the hole **opposite** to the switch, seen before. To also keep the plastic tube from sliding inside the handle, but keeping it at the same time retractable in case of repair, I thought of making a channel, back and front. The hole on the plastic outlines the depth needed.

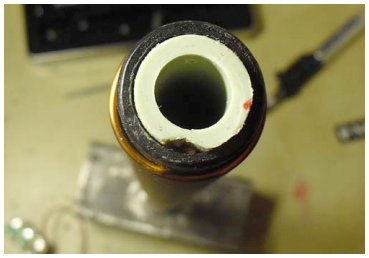
To make the channel I used an angle grinder. Watch out for your hands and keep the working object fixed properly. Two clamps for a stabilizing wood, two for the tube. I used the red line on the tube to keep the longer channel straight, the shorter to the switch went freehand.

The place for the switch was marked before. The notch (rather than channel) allows me to bring the cables to the micro switch, which will „sit“ on the plastic tube. Switch and copper starter are 180 degrees opposite to each other.

The bottom hole to fix the copper wire. It has to be 90 degrees to either switch or starting point.
I had the intention to lead the wire through metal **and** plastic tube, but I had to change my plan a bit later…

I put the pre-bent wire into the starting hole as deep as the plastic tube inside allowed, thus blocking it from escaping. With a (real) hammer, I bent the wire tight towards the handle‘s wall, then putt the loops on the handle and tightened them to the bottom. There the wire was cut and fixed to the bottom hole.

To keep it tight, bend the wire to the internal wall.
Now how do we get the plastic tube inside, and keep it moveable?
Change of plans: let‘s make a groove all along the tube…
See – shown on the small pict.

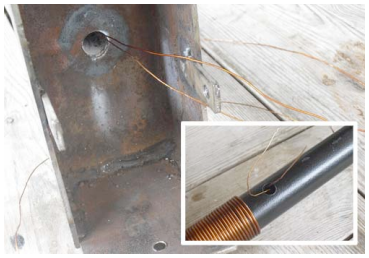


Great – everything fits!
So far the external design of my hammer…

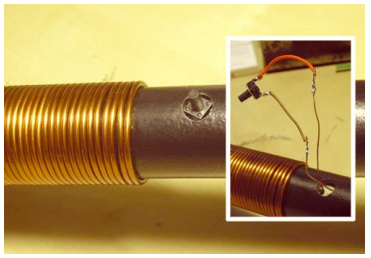
It looks so nice – just as a decoration object!
Now let‘s add the switch and see if it works, too?

This micro switch actually has got four legs, but we need just two for our cables. One leg goes into the notch, for the second leg we need to drill another hole.
Bend away the ones you don‘t need.

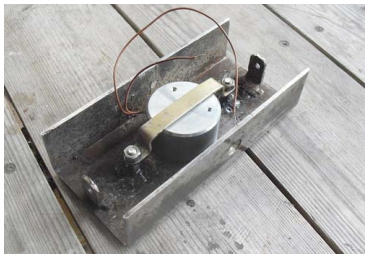
The two operating legs connected to wiring.



The cables going out from the hammer head, reaching the hole for the switch. Now connect…

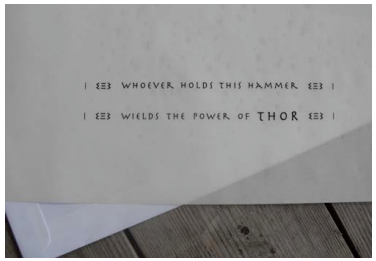


Small picture: the switch is connected.
Big picture: the switch in its final place of destination. Add some epoxy glue if needed. Mine fit quite tight.



Do you remember me trying to fix the magnet with hot glue?
Didn‘t stuck to the straight metal surface…:-)
So I had to come up with this solution, a metal band strapped around to be tightened.

created by Jeremiasz Hauck



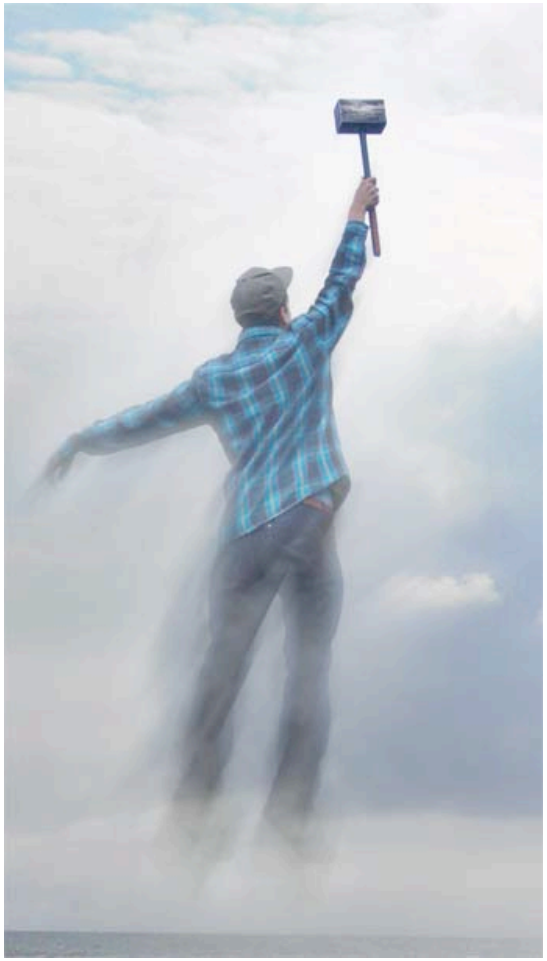
A last decorative element, to be fixed along the hammer head. I went to a printer to get me some writing on self-adhesive foil.
I included the text on a PDF file.

The foil is a one-go element, so you can‘t tear it off and try again if you glued it warped or false.
I‘ve been told that some water with dishwashing liquid allows for prolonged manipulation of the foil.

Then squeeze out the excess water with a credit card or something.
Looking at the result, I‘m not sure if I can endorse the advice I got, there‘s some goo remains under the (transparent) foil.

Oh gee!

I gathered too much of a speed – there I go…



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