**MaKey a WeAVE!**

A PROJECT USING MaKey MaKey
WITH WOVEN CONDUCTIVE MATERIALS
FOR MUSIC PROGRAMS
OR ANY OTHER SOFTWARE YOU CAN USE WITH A MaKey MaKey

made with adult students, but suitable to be made with kids

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WHAT'S NEEDED?

MATERIAL FOR WEAVING

-All kinds of yarn (cotton, wool ...)

-Frames, in our project 10 round frames made out of a recycled cardboard tube (in this case diameter 9 cm - 3.5 inches, any other size is ok too)
You can also use wood, plastic, metal.
And the shape could also be in form of a triangle, a square, etc.

-Pins

TOOLS

-Scissors, saw, pliers, measuring tape, cutter knife, needle, tape

-Laptop or other computer with speakers
FOR THE “ELECTRONICS”

- 1 MaKey MaKey

- Conductive materials that can be used as yarn or on textiles, like:
  
  Conductive fleece  Conductive paint  Alu foil
  
  Copper wire  Steel wire  Steel wool
  Stainless scrubber  Conductive thread

Also electrical wire for the connections (besides the alligator clips and connector wire provided with MaKey MaKey)

Many of these materials can be recycled or, in this case, up-cycled

SOFTWARE

- We used Soundplant and keymaps, but
- Every program or Webpage which uses the inputs that you find in a MaKey MaKey board can be used
HOW TO

First of all we make the weaving frames by cutting 10 slices (thickness 1 cm – 0.4 inches) out of a cardboard tube (other materials like plastic, wood, metal, or wicker are also suitable)

We measure and attach a pin every 2.6 cm - 1 inch around every round frame

It is very important to always get an odd number of pins (11 in this example, could be more or less depending on the diameter but always an odd number).

It doesn't matter if the distance between two pins is a bit longer or shorter.
Then a yarn end is tied to one of the pins.

Go on winding the yarn in every pin, going always from one pin to the next on its left and then to the one at the opposite side, so that you get a “yarn star”.

It’s not difficult, just follow the numbers:

For newbie weavers, here we are building the “warp”.

1 Start here

11 and end at the center
After reaching pin number 11 the yarn goes to the center and is “woven” with a needle by driving it under a warp thread and over the next one. This one-up-one-down weave is called “plain weave.”

For newbies, this thread woven up and down around the warp is called the “weft.”

When approx. 1 cm – 0.4 inches is woven, we begin using conductive materials for the weft, always driving the chosen “electric conductive yarn” over a warp thread and under the next one.

Weaving with common, non-conductive yarn and covering it with electric conductive paint is also an option.
Cutting strips of aluminum foil (used just before by the janitor of our school to wrap her break-time sandwich) can be a good form of getting an up-cycled yarn for our project :) 

A yarn can be spun by hand from conductive fleece or steel wool (steel scrubber as well). Simply gently stretch a small amount of fleece and twist it with your fingers.

Another creative possibility is to stitch conductive yarn, fleece or very fine copper wire in a fabric woven with cotton or wool yarn in both warp and weft.

Always leave a free end of your conductive yarn in the back side of your “flowers” in order to connect it with wire.
LADIES AND GENTLEMEN.... meet our handwoven “conductive flowers”

- Red cotton
- Alu foil
- Red wool
- Conductive thread
- Spun steel wool
- Blue cotton
- Sky blue cotton
- Conductive fleece
- Conductive paint
- Plastic pins
- Copper wire
- Steel scrubber
- Wool
- Steel wire
- Alu foil
- White cotton
- Red wool
- Conductive paint
- Sky blue cotton
- (we ran out of wooden pins)

It’s your turn!
NOW LET'S START WITH ELECTRONICS!

The first step is to draw a simple sketch from what we are going to do: connecting a laptop with the MaKey MaKey and the MaKey MaKey with our woven “metal flowers”

Ehem... well... the very first step in this case is different: because the students that participated in this project are adults, it is necessary to convince them that MaKey MaKey really works! (kids on the other hand don't need to be convinced) ;)

Here is a quick (amazingly quick!) test with assorted scissors as conductive stuff and minesweeper as software:

And, yes, it really works!
Then we stripe the ends of the connection wire about 2 cm - 0.8 inches. We can use a knife, pliers or scissors for this purpose. 10 of them are needed.

Note: Connection wire used in wired networks is very appropriate for this project, it has several small coated cables in a bundle, and they have different colors, making easy to identify your connections. You can use other kinds of coated wire, though.

Every single cable is attached to the conductive weft of each “flower” by tying it to a free end in the back side or, if necessary, by stitching the wire in the fabric.

Make sure that wire doesn't slip out of the “flower”!
Little by little it should look like the next picture, well, perhaps a bit less chaotic!

Another important element is the “electric drum stick” that will be connected to the “earth” in our MaKey MaKey.

We used a wooden tube, inserted a smaller aluminum tube in it, clamping a wire at one end. The “head” of the drum stick is made with thin copper wire.

But you can come up with different kinds of sticks, a simple metal rod, an old tea spoon, your own finger. Many things work!
IT'S TIME TO CONNECT ALL CABLES TO OUR MaKey MaKey!

A part of our wire can be clamped to the provided alligator clips, which can be attached to the “input holes” in the board (for our project: ▲, ◀, ◁, ▶ or “space”, and always “earth” -for our “electric hand made drum stick”)

For the rest of the cables we simply insert them into the hookups (W, A, S, D, F or G) in the back of the board. Provided cable jumpers can be useful as well, but only tied to longer wire, because those are quite short for this project.

When all connections are done, it is advised to isolate them with tape, in order to avoid a short-circuit:

Other projects may need different inputs.
So we get ten “flowers” and one “drum stick” connected with eleven long and thin cables to several alligator clips and/or directly to a MaKey MaKey board, so...

**It's time to put a little bit of order in our project!!**

It can be made by arranging all our “flowers” on a table, fixing the cables with tape somewhere in their way to MaKey MaKey...

...or, better, attaching all the “flowers” to a background. In this project, as the weavers we are, we chose a bigger round frame from our workshop:

To weave this bigger piece you only need a round frame with a longer diameter, an odd number of pins or holes around it and yarn. It is woven in the same way as our “conductive flowers” are. You'll also find enough information on how to weave on the internet. Try it!

Some advantages of this: wire can be stitched through the fabric woven on the big frame, so it remains hidden. Besides, the “flowers” can be sewn to the ground, avoiding unwanted movement.
Here a suggestion on how our 10 keys and the drum stick can be connected to a MaKey MaKey board.

Hint: help yourself drawing a wire diagram.
THE LAST STEPS

- Connect the MaKey Makey to a laptop using the provided USB cable (thanks, MaKey-team, for providing it, so that we weavers didn't have to "beg" for one at the computer classroom ;)

- Open a program or a web page that works with the keys we use. We made some experiments, choosing Soundplant and the Marimba and drum sounds (thanks again, MaKey-team, for the link to the marimba key map, so that the teacher didn't have to spend hours creating one ;)

- Test everything and **Start playing and fooling around!** Simply touch the "flowers" with the "drum stick"

And, yes, it really works!

Last but not least, a couple of technical data:

- Cost: 1 MaKey MaKey, conductive paint and thread, almost the rest of materials up-cycled (mom is still looking for her scrubber, and our janitor is wondering why this year such a lot of pins have disappeared from the school's pin board)

- Time needed: Who cares? We were creating! (Well, about 3 hours 5 persons)

- We could write a list of suggestions or trouble shooting, but better you visit [www.makeymakey.com](http://www.makeymakey.com). They speak a better English than us.

**WE HOPE YOU ENJOY SIMPLE WEAVING AND MaKeying WITH THIS HOW TO!**
We also used a MaKey MaKey in a fabric we wove on a conventional hand loom. This other project was made to show it at our yearly exhibition. Of course it was the most visited object by far. It was funny for adults and kids.

If you have a hand loom, please try it too!!

By the way, to play here a “drum stick” was not needed at all, it worked with a finger, without having to be “grounded”. We still wonder why.

Thanks for watching

About us

This project was made by the teacher and students from the hand weaving class at the Escuela de Arte Manolo Blahnik in the tiny, beautiful Island of La Palma.

(Special thanks to the colleagues from the furniture and jewelry classes for their collaboration)
(Also special thanks to our janitor for wrapping her sandwiches with alu foil)

Our School of Arts is named after Manolo Blahnik because this brilliant shoe designer was born in La Palma.