



The Theremin project

Ideas for crafting

General considerations

Crafting/ handcrafting is considered as a pivotal point and a complementary task that can imbue meaning to the project. Through the crafting process (highly interwoven in the robotic artefact construction) students become more engaged to the entire process as they explore of a number of engineering and design concepts, and they consider multiple solutions in order to achieve the results that they want.

The present document contains certain different ideas and approaches on crafting for the Theremin project. Each of them is based on the use of simple (and recyclable) materials that can be easily accessed and modified. The proposed techniques and the corresponding steps are optional and indicative. Students should be encouraged to use any material they like as well as to experiment with different designs, forms and constructing techniques. In this way they will be able to overcome any design-related problem (e.g how to create a stable structure, how to embed the circuit to their model etc.).

- Classic Theremin

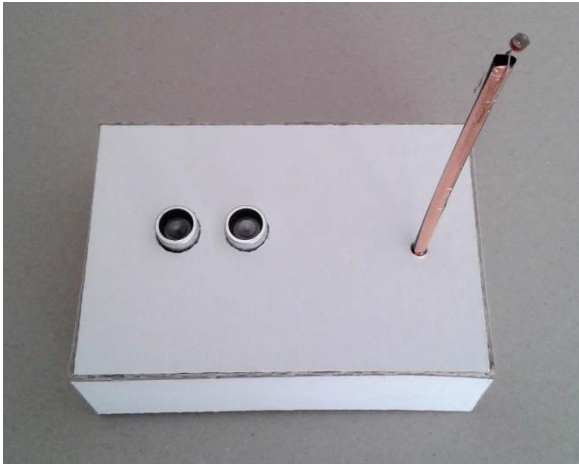


Figure 1: A classic model of Theremin from cardboard

The following images depict the procedure of modelling a rather classic model of Theremin by using cardboards or a ready-made box and a straw. Apart from the aforementioned materials, students will might also need a scissor or a cutter, a ruler, paints or coloured papers for decoration, as well as glue or tape.

To embed the electronic parts and the sensors, the students will have to create a box. Therefore, they will initially measure the components in order to calculate the dimensions of their box, as well as the holes for the Ultrasonic sensor. Then they will draw the pattern of the box on the cardboard and, with the assistance of their teachers, they will cut it off

(Figure 2). Next, they will carve the edges and they will fold the four sides (Figure 3). They are advised to glue them in order to have a more stable structure (Figure 5). In the meantime, they will also create two holes in the middle of the box, where the Ultrasonic sensor and the photoresistor will be embedded (Figure 4). They should also create a hole for the USB cable.

After finishing the box, the students can be encouraged to decorate it by using paint, coloured papers or even stickers. Then they have to decide the place that they will attach the photoresistor. They can create a small hole in one of the small sides of their box or they can use a straw in order to create an external antenna (Figure 1)

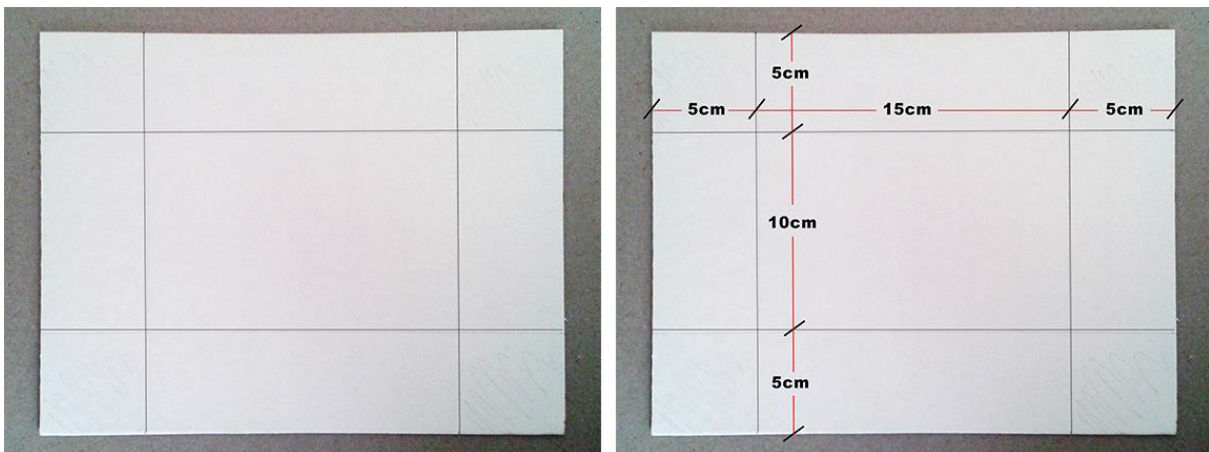


Figure 2: Creating the pattern for the box

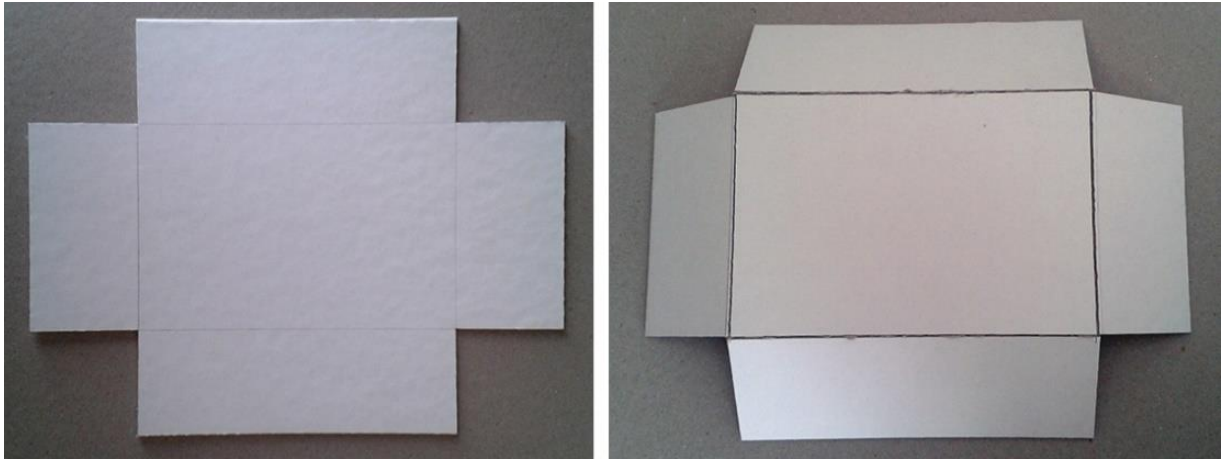


Figure 3: Cutting the pattern of the box (left) and carving the edges (right)

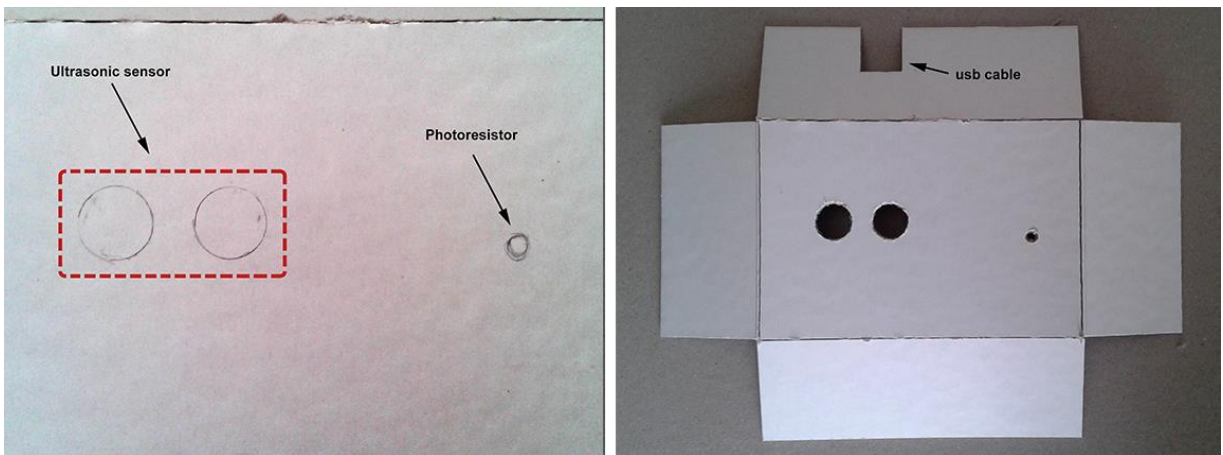


Figure 4: Marking the holes for the ultrasonic sensor and the straw for the photoresistor (left), and cutting the holes (right)

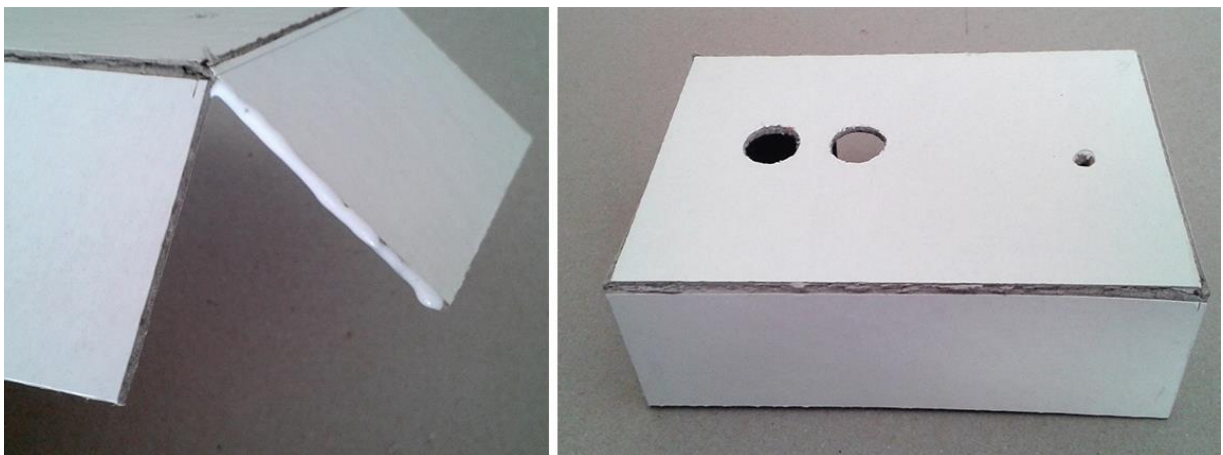


Figure 5: Gluing the edges (left) to stabilize the structure (right)

- Alternative solutions (Papier-mache technic)



Figure 6: A ghost-Theremin created from papier-mâché.

Apart from the creation of a rather typical model of a Theremin, students should be encouraged to use their imagination in order to come up with alternative ideas and technics.

An alternative proposition is depicted in the following images. The initial idea was the creation of a Theremin in the shape of the ghosts that are chasing Pac-man in the famous video-game. For this reason, the technic of papier-mâché was implemented.

For the creation of papier-mâché, you will need white glue, paper for domestic use or newspaper and a spherical surface, which will function as your mold (e.g a bowl, a balloon

etc.). After mixing the glue with a very small amount of water, you have to cut the paper in small pieces or strips and soak each piece inside the mixture (Figure 5). Then place the soaked piece of paper on your mold (Figure 6). Continue the process until covering the entire surface¹. In case that you are using a bowl as a mold, you are advised to cover it first with a membrane since it will help you to easier detach your model. Once your model is dry, you can slowly detach it from the mold. Then, if you wish, you can paint it and make the necessary modifications (e.g. create holes to embed the sensors etc.). You can embed both of the components (photoresistor and buzzer, or photoresistor and Ultrasonic sensor) on the same model, or you can create two models and thus producing a more playful model of Theremin.

If you decide to create papier-mâché with your students, please keep in mind that usually it takes one or two days for the model to get dry.

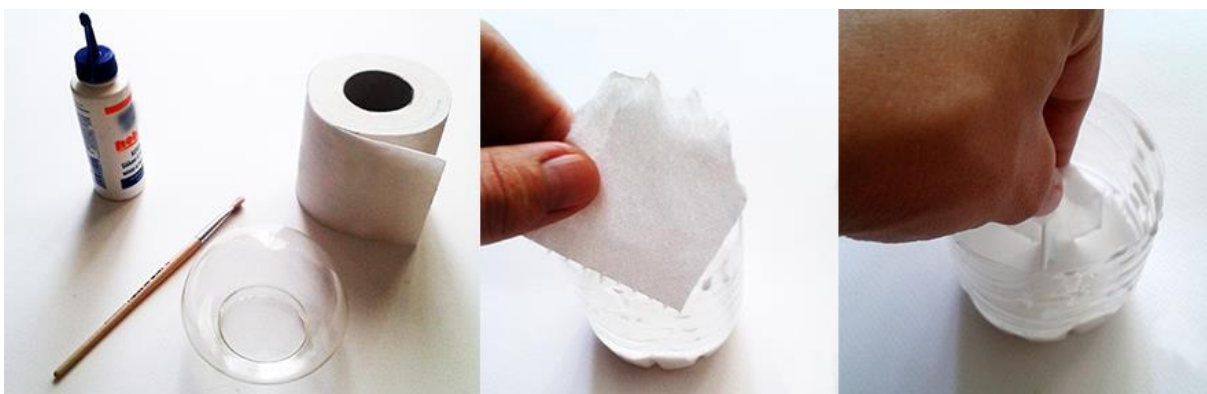


Figure 7: (Left) Materials for creating papier-mâché, (centre)cutting paper in small pieces, (right) Soaking the paper in the glue mixture

¹ You can also create a pulp by mixing small pieces of paper to your mixture of glue



Figure 8 (Left) Placing the soaked piece of paper on the mold, (centre) waiting for the model to dry, (right) finished model

- Wearable

The concept of Theremin could be applied for the creation of wearable devices. Some ideas are recorded below. Encourage your student to think upon these scenarios and come up with their own ideas.

- Creation of an oculus from cardboard with an embedded Ultrasonic sensor → alternative lived experience (trying to move inside a space only through audible signals that are activated on the presence of an obstacle)
- Stick for impaired people.
- Bangle for impaired people.

ROBOSCIENTISTS PROJECT

Motivating secondary school students towards STEM careers through robotic artefact making

Erasmus+ KA2 2018-1PL01-KA201-051129

Creators

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Contributors

Declaration

This report has been prepared in the context of the ROBOSCIENTISTS project. Where other published and unpublished source materials have been used, these have been acknowledged.

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