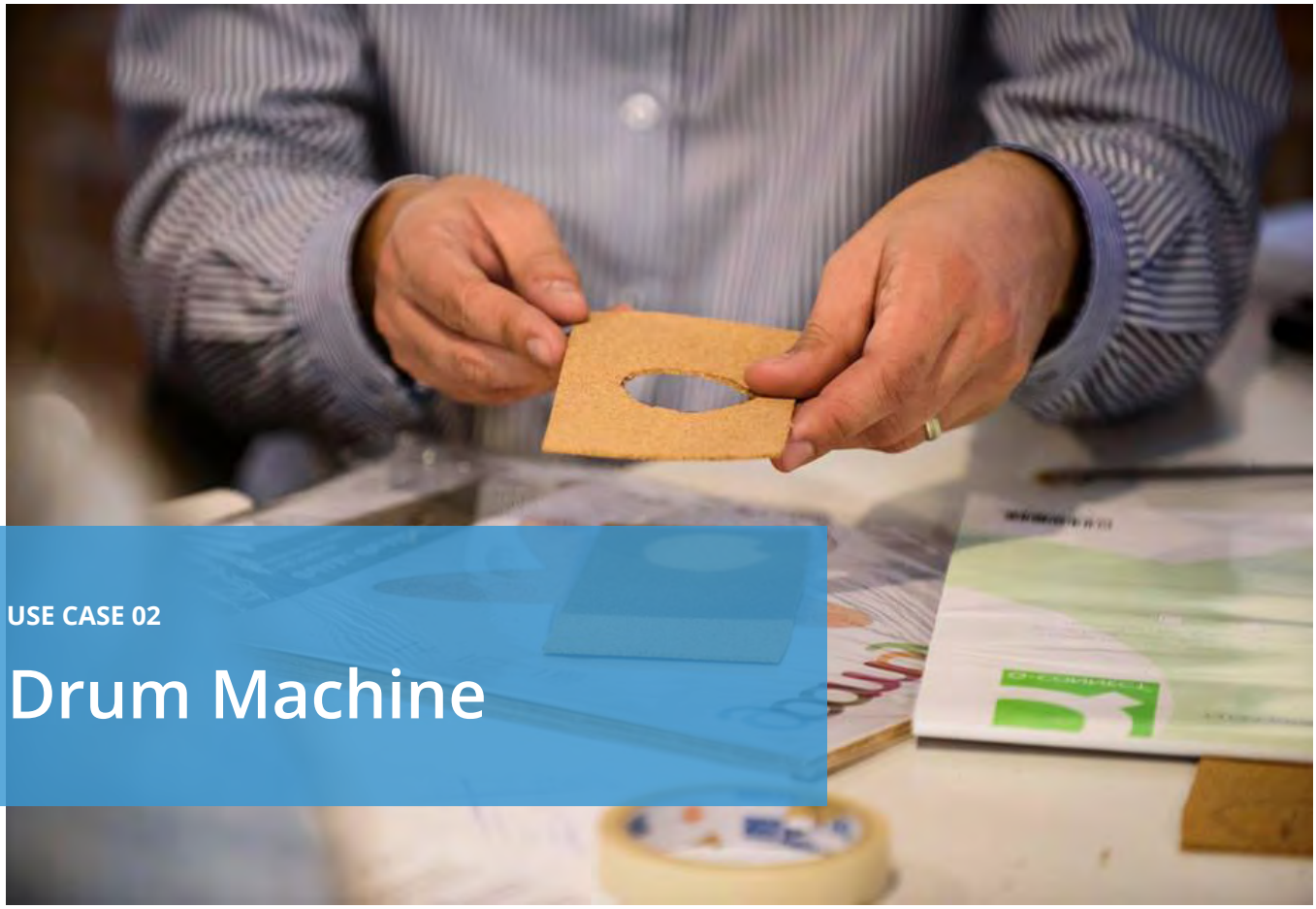

USE CASE 02

Drum Machine

Age & Level

Nikos, Greece
Substiture teacher
Teaches students around
16 years old

Primary Actor and Main Goal

He is a substitute teacher in Greece, teaching for twelve years classes and has been asked to teach them about how sounds are produced by the modern music instruments.

Topic and Content

He starts by playing recordings of some instruments and explaining the various technologies that are used to make it. However, he notices that many of the students are getting bored. He asks: “Does anyone know how to make a drum machine?” The students laugh, joking about how they can download one from the app store with their mobile phones. They are expecting to be reprimanded, but they are instead surprised by Nikos’ reply: “How about we all learn how to make a drum machine ourselves, without our mobiles?” The students are very intrigued and do not really believe this is possible, but they are willing to give it a chance.

Description of Environment and Possible Pre-conditions

Nikos has brought with him an eCraft2Learn case, with 4 project kits.The kits contain electronic components and simple instructions how use the components and STEAM projects examples.

Preparatory Work

Nikos knows well the kit, since he experimented himself with the tool some time ago.

Other Stakeholders and their Possible Interests

Nikos asks some help from the computer teacher of the school, especially because he wants his students to have access to the computer lab for Arduino programming and information searching activities.

The computer teacher of the school, who has little experience with Arduinos, finds the whole project very interesting and is offered to help by uploading the necessary web content, explaining the steps of this music project, to the school web site.

Description of Activity

He asks the students to form groups, and loans each group a kit.The students are interested, but some are worried this task might be too difficult for them, since they do not know about technology like Arduinos. He tells them not to worry, and asks them to take out a sheet of paper. "Your sheet of paper will become the buttons for your drum machine!" They think he must be joking, but they now feel very comfortable working on the project, since instead of a complicated circuit, they are focused on a piece of paper. He asks them to draw lines on the paper, dividing it up into "buttons", in any arrangement they would like.

He then asks them to take out of their project kits a few different coloured wires, and a handful of small sensors. They are instructed to connect each sensor to a different coloured wire, and to connect the free end of the wire to the series of pins on the Arduino board. Finally, he asks them to tape down each wire onto the piece of paper, so that there is one sensor in each square they've drawn. He also invites them to connect the small speaker from their kits into the Arduino's audio output connector.

Failure and Conditions

The students are following along, but they seem to be losing interest. Sensing this, Nikos decides to take an intermediary step.

Success and Condition

There are also LEDs in the kit, and he asks them to connect the LEDs to wires, and the wires to the other set of pins on the Arduino board. He knows from a previous project that there is software pre-loaded onto the Arduinos that connects the input and output pins. He now invites the students to "play" the squares on the paper, which trigger the lights, and the students are immediately engaged, for a moment. They quickly tire of making lights flash, but they still want to know more about how the Arduino works. And they really want to make the drum machine that was promised to them!

Extensions

At this point, Nikos tells them to plug the USB connector on their Arduinos into their classroom workstations, which have the Arduino coding environment on them. They load the software from the device onto their screens, and he explains to them what each line of code does, and what makes the LEDs light up. He then shows them how to add new lines of code that trigger a drum sound when the light is triggered. For the remaining time, the students play collaborative rhythms using drum sounds made by their paper and Arduino drum machines. Some of the students even get the idea that they can go back to the software and replace the drum sounds with sounds of their own voices. Now they are enjoying making music together, while having learned about music technology through an exploratory, hands-on approach.