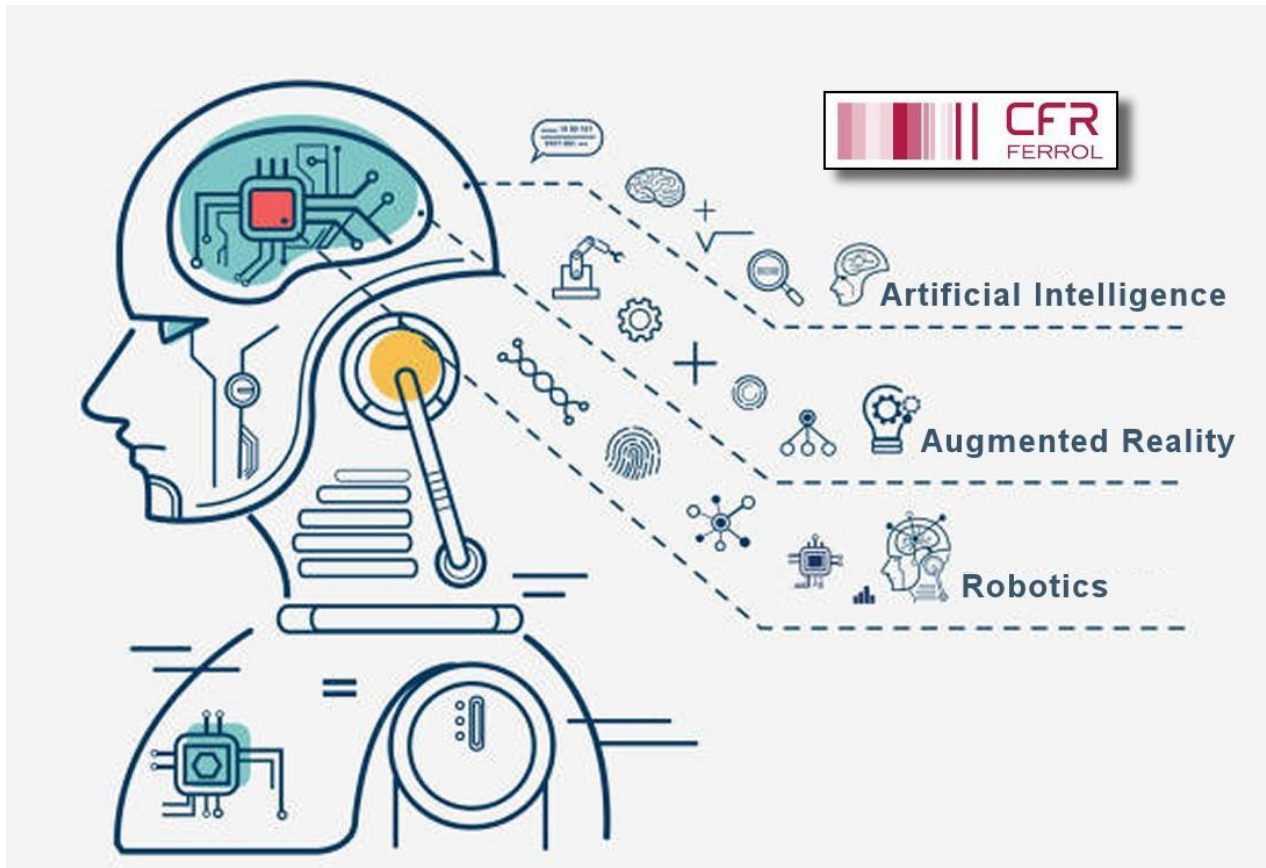


STEAM ERASMUS DAYS 2022



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INTRODUCTION

This first day deals with the use of augmented reality and artificial intelligence to improve teaching-learning processes with our students.

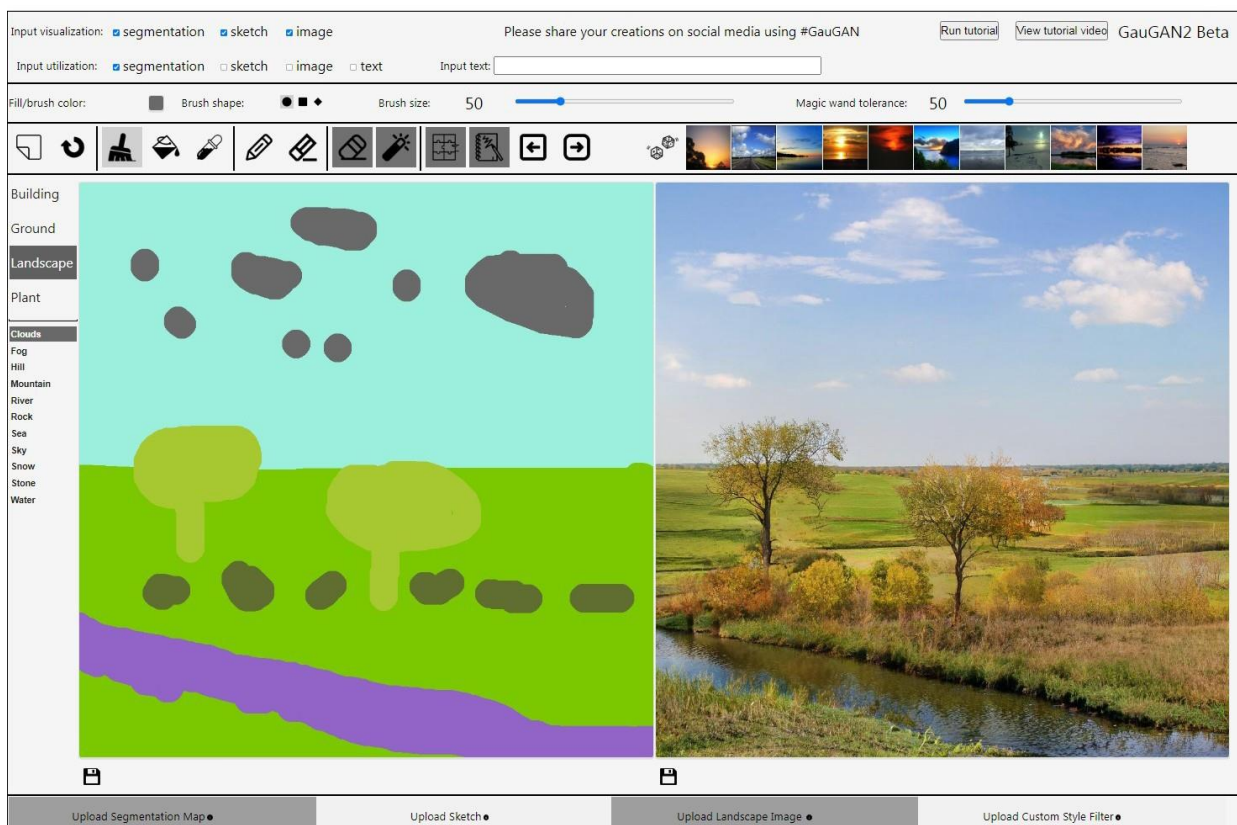
ARTIFICIAL INTELLIGENCE

Artificial intelligence can be defined in a very simple way: the aim is to provide machines with an intelligence that works in the same way as human intelligence, that is, that they are capable of solving problems without the need to be programmed and without human intervention.

Exercise 1: Creating realistic landscapes using artificial intelligence (AI)

Through the following website it will be very easy to create a very realistic landscape. It can be done in two ways:

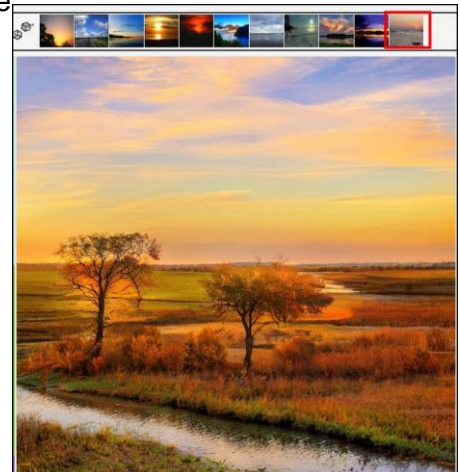
1. **Drawing in the left window** what we want the landscape to look like, (with grass, trees, a river, sky with clouds).



From the drawing on the left, the AI generates the image on the right.

In the vertical box on the left you have to choose from the different categories what you want to draw, for example, in the category "Plant" you choose "Grass" to draw the grass.

It is possible to vary this image according to the 11 sample images (landscape variation) at the top. For example, I would like this landscape to be a sunset, so I choose the first image on the top right.



Important: in order to generate these landscapes you must first check the box "[Check this box if you agree to the terms and conditions described below](#)".

2. **Describing with text the type of landscape you want to create**, in the "Input text" box, on the top centre. The steps to follow are:
 1. Uncheck the box "[segmentation](#)" and check the box "[text](#)" of the category "[Input utilization](#)".
 2. Describe the landscape with text, e.g. "[snowy mountains with trees](#)".
 3. By pressing the arrow "[→](#)" the AI generates the image on the left. When you click the first environment display on the upper right corner, the image on the left turns into the image on the right, it varies completely.

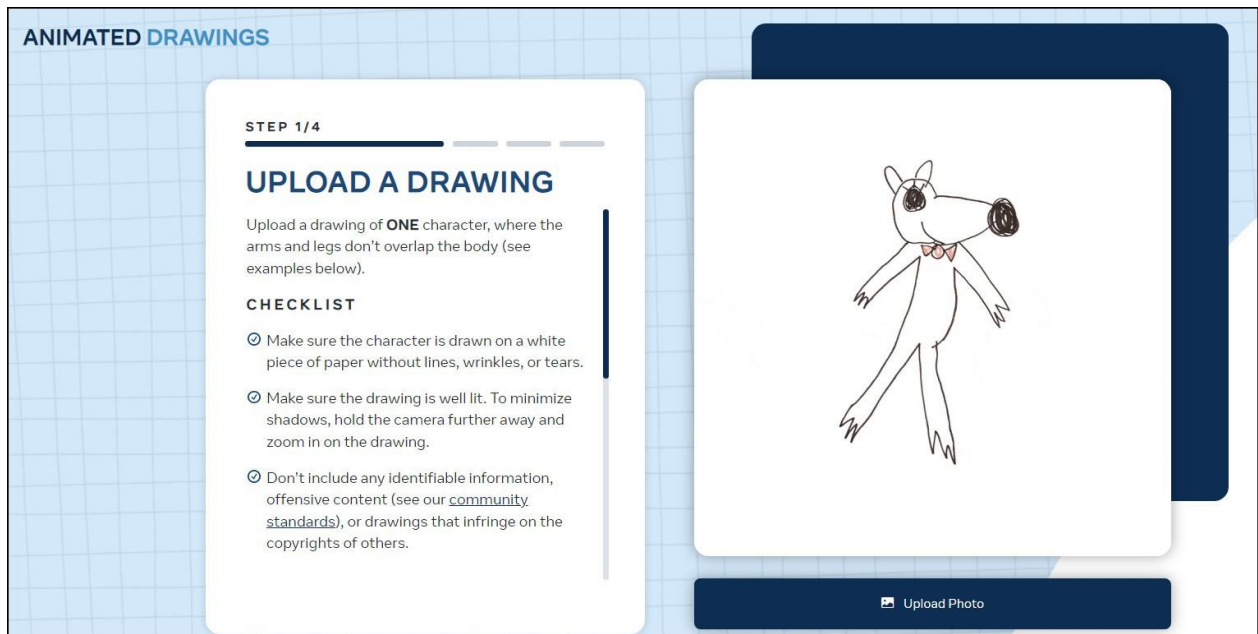


4. If you click any of the other samples the image will change again.

Exercise 2: Animating cartoons using AI

As with the previous online application, a website can be used to animate drawings.

1. Visit this website: <https://bit.ly/3GNIh9z>



2. Upload a drawing, the legs and arms must be well defined and separated from the body for the animation to be credible, like the one you can see here.
3. Once uploaded press the "Next" and "Agree" button.
4. The platform then allows you to modify the drawing to fit as a single image or to retouch it.
5. Once the image is OK, proceed to show the attachment points of the different parts of the body, which can be repositioned if necessary.
6. Finally, all you have to do is choose the type of animation you want to make.



AUGMENTED REALITY

Augmented reality is the use of virtual elements within real environments, as opposed to virtual environments, where it is possible to include real elements. Augmented reality connects the physical world with the real world, i.e. it augments our reality by including more information in it.

An example of a virtual environment is a montage where a person is included in a non-real environment, such as the one shown below.



An example of augmented reality is to show through the screen of a mobile phone, and using the built-in camera, data about the environment where the mobile phone is located, for example: information about the monuments that are close to the current location of the mobile phone can be shown and superimposed on the image captured by the camera of that mobile phone.



HOW TO WORK WITH AUGMENTED REALITY

Today, augmented reality can be used in two different ways:

- **Using a PC:** it will require a computer, a camera connected to the PC, augmented reality software and a marker.



- **Using a mobile device** such as a phone or tablet. This is the most common way of using augmented reality in education. It is better if each pupil or group of pupils has a tablet.



USE OF AUGMENTED REALITY IN THE CLASSROOM

There are several ways to use augmented reality in the classroom with students

- Using augmented reality apps with already created content
- Using an app to create augmented reality content
- Using PC software to create AR content

USE OF AUGMENTED REALITY APPS WITH PRE-CREATED CONTENT

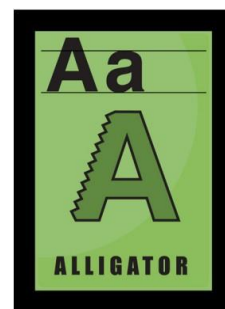
In the following exercises we are going to work with augmented reality apps and content already created but which are very useful and easy to use with the students as well as being very didactic.

Exercise 3: Using a printed marker together with an app and a mobile device

Objectives: The aim is to teach pre-school pupils the letters of the alphabet together with the names of animals in English.

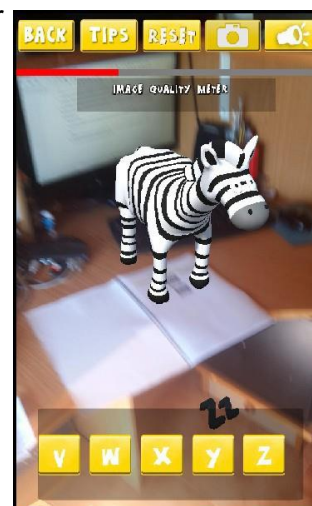
The steps for this exercise are the following:

1. Visit <http://arflashcards.com>
 1. Once you are on this website please open the "Print Flashcards" tab.
 2. Here you can find the "[AR Flashcards Animal Alphabet](#)" to download the animal bookmarks. Download a PDF file
 3. Once downloaded, print out the 89 pages that it has
2. Go to Google Play and search for "[ar flashcards](#)". Choose the one with the monkey on it.
3. Install the app described in the previous section.
4. Once installed, open the app and click on the "START" button at the top left part of the screen.



The options of this app are:

1. Photos of the animals shown in augmented reality can be taken with or without flash.
2. If you tap on the animal in augmented reality, the name of the letter is displayed in English together with the name of the animal, e.g. "A - Alligator".
3. If you have the whole alphabet in PDF and after pressing "START" you choose any card, that animal will appear in augmented reality.
4. It is possible to use your own bookmarks (they cannot be saved) from the main screen of the app by pressing the "CREATE" button. A new screen will open. Then:
 1. First focus on a marker (book or magazine cover, photo, etc).
 2. Now click (at the bottom) on the letter of the animal you want to display in AR.



3. By doing so, the animal will appear in AR and it will be possible to move it. The letter and name of the animal can be seen by clicking on it.

Exercise 4: Using a printed marker together with an app using a mobile device

Objectives: Students learn to colour with coloured pencils and to identify the colours they choose.

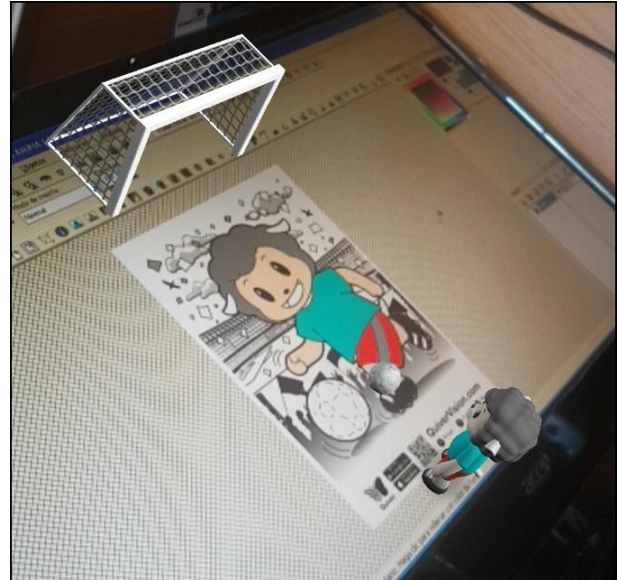
The steps for this exercise are:

1. First enter this website <http://www.quivervision.com>
2. Click on "Colouring Packs" at the top right-hand corner.
3. When you select this screen, a whole series of categories appears, containing films to download. Only those films marked as "FREE" will be available to use. So look for the category "Murphy and Friends Games".
4. Once you have opened this category, download, print and colour in the picture called "Murphy", which shows a kind of bear playing football.
5. Once downloaded, print out and colour this poster.

Watch the teddy bear playing football in augmented reality

1. It is assumed that the film in the previous section is ready.
2. Now go to Google Play to install the app called "[Quiver - 3D Coloring App](https://play.google.com/store/apps/details?id=com.puteko.colarmix)"
<https://play.google.com/store/apps/details?id=com.puteko.colarmix>
3. Once the app is installed, open it
4. Once opened, click on the round orange button (at the bottom) that has a butterfly inside.
5. Focus on the coloured picture of the teddy bear playing football
6. After a few seconds, the animated 3D object starts to download. Once the object has finished downloading, the teddy bear with a ball appears.
7. To make the little bear play football in 3D:
 1. Click on the 3D ball at the bottom of the screen
 2. Now there is a ball in front of the teddy bear and a goal in front of it.
 3. To make the teddy bear kick the ball:
 1. The bear can be moved horizontally facing the goal.
 2. If you don't want to move, simply press on the teddy bear.
 3. If you put the ball in the goal.....

You can try this exercise by focusing the camera and using the app on the image on the left, you can see the bear playing football as shown in the picture on the right.



Exercise 5: Using the "Merge Cube".

Objectives: To learn how to put all kinds of content in augmented reality using this cube. It will be necessary to complete the following steps:

1. Download and print this file_
http://www.futureworkss.com/Merge_cube.pdf
2. Once downloaded, print the cube sheet and cut it out to glue and form the cube.
3. Go to this website to see how to use the cube <https://bit.ly/320ljeO>
 1. Download the "Merge Explorer" app for Android and IOS
 2. Once downloaded, open this app and wait for the interactive augmented reality environments to load.
 3. Also install the "Merge Object Viewer" app to view all types of objects by category.



When you buy the cube, a code is included to be able to use more scenes that are now locked.

INTRODUCTION TO ROBOTICS

Nowadays, the use of robots in classrooms at practically all educational levels is widespread throughout Spain. The robots that can be used are of many types and of different prices, ranging from about 30 to thousands of euros. In this conference we will see some of the robots that we are been used at CFR Ferrol.

The use of robots in the classroom with students and the creation of activities involving them is known as educational robotics. That will allow you to cover five different subjects, by being able to create activities related to each of them, such as science, technology, engineering, art and mathematics. That is known as *STEAM education*.

STEAM education?

Yes, it is about students learning these disciplines in a real and experimental way using robots in the classroom, through practical examples from everyday life. The word STEAM is an acronym (each letter of this word has a meaning) and stands for "*Science, Technology, Engineering, Arts and Mathematics*", as it is usually indicated in English, but they are the same terms that I have just indicated in the previous paragraph.

The idea of all this is that students are the protagonists of the learning process and not just spectators as they have been up to now. For many years in my classes I limited myself to explaining the electronic symbols to my students on the blackboard, now I don't do it like that, using this robot and some templates my students learn the symbols in a totally different way, that is, they are no longer spectators but "actors" in the learning process.

ROBOTS BUILT BY TEACHERS

Since 2015 and thanks to CFR Ferrol, teachers have been taught how to assemble, programme and create all kinds of didactic activities with these robots.



Exercise 6: Robots assembled and programmed by teachers

Objectives: To learn about the different types of robots that teachers can assemble and the activities that can be carried out with them.

The following robot models can be seen below:

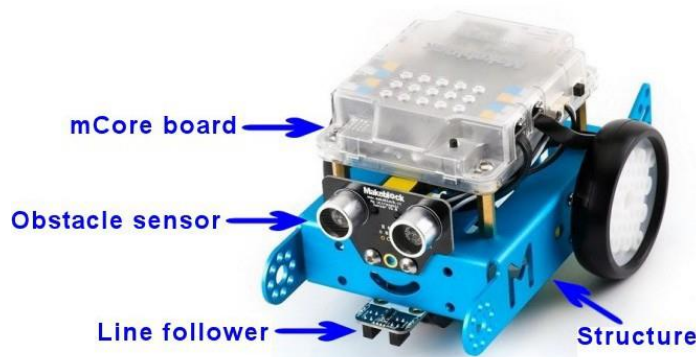
1. Escornabot Brivoi (academic year 2015-2016)
2. K-Kuribot v.3 (academic year 2016-2017)
3. K-Kuribot v.5 (academic year 2017-2018)
4. K-Kuribot v.5 improved (academic year 2018-2019)
5. K-Bot5. v.2 (academic year 2019-2020)
6. K-Bot v.4 (academic year 2021-2022) - The best of them all

THE MAKEBLOCK MBOT AND RANGER ROBOTS

These are two commercial robots that students can assemble in the classroom and which allow them to carry out many more activities than with the robots designed at CFR Ferrol.

THE MBOT ROBOT

It is the simplest and less expensive. It can be set up in less than 10 minutes and it is very easy to use and program by using the apps.



Exercise 7: Operating the mBot robot without using the apps

Once the robot has been assembled, it can be used in several ways without the need for an app. It can be used in two ways, using a button on the top of the robot or using the remote control:

1. Push the button on the upper left front part of the robot

1. Once switched on and if this button is pressed, the robot will start to move on its own and avoid obstacles.
2. By pressing the button a second time the line follower programme gets activated.
3. If you press the button a third time, the robot stops

2. The infrared controller allows the robot to operate in three different ways

1. By pressing the A key he can operate the robot by remote control using the four arrows on the controller, one for each direction.
2. Pressing the B key activates it to move on its own and to avoid obstacles again.
3. To activate the line-following programme, press the C button on the remote control.

From this link it is possible to download and print the route map for the line-follower:
<http://www.asbot.cc/wp-content/uploads/2016/01/Line-Follower-Map-A2-Size.pdf>

THE MBLOCK APPS

There are two apps that can be used with this robot and add an extra level of complexity:

- **App mBlock Blockly.** Super basic level. No knowledge of electronics or programming is required to use this app. It is used to learn how to operate and then program the robot.
- **Makeblock App.** Basic-intermediate level. It is also used to operate and program the robot without previous knowledge. The main difference if compared to the previous app is that this app can be used with any Makeblock robot, such as the mBock Ranger.

Exercise 8: Installing the mBlock Blockly app

Scan the following QR code to be able to install it on an Android mobile device. Follow the explanations to learn how to use it.



Exercise 9: Installing the Makeblock app

Scan the following QR code to be able to install it on an Android mobile device. Follow the explanations to learn how to use it.

