NON FORMAL EDUCATION THROUGH AUGMENTED REALITY TO PROMOTE SUSTAINABLE TOURISM AND RENEWABLE ENERGY

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Introduction

The development of mobile technologies and their affordability has increased the number of users with mobile devices and, implicitly, the number of applications made for such devices, regardless of the operating system used (Android, iOS).

Particular importance has been given to creating applications that enable users to interact with the environment by improving it with contextual information or exploring various simulations of reality.

It is about Virtual Reality (VR) and Mixed Reality (AR), technologies that are increasingly used in various fields.

AUGMENTED REALITY AND VIRTUAL REALITY

The augmented (mixed) reality

The augmented reality (AR) is a concept that involves enhancing (enhancing) the perception of an environmental observer by supplementing it with various elements that improve the cognitive process.

A classic example of augmented reality is that of an object in which panels are arranged that portrays the visitor's way of showing that object from different angles to another scale. Without this "augmentation" of reality, visitors would have been virtually impossible to make an overview of that location.

With the advent of smartphones, augmented reality has gone digital. Using embedded GPS receivers and image recognition software libraries, applications have been created that enable a user to point the camera to various points of interest to display real-time information about them.

Virtual reality

Virtual Reality (VR) refers to artificial computer environments that offer a simulation of reality so successful that the user can get the impression of almost real physical presence, both in real places and in imaginative places.

The fact that virtual reality is a technology that created a need and provided an alternative is also proven by the interest that large companies such as Google, Microsoft and Facebook have shown in this regard by investing in this technology.

Oculus Rift

Oculus Rift (VR) is a virtual reality device that can only be used with a computer that meets certain minimum requirements:

- Video card: NVIDIA GTX 970 / AMD R9 290
- Processor: Intel i5-4590
- Memory: 8GB + RAM
- Output: HDMI 1.3 video output
- Input: 3xUSB 3.0, 1xUSB 2.0
- OS: Windows 7 SP1 64 bit

In the Oculus Rift package, besides the eye-catcher, we also have a remote control, an Xbox One controller and a motion sensor.

Samsung Gear VR

Samsung Gear VR virtual reality glasses work with Galaxy handsets, phones that are mounted on the front of your device.

The Samsung Gear VR virtual glasses come with a multitude of integrated sensors, sensors whose accuracy, fidelity and response are far above those available on a premium phone. For example, the two lenses of the device have the function of magnifying the field of view so that the exenience is similar to that of a cinema.

Microsoft Hololens

Unlike Oculus Rift and Samsung Gear VR, the Microsoft Hololens device is self-contained, requiring no cables, handsets, and PC connection. Holographic glasses can be controlled by head movements, voice commands, and touch with your finger or hand (invisible touch-like movements).

VR Box 2.0 (Google Cardboard)

VR Box 2.0 is a device that can be used with Android 4.0 or iOS phones with a display size of 4.0-6.0 inches and having a Gyroscope Sensor. It's a more advanced version of Google Cardboard.

Among the applications that can be used by this device we mention:

- Youtube 3600
- Google Street View

Use in education and promotion of renewable energies

To illustrate how to use virtual reality applications in the educational process, we have done a virtual reproduction of an Information Technology and Renewable Energy Lab.

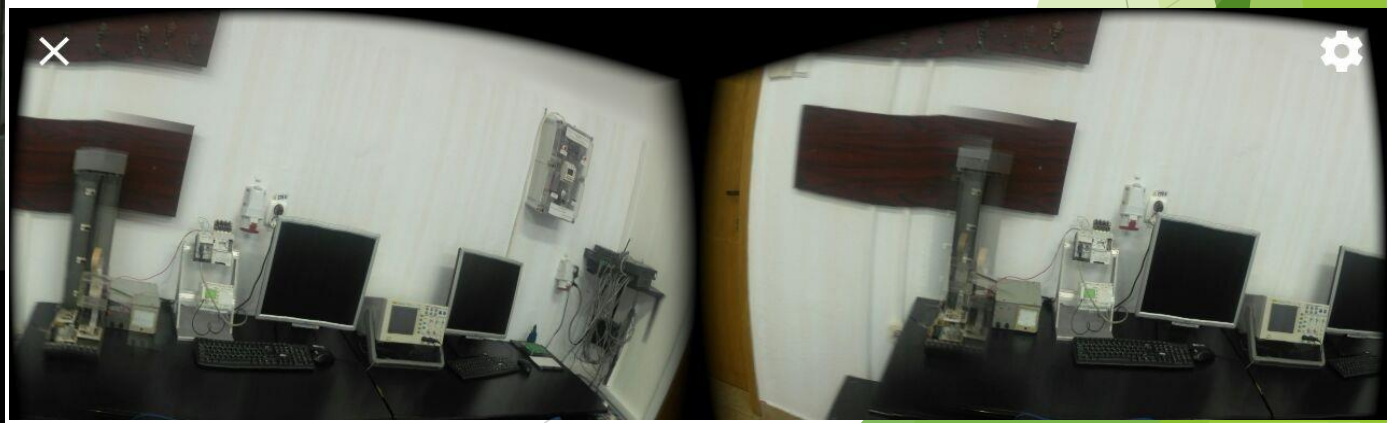
The image was made using the Google Cardboard Camera application, an application that lets you capture a panoramic image using your mobile phone.

It should be noted that the Cardboard Camera allows the user to share the image created using the other applications installed on the mobile device (Facebook, Gmail, Whatsapp, Yahoo Messenger, ...). Sharing is done by sharing a link.

Use in education and promotion of renewable energies

To view the previously created image, the same Carboard Camera and VR Box 2.0 were used. It is also possible to use the Google Cardboard device.

One of the negative aspects of this capture mode is that the resulting image is not of type 3600, when white space is displayed.



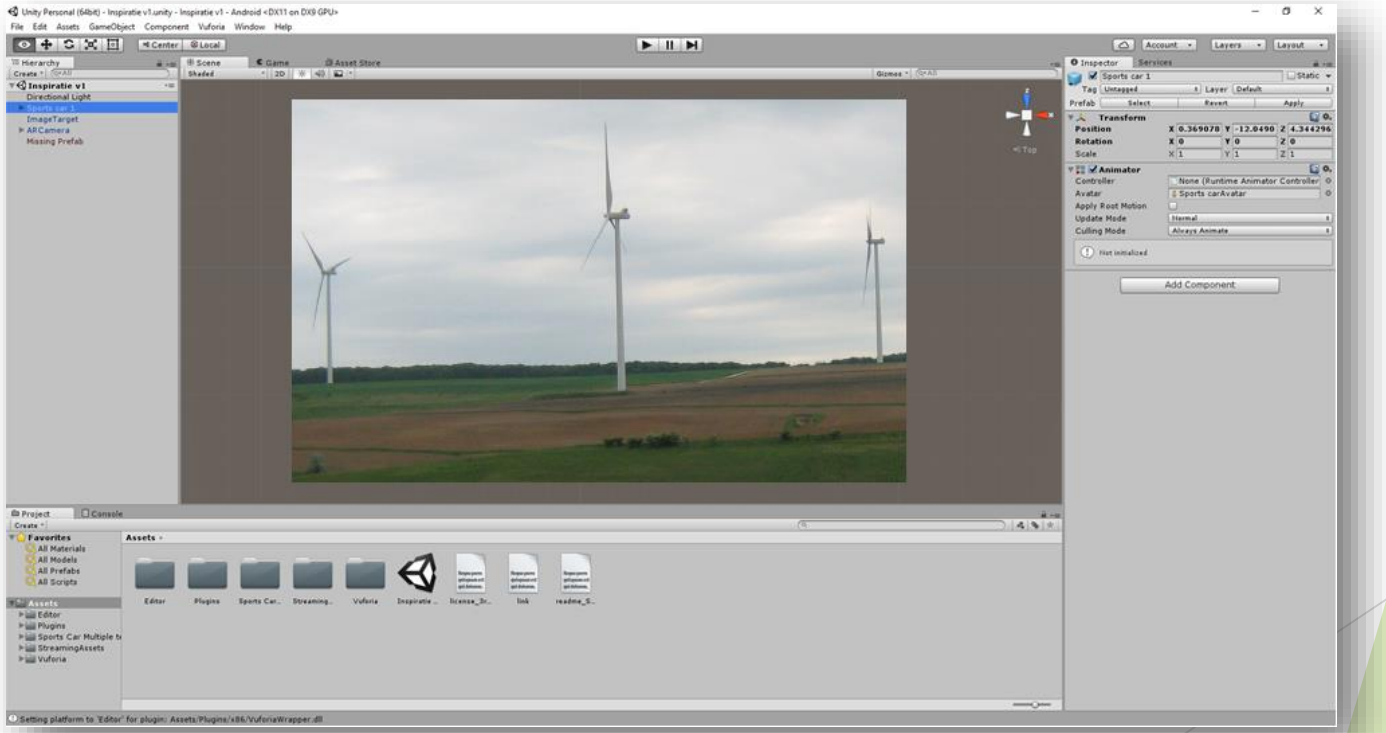
Making AR applications

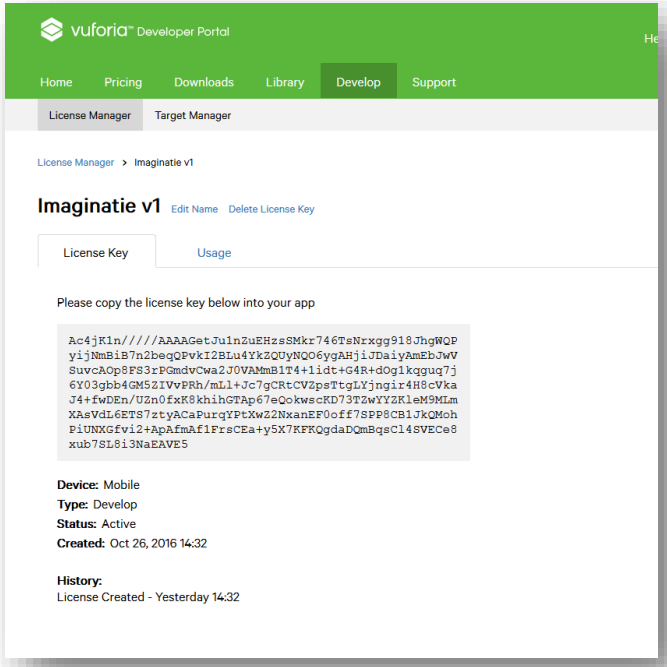
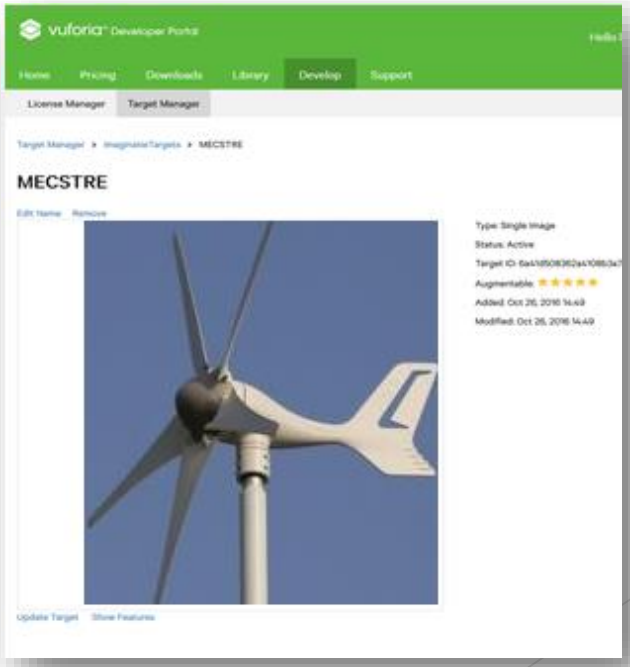
Augmented Reality (AR) is a way to augment physical elements by overlaying them with digital content. For mobile devices, applications use various sensors like GPS, camcorder or microphone. The AR creates a link between the user, the environment and the virtual world. AR technique is to attach, fix, the real elements of the 3D or 2D image through the so-called "markers".

Vuforia has incorporated into its SDK several technologies that help developers. These include Computer Vision, a technology by which developers can position and direct virtual objects such as 3D objects in correlation with real-world images when viewing them through the camera of mobile devices.

Making AR applications

Unity 3D is an extremely powerful 3D engine and an extremely user-friendly interactive application development environment. It has the advantage of being very easy to use, so people who do not have the solid programming skills and the experienced ones.



Making AR applications

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