Virtual Reality applied to roadwork training in European construction industry

IO1. Series of learning results in COEX works

A2. Analysis of the results - report

Key Action 2 | Call 2018

Cooperation for Innovation and Exchange of Good Practices

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Partners:

- Fundación Laboral de la Construcción. España
- GA Consultores. España
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- Centro de Formação Profissional da Indústria da Construção Civil e Obras Públicas do Sul (Cenfic). Portugal
- BTP CFA Indre-et-Loire. Francia

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PEDAGOGICAL QUESTIONS

a. What is a VET course?

The term "professional training" refers to all those actions that are connected to the training world and to all the tools made available to be qualified in a certain profession, to be able to carry it out with appropriate knowledge and skills and, therefore, to be competitive within this particular profession. In fact, in order to be defined "professionals", or to be "professional" within a given profession, two indispensable elements are needed: knowledge and skills. Anyone who needs to enter the world of work or want to stay there, must attend training courses to learn and keep up to date in the exercise of their profession.

What is a VR course?

At school we all learned that man has five senses: taste, touch, smell, sight and hearing, these are the senses that help us discover the world.

Everything we know about our reality comes through our senses, in other words, our entire experience of reality is simply a combination of sensory information and our brains that create mechanisms for processing this information. It is obvious therefore that if you can deceive your senses with invented information, your perception of reality will also change in response to it.

So, in summary, virtual reality is the ability to deceive our senses with a computer-generated virtual environment, usually these programming-generated environments are locations that we can explore and discover**.**

b. Who can study a VET course?

Anyone who wants to deepen or learn something new. training is open to everyone in any sector of work

Who can study a VR course?

Each of us, equipped with the right technological supports, can access the world of virtual reality

c. Where do I study a VET course?

A professional training course takes place in a classroom, in a structured context made up of desks, chairs and blackboards

Where do i study a VR course?

The course can be done wherever there is a space suitable for movement. A class, an office, a lounge, etc.

d. Why should I study a VET course?

You choose to participate in a professional training course and to train to specialize and deepen your skills in a given sector

Why should i study a VR course?

Virtual reality will offer a real alternative in the future since educators can be projected into many virtual rooms at the same time ... an educator will be able to teach several thousand students, virtually connected, without having to limit themselves to the 'classroom' space.

e. What is the use of Virtual Reality in classrooms?

To use virtual reality in the classroom, it is important to think carefully about how devices will be used and controlled in the classroom. First of all, the learning environment should be safe and pleasant for students to enjoy the lesson and RV technology. Most of these tools are not meant to be used on a desk: students will have to move, walk and stretch out their hands. The teacher must make sure that the classroom is an open and spacious place where students can move freely and explore. In addition, VR clearly limits the teacher's interaction with students: their eyes and ears are covered by headphones. The teacher has to think about how to communicate with students and control the class. Finally, some students may feel dizzy or disoriented and the teacher should be prepared to handle this.

f. What is the use of VR in teaching-learning processing?

When using virtual reality, teachers need to know exactly what results they hope to achieve and how they will be measured. If we want VR to work and help us significantly, technologies must be used in a targeted way, to achieve a desired and clearly defined result. The lesson will be successful only if the aims and objectives are clearly indicated and the ways to achieve them are known and understandable. Therefore, the teacher should introduce students to the aims and objectives of the lesson, as well as how they will be achieved and how they will be measured.

The sense of presence is defined as a subjective sensation of "being there", or rather of being present in the virtual world. This feeling is accompanied by the user's loss of sense of time and space, which is therefore sufficiently detached from the real world to be completely captured by the virtual world. In turn, this would tend to favour an emotionally positive experience of involvement, promoting the onset and maintenance of high levels of attention and concentration.

g. What are its educational advantage?

The advantages are many
-the creation of real life scenarios in the classroom, going beyond the description theoretical;

-learning by doing, without real consequences in case of errors
-the modeling of objects in various scenarios

TECNOLOGICAL QUESTIONS

h. What is a VR experience?

You are about to start your experience with virtual reality, as soon as you have worn the VR headset and the controllers, you will be totally immersed in a digital world, where you will live first-person experiences.

To feel comfortable, in a virtual reality experience, a sense of movement and balance are necessary, since the viewer produces an immersive experience in virtual reality that distracts you from everything around you and prevents you from seeing it. Always make sure you know the real surroundings before you start using the headset and while using it.

You will see reproduced, in an extremely realistic way, different road-type working scenarios, in which you and your operational team will be called to operate.

In this digital world you will be able to practice, in absolute safety, on working methods, technical and safety procedures to be implemented as needed, in advance of when they can actually occur.

i. Is this experience immersive?

You will have the feeling of being present in the virtual world. This feeling could be accompanied by the loss of your sense of time and space, if you can detach yourself enough from the real world to be completely captured by the virtual world, you will live an emotionally positive experience of involvement, maintaining high levels of attention and concentration.

Once you have entered the VROAD scenario, you will have to choose between different scenarios, the type of intervention, provide the most appropriate solutions to be able to carry out your work safely and you will move interacting with a three-dimensional environment using the controllers.

To do all this, we will use a computer to process the virtual environment to be recreated, and a VR viewer connected to it to view this environment. You will have two controllers available to interact or to move within the digital world. You will have maximum performance and realism as a PC is able to perform many complex calculations in fractions of a second, in fact what you will see through the viewer is nothing more than a real-time rendering of the virtual world.

j. Would this type of experience serve as an "exercise" for behaviour modification (from irresponsible and unsafe to safe behaviour)?

In general, how we behave depends on previous stimuli (what we think, know, perceive first), but above all the consequences (knowledge of what happens next); we repeat behaviours that have had positive consequences, while we tend not to repeat those that have had negative consequences or that have had no consequences.

Within VROAD you will be able to test yourself, see the consequences of your possible mistakes and correct the consequent unsafe attitudes at work. You will see what are the safe behaviours to be implemented in the different road scenarios, and you will learn correct behaviours for the situations represented.

You can learn by doing, without real consequences in case of mistakes.

k. Can VRoad replace specific training for COEX operators and managers?

VROAD can effectively integrate specific training, stimulating our cognitive systems, including memory and learning, which

they are rooted in our sensorimotor system and therefore in our actions.

From this it follows that learning in school contexts, which tends to involve the acquisition of abstract conceptual knowledge, with only frontal lessons, could benefit from motor involvement in the process itself.

With VROAD you will be placed in different immersive virtual environments, with scenes that are updated in a congruent way with the movement of your head and hands, making the setting even more realistic, directly making technical and safety choices, you will be the protagonist.

The VROAD training experience integrates the concept of security which must be seen as a personal interest that brings benefits to the individual, the work group and the company.

VROAD's immediate feedback (on the correct work done, on the report or suggestion provided) will keep your motivation and your commitment high.

l. Is it possible to use VRoad with a Smartphone and 3D glasses for use with Smartphone?

VRoad may only be used through a computer, VR glasses and controls. The virtual reality viewers for smartphones allow you to use this technology using a normal app. The technologies available for these applications need high-performance viewers and smartphones with screens of adequate size, which can guarantee you to live immersive experiences in good quality virtual reality.

m. What are the minimum characteristics for the use of Virtual Reality in the classroom?

To provide an immersive virtual reality experience in the classroom under the control of the teacher, it is necessary to provide hardware, software and a series of contents (virtual reality), activities and lessons ready to be used and managed centrally by the teacher .
Theoretical information must be combined with practical-experimental activities.
The teacher exposes the information he believes may be interesting and relevant to the participants, explaining to them what they will find within the VR, and what they are expected to do. Subsequently, at the end of the training experience with VR, depending on the themes identified and the didactic planning that has been decided to pursue, the teacher can move on to explain any doubts still left to the students and collect feedback.

INSTALLATION SETTINGS (Steam VR installation)

n. Introduction to the document

**If the user has ever used the STEAM platform, these steps are not necessary.**
These steps are only necessary the first installation of the equipment, in second and successive executions, no internet connection or login to any account will be required.

o. Step1: create a Steam account

Requirements: A valid email and internet connection is required

A. Access the user registration section
- To start registering your new account on Steam, you must first access the platform's website. Although it is also possible to do it through the program available for download, visiting its page is something that can be done from any connected device. Open your web browser and write this URL in the address bar:
    - Spanish: https://store.steampowered.com/join/?l=spanish
    - French: https://store.steampowered.com/join/?l=french
    - Italian: https://store.steampowered.com/join/?l=italian
    - Portuguese https://store.steampowered.com/join/?l=portuguese
    - English: https://store.steampowered.com/join/?l=english

- Through it you will **reach the Steam home screen** on its online portal.
- Now, go to the top and click **"Login"**. By doing so, you will go to the login window, a necessary place to be able to go ahead.
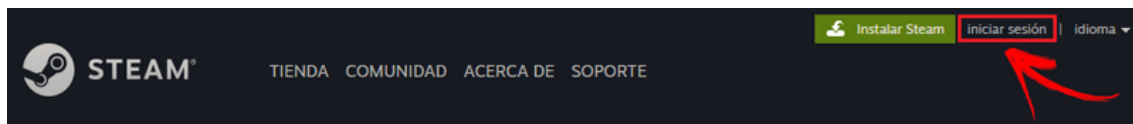
- Instead of entering an account name and password, go to the right side and click on the **"Create account"** button. This is how you will start to open your new profile on Steam.

B. First data and subscription agreement

- The first fields that appear in this new section are available for you to type in the email address you want to use for your Steam profile. **Write it in the first and second spaces to confirm it**, and right after that, choose your country of residence correctly.

- Once you have done this, scroll down a bit more to fill the next space **with the characters that appear in the image** (you can click **"Update"** to bring up another image).
- Keep scrolling down and you will have in front of you the **"Steam Subscriber Agreement"**. You can read it or, simply, descend to check the **"I accept, and I am 13 years or older"** box, and then press the **"Continue"** button.

C. Verify email

Steam needs to confirm that your email is right and also belongs to you. For this purpose, it sends you an email to the inbox of said email. Enter your mailbox, look for the company message and open it. When you do this you will see that there is a button with the text "Create my account". Click on it to be able to advance.

D. Set a username and password

After pressing the mail button, you have to go back to the window where you were registering to check that it has changed. Now you have in front of you three different fields in which you have to write what will be your **Steam username**, **as well as the password** (this twice, to confirm).

p. Step 2: install Windows mixed reality for SteamVR

Requirements: STEAM account is required as described in the previous step and internet connection

- Visit the link (all languages):
  https://store.steampowered.com/app/719950/Windows_Mixed_Reality_for_SteamVR/
- The download is free:
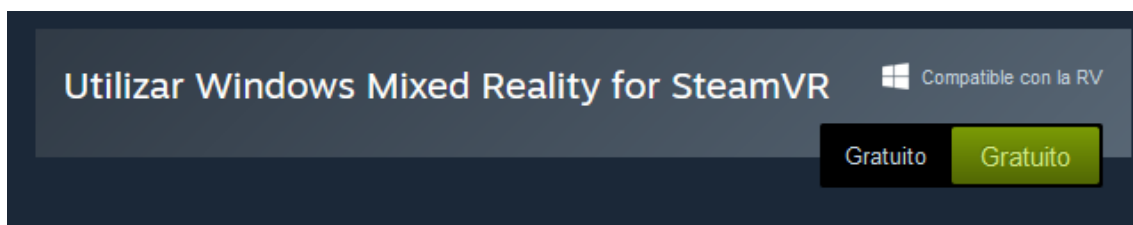
- It is recommended to restart the computer after this step
- When running allow downloads to continue

q. Step 3: allow driver downloads

- In both step 1 and step 2, downloading drivers and other supporting software will be required
- These downloads are safe and reliable.
- Once installed, you can START.
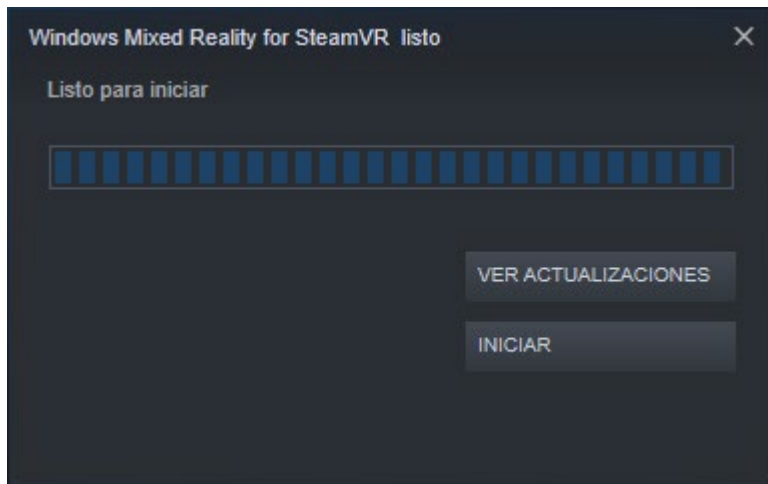
r. Updating computer equipment

It is recommended to keep the computer equipment up-to-date, especially regarding:
• Graphics card drivers
• STEAM VR updates
• Automatic Windows Updates

This will require the equipment to have internet access at certain intervals, VR-related applications to run, and notifications to be awaited.

STEAM ERROR 475

Try this solution: RUN STEAM AS AN ADMINISTRATOR. it is important, and I'm not sure why it has to be, but running steam normally prevents STEAMVR from detecting headset and controllers properly. Normally it would start up and give the "OH No! STEAMVR has encountered and unexpected problem." And it would show my headset icon as green and ready for just a second or two and shut down. but my controllers were not being detected as "Ready."
How to solve it?, If you have a shortcut on your desktop for steam, just right click->properties. Under the Compatibility tab, look for the check box labelled "Run as Administrator. if it is greyed out, you should see a button labelled "Change Settings for all users" with a coloured shield icon on it. If Windows UAC is set up to warn you about changes like this, just click yes,

and check the box mentioned earlier. Once that is set correctly, the steam icon on your shortcut should have the same shield icon in the corner of it.

Upon running this modified shortcut, you should get two warnings: First is Windows UAC, asking for permission to run the program, which will always be the first sign that you're running steam as an ADMIN. the second will be a warning from steam saying that you should turn off compatibility mode. If you don't check the box labelled "Never show this message again" you will get it every time you start steam in this manner. From one of the warnings I received, unless you use Big-Picture mode, or the SteamVR environment mode quite often, it should not affect anything significant.

CUSTOMIZING GRAPHICS PERFORMANCE FOR WINDOWS 10

s. DESCRIPTION

When we have a Windows 10 laptop and coincidentally it has more than one GPU, it usually happens that the operating system does not always use the best graphics card when we want it to be used, as in the case of video games or multimedia editing or playback apps.

This is something that we can solve in several ways, depending on whether your GPU is NVIDIA or AMD, you can use the graphic control panel that your drivers offer, if you have it installed. Or you can use Windows 10 Settings to customize the graphics performance for each app.

t. STEP BY STEP

Step 1

Press **Windows Key + I** to go to the Windows 10 **Configuration panel**. Choose the **System** section and select the Display option. Look just below the multi-screen settings there is a small link that says "**Graphics settings".**
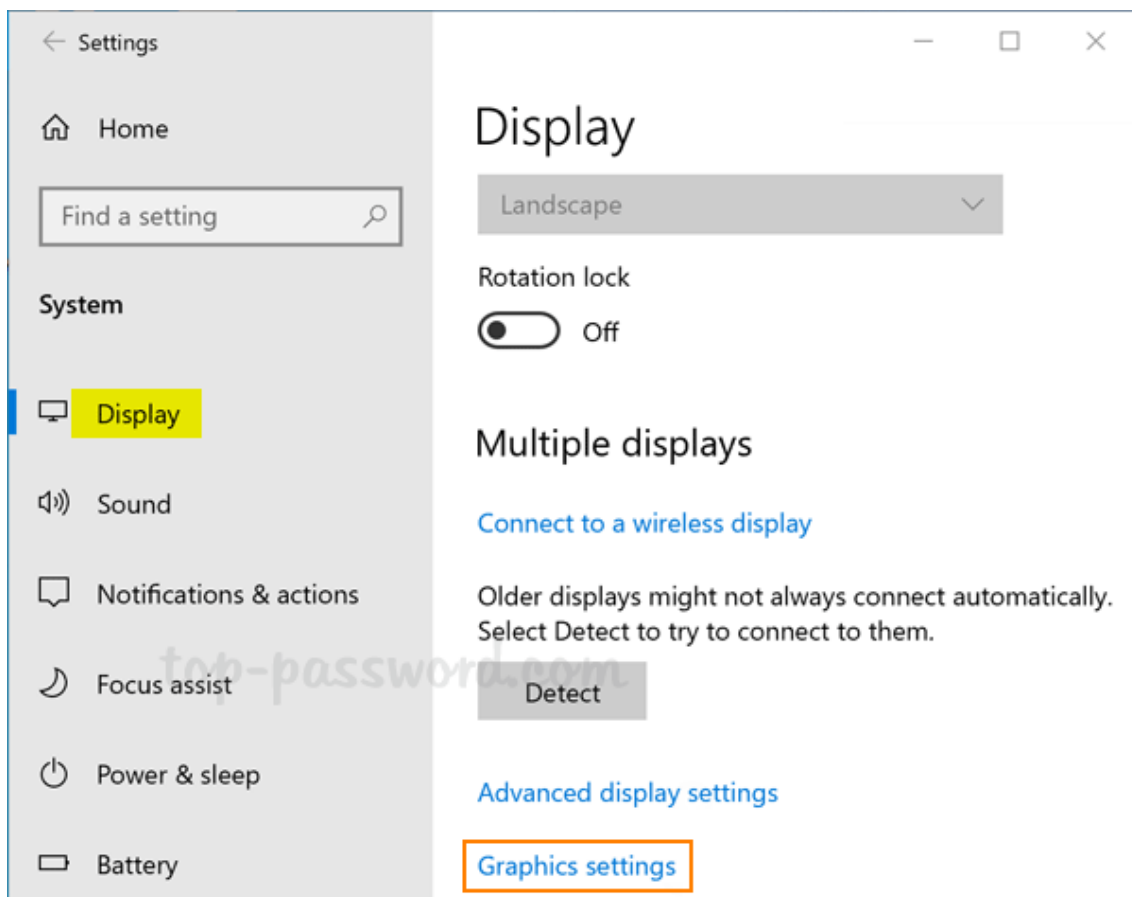
Step 2

Click on **Graphics Settings** and you will be taken to the **Graphics Performance Preferences** window. From there you can customize the graphics performance in Windows 10 for each specific application.

The benefit here is that **you can increase the performance of an app using your most powerful GPU**, or you can increase your battery life by giving less priority to apps that don't really need the power of the GPU.
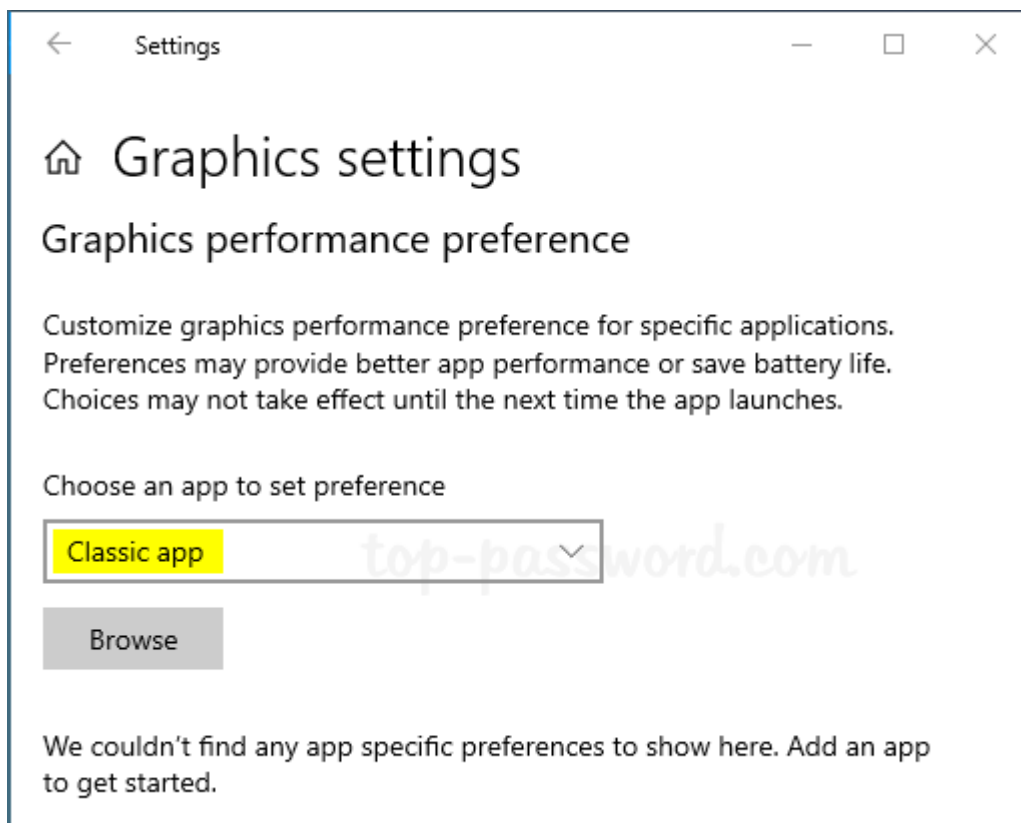
Step 3

In this configuration panel you can choose between classic apps or universal apps. If you want to change the GPU settings for, for example, a game, you must choose from the "**classic**" dropdown and you must know the path in which the executable of that game is stored.

Click "Browse" and navigate to your executable file to select it. Once in the list, click on it and then on the **"Options"** button.

Note *VROAD: must be in the SSD, usually named C:. Search and select "VRSteam.exe"*
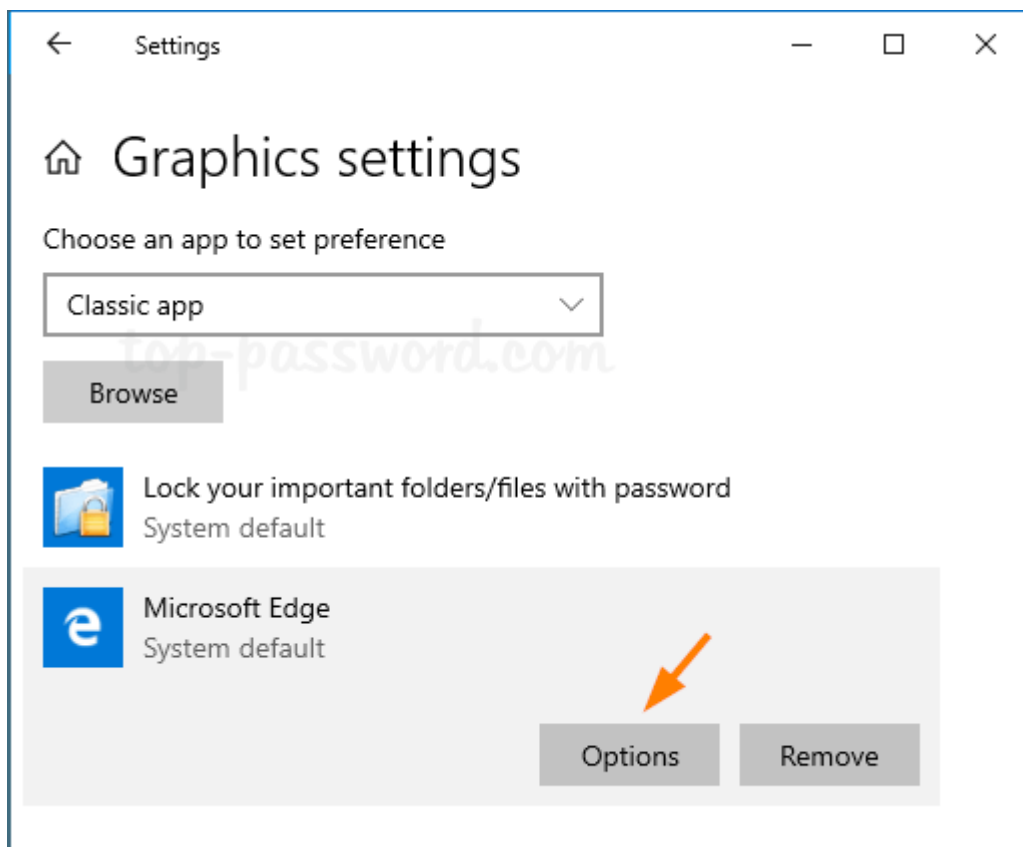
Step 4

From the **Options button** you can choose between your energy saving GPU or your **high performance** GPU. Windows 10 usually uses the default for built-in graphics, which is usually the weakest. So if for example you have an Intel and an NVIDIA graphics, sometimes when trying to play, your video game will use the worst of the two if you don't configure it by hand.

Note VROAD: For the best experience, always select high performance options.

Graphics specifications

Power saving GPU   Intel(R) HD Graphics 520
High performance GPU   NVIDIA GeForce GTX 980 Ti

Set graphics preference

○ System default

○ Power saving

● High performance

| Save | Cancel |

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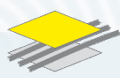
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