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The Impact of Game Engines on the Development of the Film Industry

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Every few decades, a technical revolution takes place in the cinema, renewing the industry. The appearance of color and sound, computer graphics, green screen, motion capture technology, new approaches to 3D in Avatar, all these innovations have completely changed the approach to shooting large studio projects. What will be the next revolutionary technology is still unknown, but one of the probable options is the use of game engines. First of all, we are talking about the Unreal Engine 4, which was used in the Marvel blockbusters, the new Star Wars and the Mandalorian series. Unreal Engine [1] was developed by EPIC games in 1998 to create 1st-person's shooters. In the following versions, the engine was simplified and became more universal, so now it was possible to create projects of any genre for all popular platforms. Unreal Engine 4 allows you to create games without long code writing, the local Blueprint visual programming system is available even to beginners. No special skills are required, you can create a new game based on Blueprint. Unreal Engine 4 has greatly influenced the gaming industry, because it was used to create Fortnite, Hellblade senua's sacrifice, Gears 5 and hundreds of other popular games, but it is also useful out of the gaming industry. For example, in interior design or even in filmmaking. Unreal Engine is distinguished from its competitors by photorealistic graphics and a huge library of assets. The fact is that the engine allows you to create a

elaborated and detailed world background, which is almost indistinguishable from the present. At the same time, there is another important advantage – it is a fast production process. Therefore, it is not surprising that the engine was quickly adopted by film studios. It is useful both in pre-production and creating special effects in real time. Now directors are increasingly refusing from the green screen and other popular technologies in favor of the Unreal Engine. An important feature of Unreal Engine 4 is a tool called "Sequencer". It solves problems in real time, moves fragments of the scene, selects suitable lenses, adjusts the lighting and sets the focus. Thanks to "Sequencer", the most popular way to use Unreal Engine 4 on the set was to create a realistic background. The technology can be used as a chromakey, but in real time. So now it doesn't take a few hours, but just a couple of minutes and just a few clicks. The Unreal Engine 4 pattern called "nDisplay" helps you create the backgrounds. It allows you to project an image on multiple screens or surfaces at once. The generated backgrounds are broadcast on huge LED screens and create the illusion that the actor is inside this space. Another useful tool for cinema is the "Stagecraft" technology, which creates and changes a realistic surroundings right on the set. Unreal Engine 4 also helps filmmakers with pre-visualization. Here, the role is played not only by the classic opportunities of the engine, which allows you to replace the storyboards with realistic animation, but also by special patterns for VR projects. Wearing glasses, the actor can interact with the environment in real time, helping to plan his movements in the frame accurately. While Unreal Engine 4 is still in the movies, it's still rare. The explorer here was the Disney Company once again, which has always been one of the first to use new technologies from rotoscoping to 3D animation. The main follower of using Unreal Engine 4 in movies is the director of Iron Man, the Jungle Book and the Lion King, as well as the

showrunner of the Mandalorian-Jon Favreau. He is who currently has the biggest experience in implementing game engines in the shooting process. It all started with the movie The Jungle Book, where the director was constantly put out by the necessity to change and move the chromakeys, and then Favreau decided to take advantage of the opportunities of Unity, another game engine. The engine was not used very often, it was used to create a pre-visualization of some scenes, which was broadcasted in VR glasses by the actor and the film crew. As the director put it, they created something like a multiplayer VR game about shooting a movie. It was the technology that became the basis for his next photorealistic remake of the Lion King, where virtual reality was already used in full. In fact, the film was originally completely staged by VR so that during the actual shooting, the crew could not start from storyboards, but from animation with ready-made light, color correction, operator techniques, and so on. The experience greatly influenced Favreau, because he was finally convinced of the effectiveness of his innovative approach.

In the series Mandalorian Unreal Engine 4 was already used, with the maximum [2]. Firstly, Favreau used the same strategy with pre-visualization as in the Lion King, and secondly, the chromakey was completely replaced with the LED screens with background projections created in the Unreal Engine 4. At the same time, the Unreal Engine technology helped with rendering not only exotic landscapes, but also fragments of the ship, which greatly saved on props. With the help of this in real time mode, the locations were modified, the time of day was changed and details were added that were immediately projected on the screens. Also, the engine from Epic Games is used to create animation, and as the main tool. In Unreal Engine 4, an entire scene of the cartoon In Search of Dory was drawn, and Pixar continues to cooperate with Epic Games. A full-length animated film based on Unreal Engine 4

is also not far off. Epic is working on a project called Troll, which is created using ray tracing technology, and starring actress Alicia Vikander. Jon Favreau and other directors who have used the technology agree that Unreal Engine 4 will significantly influence the future of cinema. The engine becomes easier to render, which allows you to achieve high-quality effects without unnecessary costs. At the moment, Unreal Engine 4 is far from the point where everyone can use it to create their own movie, but it already helps professionals to draw the necessary objects and backgrounds right in the production process.

The most obvious consequence of using Unreal Engine 4 is the death of the green screen. Like many revolutionary technologies from the last century, it will naturally be replaced by a new one, more convenient and cheaper to produce. Surely the shooting process will also change. In the Disney blockbusters, the visual production stage is already being introduced, and the storyboards are being replaced by the animation generated in Unreal Engine 4. If you try to look into the future, it is possible that thanks to this engine or a similar tool, cinema will become literally interactive. Watching how this technology is used today, you can only imagine how the viewer from the future changes the background and details of the film right while watching.

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