

Utilization

About

Going into this study, one of the main objectives I had in mind was to research different ways people have and can use these engines outside of the game making environment, and this goal was only intensified during the processes of learning the basics for Unity and Unreal Engine 4. Even if a project is created with the intent of publishing it as a game, it can always be modified and turned into a learning or teaching experience.

A few areas I was interested in looking into were:

- Medical
- Architecture
- Educational
 - Creating remote VR classrooms/environments
 - Tours of historical sites
 - Using 2D games/text led games for interactive learning

Architecture

Notre Dame Cathedral

On April 15, 2019 the Notre Dame Cathedral, an iconic and historical site in Paris, France, went up in flames. It suffered massive structural damage from the fire, along with smoke and water damage. The roof burned, the spire collapsed, and the stone ceiling had numerous holes in it. The art and architecture world had suffered a large blow. While reconstruction efforts are being planned and scheduled, there was a lot of sadness among people who had regrettably never gotten the chance to see the cathedral how it was pre-fire.

However, soon after, a slew of articles were published, where the possibility of aiding the reconstruction could come from an unlikely source, namely, a video game. In Ubisoft's Assassins Creed line of games, a 2014 release called Assassins Creed Unity (referred to hereafter as AC Unity) was looked to. AC Unity takes place in Paris, France during the late 1700s. Players are able to travel and parkour around Paris as it was, but one of the most predominant features was the Notre Dame Cathedral.

An artist named Caroline Miousse was the main reason why the cathedral in the game appeared so true to life. She spent two years and 80% of her time working on the game developing and recreating Notre Dame brick by brick in the engine called AnvilNext2.0. While

the game takes a few artistic liberties, and changes the scale here and there, most of the cathedral is accurate. After the fire of Notre Dame, Ubisoft made the game available for free during the week following, to give people a chance to explore the cathedral.

Medical

Video games are a well known source of practical fine hand eye coordination development. My initial thoughts for medical purposes of games and game engines were on VR. Virtual Reality gear that we currently have often requires head movement, arm movement, height changes, and more advanced gear can also detect finger movement. One of the most obvious uses for this could be with physical therapy, or physical rehab. VR is a good development tool for larger movements such as crouching, walking, and swinging an arm, but it is also a good tool for fine motor control as well. VR controllers typically have buttons, toggles, triggers, and paddles for each hand. Practice with a combination of both fine and large motor control is a very typical trait of physical therapy.

While researching, another article came up (pharmaceutical-technology.com) with an approach I had not thought about. Using a game engine to help develop medicines. During the process of creating a drug, scientists often have to take molecular structures into account. This is often where we see the famous stick and ball models come into play, but these have limitations.

“By putting the molecule data into a game engine, and visualising that data in a 3D virtual space, chemists were able to easily get among the compounds, designing and testing at molecular level, running data on different variations efficiently and easily. According to Jones, when C4X CTO and founder Dr Charles Blundell first saw a molecule he’d been working on for years in VR, he immediately spotted a number of flaws in their designs, simply because he’d seen them from a different perspective.”

Game engines are also being utilized for clinicals and surgical practice. In a physical environment, those doing practical learning, there are often rooms that are dedicated to practice surgeries, clinicals, etc. These rooms require real equipment and tools, which can often be expensive. By using game engines to create simulated environments, true to life scenarios can be created to scale, without risk of equipment maintenance or large amounts of space being required. While VR equipment can be pricey depending on which models you use, they are much easier to maintain than multiple rooms filled with medical equipment

Education

An easy use for education would be using a game engine to create a virtual classroom experience. I thought of this during the latter half of the Spring 2020 semester when schools were shut down in Texas and online learning became the norm. I was taking robots at the time, and I was constantly thinking to myself “Wow, this would be a lot easier if I was actually at

school in person, with the robot". The ability to create and utilize a model of the robot, and even the classroom would have been an excellent use of a game engine at the time. For my game engine learning project, I recreated a classroom I frequently used. The project could also easily be transferred and rebuilt in a VR environment if one has a strong enough GPU, and I believe a VR classroom would be much more conducive to learning than a conference call application could ever hope to be.

At a school I interned in, there was VR equipment that was accessible to the students under teacher supervision. The equipment was used as the lessons called for it. For example, one class was studying red and white blood cells for biology, and they were able to use VR to get an up close look at the cells and how they interacted in the bloodstream.

There are also very accurate scale models created in game engines of historical buildings and sites, museums and aquariums, and other such things. If a museum across the country has a section that is relevant to a lesson, it can be virtually toured from the comfort of a student's own school.

A more obvious use for game engines in education would be teaching students how to use them. They would be able to become familiar with the tools available and would develop the intuitive skill set to go with them that previous generations did not have.

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Education

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