SYSTEM ALERT!

Tomorrow is almost here.

ATTENTION GAMERS

Has a game ever made you feel *inspired*?

Maybe your eyes were popping from the detailed graphics. Maybe you were busting crazy, hilarious moves with your friends thanks to the perfect controls. Maybe the complexity of the story was dazzling you.

And right then, you didn't just want to play this awesome game. You wished to create a new game that would make others feel the same way you were feeling.

Many gamers have this feeling. Whatever skill set you wish to develop, there are roles in video game creation that could be yours. ⚠

Sights and sounds

It can take a small army of professionals to create the rich experience that games provide for your senses, your mind, and your emotions.

Think about the soundscape that fills your ears as you play. Though you might not pay active attention, the music, the voices, and the effects all shape the mood. And all these different types of sound are created by different teams of people.

Or consider the vibrant graphics. Different games use different styles of art – cartoonish or realistic, 2-D or 3-D. It takes many artists to create the vast number of characters, objects, landscapes, and backdrops needed. These artists must collaborate to make sure the same art style flows throughout the final game. And they must work with the programmers and level designers who will bring their work to life. ⚠

Coding is essential in video game creation and in many other careers. Many believe coding will be one of the most important job skills in the coming decades. Regardless of the use, the logic of code remains the same. A fun way to learn coding is through robotics.

UBTECH's UKIT Beginner robotics set can get you started in coding, using hands-on STEM+C to animate your robot. ⚠

UKIT Beginner

Under the hood:
Programmers and level designers

Though deep, deep down, games are just 1s and 0s (signals that turn a flow of electricity on and off), programmers almost never start there. Coding languages can be quickly understood and used by a trained human, and the code can be translated, or compiled, into instructions that make sense to the computer's hardware.

Coders often also build games on top of software engines that already exist. Imagine an architect is given just the frame of a building and told to build a new structure on top of that. This saves time, but it also shapes what the game can become. The programmers work with one another to match the in-game physics with the motion with the controls with the hardware and system specifications.

The different levels and areas of a game are designed by a separate group of level designers. These experts work closely with the programmers. Often, they use tools that help them design quickly so not every tree and rock has to be coded individually. ⚠

> " Although the technical considerations (such as what programming language to use, what type of game engine, etc.) are important, really they are very secondary to the core goal of delivering that experience.
>
> — **Riley Dutton, creator of *OrbusVR***

Tying it all together: Designers

When a video game is made, it isn't good enough that all the separate parts perform nicely. They must work together well. The artwork from *The Legend of Zelda* wouldn't fit in *Minecraft*, and the players in a Madden NFL game shouldn't be able to jump like Mario.

In other words, every part of this huge production must connect to a greater vision.

This vision is put in the hands of a designer or designers, and everyone on the team contributes to it. The designer oversees the story, the experience, and the overall feel of the game. The game must live in their imagination before it can be made and shared with others. ⚠

Does the idea of working on a creative team thrill you? The *Design Time* STEM Expedition® by Pitsco will give you a taste of this type of career.

In *Design Time*, students participate in a contest for the Time Town Clock Shop. Students use the engineering design process to develop a new clock and then create a plan to market it to potential customers.
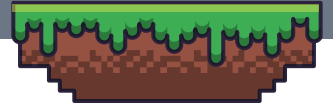
> " Personally, I prefer a team environment where everyone shares their own ideas of what they think will work best, then the team discusses the different merits of each approach; at the end of the day, though, it's up to the director (or team leader or whoever it might be) to make the final decision. . . . The most important thing, really, is just that the team always shares in the successes and the failures together. "
>
> — **Riley Dutton, creator of *OrbusVR***
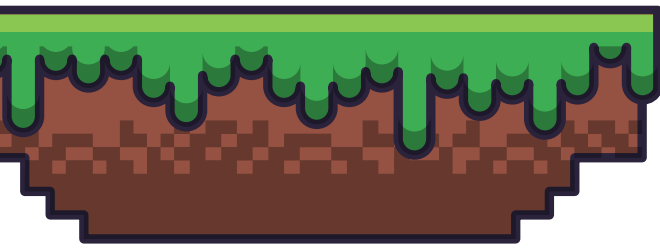
STEM Expeditions®

Adventure in VR:
the making of *OrbusVR*

Riley Dutton is the lead creator of the high-fantasy adventure game, *OrbusVR*. *OrbusVR* is a landmark in gaming, being the first MMORPG designed for room-scale virtual reality. (*MMO* stands for massively multiplayer online game. This means many players, connected through the Internet, are playing together. *RPG* stands for role-playing game.)

Players don a VR headset (such as HTC Vive or Oculus Rift) and are immersed in a world of fun adventure. They journey through spectacular settings with others, using teamwork to face off against monsters. Players use voice chat to collaborate.

We chatted with Riley to learn about what inspires game creation.

"When it comes to *OrbusVR*, my primary drive is to deliver a certain fun experience; we have an 'ideal experience' in mind involving a new player who ventures into the world, seeing new environments and encountering an enemy, which another player then helps them defeat. All of our game design really centers around delivering this experience as often as possible in as many new ways as possible."

Images courtesy of *OrbusVR*

This explains the purpose of a game. But what makes it fun to create one?

"Working in game design is really about delivering something that you would want to enjoy yourself and wanting to be the person that helps create that experience for others. So, certainly, we draw from our own prior experience in games we enjoyed (e.g. other MMOs like *World of Warcraft*) as well as the community's feedback on our forums and through beta testing, but really at the end of the day if you're not delivering a game you would enjoy and want to play, you won't have much fun building it." ⚠

Getting it right: Testers

The work goes in steps, from idea to development to technical and creative work to testing. Oh yes, games must be tested to exhaustion. Professional testers don't just play a game – they try to push it past its limits, find the mistakes and glitches, get behind the walls, and make characters do things they were never intended to do. Testers find flaws and report them. This is an important and continual part of the process because flaws must be found and fixed before a game is ready.

Ever heard the expression "back to the drawing board"? It is much the same. ⚠

> " **When something works well, or even when something doesn't work at all, teams need to look at each other and say 'we learned something' and move forward together.** "
>
> – Riley Dutton, creator of *OrbusVR*
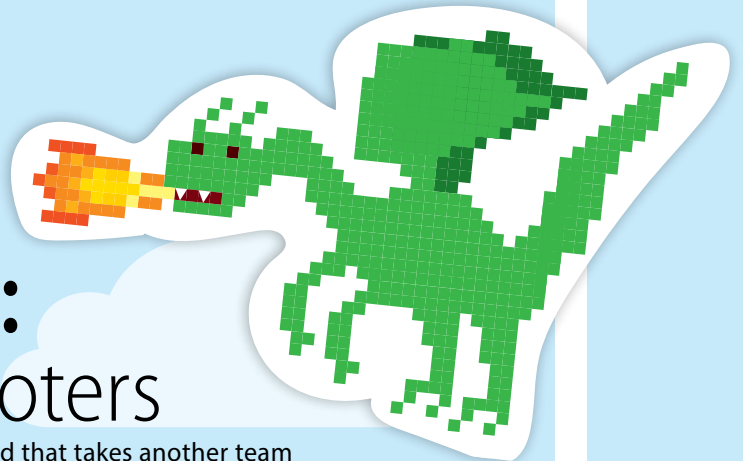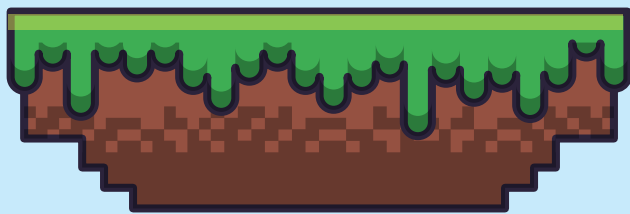
Putting a bow on it:
Publishers and promoters

Creating the game is one thing. Publicizing it is another, and that takes another team effort. These marketing professionals work to make sure that gamers like you hear about, read about, dream about, and connect to their game.

With all these different aspects in play, no wonder it takes so long to create a game. It can take years. It took less than two years to create the playable version of *Minecraft*. But it took more than five years to develop *Fortnite*! ⚠

Prototyping

We bet you didn't know it, but many games are prototyped with paper before any code is ever written. Paper cutouts representing characters, backgrounds, menus, and more clarify the ideas. Doing this step models a game's look and feel for those who will collaborate to create it. It can also be used to promote the concept to those who will fund its creation. ⚠
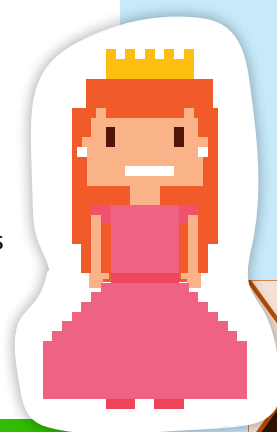
Modern lyrics express
more anger, less joy

What could be more different than songwriting and data analytics? One uses music and lyrics to share stories and emotions. The other uses math and computer algorithms to sift through and draw conclusions from raw data. But both can give us pictures of our world and ourselves.

Researchers at Lawrence Technological University looked at more than 6,000 hit songs from the 1950s to the present day. They gathered data about the emotions expressed by those songs by analyzing the words and phrases in the lyrics. The data about emotions was cross-referenced with the songs' release dates. This showed how often certain emotions were expressed in different eras.

Since the 1950s, popular songs about anger, disgust, and fear are on the rise. On the other hand, songs about joy have declined. Not a heartwarming finding, but it helps us understand our world. ⚠

Get started in materials science with the Materials Deflection Tester. Want to know whether laminated balsa wood bends more or less than plain balsa wood or if aluminum bends more than steel? It's easy with this tester.

Materials Deflection Tester

Rejuvenating rubber

Self-healing materials aren't new, but the technology just leveled up. A new 3-D printed rubber material can even heal itself when cut in half! Heat helps the healing process along, but it can work even at room temperature. The creators believe it could impact industries such as shoes, tires, and soft robotics.

"We actually show that under different temperatures – from 40 degrees Celsius to 60 degrees Celsius – the material can heal to almost 100 percent," said Kunhao Yu, one of the students who worked on the project. ⚠

A computer circuit that learns from experience

When your dogs hear you opening a can of dog food, they excitedly anticipate the tasty meal. But they were not born knowing what that sound meant. Their brains had to learn to associate the sound with the fact that they were about to be fed.

A newly developed electronic circuit has been designed to learn in the same way. It mimics the brain by growing connections between one stimulus and another. The circuit uses a new transistor made of organic materials, and researchers say it is a major step toward creating computers that can mimic the brain. ⚠

Student name: _____ **Class/Hour**: _____

SySTEM Alert! Quiz (Volume 7, Number 4)

1. To a computer, one means _____ and zero means _____.
    - A. on, off
    - B. up, down
    - C. plus, minus
    - D. right, left

2. The different parts of a video game won't mesh if the designers don't _____.
    - A. attend the same school
    - B. collaborate
    - C. use the same tools
    - D. have similar personalities

3. Coders often build games on top of _____.
    - A. musical scores
    - B. The Legend of Zelda
    - C. drawing boards
    - D. engines

4. During the creation of a video game, the _____ oversees the story, the experience, and the overall feel of the game.
    - A. producer
    - B. lead artist
    - C. designer
    - D. professional tester

5. Since the 1950s, popular songs about joy have _____.
    - A. increased
    - B. declined
    - C. stayed about the same
    - D. gotten better

6. During the creation of a video game, what type of professional plays a game to find glitches?
    A. level designer
    B. producer
    C. promoter
    D. professional tester

7. According to video game designer Riley Dutton, what is more important than technical considerations?
    A. delivering an experience
    B. artwork
    C. choosing the programming language
    D. choosing the game engine

8. A model that is created to clarify ideas is called a _____.
    A. game engine
    B. prototype
    C. MMO
    D. data analytic

9. A new type of 3-D printed rubber can heal itself after damage. What helps that process along?
    A. oxygen
    B. water
    C. glue
    D. heat

10. What does MMO stand for?
    A. massively multiplayer online
    B. mathematically measured outcome
    C. mistake management and oversight
    D. melty mushy oozy

Bonus:

Think of a product created by teams of experts collaborating. (Video games, movies, aircraft, and cars are all examples.) List five jobs required for the creation of that product and circle one that appeals to you. Then, write a sentence explaining why it would be important to communicate with other types of professionals to do that job well.