Star Trek*: Bridge Crew and VR’s New Frontiers

Start Trek*: Bridge Crew is the latest example of how new virtual reality (VR) titles are fully utilizing CPU and GPU power to provide immersive gameplay. This game, the newest title from one of the most important science-fiction franchises in gaming, also illustrates many of the key concepts described in Intel’s Guidelines for Immersive Virtual Reality Experiences, making it worth a deeper look.

The most successful VR titles provide an escape into other worlds that feel real. Intel* Developer Zone readers have already learned about Arizona Sunshine* and Lone Echo*, two games that illustrate how successful VR titles provide this immersive quality by following emerging standards documented in the guidelines. Both titles smartly created the illusion of alternate realities—in space or deep in a mine shaft. For this article, Star Trek: Bridge Crew provides another perspective.
Latest in a Long Line

More than 50 years after the 1966 network television premiere of *Star Trek*, the franchise continues to (boldly) go from strength to strength. The original series was canceled after just three seasons, but through syndication, spin-off series, novels, comics, magazines, exhibitions, and a staggering 13 feature films, *Star Trek* has become one of the most recognizable titles in sci-fi history.

Fans have previously gone to great lengths to taste the *Star Trek* experience in real life, from attending far-flung conventions, to bidding at charity auctions for walk-on roles in the TV and movie productions. But that experience was available only to a lucky few, until now. Dubbed a “real-life holodeck” (the place where members of *Star Trek: The Next Generation* got to live out their fantasies), the *Star Trek: Bridge Crew* video game simulates the experience of piloting a Federation starship, using the 2009 reboot film *Star Trek* as a backdrop to the action.

Developed by Red Storm Entertainment, a Ubisoft Entertainment company, *Star Trek: Bridge Crew* was originally released in spring 2017 as VR-only for Windows* and Oculus* Rift, and the Sony PlayStation* VR. The non-VR version followed later that year. The game takes place just after the planet Vulcan has been destroyed; the crew is tasked with locating a new home for the few Vulcan people that remain, starting in a region of space occupied by Klingons. As in the movies and TV shows, the characters plot courses and navigate the ship, arm and operate weapons, and control the ship’s power and carry out repairs. Players can be local or online, and all but the captain can be computer-controlled.

Adding VR to this title takes fans closer than ever before to the heart of the *Star Trek* experience, putting them directly on the bridge. Put on the headset, and you’re on the USS Aegis, in the command center, with that familiar widescreen view of space in front of you. Up to four players assume the essential roles of captain, engineer, helmsman, and tactical officer. A solo option is available, but the experience differs significantly; interaction between crew members is an important aspect of the game.

Many VR titles take players into worlds they have never seen before, with no existing frame of reference and no comparisons to be instantly made. But for *Star Trek: Bridge Crew*, it’s not so much “where no game has gone before” as it is “going into a world that’s very familiar to a lot of people with very firm ideas on how it should be portrayed.” This is a world where fans care greatly about such things as the noises doors make. Will the “rules” apply? And will the game be the “just like being there” experience fans are hoping for? Let’s explore.
Realities of Virtual Reality

Intel's guidelines for making VR games, in which players not only feel safe, but also want to continue playing, fall into three main categories:

- Physical foundation
- Basic realism
- Beyond novelty

Safety First

The physical foundation is built on safety, comfort, and occluding the real world. The safety aspect is both physical and social, making sure that players' safety is ensured in the physical world while they interact with the virtual world, and that they are aware of social consequences of actions in the virtual world. Comfort relates to ergonomics, such as well-fitting headsets and easy-to-use controllers, and avoiding the dreaded motion sickness. Occluding the real world is about preventing distraction from the VR experience, which can easily be overlooked.

Cristiano Ferreira, a game-technology engineer at Intel, explained how to avoid one of VR's earliest issues: motion sickness. “The big 'no-no' is suddenly accelerating a player without them causing the movement, unless special conditions are met,” he said. One such condition he mentioned is to place the character within an apparently static surrounding vehicle. In Star Trek: Bridge Crew, the crew members keep to their respective stations within the static confines of the deck. There is even an option to inhabit the captain's chair from the original, first-run series.
“You want to feel a sense of grounding in reality, to allow yourself to feel the safety required for complete immersion,” Ferreira explained. He offered other examples of unsettling characteristics of an unsafe environment. “If you've ever had a dog running around or a ledge nearby in your VR play area, you know what I'm talking about. [That] can be terrifying.”

**Basic Realism for New Worlds**

The guidelines break basic realism into the following subcategories: graphical integrity, realistic sound, responsive world, and intuitive controls.

Some aspects of *Star Trek: Bridge Crew* bring up the fascinating notion of the “uncanny valley” referenced in the guidelines. The uncanny valley refers to the theory that when “human replicas approach a convincing level of reality but aren't quite there, they elicit greater feelings of revulsion from observers than mere cartoons.” Fortunately, *Star Trek: Bridge Crew* does not make the mistake of presenting avatars with unsettling hyperrealism. The avatars in the game are obviously avatars, without being creepy or robotic. Ubisoft also maintains graphical integrity by avoiding unsettling bugs, glitches, and other jarring user-experience characteristics that can shatter the illusion. This additional advice from the guidelines is key to maintaining immersion. “Unrealistic conditions in games that are attempting realism quickly bring the player back to reality,” Ferreira said.

*Figure 2: Players interact mainly with bridge controls, which maintains physical safety.*
Intel has found that well-rated VR games typically include high levels of interactivity between the player and the scenery. The ability to engage with and navigate through your surroundings is what contributes to the success of VR games such as Arizona Sunshine* and Lone Echo*. In Star Trek: Bridge Crew, the characters keep to their seats on the bridge, which reduces interactivity, but the game aligns closely to player expectations of how the crew functions, with each actor standing or seated in a specific location engaging in activity related to their rank. In the original series, much of the action on the bridge consisted of punching buttons, moving levers, and addressing commands. The level of interactivity in Star Trek: Bridge Crew is a deliberate, nostalgic nod to the Star Trek universe, and it matches the real and virtual expectations of the Trek-savvy.

While the bridge scenes evoke nostalgia, the space scenes are what truly go where no game has gone before, with beautiful graphics and wonderful sound effects that dazzle players with extraordinary scenes of imagined worlds. “The beauty of VR comes from the ability to experience the unreal with a hint of reality,” Ferreira said. “This enables humans to experience things nobody has seen before.” Games can break the laws of physics, create visuals not possible in the real world, and enhance those visuals with mesmerizing audio, while still maintaining a basic integrity. Star Trek: Bridge Crew accomplishes this beautifully.

Responsiveness and intuitive controls are the two final keys to basic realism. The intuitive bridge controls are “like an extension of your body,” Ferreira enthused, and exhibit the expected responsiveness when navigating through space, firing weapons, or raising shields. “In that sense, you do have interaction with game scenery,” he said. One of the keys to the game’s success is the intensity of focus, which makes the player feel empowered and active in any scenario.
Figure 3: The engineering console is responsive and intuitive, fitting the guidelines nicely.

Go beyond Novelty by Meeting Expectations

Beyond novelty is the third category of Intel’s VR guidelines, and the voyage of Star Trek: Bridge Crew is set on that course. In its VR guidelines, Intel defines going beyond novelty with these bullet points:

- **Smooth onboarding**, making that all-important transition from the real to the virtual.
- **Ubiquitous interactivity**, placing the expectations of the player center stage.
- **Primacy of VR interactions**, emphasizing the uniqueness of this world.

Since most players will be experienced with Star Trek’s basic premise and background, onboarding involves simple tasks that establish the game’s mission and controls. The differentiated roleplay creates options, for the storylines and player’s reactions, encouraging players to begin new missions. The environment (and extent of interaction) is as expected, thanks to its adherence to the existing Star Trek paradigm. The controls for each crew member are simple enough to use easily and without frustration, yet intricate enough that they remain engaging and fun. In-depth tutorials are baked into the game, part of that smooth onboarding process that means there is no jarring disconnect as the player transitions into and then moves through the virtual world.

*Star Trek*: Bridge Crew Final V2

Page 6
Ubiquitous interactivity is present in the game due to its very nature. Rather than simply blast through endless waves of space invaders, crew members work the controls, interpret orders, plot courses, and develop strategies. The challenges increase, as do the rewards and the responsibilities, but each interaction is logical and true to the genre and the franchise.

The engineering role, for example, involves distributing available power to the shields, engines and phasers, and that demand increases when the ship sees action. A good engineer will be cool, calm, and collected in the face of action, in the model of storied characters such as Lieutenant Commander Montgomery Scott or Lieutenant Commander Geordi La Forge. Players would do well to study their documentation!

The tactical officer is in charge of scanners and weapons, which includes phasers and torpedoes. After scanning an enemy ship, controls enable targeting its engines, shields, or weapons only, just as in the episodes and movies. This targeting works only when the enemy’s shields are down. However, with help from a scan by the ship’s engineer, a clever tactician can isolate the enemy’s shield frequency and disrupt them.

![Figure 4: The tactical console can monitor enemy weapons and defenses, and isolate individual systems for attack.](image)
The helmsman plots courses and drives the ship. Controls at their disposal include impulse and warp drives, speed, heading, and vector. If more speed is required than the available power allows, the captain has the option of ordering engineering to reroute the ship.

![Image of a ship's control panel](image)

**Figure 5:** Course plotted, the helmsman turns the ship toward the yellow course line.

The captain has access to the same information as the crew but also controls what displays on the main screen, which can repeat his controls for all to see or show a view outside the ship or the destination, with various levels of magnification. The captain's controls can send commands to the corresponding crew members electronically. These comments can also be sent verbally, at the captain's discretion. Whether players channel their inner James Tiberius Kirk or Jean-Luc Picard, the game offers the captain full control of the bridge.

The notion of primacy raised in the guidelines is an important one, and this game is a great illustration of effective primary interactions. As the guidelines state, “software that emphasizes the unique capabilities of VR and puts them to use in the primary interactions will be much more effective in sustaining the user's interest and continuing usage.”

Jeremy Bailenson, director of Stanford's Virtual Human Interaction Lab, said developers should ask themselves a basic question as they envision success with primary interactions: Is the experience rare, impossible, too dangerous, or too expensive to do in actual reality? Piloting a starship while wearing that coveted Starfleet insignia checks all the boxes. Fans want to be inside that universe looking out, and their expectations of how it will function and how they will interact within it have been carefully considered.
An Accomplished Mission
As with any solid AAA title, more powerful system specs provide smoother graphics rendering and high frame rates for Star Trek: Bridge Crew—vital to a realistic and immersive VR experience. Part of Ferreira’s job at Intel is to analyze games for game developers and help them determine where to make performance improvements. Ferreira says that a common misstep is to attempt to do too much with visual effects that don't add to the story, such as lens flare, motion blur, forced depth-of-field, or chromatic aberration. “It’s crucial to be mindful of exactly what’s happening on the GPU,” he said, in order to preempt performance issues. “Using frame-analysis tools such as Intel® GPA [Graphics Performance Analyzers] can help you peer under the covers to see exactly what’s happening. You’ll be surprised at how heavily certain post-effects can bogart your frame budget.” You might also find things you can take out.

Star Trek: Bridge Crew is a successful VR game because it adheres to known best practices for a great VR experience, as captured in the Intel VR guidelines. If you are thinking about creating a new VR title, download the guidelines today to give yourself the best possible chance for success.

Resources
Find out more about the Star Trek: Bridge Crew game here: https://www.ubisoft.com/en-gb/game/star-trek-bridge-crew/

Notices
No license (express or implied, by estoppel or otherwise) to any intellectual property rights is granted by this document.
Intel disclaims all express and implied warranties, including without limitation, the implied warranties of merchantability, fitness for a particular purpose, and non-infringement, as well as any warranty arising from course of performance, course of dealing, or usage in trade.
This document contains information on products, services and/or processes in development. All information provided here is subject to change without notice. Contact your Intel representative to obtain the latest forecast, schedule, specifications and roadmaps.
The products and services described may contain defects or errors known as errata which may cause deviations from published specifications. Current characterized errata are available on request.

Copies of documents which have an order number and are referenced in this document may be obtained by calling 1-800-548-4725 or by visiting www.intel.com/design/literature.htm.

Intel and the Intel logo are trademarks of Intel Corporation in the U.S. and/or other countries.

*Other names and brands may be claimed as the property of others.

© 2018 Intel Corporation