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CS 428 VR/AR
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Boneworks

Introduction to what it is:

Boneworks is a first-person VR puzzle and shooter game from the people over at Stress Level Zero. Stress Level Zero has been consistently making a name for itself in the world of VR since 2016 with their release of Hover Junkers, and again a year later with their release of Duck Season. Building on the foundations that their previous two titles give them Stress Level Zeros third release Boneworks is a natural progression in their pursuit of probing into the world of VR and seeing what works. Their first title Hover Junkers was born right at the introduction of room scale gaming to the mass market. They designed the game to take advantage of this by having the play space be defined by the room's boundaries forgoing the clunky forms of locomotion that were available at the time. Their second title came in a time where people were starting to realize the short comings of two-handed firearms in VR. When trying to hold a firearm in VR a one handed weapon like a pistol feels very natural, many of the controllers are pistol gripped in design, and stabilizing by cupping a hand is a very easy and natural thing to do in VR. However, two handed weapons create an issue. When balancing a weapon with two hand in VR you lose any stabilization benefits you would have with a one handed weapon as you can no longer brace with your other hand or your shoulder as you would in real life. Stress Level Zero realized this and with their second title they wanted to experiment with it. In Duck Season they introduced a weapon handling style by taking advantage of the players natural tendency to shoulder weapons, they added a sort of magnet to the stock that will snap it to the players shoulder when brought close, allowing for a much more stable feel for two handed weapons. This process of identifying a problem and experimenting with new unique ways to solve them carries over into their development of Boneworks. It is born out of the ever-increasing desire for more accurate presence, life like movement, and polished games in VR. Boneworks takes the idea of physical presence and life like movement and runs with it literally. The game is built on top of an intricate physical sandbox, where everything from game objects to individual limbs have a different weight attached to them. As the player moves and interacts with the environment hands and objects interact realistically with walls, props, weapons, enemies. Each collision of objects having a weight and physicality to it. Objects also have realistic weights and weight distribution; a sledgehammer is much heavier on the hammer end and requires a grip much closer to the center of gravity for it to be easily held in one hand. This experiment in introducing the sensation of weight and the physicality of one's self was a solid bet toward increasing the sensation of presence in VR.

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Why is it a good use of VR or AR?

Boneworks is a good use of VR because it pushes to change away from the standard way player models have interacted with the environment such as those seen in traditional 3D games and their subsequent adoption for VR games. Like VR itself it breaks away from designing a game as if it were being observed through a camera on a monitor. Rather than have a simple collision mesh for the player with static arms sticking out into the middle of the screen and having limited interactivity with the environment, in Boneworks hands and whatever they're holding interact with everything. If you try to walk up to a wall with something in your hands, rather than the floating hands continuing to hold the item in front of you (the consequences of how traditional games are designed) the object collides with the environment forcefully. A consequence of this action (one which may be traditionally remedied by having the player suddenly stop) is that newtons laws come into play. If I charge a wall carrying some object and I strike the wall the object as well as myself will suddenly be flying backwards. This is a simple consequence of the everything's physical approach that the developers at stress level zero have taken. The player model isn't just affected by the ability to bounce off the walls. In most traditional games when swinging weapons you don't usually have to worry about making collisions with the wall and those walls consequently stopping all the inertial you've built up in a swing however, in Boneworks you do. A swing of a sledge hammer realistically lags behind as you struggle to swing its weight and given not enough room (be it by a wall an enemy or a low ceiling) you won't have enough inertia to damage anything. It'll be more like throwing a punch while inside a coffin. The damage system dictates that damage inflicted requires not only mass but speed, and as a consequence it dictates that in order to achieve speed you need to apply more force i.e. a much longer swing. This builds up a melee system that blows traditional systems like those found in Skyrim VR out of the water. You end up feeling every swing as well as every impact, and you need to more tactful in how and where you make your swings. Compare this to the rapid wrist flicking of Skyrim VR and you can see the advancements a system like this has made in VR. Another thing Boneworks does as a consequence of its physicality is that a firearms recoil is not only noticeably felt in its site picture recovery but also can be viewed on the player arm itself. Since recoil is a force applied by the firearm it will push the players arm realistically away. To mitigate this the player needs to brace with a second hand and control shots or else the recoil forces will flail the hands wildly as they compound. Firearms also respond physically with the environment forcing a player to keep that in mind as they try to peak around corners or go into tighter hallways. This is traditionally not handled and usually results in the ability to fire through objects or at the vary least have a weapon stick into them. In a VR world immersion is everything and Boneworks tries to bring that sense of presence closer with its physicality.

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Who are its intended users?

Boneworks has with it a decent barrier to entry. It intends for its users to have already achieved their “VR legs”. Foregoing all locomotion types other then continuous, it is not for those prone to VR sickness. Just like the introduction of the dual stick controller, it has become a staple of VR games to include with them various movement types. Usually there will be an option for teleport (something that is much easier on the nausea) along side the option for continuous movement. This creates a situation where a massive filter exists at the entrance to the game forbidding anyone who even has mild VR sickness. With this in mind, the game is clearly not intended for newcomers or the mass of the VR playing community, but rather is an enthusiast’s game inside what is already an enthusiast’s industry.

What are the issues (positive and negative) with it?

As Boneworks tries to push through in progressing VRs sense of presence it creates with it a series of new challenges that need to be resolved. The largest issue Boneworks inadvertently creates is actually a consequence of the very issue the game is designed to solve. By creating a VR world that is fully physical the player model and by consequence the player is fully physically represented. This creates a mental and physical disconnect from player to player model. As a player interacts with an environment their hand may get stuck on some level geometry with out them even noticing. This causes a situation where the players actual hand may be in front of them waving wildly, but in actuality the VR hand can be stuck behind them. This disconnect isn’t limited to hands but every part of the body causing some mild nausea as your VR body reacts to forces your physical body has no sensation of. The reason this happens is it breaks one of the cardinal sins of VR, moving the player in unprepared unwanted ways. Boneworks also makes some decent VR errors in level design. In VR there is an issue that gets created by level design that you’d not expect in traditional games. Due to the majority of headsets containing a cord that plugs into the computer it is easy to find yourself in a situation where you’ve wound up the cord behind you into knots. This can be mitigated in level design by either having more linear levels or countering your level design turns with opposite turns later on. The biggest sin one can do against this concept is also committed in Boneworks, and that is platform stairs. Platform stairs creates a situation where a user is forced to make two 90 degree turns in quick succession in order to flip 180 degrees and progress up the other half of the stairs. If you have more than one level, you quickly run into a problem where you will need to stop and unwind yourself by twirling in a circle against the flow of the stairs. This is a problem mitigated with the use of snap turning Snap turning is a band aid solution to this bad level design that is used more as a crutch then a solution. By using full staircases and adhering to the

level design of canceling out turns a VR game can have a much more fluid experience. This isn't to say that all of Boneworks issues are bad and should be abandoned, rather the games issues should be seen as a successful attempt at VR innovation and should be improved upon until a concise idea of perfect VR locomotion and user presence is achieved.