Representing Amphibian Perspectives in a 3D Game Engine

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1. INTRODUCTION

First Person Shooters (FPS) have dominated the gaming landscape, as evidenced by successful titles such as *Call of Duty: Black Ops* (Treyarch 2005-present) selling more than 30 million units (Clement 2022). Although first-person perspective is particularly associated with FPS games, this viewpoint is found in a wide variety of genres from horror and survival games, to puzzle platformers. For instance, first-person perspective can be found in simulation games such as *PowerWash Simulator* (FuturLab 2003-present), and *House Flipper* (Frozen District 2014–present).

Exploring this area, this project investigates recreating an amphibian's sensory experience, from a first-person point of view using a 3D game engine. Amphibians and in particular the Texas Blind Salamanders were chosen as they have unusual sensory perceptions that differ from people. They do not experience the world the same way that we would, which creates an interesting challenge to represent them in an audio-visual game engine. For the purposes of this project, this will be achieved by looking at what already exists in the gaming market; identifying possible approaches of non-human representation; and focusing on recreating these experiences through the design and development of a prototype in the Unity game engine.

2. BACKGROUND

An investigation into the habitat and adaptations of the Texas Bind Salamander was undertaken, so that it could be recreated in a Unity video game prototype. This provides the necessary aspects of the Texas Blind Salamander's lifestyle, which can then be considered for implementation in the simulation.

2.1 Habitat and adaptation

The Texas Blind Salamander is located at the Edwards Aquifer in the San Marcos pool in Hays County, Texas (Geraldson & Haas, 2014). This aquifer is found in a karst environment meaning that soluble rocks have been dissolved leading to the formation of caves. These caves help to drain water from overlying soil, and it's within these caves that the Texas Blind Salamander resides. Texas Blind Salamanders can only be found in this location due to it having consistent temperatures and supply of fresh water. As apex predator of their ecosystem, their diet consists of snails, shrimp, and amphipods.

The Texas Blind Salamander lives completely submerged in water making it entirely aquatic. This has led the salamander to develop gills, translucent skin, flat and wide tails for quick movement. They have also adapted to detect water pressure waves which allows them to hunt their prey without any visual, auditory, or olfactory senses. The pressure waves produced by the prey signal to the salamander their location. The salamander can also detect a chemical trace produced by other members of the same species, which is used for reproduction and gender identification of the other salamanders. However, this adaptation means that fresh water is required for their habitat as any contamination could prevent them from reproducing.

2.2 First-Person Perspective

Some studies suggest that point of views (POV) in video games can greatly impact player immersion and the way players might identify themselves through the game world and its characters (Cicchirillo 2020).

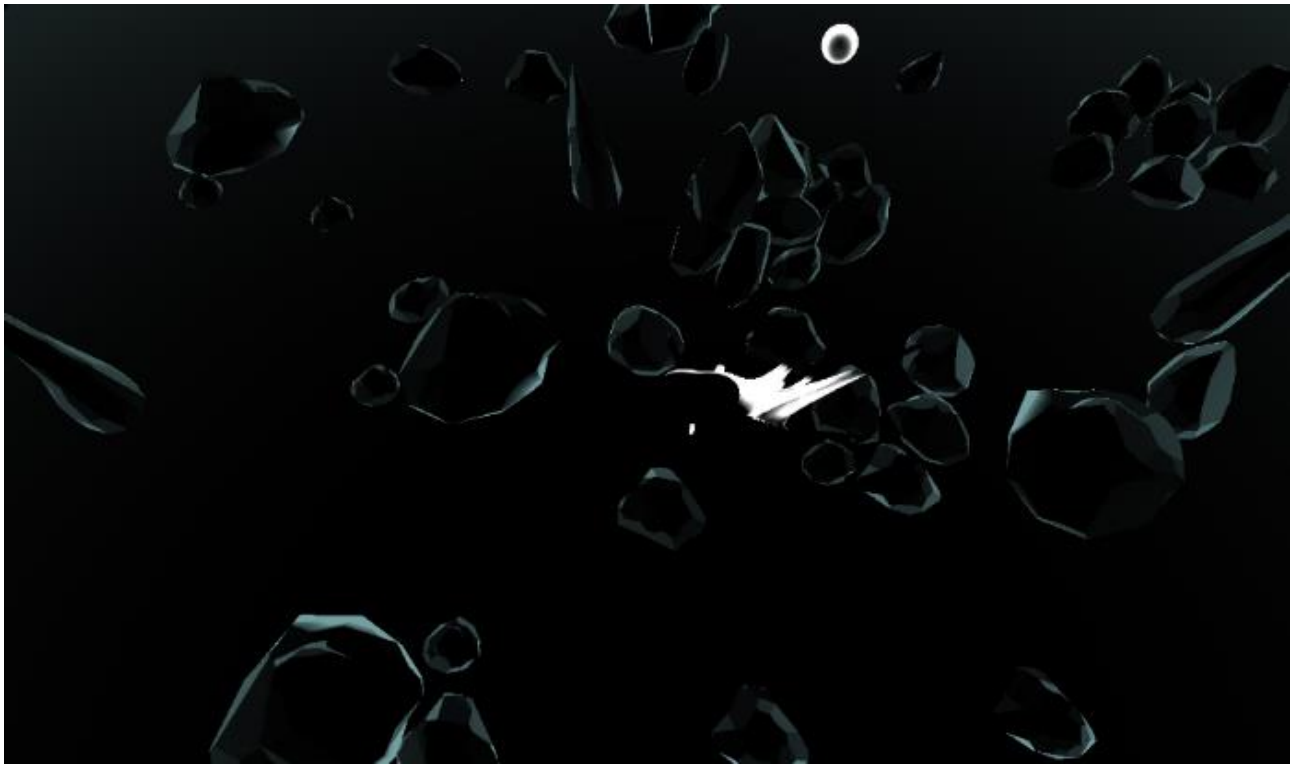

Figure 1: *Screenshot showing the prototype simulation made in Unity. Shaders are used to represent the sensory experience of the Texas Blind Salamander.*

For instance, a study by Cairns and Alena (2015) suggests that immersion increases when using a first-person perspective. They also argue that if players find a game more challenging, they will feel more immersed, because it will require greater cognitive involvement. This implies that not only does the POV affect immersion but its use in relation to challenge can give rise to greater immersion (Cairns & Alena 2015).

First-person perspective is used to indicate less common forms of sensory experiences in several existing video games, such as *Perception* (The Deep End Games 2014-present) which represents experiences of blindness using graphical effects; *Alien vs. Predator* (Rebellion 2010-present) which depicts the sensory perception of aliens and predators; and *Metroid Prime 2 Echoes* (Retro Studios 1998-present) which contains the ability to alter the players perception of the world to complete some gameplay goals. Theses were among the titles reviewed as part of the background work for this project.

3. PRODUCT PROTOTYPE

Currently, the prototype has made use of two different shaders to represent the blind sensory experience of the salamander (Figure 1). One shader is applied to the cave-like environment to simulate minimal visual detail whilst still allowing the player to navigate comfortably. The other shader has been applied to the prey objects which change the object's alpha level making them only visible once the player is within a certain range. A particle system in conjunction with motor rumble functionality, is being utilised to represent the Texas Blind Salamander's ability to sense water pressure waves. This system is attached to the prey objects, simulating the salamander's way of hunting for food. The motor rumble activates when the water waves collide with the salamander's body; this is also complimented by User Interface (UI) elements which indicate the direction of the prey objects, currently limited to left and right.

4. SUMMARY

In order to investigate the capabilities of first-person perspectives in video games, and to broaden the realm of non-human representation in games, the Texas Blind Salamander has been chosen due to its unique sensory experience of the world. The Texas Blind Salamander is entirely aquatic and lacks any olfactory, visual, and auditory senses making it a unique challenge to recreate its sensory experience through the Unity game engine. The current prototype makes use of multiple shaders, particle effects, UI elements, and haptic feedback technologies to represent the sensory experience of the salamander.

5. REFERENCES

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