

Graphics and Multimedia (COMP3419)

Assignment Option 1

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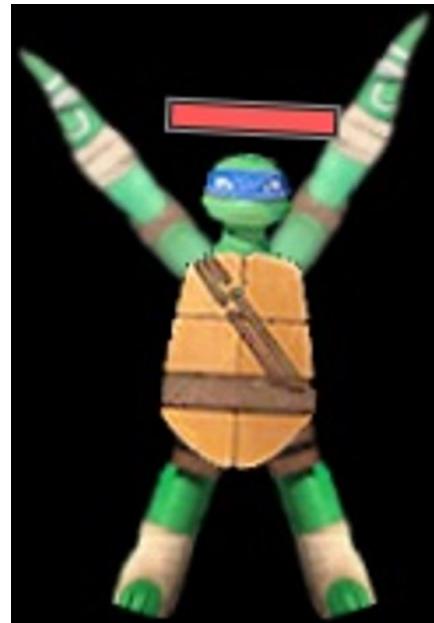
1. COMP3419 Assignment - Option 1

1.1 Introduction

My intelligent animation is a ninja turtle fighting against bat monsters in a castle environment. The ninja turtle is attempting to defeat as many monsters as possible while avoiding plastic straws.

1.2 Intelligent Object Artifacts

1. **Ninja Turtle (Character Class):** The Ninja Turtle, the central character of our narrative, is built from five separate assets: two arms, two legs, and a central body. These components are animated using motion tracking points from the provided video, lending fluid motion to the main character.



1. **Bat Monsters (Monster Class):** Inhabiting the environment as the first intelligent object, Bat Monsters are created from three assets: a left wing, right wing, and central body. They navigate the space with a randomised trajectory, and upon colliding with the Ninja Turtle, they take damage and change their velocity in an evasive manoeuvre. Each monster has its own health bar, and upon depletion, it despawns. At any given moment, a minimum of four monsters are present.



1. **Straws (Straws Class):** Reflecting the real-world plight of turtles against ocean plastics, the Ninja Turtle encounters 'straw' objects as hazards. These straws, spawning from the ceiling and falling, cause damage to the Ninja Turtle upon contact. A minimum of three straw instances are active at any time, despawning after causing damage.



1. **Health Bar (HealthBar Class):** Both Bat Monsters and the Ninja Turtle feature health bars above them, graphically representing the damage they have sustained.

1.3 Environment Artifacts

1. **Death Screen:** If the ninja turtle incurs more damage than available health, they are considered to have 'lost'. In accordance, a game over graphics is displayed.



1. **Win Screen:** If the ninja turtle survives for the entire duration a congratulatory scene is rendered. A win is defined by the survival of the turtle into the last 15 frames of the render.



1. **Spray Paint Score:** The main wall within the environment has the main characters 'score', every time they slay an enemy the score will increment.



1.4 Motion Tracking

The procedure starts with loading a monkey frame from a video, enhancing its brightness and vibrance to highlight specific pixels. A function then removes pixels not matching a certain colour profile, isolating those with a dominant red channel. This creates a masked image with distinct 'blobs'. These blobs are grouped using a recursive algorithm based on their proximity, identifying their centroids.

The next step is to find the monkey's central blob. This is done using two methods: one selects the blob nearest to the average centroid position, and the other picks from blobs within the outermost perimeter. The blob closest to the average is chosen as central. The monkey's arms and legs positions are deduced relative to this central point.

Ninja turtles graphics are then aligned with these points, needing positional and rotational adjustments for natural limb proportions and aesthetics. For example, limbs too close to the centre are extended, and the character is rotated to keep its legs parallel to a set floor level. If the monkey's legs overlap in the video, the process redefines the character's legs by fitting the largest sphere in the leg area, removing it from the mask, and recalculating new leg coordinates.



1.5 Artifact

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area, removing it from the mask, repeating the process and recalculating new leg position based on the sphere coordinates.