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MOCAP AND THE DIGITAL REVOLUTION IN THE PRESERVATION OF CULTURAL HERITAGE, DIGITIZATION OF THE TYPICAL BAMBUCO TOLIMENSE DANCE

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Abstract: Culture reflects the identity and history of a people and represents a precious heritage that we must preserve and transmit to future generations. By sharing our culture with young people, we give them the opportunity to connect with their roots, understand where they come from, and develop a sense of belonging and pride in their community.

Preserving the culture of a community using new technologies has become an invaluable tool in the digital age. These technologies offer unprecedented opportunities to document, preserve and disseminate cultural heritage in an accessible and global way. By digitizing files, photos, audio and video recordings, creating databases and online platforms, we can safely store and preserve the cultural wealth of our communities.

Motion capture suits, also known as MOCAP (Motion Capture), play a vital role in many industries, from entertainment to medicine and scientific research. Del Rio (Kuroiwa, 2017). These suits are designed to record and capture human movements with great precision, allowing you to create realistic animations and visual effects. At the SENA Tolima Tecnoacademia, a MOCAP has been used for the digitization and subsequent production of 3D digital content of the choreography of the typical Tolimense bambuco dance.

The integration of technologies such as motion capture suits into cultural preservation represents an exciting advance in heritage conservation and dissemination. By using MOCAP to digitize and recreate choreographies of traditional dances, such as the Tolima bambuco at the SENA Tolima Tecnoacademia, a door opens to new ways of experiencing and appreciating the richness of our culture. These initiatives not only keep traditions alive, but also make them accessible to a wider audience, helping to strengthen the bond between present and future generations with their cultural heritage.

THEORETICAL FOUNDATION

The use of motion capture technology (MOCAP) in cultural conservation is a relatively new but promising field. While it has traditionally been used in industries such as entertainment, medicine, and scientific research, its application in cultural preservation is gaining momentum.

One of the earliest antecedents of using MOCAP in cultural preservation dates back to the "Digital Rosetta Stone" project developed by the University of California, Berkeley, in the early 2000s. This project used motion capture technology to document and preserve indigenous dances of Native American tribes. The idea was to capture the dancers' precise movements and preserve them in digital form for future generations.

Another notable example is the work done by the Smithsonian Institution in its "Animating Culture" project, where MOCAP was used to document and preserve traditional dances and ceremonies of indigenous North American cultures. This initiative allowed not only to preserve traditional art forms, but also to create interactive educational resources that help communities keep their culture alive and share their heritage with the world.

Today, MOCAP is being used in a variety of cultural contexts to document and preserve everything from folk dance to traditional performing arts, such as kabuki theater in Japan. Additionally, it is being used by cultural institutions, museums, and community organizations around the world to create interactive and educational experiences that promote appreciation and understanding of diverse cultures.

The Motion Capture Suit or MOCAP is a sensor-based full-body motion capture system that can record a person's motion data to transform and animate it in 3D. Currently, two methodologies are recognized, the first is with high-resolution and high-speed

cameras, and the second is through sensors (accelerometers) located on the moving parts of the test subject. (Veraszto, Camargo, Garcia, & Barros, 2012).

The precision of these systems has advanced rapidly, currently allowing them to be used in different disciplines such as health, sports, art and entertainment, among others. Allowing the development of new medical processes, as well as the improvement of athletes' performance by perfecting postures and movements; In entertainment they are the basis for the generation of content with green screen, in which the characters are recorded and then the entire scene is edited. (Del Rio, 2017)

Currently, the SENA Tecnoacademia has two Perception Neuron Pro motion capture suits (see Figure 1), these MOCAPs are characterized by being based on gyroscopic sensors and accelerometers that are located in different mobile parts of the body as seen in Figure 2.

Figure 1: Perception Neuron Pro Motion Capture Suit.

Source: The authors

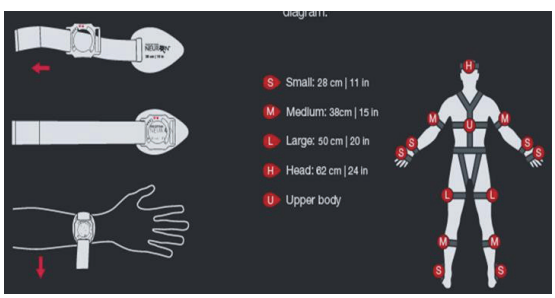


Figure 2. Location of MOCAP Perception Neuron Pro sensors.

Source: Taken from perception (2020)

GOALS

GENERAL GOAL

To digitize the choreography of the typical Bambuco dance through the use of motion capture suits and 3D software.

SPECIFIC GOALS

- Establish the theoretical framework on Tolimense Bambuco for the development of the Project.
- Create the 3D character to be used in the digital content
- Use motion capture suits to compile the different steps that make up the Bambuco Tolimense choreography.
- Design the digital content scenario
- Produce educational digital content for teaching the choreography of the Typical Bambuco Tolimense dance.

METHODOLOGY

The development of the project will be carried out using the ADDIE methodology (analyze, design, develop, implement and evaluate). It is important to highlight that the design, development and implementation stages are equivalent to the pre-production, production and post-production stages; This applies because the main result expected to be obtained is digital content.

ANALYSIS

Everything related to the MOCAP motion capture systems was analyzed, the equipment available was recognized, these were the Perception Neuron Pro suits. This analysis allowed us to define the necessary hardware and software resources for the use of the MOCAP, as follows:

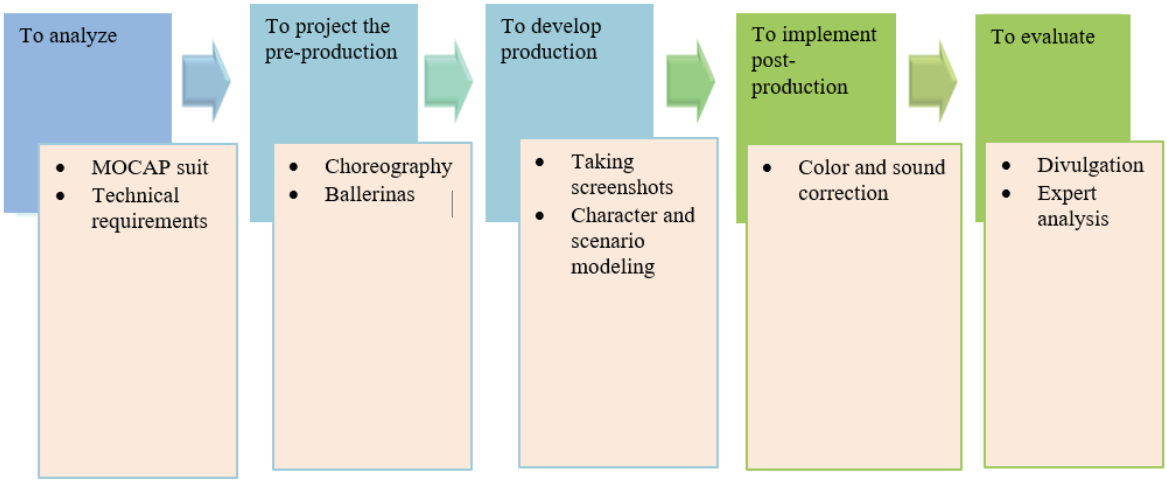


Figure 3: Project methodology.

• 4Gb of Ram memory or higher is recommended for the PC that is in charge of taking the screenshots.

• It is necessary to use the Axis Neuron Pro software from the manufacturer. (See Figure 4)

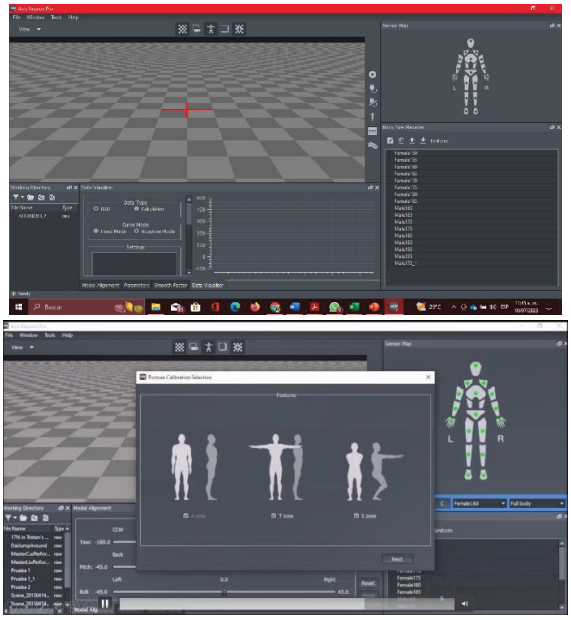


Figure 4: Axis Neuron Pro Software

DESIGN – PRE-PRODUCTION

The conceptual art of the characters was made by designing freehand sketches of the characters, as well as the settings. See Figure 5.

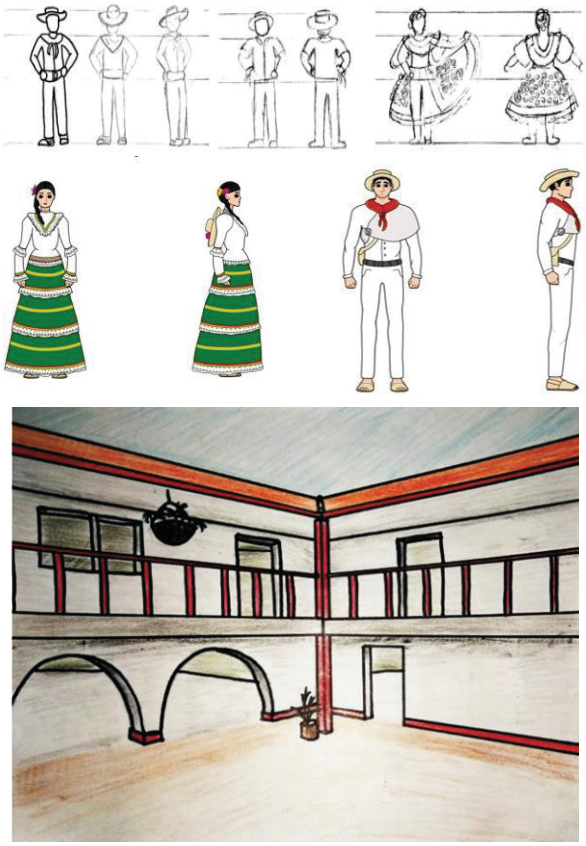


Figure 5: Freehand sketches.

DEVELOPMENT – PRODUCTION

The detailed characters of the man and woman were designed taking into account the bambuco costumes, the visual effects and simulation of the skirt fabric, the texturing of the skin were generated, the scenarios were designed taking into account the lighting and the position of the cameras, using high quality software such as Maya, CC4 and Blender.

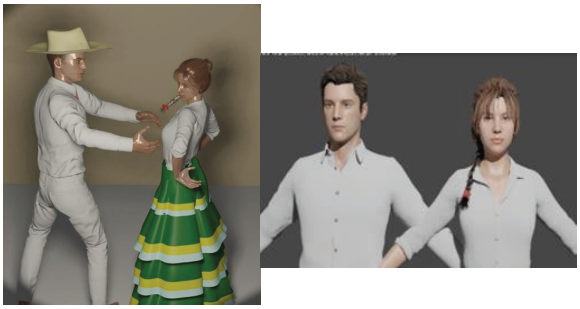


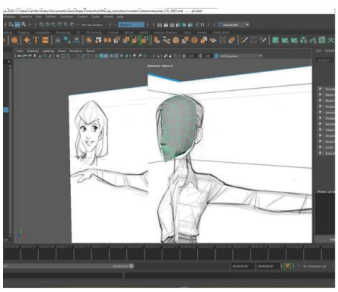
Figure 6: Creation of man and woman characters.

Subsequently, motion capture was integrated into the characters and objects that appear in the choreography. See Figure 7.

The individual videos were captured of each of the 8 movements performed in the dance. All of this has been assembled into an animation using the camera animation technique to show the complete choreography in a final video.

The rendering was prepared taking into account the creation of the virtual cameras and their animation, the image sequence was edited with the Adobe Premier program, and finally the sound was added. See Figure 8.

Figure 7: Motion capture. In studio (on the left) in traditional setting (on the right)



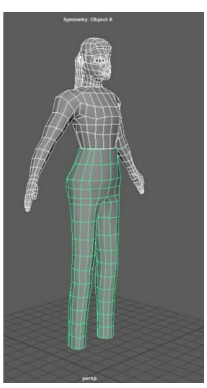


Figure 8: Rendered in Adobe Première

IMPLEMENTATION – POST-PRODUCTION

In this phase, audio and video corrections were made that allowed us to obtain a final product in accordance with what was projected.

Currently the content has been reviewed by EFAC experts and they indicate that the result is satisfactory and the 8 movements of the choreography can be observed.

Figure 9: Images of the final product.

PRESENTATION OF RESULTS AND DISCUSSIONS

The successful recognition and manipulation of the MOCAP available at the SENA Tolima Tecnoacademia, Perception Neuron Pro, allowed the recording of the complete movements of the test subjects. However, during the project development process, significant challenges were encountered related to capturing and manipulating movements using the MOCAP Perception Neuron Pro. Despite the limitations of the Axis Neuron Pro software to capture movements of two people in one plane, this difficulty was overcome by making independent captures for each dancer.

To create the scenes it was necessary to extract the files from the two independent captures, take them to Blender, with their respective animation, adjusting cameras and lighting; What took the most work was adjusting the movements of the people in each frame of the animation, to achieve a view like in real life (a couple dancing). Finally, a product is generated in AVI and MP4 format. (Porras, 2020)

Integrating the capture files into the Blender software was crucial to creating realistic scenes, carefully adjusting the characters' movements in each frame of the animation to recreate the feeling of a couple dancing in real life. Additionally, choosing Blender as the primary tool was beneficial due to its versatility, intuitiveness, and ability to preview rendering in real time, especially with the use of the EVEE component, which adds an additional level of realism to the scenes.

During the development of the project, 3 MAYA software were used, CC4 of which a license must be acquired and finally Blender was used, which is free software and allows carrying out the actions that previously required the two initially mentioned programs.

What stands out about Blender is that, unlike other software such as MAYA and CC4 that require licenses and a steeper learning curve, its accessibility and efficiency in the production of 3D digital content.

The final result is a digital content – 3D video of the dance, which can be seen at the following link: https://youtu.be/KzVpxk_iH9M

FINAL CONSIDERATIONS

The MOCAP Perception Neuron Pro suit makes it easy to record detailed movements of each test subject. However, it does not allow simultaneous recording of two subjects in the same scenario, so they must be recorded separately and then brought together during 3D processing.

The Blender editing software allows you to model and place both characters in the same scenario, and then capture the movement of each one obtained from MOCAP by sequencing more than 8,000 images.

The final digital content, a 3D video created in Blandir, offers a detailed observation of the dancers' movements in the choreography of the Tolimense bambuco, which facilitates its use in learning this dance.

The replication of this project with different typical dances could support the conservation and dissemination of our culture, taking advantage of new technologies that allow the digital manipulation of characters, settings and views.

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