Maestría en Ingeniería en Sistemas y Cómputo Inteligente

Title

System motor rehabilitation for children with Down Syndrome using Kinect technology

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1. Introduction

Computer graphics is involved in computer science where produce synthetic visual images. The computer graphic is divided in three areas; 3D animation in real time (it use in video games), special effects edition (by TV and movies), edition of image and modeling (it is implement in engineering and medical objectives) [Hernan C et al (2004)].

Actually, computer graphic is a tool that allow three-dimensional graphics creation, these are used in virtual reality. The avatar in virtual reality is three-dimensional visual representation of user in a synthetic space. The contribution of three-dimensional graphics has created new forms of education are implemented therapy systems that allow an improved quality of life for special people [Van Dam et al. (2014)].

For this reason, this work aims to develop an avatar which will connect to Kinect sensor for incorporation into a system of motor rehabilitation for down Syndrome children.

2. General objective

To implement a system for motor rehabilitation for Down Syndrome children.

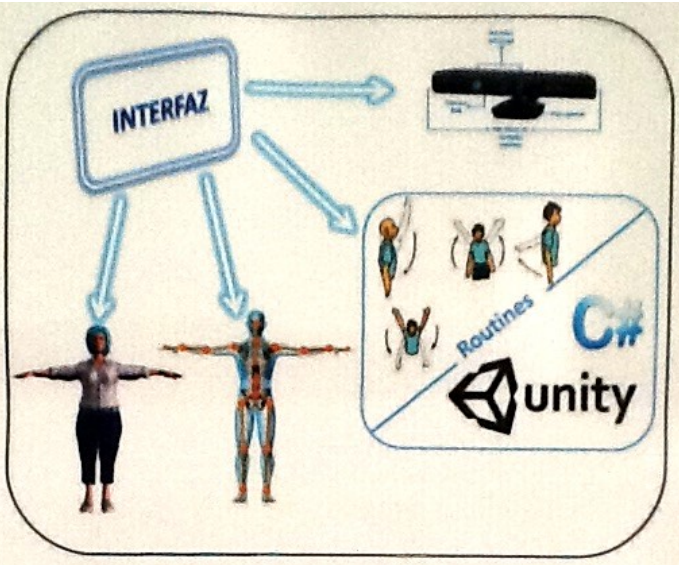
Specific objectives

- To design and implement an avatar with human morphology for incorporation into Kinect. (100%)
- To implement motor rehabilitation routines for upper body. (10%)
- To integrate Interface, Kinect technology, avatar and motor rehabilitation routines. (50%)

3. Method

The methodology proposed was the following:

- To create 3D model whit human morphology
- To Add a kinematic chain in avatar to give movement with Kinect sensor.
- To develop routines for the rehabilitation of arms, these will be created as an animation, which will be executed many times as necessary.
- Finally, the components are integrated into an interface that will allow you to interact with them.

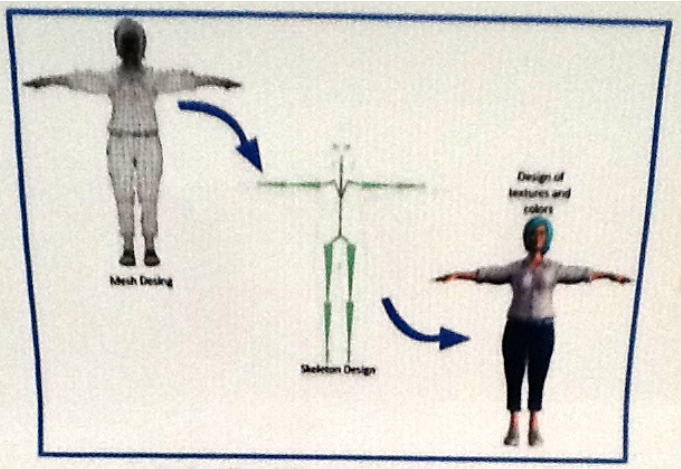


The image shows the main tasks for the development of the project

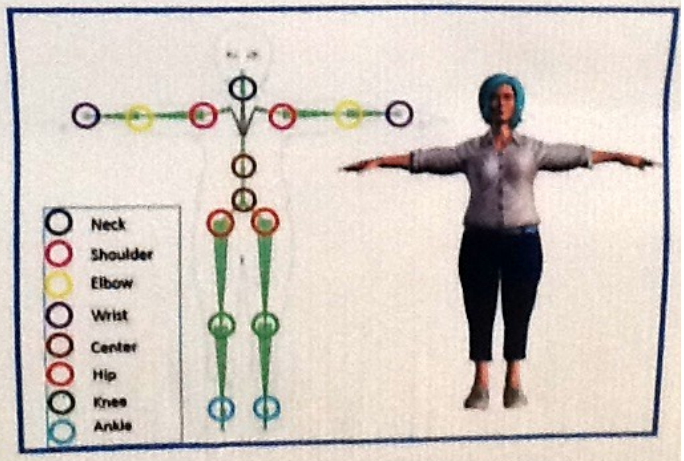
4. Results

The results obtained are the follows:

- A 3D model with human morphology has been generated to build the avatar.
- An Skeleton (Kinematic-chain) was added to avatar to allows its movements.
- Connecting between avatar and Kinect has been developed to generate animation in real time.
- A first version for interface allow the children observe the exercise that they do.

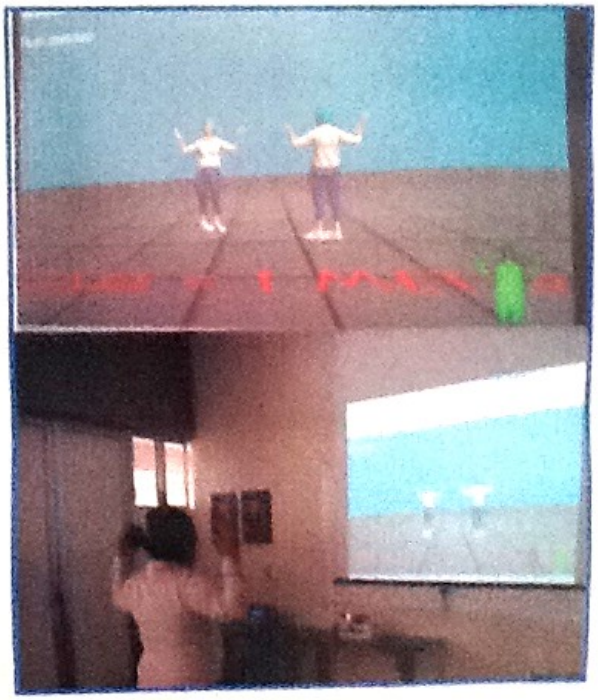


Design of modeling to generate an avatar



kinematic chain associate to avatar (links and joints)

This picture shows the interface, which already has integrated the module of the avatar



The image show connection between avatar and Kinect

5. Conclusion

In this work has been presented the progress of the development of an avatar and incorporation of a kinematic chain which allows add movement to avatar generating an animation in real time with Kinect sensor. In addition to displaying the first version of interface which is developed in Unity.

The next step is to create the routines rehabilitation for the upper body part and add them to the interface to obtain the full rehabilitation system.

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