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Real Time 2D Garment Simulation on Wireframe Human Model

KEYWORDS: Simulation, Visualization, Designing, Rendering, Wireframe, Mesh, Imaging

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ABSTRACT *Real Time garment simulation environment has provided tremendous designing and manipulation of the garment directly on a virtual human model. This study provides an analysis on the garment style that was developed on a virtual human mesh model. The front, back and side posture of the Virtual Human model are snapped and this wire frame base on the human model is used as a guide to design the garment. The analysis of the garmented model provides a clear view on designing perspectives that human mesh models provides accurate pointing and scaling on the wireframe base which acts as a guide. The wireframe model provides accurate positioning and placing of the garment parts without any shape de-formality and unbalanced garment parts. Further these snapped wireframe image can be printed as an Adobe Acrobat document for direct manual rendering.*

1. INTRODUCTION

With the advent of several designing software Apparel designing has widely benefited with Technological and scientific up gradations. Within a short period of time computer aided designing has played a foremost role in fashion construction process. Computers have been an inevitable tool for design creation and manipulation. With the progression of body modeling systems, CAD/CAM systems, Graphics and rear-ender detection and Quick response has led to the up gradation of garment manufacture in more scientific perspectives [1]. Developing a virtual model involves complex tasks like adding skin tone to the desired race, adding shade to the skin, accurate body part joints, and controlling the vertices on cloth parts as well as body parts, accuracy in structuring and interpretation of the cloth parts to the virtual model, application of texture to the garmented surface and controlling the mesh resolution. The garments are fitted on to a virtual body by means of a physical simulation technique. Body-to-body mapping and effortless seaming can be extended to the non closed mesh in virtual environment [1][2][5]. The virtual environment requires complex understanding and skills in modeling and is more widely suitable for fashion designers, animators, film developers and game developers. Implementing these tasks requires a lot of design time but these creation of these realistic virtual characters in a virtual environment also requires computation skills. Modeling is classified into two groups; structural and mathematical. The structural based designing aspect requires anthropometric knowledge which is used to organize and construct virtual models. In mathematical based designing physical or geometrical aspects are used to represent the virtual model [3].

Cloth modeling tool are used in the apparel manufacture to design and sample garments before the bulk production process. These modeling tools fit into the needs of the industry requirement, targeting on fabric simulation and fit analysis. Clothing simulation tools helps the designers to create 3D clothes on a 3D human model. On the whole, simulation of a garment is created based on two main aspects, the shape of the garment and the fabric structure [4].

Modeling, rendering and simulation of garment on a virtual human mesh model are the main aspect that is discussed in this study.

EXPERIMENTAL

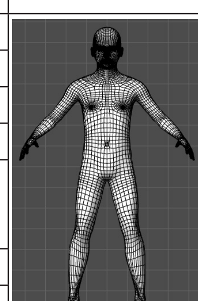
2.1 Modeling

The wireframe human model is developed using Make Human 1.0.0 open source software for making 3D human characters which is used for Real Time Simulation. This is a user friendly application which provides easier modeling facility in a mesh surface. The virtual human characters can be viewed from any angle and the characters can be rendered creating using Make Human software can be manipulated and viewed in any angle with the help of an inbuilt camera feature within the application. The built in camera feature allows capturing the screen image and storing the captured image in the desired location.

The Virtual model can be developed with the help of measurement feed by the user using a standard measurement chart or the user can directly control the dimensions of the virtual model directly on the workplace that is the Make Human application directly adopts itself to a predefined standard measure which is the built in feature of this software.

The Make Human open source 3D character creation environment provides wide options like selection of skin tone based on race with body sculpting options [5][6].It also enables the user to do part by part manipulation of Human Model thus providing scopes for micro level designing aspects like jewellery, foot wear and accessory designing. A detailed study of the application will provide many other scopes in designing, rendering and simulation.

Table – 1: Measurement chart of Virtual Human Mesh Model

S. No	Feature		Virtual Child Model
1	Gender	Male	 **Front view**
2	Age	10	
3	Muscle	50%	
4	Weight	100%	
Measurements (in cm)			
1	Height	138	
2	Chest	78	
3	Waist	61	
4	Hip	73	

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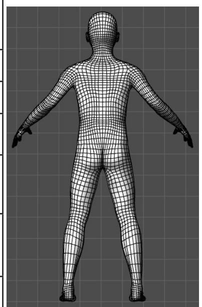
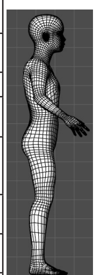
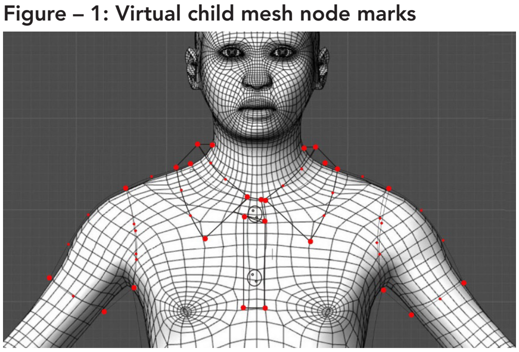
S. No	Feature		Virtual Child Model
Measurements (in cm)			
5	Neck Round	31.5	
6	Neck height	9.2	
7	Upper arm circ	20	
8	Upper arm length	22.6	
9	Lower arm length	19	
10	Wrist circ	61	
11	Front chest dist	24.6	Back view
12	Nape to waist	30	
13	Waist to hip	15	
14	Shoulder dist	10.3	
15	Upper leg height	27.2	
16	Thigh circ	41	
17	Lower leg ht	41.2	
18	Calf circ	30.2	Side view
19	Ankle circ	18.3	

The Table 1 shows the Measurement chart for the Virtual Child model. There are 19 important measurements that are required to construct the Virtual model with Make Human 1.0.0. A model for 10 year old boy was developed using the standard measurement chart.

2.2 Rendering
The Make Human 1.0.0 provide wide rendering option like Blender exchange (.mhx), Film box (.fbx), Collada (.dae), wave front object, MD5, Ogre 3D, Stereo lithography (.Stl), Biovision Hierarchy BVH, Skeleton (skel), Jpeg, Multipicture (.mpo), Pixus (.pcx), Scitex (.sct). The virtual human mesh model was rendered in jpeg format for 2D designing, simulation and visualization.

Placing the Node marks over the child mesh
The Virtual child mesh model was imported to the work place of Corel Graphic suite X5 for garmenting the model. The Virtual child mesh model image in itself has a simple wireframe which is used as a guide to design garment over the 2D model. The wireframe grid position to the seam position on the model was noted and this wireframe grid position helped as a guide to digitize node points over the virtual mesh model. The shape tool, Bezier tool, Fill color tool were used for the designing the garment.

Figure – 1: Virtual child mesh node marks



The Figure 1 shows the Virtual Child mesh node positioning over the mesh model garmented using Corel Graphics Suite X5. The models mesh act as a guide to design the garment parts over the virtual mesh model.

There are two types of node marks:

Primary Node
Secondary Node

Primary nodes are placed on the edge position of the garment.

Secondary nodes are placed in between the primary nodes. The primary and secondary nodes are used as connectors for the drafting lines.

Designing Garment over the child mesh model
The wireframe model acts as a guide for node positioning. For the accurate placement of the nodes, the designer must know technical drafting of the garment. Nodes are used to connect two or more ends together.

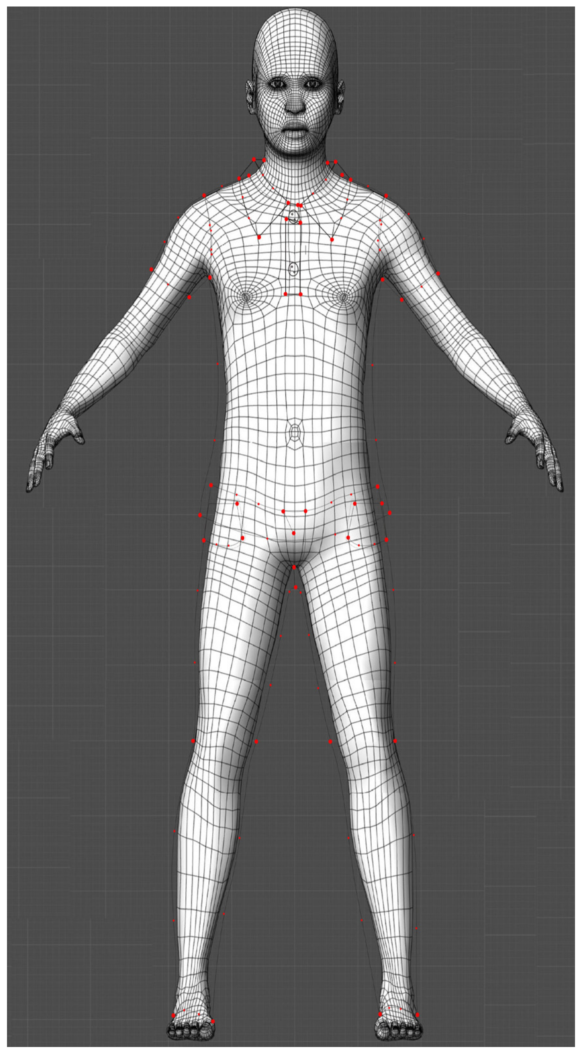


Figure – 2: Virtual child mesh model Front part node marks

The Figure 2 shows the node positioning on the virtual child mesh models front pose, which was garmented in Corel Graphic Suite X5.

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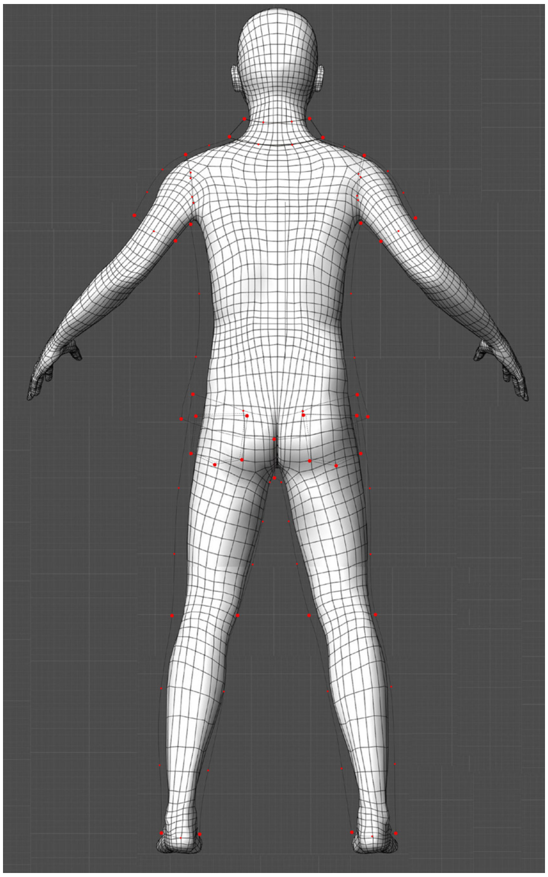

Figure – 3: Virtual child mesh model Back part node marks

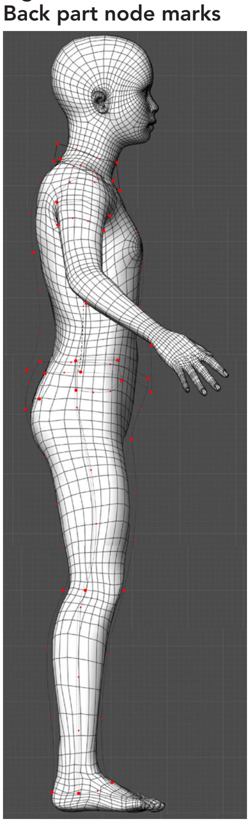

Figure – 4: Virtual child mesh model Side view node marks

The Figure 3 and Figure 4 show shows the Virtual child mesh model's back view and Side view node markings which was garmented using Corel Graphics Suite X5.

RESULT AND DISCUSSION

The garmented mesh kid model has been displayed below:

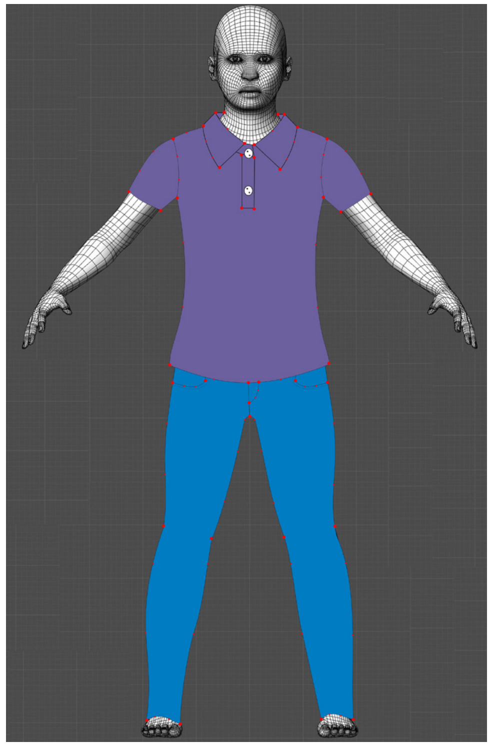

Figure – 5: Virtual child mesh model Garmented front part

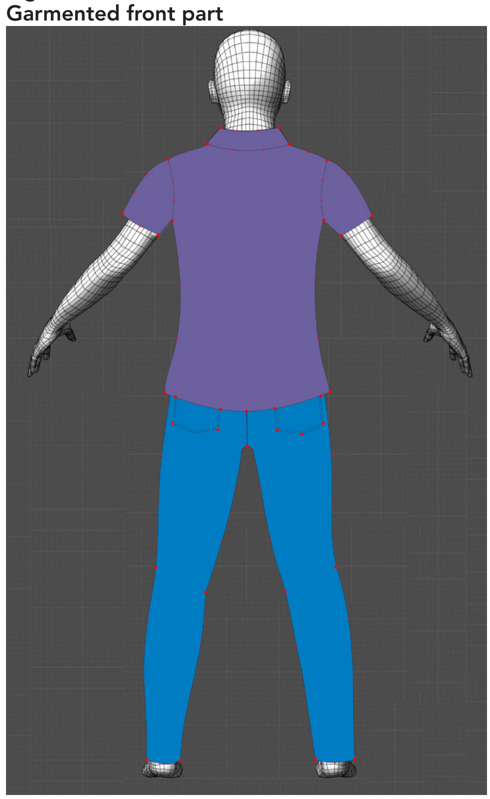

Figure – 6: Virtual child mesh model Garmented back part

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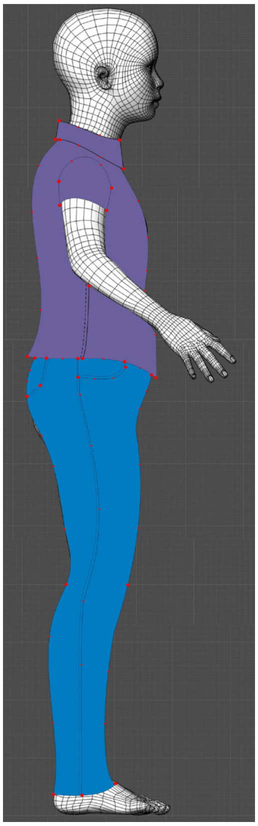

Figure – 7: Virtual child mesh model
Garmented back part

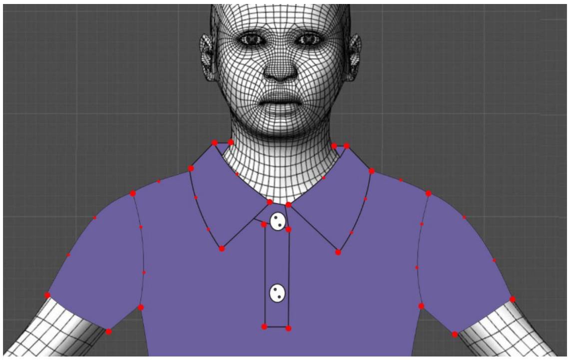

Figure – 8: Virtual child mesh model
Zoom view

The Figure 5, Figure 6, Figure 7 and Figure 8 shows the Virtual kid skinned models garmented images in different perspectives.

CONCLUSION

A detailed analysis of the garmented model provides a practicable acceptance that human mesh models provide accurate digitizing of the nodes on the mesh which acts as a guide, where as the skinned human model doesn't provide accurate marking but provides real time simulation of the garment with wide designing and editing options. The human mesh model provides accurate marking and garment designing options with wide scope of alteration and manipulation options. The results of the simulation on the virtual child mesh models are more realistic. Designing over a mesh model is a time consuming operation and it requires construction skill both technically and idealistically. 2D imaging offers wider scopes of designing as the image is saved in a standard format supported by globally accepted designing software like Corel, Adobe and Autodesk. Hence instead of constructing the garment on a blank workspace provided by the software, it is more feasible, convenient, easier and accurate to design on the human models imported as a surface image.

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