

# A Model of Interactive Human-body Based 3D Fashion Illustration in Mass Fashion Industry

**Keywords:** 3D fashion illustration / standard human-body / mass fashion industry

## **Abstract**

*With the trend of globalized mass fashion industry, we need the fashion process from design to manufacture to be accomplished under more precise and efficient way. There are 2 main streams in fashion illustration now, one is art work style illustration, which has strong character of designer, and often cannot be used directly in the mass fashion industry; the other is standard fashion flat illustration, which is popularly used in the global fashion industry.*

*Although the flat drawing plays the main role in today's fashion design performance, it has obvious disadvantages. Firstly, there is no human-body benchmark, design lines cannot be understood precisely by the sample maker, so the sample clothes should be redone for many times, which reduces the efficiency. Thus, a precise model of human-body is needed. Secondly, the flat drawing usually represents the design only with the front view and back view, but many designs cannot be expressed well just from the front or back view, so a 3D model of design performance is necessary. Thirdly, most design sheet are hand drawn and cannot change easily, and not suitable for online transferring and adjustment. Now the design sheet is supposed to be interactive, to keep up with the rapid development of global fashion industry chain.*

*According to above, the paper suggests a new model of interactive human-body based 3D fashion illustration. It is based on 3D digital human body data collection and interactive multi-viewpoint from technical cartography theory. It provides designer's precise shaping and proportion for the sample maker and manufacturer, which allow more efficiency of the global fashion industry chain, no matter how various the human bodies are.*

## **1. Introduction**

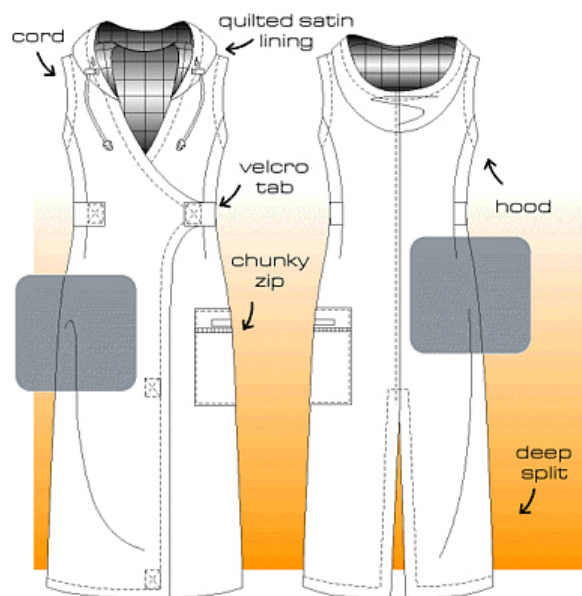
Looking into the mega trends of fashion industry today, we find that the quick response global fashion supply chain is becoming a hot issue. Comparing to haute couture and designers' brands in last decades, today's fashion industry requires the process from design to manufacture to be as fast as possible. There are already quite a many solutions of fashion CAD, CAM, ERP and e-business platforms, which make the process from manufacture to

merchandising faster. However, there is hardly any satisfying solution for fashion designers to present standard design illustrations for updated needs. The paper presents an experimental study meant to help to clearing up possible questions on this matter.

## 2. Experiments

There are 2 main streams in fashion illustration now, one is art work style illustration, which has strong character of designer. Normally the artful fashion illustration is based on a fashion model with movement, which imitate the look as the real fashion model. This kind of fashion illustration is most fashion designer's favorite, whereas it cannot identify the style precisely, so it cannot be used directly in the mass fashion industry.

The other main stream of fashion illustration is standard fashion flat illustration, which is popularly used in the global fashion industry today.



**Figure 1.** Fashion flat illustration is now internationally accepted and widely used.

As the human body is three dimensional, the clothing appears to be 3D effect when it is worn on the body. The current fashion illustration express the design effect mostly from the front view and back view, which has many limitations.

The method of fashion illustration has the limitation to show the styles design from various views—the design on the shoulder, the design aside the waist, the sleeves, the pants, etc. Almost all the styles are for-sure designed with simple side seams or nothing along the side the body. However, there could be many spaces for the 3D design on the side.



**Figure 2.** There are many spaces for the fashion designers to make the 3D design on the side.

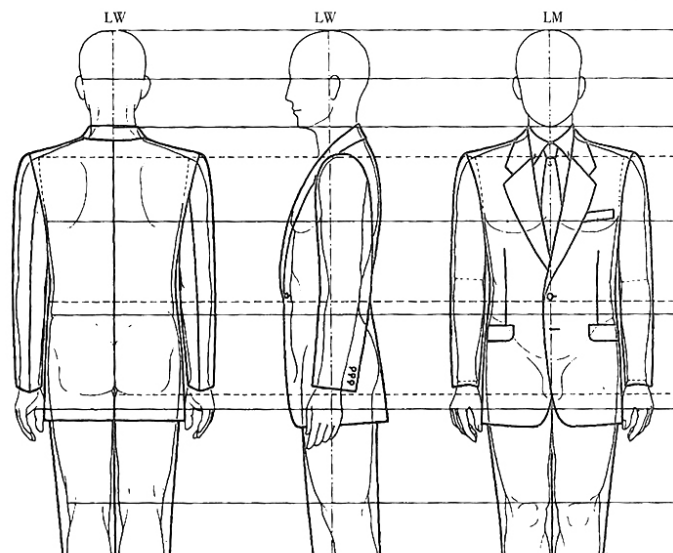
It has the limitation to show the styles with complicated structures, such as evening dress and other draped styles, which have three-dimensional structures.

Almost all the design sheets now are drawn by hand with personal estimation of the clothing proportions. Thus every designer draws differently. Even the same designer cannot draw exactly the same proportion from time to time. There is also lack of accuracy in positioning and shaping the apparel components, such as various types of pockets, cuffs, pleats, zippers, etc. So pattern maker, as the next step of fashion design, sometime is regards as the re-designer, because it is according to his taste and experience to make the pattern. Therefore, normally the sample clothes should be redone for many times to satisfy the fashion designer's original intention, which is not efficient.

With the trend of globalized supply chain, many fashion companies have their design part and manufacture part separately in different places, even in different countries. For example, China as the biggest clothing manufacture country, is receiving design sheets from all over the world all the time. But almost all fashion companies draw their design illustrations in their own ways, thus there are quite a lot uncertain factors in the procedure of making sample clothes.<sup>1</sup> Obviously this is not suitable to the mega trend of quick response fashion industry. A standard model of fashion illustration for today's mass production based on human-body becomes more and more important.

### 3. Results and discussion

It is essential to have the precise fashion illustration in mass fashion production. Especially when manufacture is taken place in different places, in order to make the mass production more efficient, the unsure parts in the fashion illustration should be eliminated when transferring design creation to pattern. Therefore, the precise fashion illustration with exact details is necessary. It is because of the tridimensional character of clothes on body, the traditional fashion flat illustration with only front view and back view cannot present the design intention precisely, and the 3D fashion illustration is becoming important. Even in ordinary garment, 3 views (front, back, side) should be presented. As for more complicated garment, besides the basic views, the top view is also preferred.<sup>2</sup>

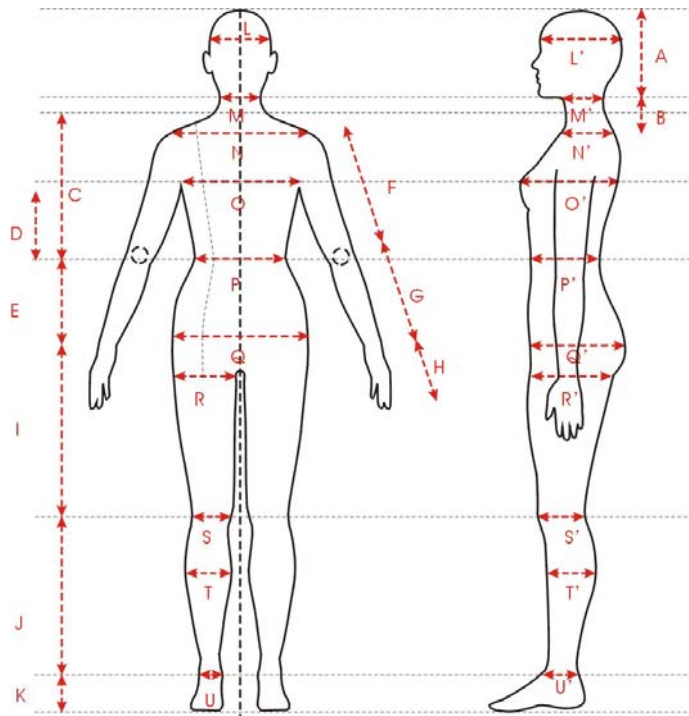


**Figure 3.** Three basic views (front, back, side) in fashion illustration, cited from *Body and fashion*, Nakazawa (Japan), Beijing, China Textile Publisher, 2000.<sup>4</sup>

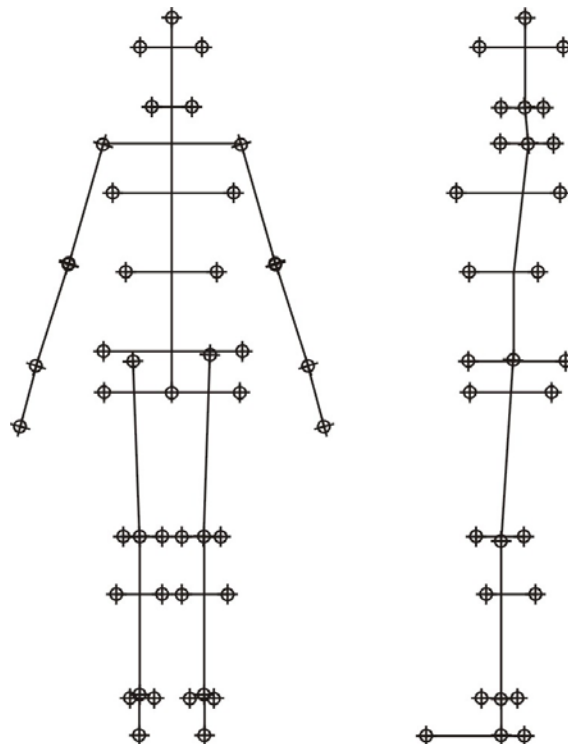
It is important to get different views of standard body as reference for drawing precise 3D fashion illustration. Just as a mannequin is necessary for draping, a 3D mannequin on paper is also needed for 3D fashion illustration as a base. The concept of multi-view includes front view, back view, side view, top view and any views designer would need. The standard multi-view base for 3D fashion illustration can be achieved through the projection of standard 3D modeling.

Before modeling the standard human-body, it is essential to acquire the key data from the body. Because every fashion brand has its own target customers, they are different in gender, age, body shape, etc. So it is important to acquire the body data according to the target customers of the brand and set up a standard model. This is also a key step before making the pattern. The 3D Body Scanner is the most efficient way to get human data. Normally the key data includes:

<b>View</b>	<b>Width from Front View</b>		<b>Width from Side View</b>	
<b>Vertical View</b>	head	A	head	A
	neck	B	neck	B
	between shoulder and waist	C	between shoulder and waist	C
	between chest and waist	D	between chest and waist	D
	between waist and hip	E	between waist and hip	E
	upper arm	F	upper arm	F
	lower arm	G	lower arm	G
	hand	H	hand	H
	thigh	I	thigh	I
	calf	J	calf	J
	foot	K	foot	K
<b>Horizontal View</b>	head	L	head	L'
	neck	M	neck	M'
	shoulder	N	shoulder	N'
	chest	O	chest	O'
	waist	P	waist	P'
	hip	Q	hip	Q'
	thigh	R	thigh	R'
	knee	S	knee	S'
	widest part of calf	T	widest part of calf	T'
	ankle	U	ankle	U'

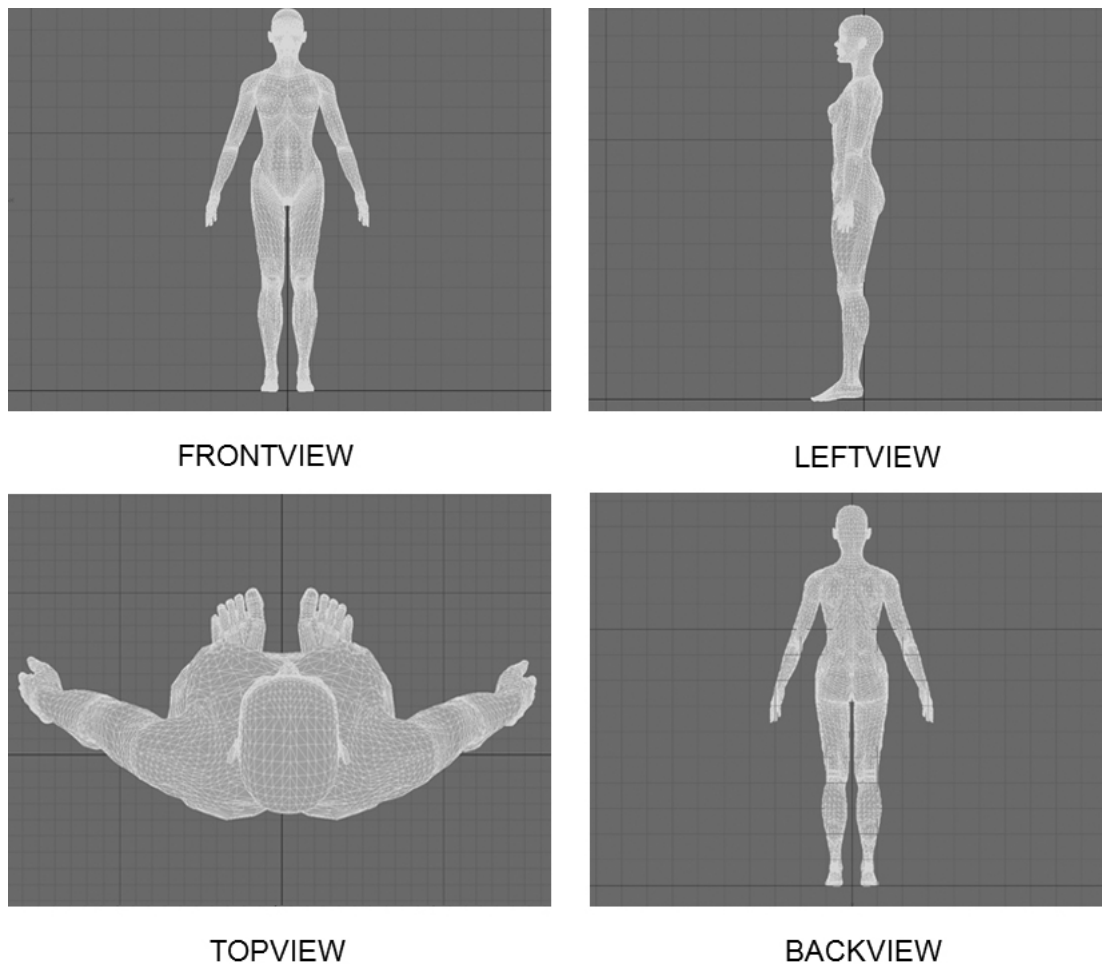


**Figure 4.** Data Acquisition from the standard human-body, contour following [TC]<sup>2</sup> body scanner (the author)



**Figure 5.** Data Acquisition from the standard human-body, contour following [TC]<sup>2</sup> body scanner (the author)

After scanning the body, the key data of the stand body can be acquired quite easily. And the 3D model of body can be also achieved by the 3D body scanner or other 3D software.



**Figure 6.** 3D model of body is achieved (the author)

As there should be an international and efficient standard for the size of the 3D fashion illustration, and most fashion designers and fashion companies use A4 paper (210mm×297mm) as design sheet, here suggests a proportion of 1:10 as the size of the body on paper. For example, if the height of standard real human-body is 160cm, the base of the 3D fashion illustration on paper would be 16cm. The standard is based on the following principles:

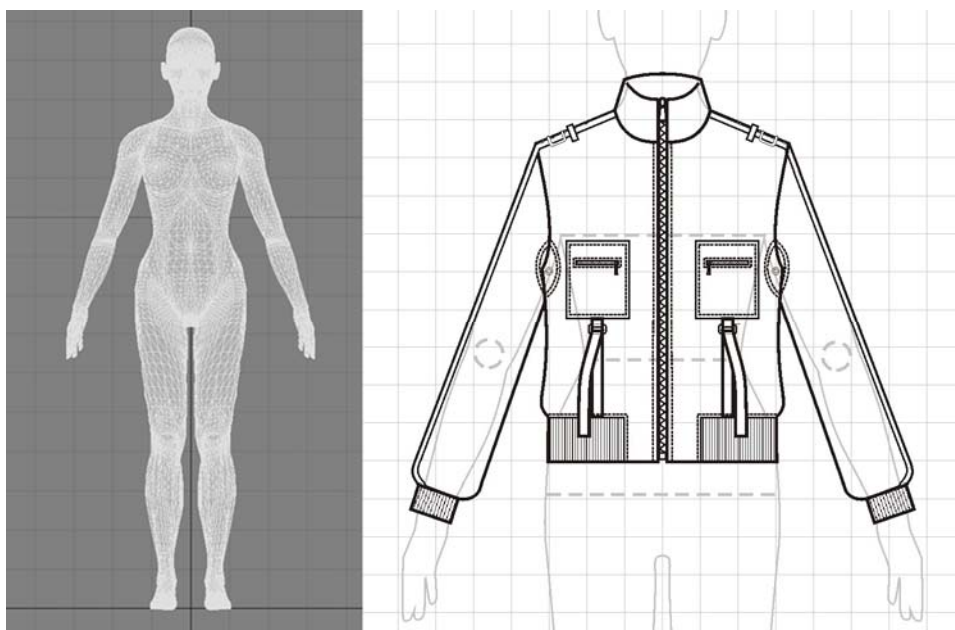
The proportion is also easy for pattern maker to manipulate the design into pattern. As the proportion is 1:10 on paper, the pattern maker can easily get the precise size for pattern just multiply the size by 10.

Here also suggest the standard for grids besides the base of standard human-body. The basic unit of reference grid is  $5\text{mm} \times 5\text{mm}$ , which represent the size in reality is  $5\text{cm} \times 5\text{cm}$  according to the 1:10 proportion. Thus, with the application of standard size of human-body and grid, any details in the design illustration can be precise.

After comparing, the most precise and efficient multi-view 3D fashion design sheet should include 5 views: front view, back view, left-side view, right-side view and top view. Almost all the details in most garments can be represented precisely by the 5-view model of 3D fashion design sheet. If there should be more details, some partial-views can also be achieved.

The front view shows the fashion style from front. The standard human-body base is acquired by projecting the 3D standard body from front. The fashion design illustration is drawn according to the standard human-body and grid base.

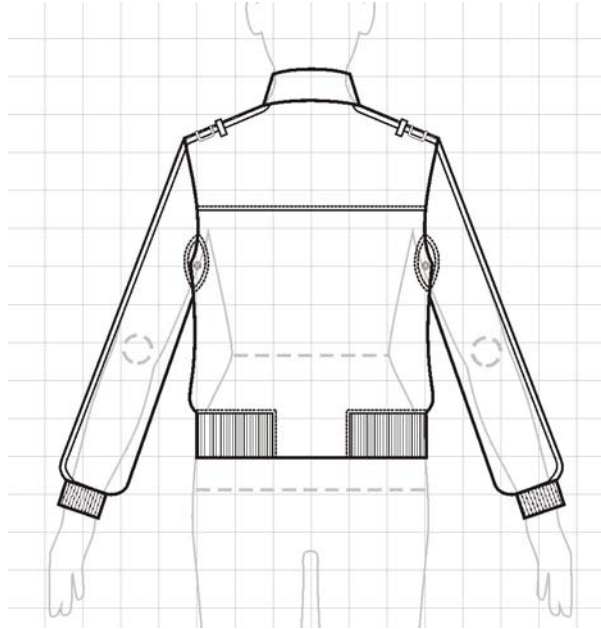
Fashion illustration from front view normally is the most important perspective, because most fashion styles emphasis the design elements in front.



**Figure 7.** Fashion Illustration from Front View (the author)

The back view shows the fashion style from back. The standard human-body base is the same as the front view. When drawing the back view illustration, it is important to pay attention to the coherence and connection between the front and back view.

Front view and back view are the most basic views of fashion illustration.

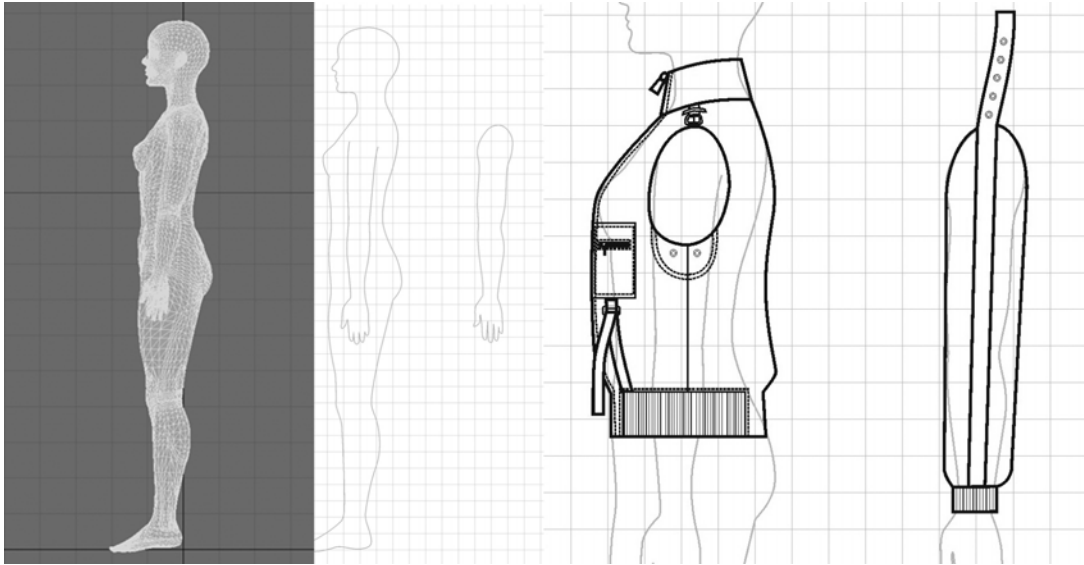


**Figure 8.** Fashion Illustration from Back View (the author)

The left-side view shows the fashion style from left. The standard human-body base is acquired by projecting the 3D standard body from left. The fashion design illustration is drawn according to the standard human-body and grid base.

Fashion illustration from left-side view normally is used for designing the sleeves, trousers, skirts, and details designed in left. With the side view, fashion designers have more space for creation besides the side seam.

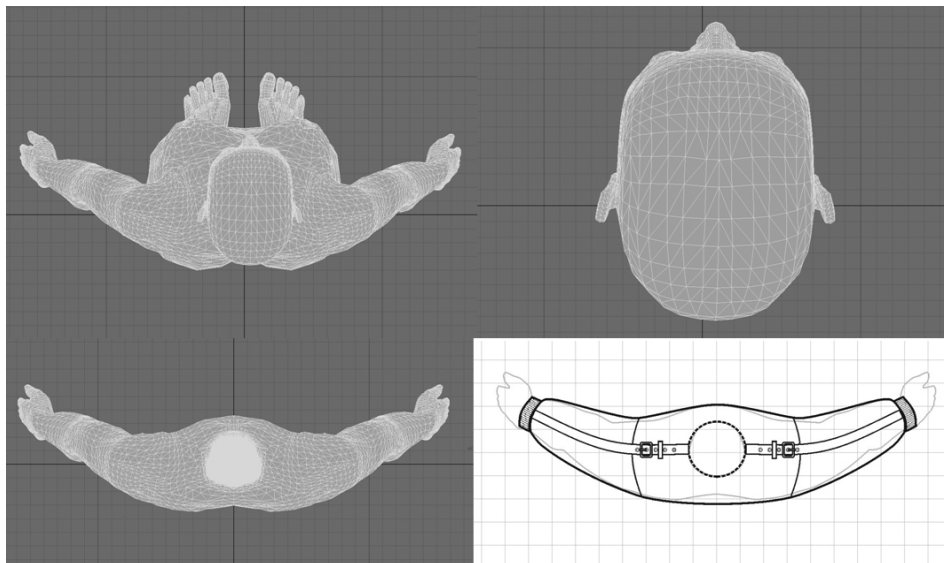
Because arms cover the side of body by side projection, it is suggested that the side view of arm, and the side view of the body without arm should be projected separately. Thus, any design around arm hole, or along the side of the body can be defined clearly.



**Figure 9.** Fashion Illustration from Left-side View (the author)

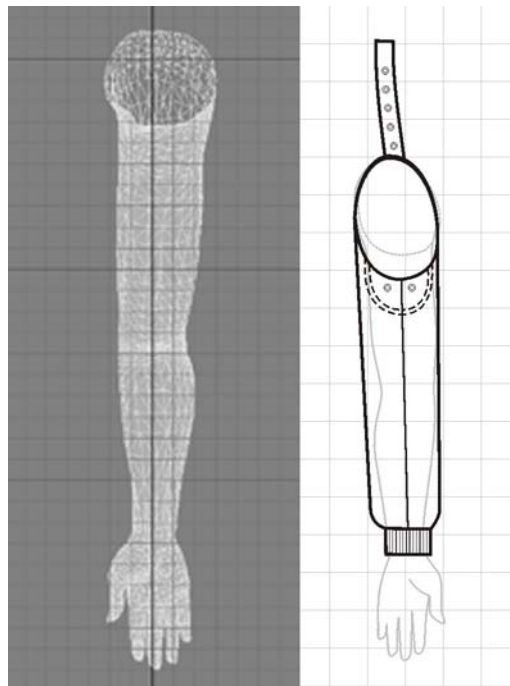
The top view shows the fashion style from top. The standard human-body base is acquired by projecting the 3D standard body from top. The fashion design illustration is drawn according to the standard human-body and grid base.

Fashion illustration from top view normally is omitted if there is no design should be emphasis on head or on shoulder. But if there is some design, as some part of head covers shoulder from the top view, it is suggested that the top view of head, and the top view of the body without head should be projected separately. Thus, any design on the head and shoulder can be defined clearly, such details as hood, shoulder pad, epaulet, etc.



**Figure 10.** Fashion Illustration from Top View (the author)

If the designer's creation beyond the 5-view of above, the partial view can also be acquired by projecting the 3D standard body from a certain part. For example, if the designer wants to have some detail design on the inner side of the sleeves, the arm can be projected from the inner side as the partial view, and the design illustration can be drawn according to the standard human-body and grid base.



**Figure 11.** Fashion Illustration from Partial View (the author)

#### **4. Concluding remarks**

The model of interactive human-body based 3D fashion illustration provides further solution for the fashion designers under today's globalized quick-response supply chain. Firstly, the design precision and style understandability can be higher than the current fashion flat illustration. The control of proportion, size, symmetry and etc. can be more precise, which provide quicker response between designers and pattern makers' work. Secondly, the connection between style and body can be clearer. Through the reference of the multi-view of standard 3D human-body, there is more space for fashion designers' creation, and the style of the cloth can be presented more easily. Third, the type of fashion illustration provides closer links between the design department and the manufacture department in different places, which accelerate the response speed from fashion design to mass production in the global fashion supply chain.

## References

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