# 3D Modeling Method by Drawing Freeform Stroke on Two Coordinate Planes

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## 1 Introduction

In recent years, the improvement of computer technology has led to worldwide acceptance of 3DCG as a new image technology. Now, the general user can create 3DCG objects with modeling software and so on. Generally the user draws 2-Dimensional strokes on three planes (X-Y, Y-Z, and Z-X) to create 3D models with existing modeling software. It is difficult, however, for the user to adjust the positional relationships between each of the strokes in the three planes. One solution to this problem is the use of sketch-based modeling such as SKETCH[1] and Teddy[2]. Using their modeling method, the user draws 2D strokes on a 2-Dimensional plane, and rough 3D models are generated from those strokes. These methods have some advantages. For example the rapid generation of approximate models, the user friendly sketch interface, and so on. But the form of the generated 3D models was very limited because both SKETCH and Teddy generate 3D models by presumptions based upon the strokes drawn on only one plane. We propose, as one solution to this problem, a 3D modeling method which can specify the form freely using two planes.

## 2 Exposition

The outline of our proposed modeling method is explained below. The user can simply draw a rough outline of the object from the side view (Figure 1-a) and the top view(Figure 1-b). Figure 1-c shows the outline which is obtained by tracing the pictures and reflected into 3-Dimensional space. The blue outline is the top view shape and the pink outline is the side view shape. The system then automatically generates a corresponding 3D model(Figure 1-d). The algorithm which automatically generates the 3D models based upon the outlines is shown in Figure 2. Step1: The user draws the outlines from the top view on the X-Z plane and from the side view on the X-Y plane. Step2: The two outlines are reflected in 3-Dimensional space. Step3: By translation and scaling of the outline from the top view, the two outlines can be combined, and the relative size and position can be made to respond. Step4: A wire frame model is completed by performing the same process as in Step3 to all the points that constitute the outline from the side view. With this algorithm, it is possible to make the outline from the top and side views correspond automatically. That is, it is not necessary to take into consideration the position and size of the two outlines. The user can, therefore, create 3D models very easily. It is also possible for the user to create a 3D model without using pictures. Figure

3 show outlines drawn without using pictures and the 3D models generated from them.
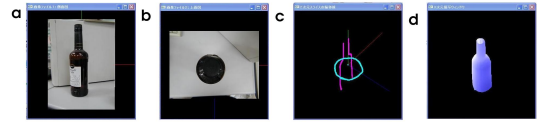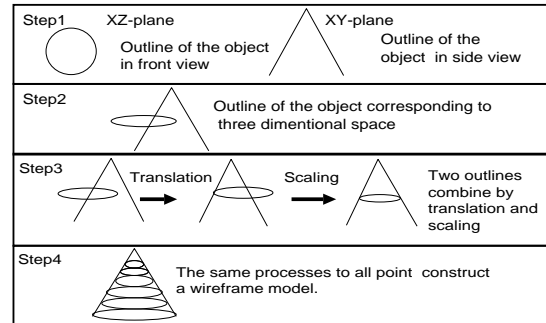


Figure 1: Implementation
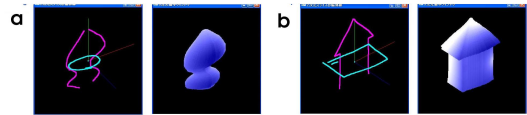


Figure 2: Modeling algorithm



Figure 3: Example of 3D models without using pictures

## 3 Conclusion

Using our proposed method, if the user draws only the outlines from the top and side views, the corresponding 3D image is generated automatically. Therefore, even one who has little skill or knowledge about 3D modeling can create a 3D model very easily. The user draws the outline of the object either by tracing pictures, or by drawing the outline freehand. Additionally, with our method, it becomes possible to express 3D models with more varied forms than the case when using only one plane as SKETCH or Teddy. Because our proposed method can specify form freely using two planes, our goal is to develop an interface capable of expressing more varied free-form models based upon our method.

### References

[1] R.C.Zeleznik,K.P.Herndon,J.F.Hughes.SKETCH:An interface for sketching 3D scenes,SIGGRAPH 96.1996.

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