Creating 3D World with NPAR

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Introduction
Like traditional artistic media, NPAR system allows the user the possibility of expressing anything we want, in any way we want [1]. To realize this goal, there are many trials to improve the way of creating and representing the 2D and 3D computer graphic image from CAD software firms and research labs. In recent days, the ArchiCAD [2] added another plug-in, ArchiSketchy for hand drawn effects. This Plug-In was designed to allow ArchiCAD users to transform regular computer drawn projects into warmer hand drawn style designs. And also, Sketch Up [3], 3D modeling tool uses a sketch metaphor for modeling and representing the architectural design idea. Even with their trials, however, much work still needs to be done before an artist will feel at home using such a system. Those systems maybe do not satisfy the NPAR’s motto to “allow the user the possibility of expressing anything we want, in any way we want”. In this paper, I present challengeable paper, which tries to compensate for the lacks of these tools. Even with some restrictions, this paper shows pros and cons of using the Sketch metaphor and NPAR paradigm through the whole design process promising efficient benefits to the entire construction industry. “Today’s research, tomorrow’s software.”

Christmas Pop-up Card
Imagine you receive a Christmas Pop-up Card [4]. When you open the card, some pieces drawn with a snowman, house, and a Santa will pop-up from the snowy background image. The various distance of each extrusion will make a paper-based 3D world in your little card. Let’s expand the interface from the card to computer space. And also, imagine that you can create pop-up card using a pre-defined gesture without paper and scissors in Virtual Environment.

Harold: A World Made of Drawing
Jonathan M. Cohen presented a paper, “Harold: A World Made of Drawings” at NPAR 2000 [5]. In this paper, Cohen presented how to interactively create and use a 3D world in Virtual Environment. This system is different from general 3D world modelers such as Cosmo World and 3D studio MAX using the 3D solid modeling interface. Differently from these tools, the interface paradigm in Harold used “drawing” as a metaphor for creating and navigating a 3D scene. For example, when users draw one image, the image is created and located on the right position in 3D World considering the user’s viewpoint. To locate this image-object in the 3D world, Cohen uses “billboard” which seems like the image-plates in pop-up card. Each billboard presents the images created with User-strokes and rendered with NPAR. Moreover, this system supports to generate a background, which surrounds the image-billboards through sketch gesture as well. Background is composed with terrain, ground, and sky.
Pros and Cons of Harold System

In this system, it isn’t needed to calculate 3d objects which other 3D modeling systems use for rendering or refreshing them when users change the view. So, users can efficiently and synchronously create and navigate 3D World without blinking. However, there is a limitation to visualize the 3D scene in various view-points because the objects are 2.5D face-object mapped with the drawing images. To compensate this lack, they mentioned a “bridge billboard” to link billboards related to the action of user stroke. Using a bridge billboard, they recomposed the layout of billboards and resized the billboard to make a perspective view. As a result, it still seems to be difficult to make a perspective image of billboard itself.

The most important thing in this paper is to use gesture metaphor through whole design processes such as creating object and background, navigating a scene, and making a user-interface. Users don’t have to change the system to navigate after modeling. Users don’t have to change input device while designing and navigating. This consistency will allow the user feel at home using this system when designing. Even with some limitations, user can express anything they want, in any way they want.

Conclusion

NPAR system should not impose the standards of the “real world” [1]. In other words, it means that we don’t have to generate the photo-realistic 3D world in Virtual Environment. This paper shows how we can apply NPAR system to generate 3D world through the whole processes. As Cohen mentioned about a small boy, Harold, we might create a world by drawing with a purple crayon and explore the world by walking into this 3D NPAR World in the near future.

References