

# 利用影像深度地圖即時產生雙眼立體影像及其硬體設計

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## 摘要

When you look at the object, that object will cause some displacement in our eyes. This displacement is called parallax. When the object is farther, the parallax become smaller, and on the other hand, it becomes greater. Because the reason of parallax makes people have feeling to stereoscopic vision. We can utilize some methods to transform the 2D image to virtual stereoscopic image. For example, DIBR (depth-image-based rendering) algorithm utilizes the depth map and virtual stereoscopic camera model of 2D image to produce the stereoscopic image with parallax. In the course which we produce. We change the position of the object in the image, and it results in hole problem in the image. Such stereoscopic image can't be watched. Therefore we should use the image inpainting algorithm to fill the holes. But it spends too much time. In order to achieve the real-time application, we hope that we can transform the whole stereoscopic image generation system to hardware to favor future application. In the paper, we designed depth map that match to 2D image to produce hardware architecture of stereoscopic image generation system. We use the DIBR algorithm to generate the binocular image. Then we use simple image inpainting algorithm to fill the hole. Considering the hardware design and computing time, we simplified the image inpainting algorithm. Although it makes the ficiency getting down, the result is still in an acceptable scope. As a result of image structure, we usually have to repeat scanning the whole image for minority several hole regions. So, in order to increase the computation the speed. We tried to partition the whole image into segments, and processes several lines each time. Then, we scattered the computing time. And we found that this kind of processing method can improve the efficiency that promote approximately 50% than whole image processing. In the experiment, we achieve the real-time computing in

150MHz clock (320 x 240 @30 fps). There are totally 2,849 logic registers in this design.

關鍵字：DIBR(depth-image-based rendering), Image inpainting , Stereoscopic Image, hole filling, binocular vision.