

Mplayer3D/Snap3D technology information

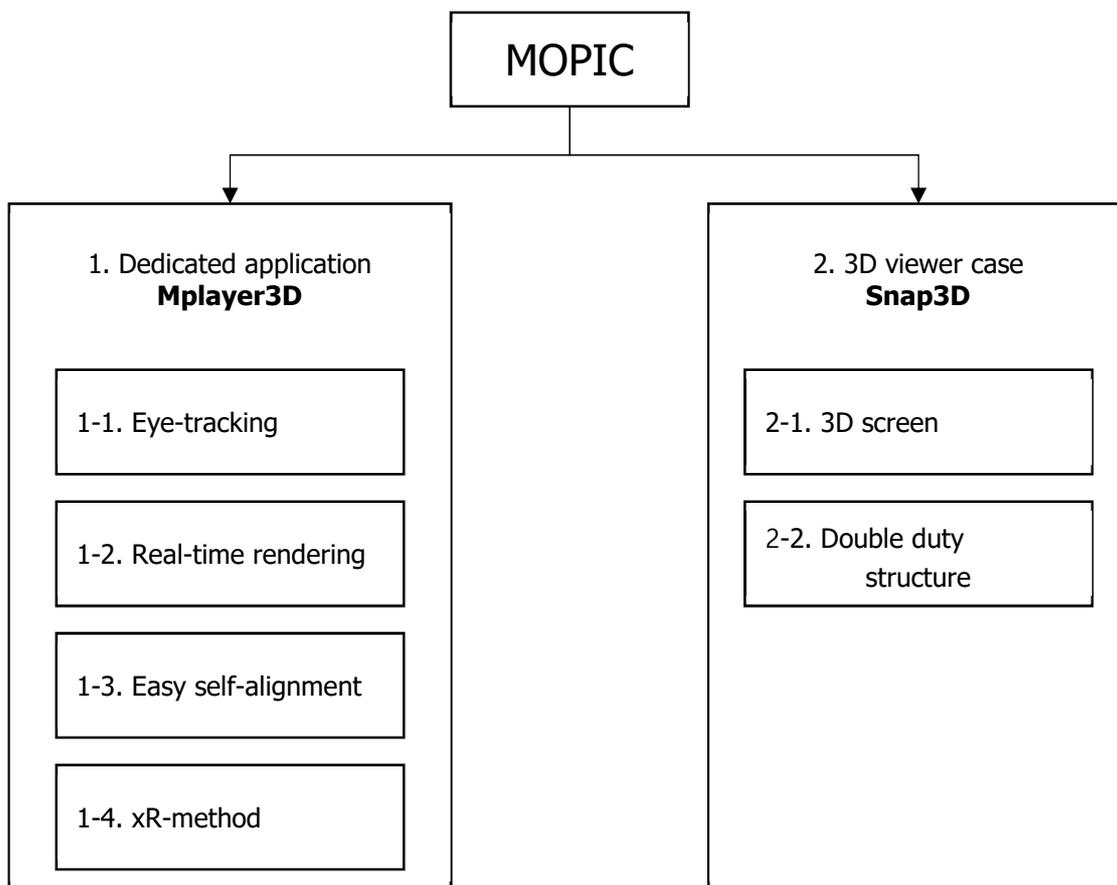
This is the technical manual of Mplayer3D, a 3D playback-only application of MOPIC Co.,Ltd. and Snap3D, a 3D viewer. The purpose of this manual is to make it easier for the customer to understand our technology, and does not include all the technologies information. There is an adaptation for technical protection or easy understanding. For more technical information, please contact info@mopic.co.kr.

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Mopic Co.,Ltd.

Technology structure



Introduction

The 3D solution provided by MOPIC consists of Snap3D, which plays the role of 3D glasses, and Mplayer3D, which is a dedicated application. The aim is to explain the technology applied to each customer to understand the Mopic products.

Abstract

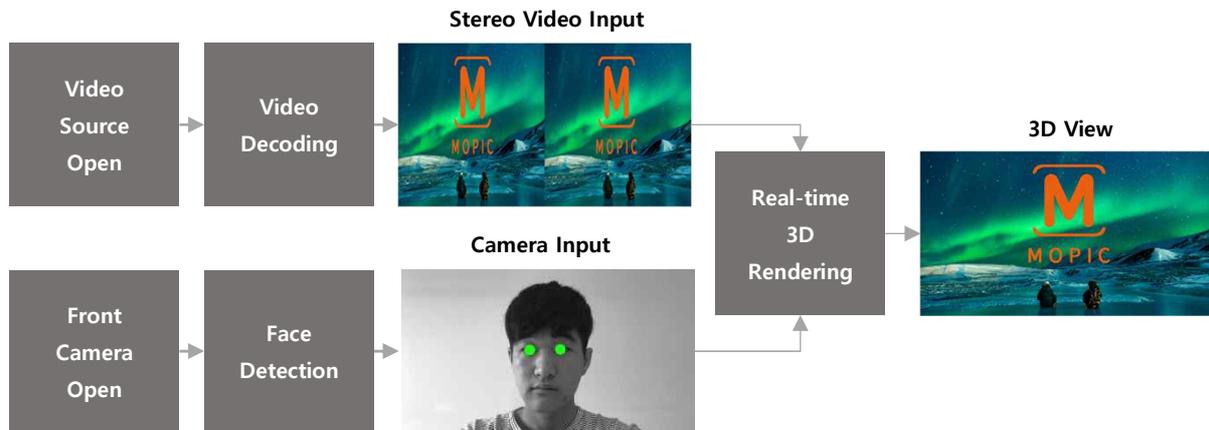
Mplayer3D uses eye-tracking technology to track the user's viewpoint; real-time rendering technology to make 3D images look good at the position of the measured point; a self-alignment technology that allows consumers to easily align Snap3D with the smartphone; and a boundary value adjustment technique for realizing a smooth and less fatiguing 3D image.

Snap3D replaces the role of 3D glasses on 3D TVs. It introduces the principle of separating the field of view without glasses, and the technologies applied to implement the functions of a protective case and a 3D viewer at the same time.

A description of stereoscopic viewing and the types of images available in Mplayer3D are described in detail.

Finally, the H / W specifications for using Mplayer3D is described.

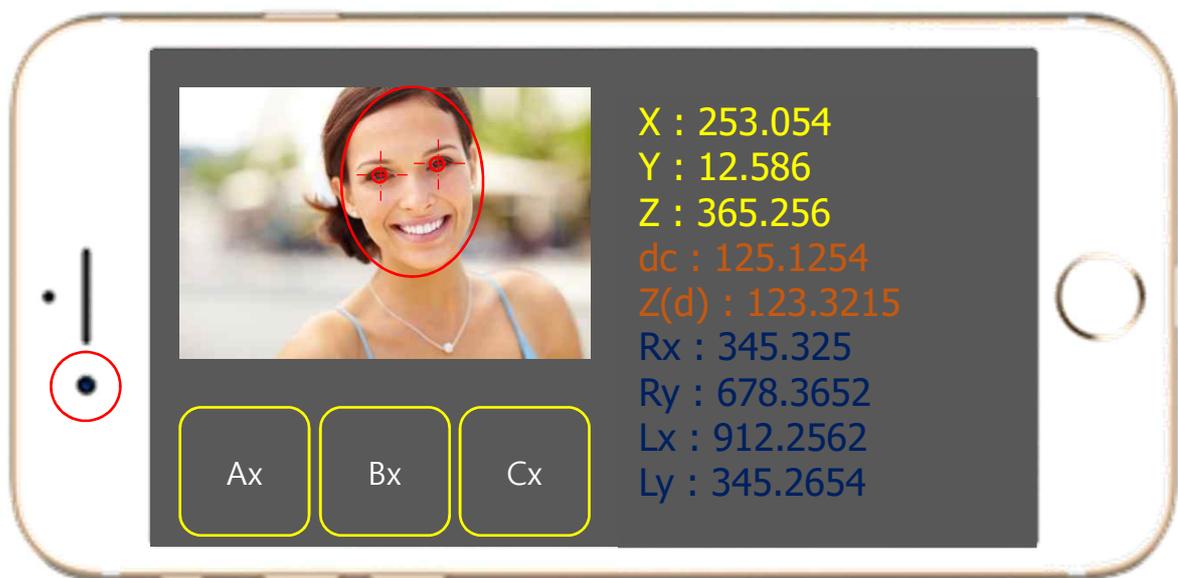
1. Mplayer3D



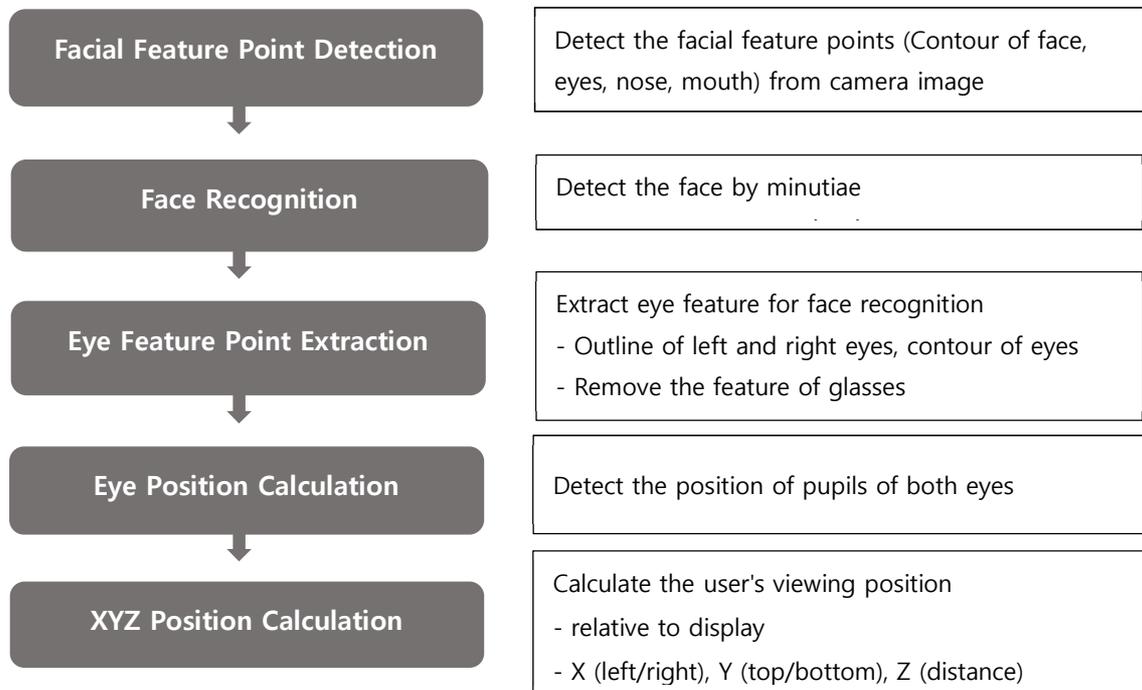
Technology introduction

It is available as an application which can be installed on the smartphone. Mplayer3D is a program that turns ordinary smartphone into a 3D device. Also, it includes the functions of finding the position of the user's pupils with the face of the user photographed by the front camera, and combining the input 3D video source to deliver the clearest 3D image at that position.

1-1. Eye-tracking technology



<The face of the user is photographed in real time using the front camera of the smartphone with the pupils located in the image. In 3D imaging, it is very important to know from where the user is viewing, rather than at where the user is viewing. This technique accurately measures from where the user is viewing the screen>



< A flowchart for locating the user's viewing position >

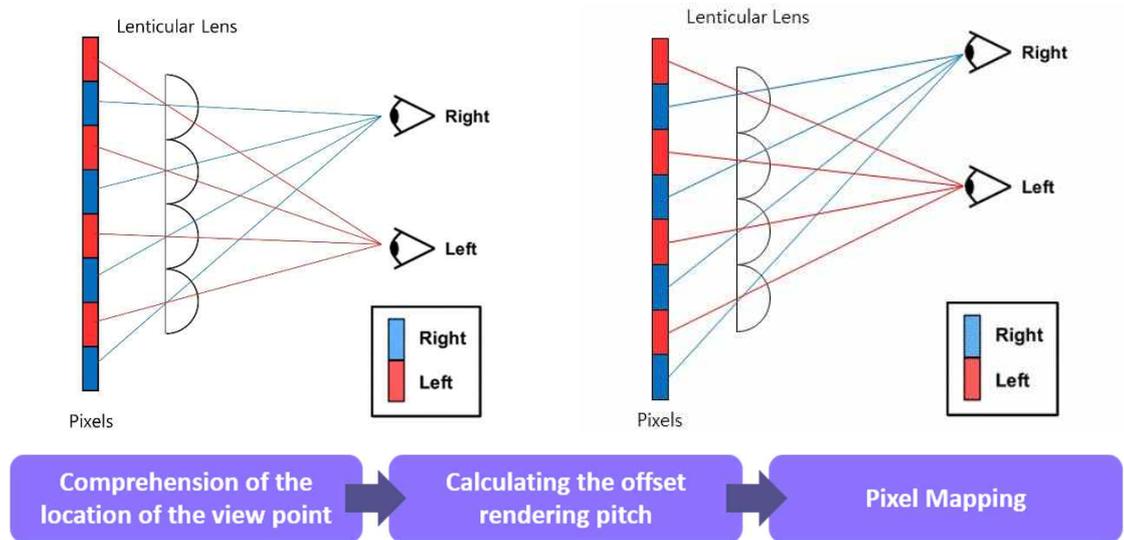
Technology introduction

With this technology, we can comprehend the location of the user's eyes using the front-facing camera of the mobile device. This is crucial in viewing 3D VR without glasses as users constantly change their viewing angles. Images with facial features taken by the front-facing camera are used to locate the pupils of the user, then calculate the values of X, Y and Z from the screen. If the user changes the position, the values will be re-calculated at a speed of 30z. The viewing angle will thus be changed without delay.

Exclusive technology

This technology can measure the user's position in depth accurately and quickly. While the technology is commonly used at the level of comprehending direction, Mopic uses this technology to find the precise distance and direction, accurate to within 5mm, providing perfect 3D image. Also, the technology includes an algorithm that maintains the eye-tracking speed at 30Hz with any mobile devices.

1-2. Real-time rendering

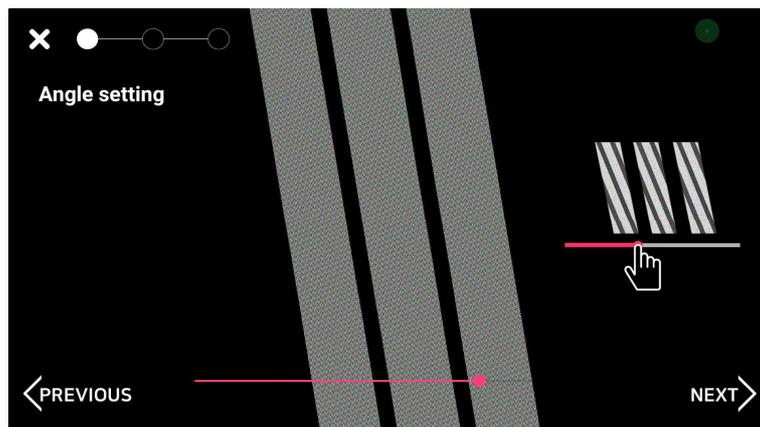


<When the user's position changes, the values of the pixels change subsequently so that the user can see the same image through the same lens at any positions>

Exclusive technology

This technology makes 3D images clearly visible when the user changes the position or angle of viewing. The autostereoscopic 3D imaging devices currently available in the market only allow fixed point of view, so the user has only one position to view the image in 3D. Our technology modifies the screen according to the user's point of view to provide users with clear 3D image in any positions or angles.

1-3. Easy self-alignment



Technology introduction

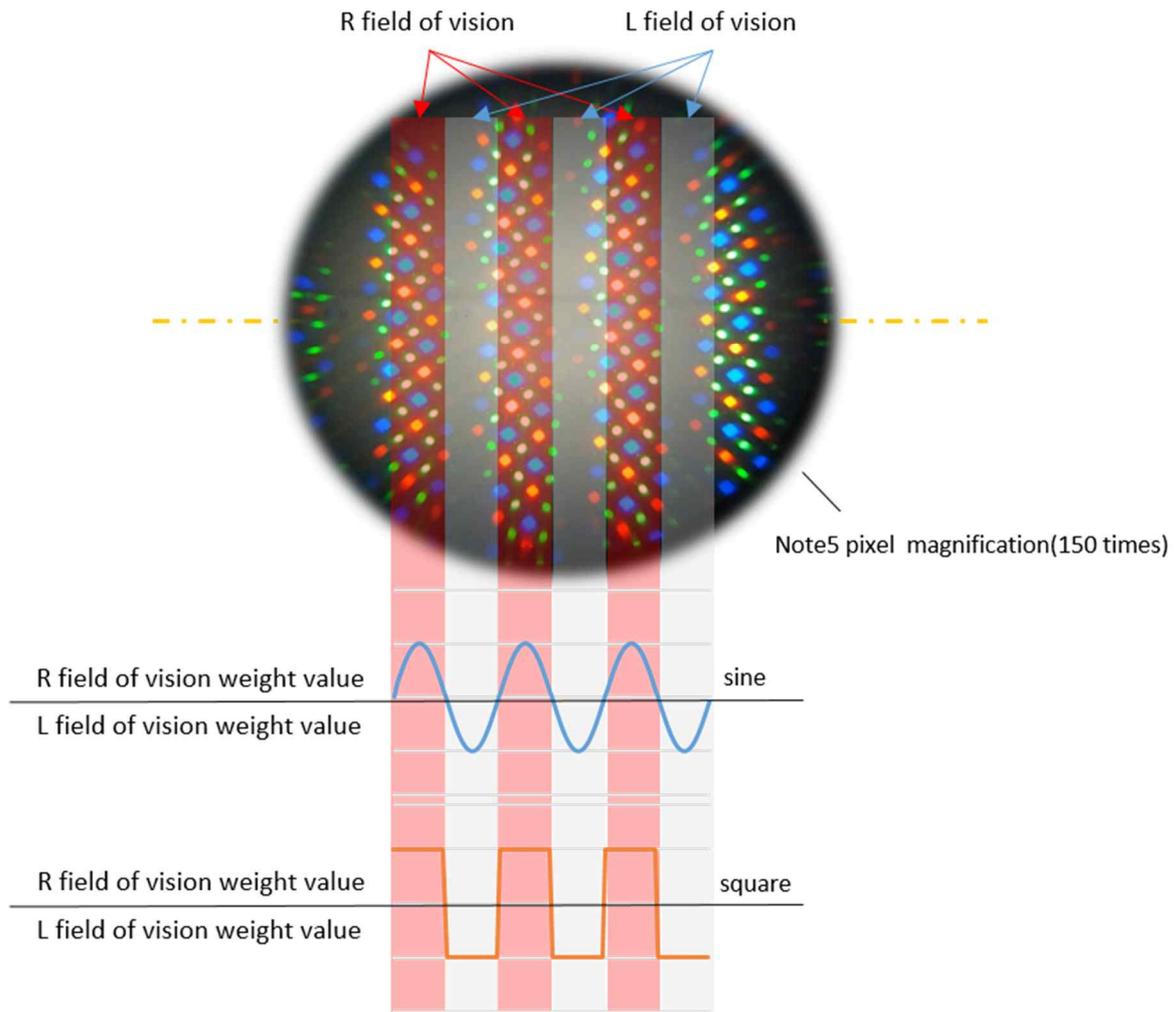
Mopic is the first company that designs and develops a product using the idea of detachable lens in the form of protective case. Users shall do an initial setup to align the mobile device with the lenticular lens. Moreover, Mopic is the first in obtaining the patent of creating and systemizing such an alignment.

Exclusive technology

This technology has not been tested by a third party because no one has ever made a product like Mopic. Over the past 4 years, Mopic had been improving our product in various ways to make sure that it runs properly and seamlessly.

* Please refer to the user manual for more information on the initial setup.

1-4. xR-method



Technology introduction

In order to view 3D images, the left and the right eyes must see completely different images. The principle of autostereoscopic method is that the image displayed will be divided from 1 frame to thousands of borders, then arranged separately into a left image and a right image. The crucial part of this technology lies in how to deal with the borders to construct a route to change one side of the image to the other.

Exclusive technology

Mobile devices have different pixel structures depending on the manufacturers and models. An algorithm that suits the structure is a crucial part of 3D imaging. Mopic exclusively obtains the knowledge and expertise in this field.

2. Snap3D

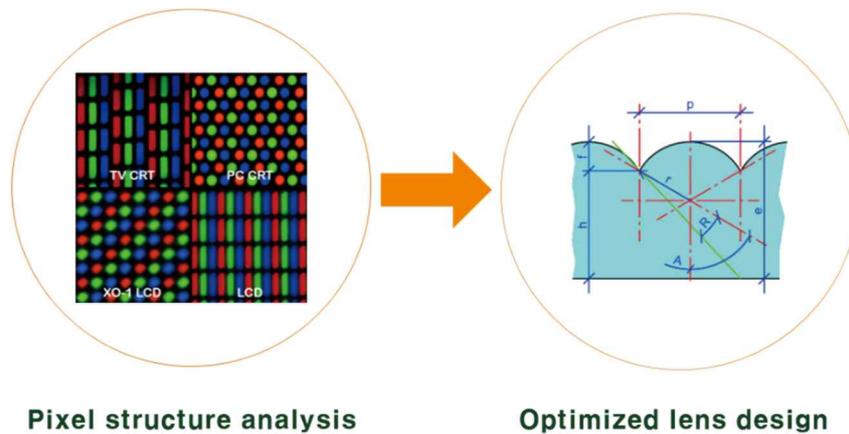


Technology introduction

Snap3D looks like a normal protective case, but it has the role of a 3D viewer. A lenticular lens is attached to the inner surface of Snap3D, which makes it look different depending on where the image is viewed with the same principle as a hologram post card. The case is made of polycarbonate to resist external impact and bending, and it has an optimized fit with the smartphone for easy attachment and detachment.

The thickness of the product is specially designed so that users can touch the screen smoothly, and the structure is carefully designed so that there is no inconvenience in using the home button and camera. A protective film of 3H or more is affixed to the outer surface to prevent the occurrence of scratches.

2-1. 3D screen design



Pixel structure analysis

Optimized lens design

Technology introduction

The thickness and pixelation of lens differ by the models of the mobile device. The design of the lens has variables such as focal length and lens pitch (There are more but these are the most important). When it comes to smartphones, thousands of lenses are aligned. This technology measures and calculates the pixel size and placement in order to construct an optimized lens design.

Exclusive technology

This technology is paramount in providing a clear and high-resolution 3D image. Mopic has various types of lens that match with the pixel size and structure using our self-built tools.

2-2. double duty structure



Technology introduction

Unlike the usual protective case, Snap3D can be used as a stereoscopic viewer. It is convenient to use even when it is attached to the screen. First of all, we make a cutout for the cameras with an optimized size, regardless of the front or back. The 3D screen is ultra-thin, even when it is applied to the front of the device as a 3D viewer, its touch function will not be affected. Attaching 3D lens directly to the protective case is an innovative and creative way to watch 3D on the mobile device, without affecting the reliability of the mobile. We stabilize the 3D lens on the case so that when Snap3D is attached to or removed from the mobile, the 3D lens will not be deformed. Our technology makes it possible to watch 3D with lower production cost and provide it to the user at an affordable price.

When attaching the 3D lens to Snap3D, it is very important to attach it with the correct angle and position. We have developed a unique device capable of precisely measuring angles and positions. With this device, we can provide stereoscopic images of consistent quality in every product.

Exclusive technology

This technology precisely attaches the 3D lens to the protective case which are then projected as one body. This makes it possible to provide high quality 3D images using a very simple and affordable protective case.

3. Contents

3-1. Stereoscopic

Definition

3D image is a method of imitating what human beings visually perceive. The reality that human beings visually feel is a 'three-dimensional image' with a sense of space. However, because the media implements the image on a 2D plane, the presence and immersion are inferior. 3D image technology is developed to provide the same experience as human vision by generating a visual element called '3D sensation' so that even if it is implemented on a plane, it can feel a sense of space.

Principle of 3D image

The human vision perceives the image information of the object with two eyes, and acquires the visual information in a way that the brain perceives it in a comprehensive manner. At this point, there is an important biologic characteristic that both eyes are about 6.5 cm apart. Therefore, when looking at a specific object, both eyes produce different images due to the difference in angle of view. This is called binocular disparity. As the two images with the visual difference are synthesized, the 3D effect of the object occurs and the image information that can perceive the spatial perception is recognized in the synthesis process.

3-2. 3D Video/Image File Format

Side-by-Side



<half SBS>



<full SBS>

The left and right images are arranged side by side, and the image is arranged on one lower side of the HMD as above.

Depending on the size of the image, it is divided into Half and Full. The difference is that one screen is divided in half, and the other is not.

Top-bottom



<Half TOB>



<Full TOB>

The left and right images are arranged vertically side by side, and the image is arranged on one lower side of the HMD as above.

Depending on the size of the image, it is divided into Half and Full. The difference is that one screen is divided in half, and the other is not.

Other formats

Other 3D formats include interlaced and inter-frame formats. The interlaced format for which the R / L image are mixed in each column and row is used for polarized glasses, and the inter-frame format in which R and L are crossed out every frame is used for shutter glasses.

Mplayer3D Supported Formats

Half Side-by-Side (SBS) and half Top-Bottom (TB), which are the same as conventional image size, are frequently used for maintaining the compatibility of SBS and TB 3D video formats.

Full SBS and Full TB are used in some photographic images. Mplayer3D supports 3D video formats of SBS and TB, which are both widely used.

The sequence of L / R images consists of L -> R from left to right and R -> L from top to bottom. However, in some images, the L / R position can be changed. If the image is not set to the image meta data when created, the user must manually select L -> R or R -> L. Users can easily distinguish the 3D images. Mplayer3D supports L / R and R / L toggle switches, which can be selected by the user.

4. Specifications

For Android

4-1. Functions

1. Side-by-Side / Top-Bottom conversion
2. Subtitle Support (srt, smi)

4-2. Supported Video Resolution

3840*2160, 1920*1080, 1280*720

4-3. H / W Requirements

CPU : Octa-core 1.9 GHz Cortex-A53 or more

GPU : Mali-T760MP8 or more

Camera : 720p@30fps or more

RAM : 3GB or more

Version : Lollipop 5.0이상

Size : 7MB