International Journal of Science and Research (IJSR)
ISSN (Online): 2319-7064
Index Copernicus Value (2015): 78.96 | Impact Factor (2015): 6.391

FogScreen: The Walk through Virtual Environment

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Abstract: ***The FogScreen walk-through technology has become very popular and famous during recent years. It is an immaterial projection screen that consists of air and a little humidity, and enables high-quality projected images in thin air. In this paper we are discussing about close view of FogScreen, working, components, advantages and future of the technology.***

Keywords: FogScreen, walk through technology, Virtual images, Virtual Technology, Dry fog.

1. Introduction

FogScreen[1,2] is an exciting new projection technology that allows to project videos and images on the screen of dry fog, which creates illusion that the images are floating in air. The FogScreen creates an image floating in thin air and encourages the audience to play with it. One of the features is the possibility to project different images on both sides without interfering each other. The fog is created by using with ordinary tap water without adding any chemicals.

Water is the only ingredient to make this device work. The water consumption depends on the size of the screen. A 2.2 meter wide screen consumes 6-10 liters of water per hour. The water is filled in the tank or water line is connected in the case of permanent installation[8].

FogScreen creates a dry fog by ensuring that the water droplets are in the range of 2-3 microns in size and are electro statistically charged so that they move around and away from other objects.

The FogScreen enables many novel applications, such as an example in art, theater, trade fairs, and in other fields of business, entertainment, and life. The audience or a performer can enter through the FogScreen, which could be a walk-through advertisement, or an entrance to a theme park. Mixed reality and immersive projection technology can use virtual rooms with fog screens [5].

FogScreen is a 2D projection screen, but not a common transparent screen like hundreds of others in the market, rather an immaterial screen. The word immaterial in relation to display systems refers to those that create that sense of imagery floating in mid-air, usually created using water, smoke or fog.

FogScreen Inc has created two products. The Inia is the original 2-meter-wide screen. One, the latest FogScreen product, is a smaller 1-meter-wide screen. It functions almost exactly like the Inia but enables limitless screens to be merged together to produce imagery of any height and width. The immaterial property of the FogScreen enables all kinds of magic and fun, i.e., drawing, gaming or web browsing. It is possible to walk through the screen to and see the interactive work on both sides.

2. History

FogScreen was invented by Finnish Virtual Reality researchers. Initially it was names as WAVE (walk through virtual Environment), it was announced in December 2001. The first public demonstration of FogScreen was in Finland 2002. It is an immaterial screen and uses the method of fog on which to project imagery (DiVerdi et al 2006).

Working of FogScreen:

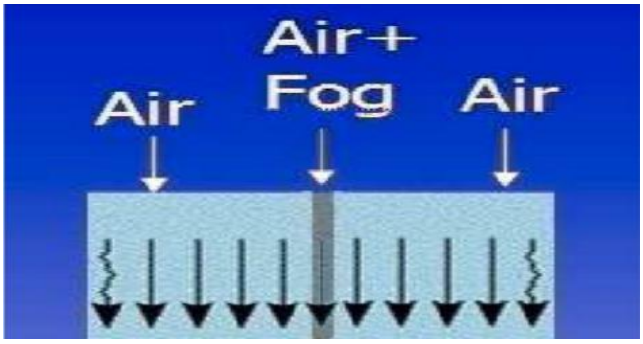
The standard 2-meter-wide FogScreen works much like an ordinary screen in terms of projection properties. The FogScreen, however, passes some of the projected light, so it makes sense to use a bright projector. A 5000 ANSI lumens projector is usually sufficient for lit environments such as trade shows, if the background is dark. In dark rooms dimmer projectors will suffice.

Very tiny details like small text or extremely low-contrast images can not be seen clearly on the screen due to the changing texture of the flowing fog. The effective image resolution is best towards the top of the screen and somewhat deteriorates with increasing distance from the fog dispenser. Imagery without very fine details looks good, and color and contrast are vividly preserved. The image looks the best when viewed on-axis towards the projector, and is usable in most off-axis viewing directions. Only when viewed from side, over about 60 degrees, the adjacent pixels start to get disturbingly mixed with each other, due to the thickness of the screen. Naturally this depends on the quality of flow, which depends also on environmental issues like wind.

The screen can also be made interactive, reacting to the touch of the viewers [3]. This turns the passive projection screen into an immaterial touch screen, and greatly extends the application possibilities. Interaction can be implemented with, for example, laser scanning [4]. The finger or a hand of a person standing in front of the FogScreen can be tracked to emulate mouse functionality. The ability for a viewer to walk completely through the FogScreen makes it appropriate for enabling new viewing and interaction possibilities. While two traditional displays mounted back-to-back could present a similar pseudo-3D display to multiple viewers, the opaque displays would prohibit viewers from effectively collaborating across the two displays by obscuring users' views of each other, distorting speech, and making it difficult to pass physical objects across the display. This permeability of the FogScreen is important not only for imaging and visualization, but also for a variety of new interface techniques.

Formation of fog screen

It is formed by using ordinary tap water without any chemicals and digital technology like ultrasonic device to create thin layer of dry fog which is sandwiched between two air curtains. The fog will create by fog generating device. It creates a dry fog by ensuring that the water droplets are in the range of 2-3 microns in size and are electro statistically charged so that they move around and away from other objects. The screen is created with dry fog.



After the screen is formed, images can be projected on it. With two projectors, we can project two different images on the both sides of the screen, which is called "dual sided nature". Screen could operate within a broad range of environmental conditions. With lager water droplets, the fog which creates is wet, which cannot be used to form a screen. The fog we are using is dry, so it does not make you wet even you walk through it[7].

The dual sided nature allows for new possibilities in multi user face-to-face collaboration and pseudo 3D visual effect (Olwal et al. 2006), which shown in the following figure.

Olwal has created several pseudo-3D interactive applications[6]. This interactive application allows a user to stretch and sculpt, move and rotate a 3D model of head. The fog screen also used with volumetric 3D displays.

3. Applications

- The developers of FogScreen says the unique nature of it will make it a memorable experience for customers. It is environment friendly as it does not use any chemicals.
- FogScreen can be used in the seminars to make interactive presentations.
- It is used in case of project a 3D images in education systems.
- We can create luxurious interior with FogScreen.
- Immersive projection technology cloud use to create virtual rooms.
- Using FogScreen we can create effective advertisements.
- Increase productive skill and quality of products.
- Safety for kids, it is immaterial so that you walk through it.
- Increase production skills technology transfer.
- Mostly used in Museums, theme parks, Science Centers and stage productions.

4. Limitations

- It is very expensive, but FogScreen Inc working on providing it in a reasonable price.
- FogScreen works best with a dark background that enhances the brightness of the image on the Fog screen behind the projector. So it can be used in day light.
- Need 1k W energy to produce 1m long FogScreen.

- You can not make a high FogScreen, because fog would diffuse with distance.

5. Conclusion

In this paper we presented the FogScreen walk through technology is emerging and interactive and immaterial technology in which images float in air. Despite it is successful already and touching the all possibilities which can bring to the world of multimedia.

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