Is there a future for 3D in Sound?

This essay will first define 3D sound and then highlight the current innovation in different fields that use 3 dimensional sounds.

Many of the people that read this essay will certainly have seen 3D visual pictures at the cinema, from their TV or even from their game console. However, unless working in the technology fields, it is unlikely that many have heard a 3D sound recording. And that's because it is not yet established for the public.

However, sound multi canal exists since 1940 with the arrival of the Surround Sound with "Fantasia" made by Disney, then the 5.1 was coming and after that the 7.1.
Nevertheless, surround sound has its drawbacks of which one is where the listener is listening to the loudspeakers. This spot is determined by the five loudspeakers placements and it's called the "sweet spot".
Hopefully, engineers have found an alternative to this problem by using headphones and a technique called "Binaural recording" (ANON).

Binaural recording is a method of using two microphones to record audio, giving an illusion that sounds are coming from specific points in space, which is said to give a more accurate representation of the world around us.
However it is not a new concept, much like 3D films were first released in the 1950's, binaural sound in a rudimentary form has been around since the 1880's (Loughborough University 2014).
A very good example of binaural recording is a video of a virtual barber cutting the listener hair. By simply put on the headphones, the listener feels like he is in the barber shop.
When listening to this example, people find surprising that, in fact, it is pretty realistic when the barber is going around the head with his scissors and his electric razor.
He starts demonstrating the effect of this recording technique by putting on and off a plastic bag over the listener's head. Then, the barber moves from the right hand side to the left hand side while talking in order to demonstrate the ability of the human ears to determine where he is in the acoustic space. It demonstrates the accuracy of the 360° nature of how human ears pick up nuance in the sound waves (N3m3sys21 2012).

The explanation is that, they are using a fake head with two microphones attached to it, one on either side of the head. The brain of the listener is doing all of the work, telling him where the sound is coming from. The listener is able to determine where the barber is in the room when talking, thanks to the power of the brain calculating the tiny differences in sound intensity and arrival time from two open ears (N3m3sys21 2012).

Yoshida stated that: "More accurately defined as "spatial audio" or "interactive audio", 3D audio technology mimics the ability of the human ear to discern not just sounds but the location of acoustic events." (Yoshida 1995).

If the surround sound such as 5.1 means that 5 speakers are surrounding the listener and 1 that is the subwoofer. What is added to enhance that for the 3D sound is the addition of height to the audio field.

Mixing in 3D means that the audio engineer is actually mixing in a space around and above him. For the moment, this is especially used in the cinema, not yet in music as it would be difficult and maybe a bit odd to listen to music in 3D.

The reason that listening to 3D music is a bit odd is due to the fact that, first of all, "normal" people have only two ears ; secondly, usually when people go to a concert, they watch the band in front of them therefore it means that the sound is in front of them too. However, for the cinema, it is different principally because the cinemas are already equipped with surround sound (5.1 usually). For instance, when someone walks somewhere, he/she hears the sound everywhere around him/her, as well as behind, on the side or even above him/her. As everyone certainly already knows, our world is in three dimensional sounds.

Although 3D sound is principally used in the cinema industry, it can be used to help disabled people such as blind. For instance, a study has been made with blind children and 3D sound technology to help them with everyday life such as orientation, avoiding obstacles, and identify the positions of various characters and objects within the environment. In this study, scientists have discovered that sound can be essential for attention and motivation purposes during interaction (Sanchez & Saenz 2007).

In the same way, 3D sound could be used in military training. They are already using simulation games to train for high pressure situations. 3D sound would help to make the training exercise truly realistic (Loughborough University 2014).

In the video games domain, massive ameliorations in interactive audio have been noticed over the past few years.
These ameliorations have been made possible thanks to the sophisticated aptitudes supplied by middleware* engines like "Audiokinetics's Wwise" and "FMOD", as well as a multitude of branded audio engines.
Companies and developers have fluid interactive music, better implementations of real time and dynamic sound mixing, and higher fidelity audio overall – all in surround sound.
 From there, developers should renounce conventional stereo and 2D surround formats in favour of 3D audio (Henein 2013).

The problem with almost everything new, is that it cost lots of money to produce and to buy. Therefore, unless being a "true player", people will need time to accept and spend money to buy a 3D sound system to play with their video games. It will certainly cost a lot of money at first and probably be a lot more affordable in a few years, when it will be well established.

The 3D in sound is already well established as there are several studios in Europe which have 3D material to mix sound in 3D such as Auro 3D which is used to mix sound in the cinema industry. One can be found in Brussels, Belgium, at the "SAE Brussels Institute".
The fact that Surround Sound has been adopted for years by the cinema and from people at home, 3D sound shouldn't have many difficulties to become a standard.

References.

Loughborough University (2014). Is 3D Audio The Future? *Loughborough University in London.* [online] [viewed 08 January 2015].
Available from: www.lborolondon.ac.uk/blog/is-3d-audio-the-future/

ANON. Pourquoi parler de nouveau son ? [online] [viewed 08 January 2015].
Available from: http://nouvoson.radiofrance.fr/pourquoi-parler-de-nouveau-son

Henein, M (2013). Audio Special: The 3D future of game sound. *Develop magazine.* [online] [viewed 08 January 2015].
Available from: www.develop-online.net/analysis/audio-special-the-3d-future-of-game-sound/0117609

N3m3sys21 (2012). Virtual Barber Shop, Enter to get your Haircut! *YouTube.com* [online] [viewed 08 January 2015].
Available from : http://youtube.com/watch?v=ILYM4hdfAVs

Sanchez, J & M, Saenz (2007). 3D sound interactive environments for blind children problem solving skills. *Behaviour & Information Technology.* Vol.25, Issue 4. [online] [viewed 10 October 2014].
Available from:
http://www.tandfonline.com/doi/abs/10.1080/01449290600636660#.VFuMNXElKb8

Yoshida, J (1995). Developers like the sound of 3-D audio. *Electronic Engineering Times.* [online] [viewed 10 October 2014].
http://go.galegroup.com/ps/i.do?&id=GALE|A16915691&v=2.1&u=southampton&it=r&p=AONE&sw=w

Definitions.
***Middleware:** software that acts as a bridge between an operating system or database and applications, especially on a network.