

Panoramic Imaging from 1767 to the Present

Ryad Benosman

Laboratoires des Instruments et Systèmes d'Ile de France

Université Pierre et Marie Curie

75252 Paris Cedex 05

rbo@lis.jussieu.fr

Abstract

Panoramic imaging has emerged as a new discipline of computer vision in the beginning of the 90's. The discoveries of all the research done, turned out to be what scientists found and achieved hundred years ago. At that time, panoramic imaging was a very popular activity. When few people could travel, panoramic paintings gave the masses an inexpensive way of travelling by reproducing the reality. The word "reproducing" contains all the essential elements that give panoramic imaging many of its main advantages. Panoramic imaging is being able to send information of an unknown scene by retrieving its 3D elements and building them in a virtual world. The aim of this paper is to show the path of panoramic imaging from its creation to the present.

1. Panorama as a commercial activity

Many researches have been carried out on mobile robots with vision systems that allow them to move freely both in familiar and unfamiliar environments. Most robots see only obstacles which are right in front of them which are very often static. There will therefore unavoidably collide with moving objects coming from behind or from the unseen sides.

The solution to this problem lies in the use of panoramic sensors. Several attempts to get 360° images have been carried out.

It was Robert Barker who invented the panorama, being an English landscape painter he obtained his certificate in 1767 for his invention "The one which I entitle nature through glimpses, is meant through some drawings and some adequate visualisation to create a full and total

immersive perspective of any given country". The ingenious principle is quite simple; it is based on a huge and fully circular drawing covering the wall of a rotunda that the onlooker discovers while moving on a platform placed in the middle.

The flood lights coming from the ceiling and from the upper and lower edges.

The idea of the total view of a site has undergone some developments from 1770-1780 especially through the geographic and cartographic studies of the French Alps. Barker has invented a rendering device that was unknown before his invention. Robert Fulton an American artist and engineer, brought the patent to France and divulged all its rules in 1799. He opened the first commercial rotunda in Paris, exhibiting the panorama "View of Paris" by the painter Constant Bourgeois, Denis Fontaine and Pierre Prevost. The latter remained the first French panoramist, supervising 18 panoramas until his death in 1823. Three rotundas were built in Montmartre between 1801-1804. The name of the present "passage des panoramas" derives from them. Panorama expanded all over Europe with quite localised exploitations. Panoramic paintings circulated from Paris, London, Amsterdam to Berlin and other cities. After two successful decades, the magic show of panoramas started waning. The public of major European cities could marvel at the sight of many eastern and western famous cities. Some historical events had also been presented.

In 1822, Daguerre with his invention of the Diorama received the fashion of what was described as "Rama fashion". To give more reality to the panoramic paintings, real settings are added such as a set of floodlight to give liveliness such as the night and day impression, shadows, clouds. All these new effects led to a race for the total illusion.

In the panorama "Navarrin Battle" (1831), the visitors were placed on a ship poop and arranged a transition with a decor between the platform and the painting. The spectator is cut from the external world and found himself in the heart of historical events.

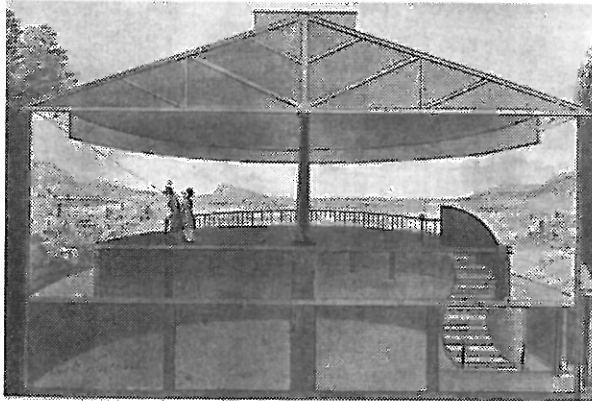


Figure 1: Robert Fulton's panorama as appearing in the patent of 1799, (coloured pencil, National Institute of the Industrial Property, Paris)

From that moment on, all panoramas have had a scenography which owing to the technical development, has been improved. Movement was added to the platform, and even sonorous environment and finally an animated image with the arrival of cineorama in 1900. When the fashion of panoramas faded out at the end of the XIX century, the heritage totally disappeared, due to their large dimensions, the canvas were cut into pieces and sold. Panoramic paintings were never considered as an art, but more as a commercial activity.

2. The use of mirrors

Panoramic imaging uses many shapes of mirrors to allow 360° vision. Mirrors have always been used in art, to add another point of view in the painting. The use of mirrors has also a philosophical meaning, it was usually used to add moralistic ideas and can usually be seen as the omnipresent eye of God. Mirrors were also very expensive the first ones were made out of polished metal, for years they were small and had a spherical shape. The last mirrors were made using glass and lead and had good reflection properties.

Mirrors can also be seen as the ancestors of cryptology. Based on the principle of anamorphosis, distorted images were generated using special mirrors which shapes allow decoding the information.

3. Patents

The eldest patent is surely the one of Robert Barker that dates back to the year 1767. The second interesting patent is the one of Mangin, a French inventor, which can be seen as the father of all existing catadioptric

sensors. Many patents can be found a short overview can be found in [11].

4. conclusion

This paper gave an overview of some important historical aspects of panoramic imaging. It showed that panoramic imaging is a very old concept. We found out that most ideas that we thought new existed already and were used in the past. Today generating panoramic images is less painful than it used to be due to the use of powerful computers that lower the computational costs. Panoramic imaging is surely at the beginning of a long road and will surely be more and more used in different fields connected to robotics.

Bibliography

- [1] Stephan Oettermann, The panorama: history of a mass medium - New York: Zone, 1997. - 407 S.: Ill. Einheitssacht.: Das Panorama <engl.> ISBN 0-942299-83-3
- [2] E. Michaux (Coll. Champs Visuels), Du Panorama Pictural Au Cinérama Circulaire, Origines et histoire d'un autre cinéma 1785-1998, edition harmattan, Paris, France, 1998.
- [2] Le XIX siècle des Panorama," Bernard Comment, Ed Adam Biro, Paris, 1993.
- [3] La Peinture en cinémascope," Beaux Art Magazine, Paris, no. 115, 1995, pp. 140-143
- [4] Le XIX siècle des Panorama," Bernard Comment, Ed Adam Biro, Paris, 1993.
- [5] La Peinture en cinémascope," Beaux Art Magazine, Paris, no. 115, 1995, pp. 140-143.
- [6] L'art de depeindre: la peinture hollandaise au XVII siècle," Alpers Svetlana, Gallimard 1990, Paris.
- [7] Le miroir," Baltrusaitis Jurgis, Ed Le seuil, 1978, Paris.
- [8] Les miroirs 1650-1900," Child Graham, Ed Flammarion 1990, Paris.
- [9] Anamorphoses," Baltrusaitis Jurgis, Ed Flammarion 1990, Paris.
- [10] Anamorphoses," Mathey François and Levie S.H., catalogue d'exposition, 27 February-9 May 1976, Museum des Arts Decoratifs, Paris.
- [11] R.Benosman, S.B.Kang "Panoramic Imaging: Theory, Sensors and Applications", Springer Verlag, 2001.