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## Solar Azimuths in the Planning of a Nur Jahan's Charbagh

Amelia Carolina Sparavigna<sup>1</sup> 

<sup>1</sup>Department of Applied Science and Technology, Politecnico di Torino, Italy

**Abstract:** A charbagh garden, the Dilkusha Charbagh, located near the town of Shahdara Bagh in Lahore, Pakistan, was created by the Mughal empress Nur Jahan. At the center of the garden, it was built the mausoleum of her husband, the emperor Jahangir. The paper discusses this charbagh and its planning according with solar azimuths.

**Keywords:** Satellite Maps, Solar Orientation, Mughal Architecture, Charbagh.

### 1. Introduction

In a recent paper [1], we have discussed the gardens of Taj Mahal and their planning according with the azimuths of sunrise and sunset on solstices. The Taj Mahal is the mausoleum built in 1632-1648 at Agra by Shah Jahan as a tomb for his wife, Mumtaz Mahal. Shah Jahan (1592-1666), the King of the World, was the fifth Mughal Emperor who reigned from 1628 until 1658; he is credited of many splendid monuments, so that the period of his reign is considered as the golden age of Mughal architecture [2,3]. Among these monuments, there is the mausoleum of his father Jahangir, the Conqueror of the World. The mausoleum is located near the town of Shahdara Bagh in Lahore, Pakistan. Placed at the centre of a walled garden, the Dilkusha Charbagh, the mausoleum was built ten years after the death of Jahangir. The garden was laid out previously by the empress Nur Jahan (1577-1645), the Light of the World, with the typical structure of a Mughal garden. Like that of the gardens of Taj Mahal, the planning of the Dilkusha Charbagh shows an agreement with the solar azimuths on solstices, as we will discuss in this paper.

### 2. Jahangir and Nur Jahan

Nur-ud-din Mohammad Salim, known as Jahangir (1569-1627), was the fourth Mughal emperor who ruled from 1605 until his death in 1627. As reported in [4], his reign was characterized by political stability, a strong economy and impressive cultural achievements. Jahangir was fond of art, science and architecture. He was a naturalist as well: in his

Tuzuk-i-Jahangiri, Memoirs of Jahangir, he recorded his observations on plants and animals.

Under the influence of his Persian empress, Nur Jahan, he promoted the Persian culture throughout his empire. As previously told, the owner of the Dilkusha garden was this empress [5]. In the Reference 5, we read that a local tradition is claiming that "the design and construction of Jahangir's tomb were in Nur Jahan's hands" too. However, in Muhammad Salih's Shah Jahan Nama (The History of Shah Jahan, completed in 1659-1660), the tomb is primarily attributed to Shah Jahan. The name of the architect is not known, but it seems that Chandar Bhan, a historian and writer, served as a supervisor of the site for some time [6].

The walled tomb-garden is entered from the Akbari serai on the west side (see Figure 1). The serai has gateways on the North and South and a pre-Mughal period mosque on the West [6]. At the centre of the garden lies the tomb which rests on a high podium, surmounted with tall minarets on all four corners. The square garden was divided into four parts in the Charbagh pattern, with water canals. There were fountains and water flowing. The water for the garden was lifted from eight wells located immediately outside the enclosure wall to an aqueduct running on top of the wall. Some terra cotta pipes were feeding fountains and tanks [6]. Every intersection in the garden was marked by octagonal and square tanks [7].



Amelia Carolina Sparavigna (Correspondence)



d002040@polito.it, amelia.sparavigna@polito.it



+39-011-564-7360



**Figure 1** - The Jahangir's Tomb is located near the town of Shahdara Bagh in Lahore, Pakistan. The mausoleum is at the centre of a walled garden, the Dilkusha Charbagh.

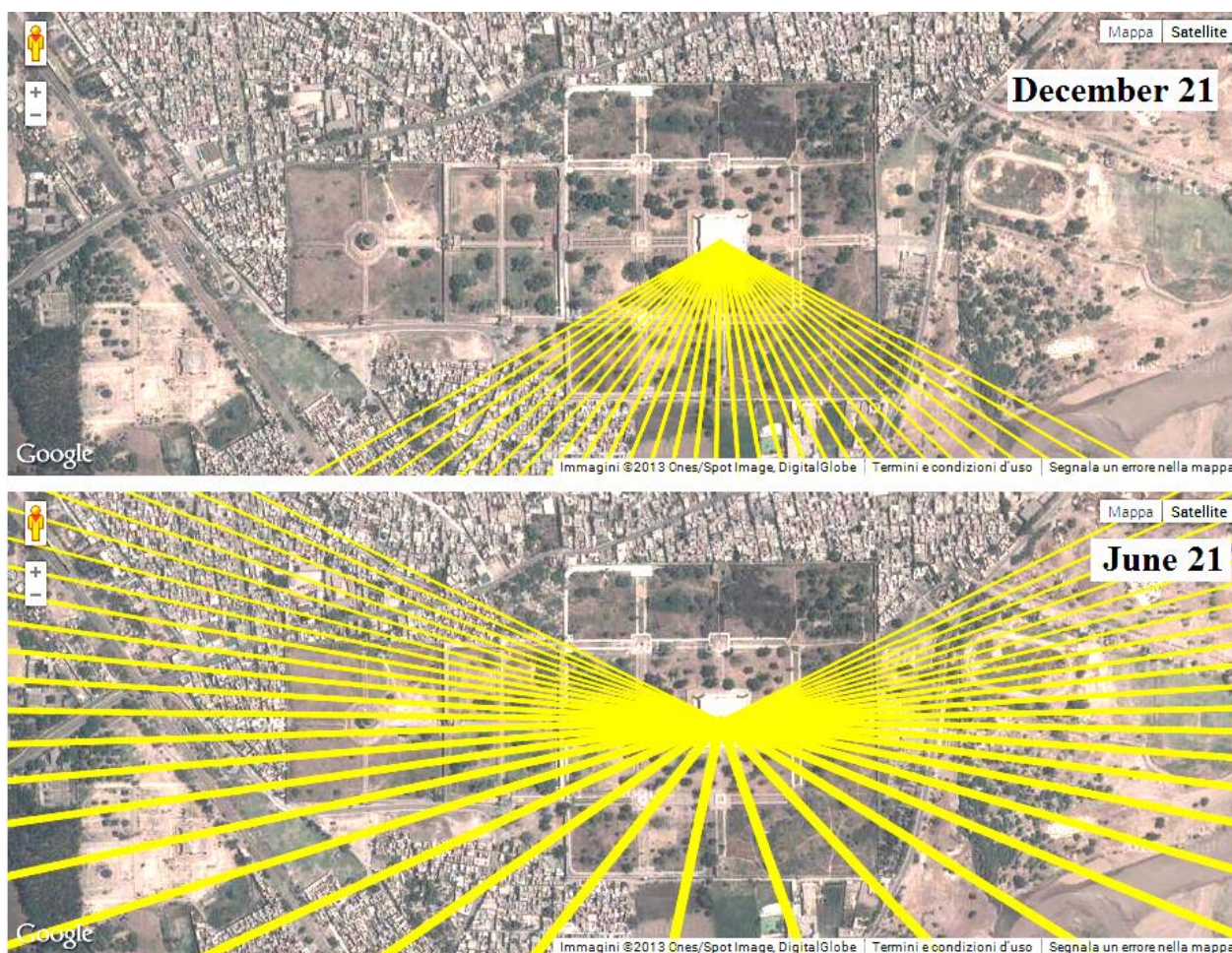
### 3. The Sun on the garden

As discussed in [1], the “charbagh”, which means “four gardens”, is the Mughal garden modelled on the Persian gardens, with a planning which symbolizes the Paradise, the “Garden of Eden”. Let us also remember that the word “paradise” is coming from the Iranian word “pairidaeza”, which indicates a park in an enclosure, that is, a walled garden [1]. The Paradise is a garden of abundance with four rivers flowing from a central spring along the four cardinal directions. Therefore, in their ideal design, the charbagh gardens were laid out as a square or rectangle subdivided into four equal parts; the rivers were represented by canals which separate the garden by flowing towards the cardinal points. According to Reference 8, most Mughal charbaghs are rectangular with a tomb or pavilion in the centre. In the case of the Nur Jahan's Charbagh in Shahdara Bagh, the centre of it was occupied by the tomb quite after the garden was created.

In the Reference 1, we discussed the charbagh of Taj Mahal. The garden, such as all the complex of the mausoleum, is aligned in the North-South cardinal direction. Using a tool able to determine the solar azimuths, we were able to see how, on winter and summer solstices, the sun rises and sets at the corners

of the garden. In [1], we concluded that the enclosure of the garden of Taj Mahal is a symbolic horizon, where we have the alignment in the North-South cardinal axis, representing the axis of the world, and the corners placed in such a manner to represent the path of the Sun over the year. Another example of such a symbolic enclosure is a court of the Forbidden City in Beijing, that having at its centre the Hall of the Central Harmony, between the Halls of Preserving Harmony (North) and Supreme Harmony (South) [9].

The Jahangir's mausoleum complex is aligned in the East-West direction. However, the Dilkusha Charbagh, which was built before the tomb, can be considered aligned in the North-South direction, as the gardens of the Taj Mahal. In the Figure 2, we can see the direction of the sun on the winter and summer solstices, given by Sollumis.com (<http://www.sollumis.com/>). The images are polar diagrams overlaying a satellite map. Let us note that the subdivision of the charbagh is obtained according with the sunrise and sunset azimuths on solstices. It is possible then that this garden, with its references to solar azimuths, had been used as a model for the gardens of Taj Mahal.



**Figure 2** – The Dilkusha Charbagh complex is aligned in the cardinal directions. In the two images we can see the direction of the sun during the winter and summer solstices, given by Sollumis.com (<http://www.sollumis.com/>). This site provides a polar diagram, overlaying a satellite map, showing the directions of the sun for any day of the year. The lines on the drawing show the direction and height (altitude) of the sun. Thicker lines mean the sun is higher in the sky. Longer and thinner lines mean the sun is closer to the horizon.

#### 4. Conclusion

The Mughal Gardens are representing the “Garden of Eden”, according to the mystic texts of the Mughal period, with four canals flowing from a central spring in the four cardinal directions. Here, we have seen that one of these gardens, the Dilkusha Charbagh, could have been planned in agreement with the sunset and sunrise azimuths on solstices, like the gardens of Taj Mahal. Their enclosures are symbolic horizons, which have the alignment in the North-South cardinal direction, representing the axis of the world, and the corners located according to the sunrise/sunset azimuths on solstices, to represent the path of the Sun over the year.

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