

Touring the Cosmos through Your Computer: A Guide to Free Desktop Planetarium Software

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Summary

This paper reviews ten free software applications for viewing the cosmos through your computer. Although commercial astronomy software such as Starry Night and Slooh make for excellent viewing of the heavens, they come at a price. Fortunately, there is astronomy software that is not only excellent but also free. In this article I provide a brief overview of ten popular free Desktop Planetarium software programs available for your desktop computer.

Astronomy Software

Significant strides have been made in free Desktop Planetarium software for modern commercial computers. Applications range from the simple to the complex. Many of these astronomy applications can run on several computer platforms (Table 1).

Most amateur astronomers can meet their celestial needs using one or more of these applications. While applications such as Stellarium and Celestia provide a more or less comprehensive portal to the heavens, more specialised programs such as Solar System 3D Simulator provide narrow, but focused functionality. Regardless of your astronomy viewing needs, the chances are you can find a free application that rivals for-profit alternatives.

Asynx Planetarium

Asynx Planetarium is a free planetarium and Solar System simulator that provides an ideal format for students and even children. Part of its accessibility to younger

Table 1. Ten free desktop planetarium applications.

Software	Computer Platform	Web Address
Asynx	Windows 2000, XP, NT	www.asynx-planetarium.com
Celestia	Linux x86, Mac OS X, Windows	www.shatters.net/celestia
Deepsky Free	Windows 95/98/Me/XP/2000/NT	www.download.com/Deepsky-Free/3000-2054_4-10407765.html
DeskNite	Windows 95/98/Me/XP/2000/NT	www.download.com/DeskNite/3000-2336_4-10030582.html
Digital Universe	Irix, Linux, Mac OS X, Windows	www.haydenplanetarium.org/universe/download
Google Earth	Linux, Mac OS X, Windows	http://earth.google.com/
MHX Astronomy Helper	Windows Me/XP/98/2000	www.download.com/MHX-Astronomy-Helper/3000-2054_4-10625264.html
Solar System 3D Simulator	Windows Me/XP/98/2000/NT	www.download.com/Solar-System-3D-Simulator/3000-2054_4-10477538.html
Stellarium	Linux source, Mac OS X, Windows	www.stellarium.org
WorldWide Telescope	Windows	www.worldwidetelescope.org

users is based on its interface, which is simple and intuitive. As with many astronomy applications, Asynx Planetarium can display the night sky from any location on Earth (between the years of 1760 and 9999). Although it covers over 10 000 stars, Asynx Planetarium is less powerful than

applications such as Celestia or Stellarium. Planets, Messier objects, the 88 constellations and the Moon with phase are all incorporated into this tightly built application. Asynx Planetarium is also suitable for users who want fast animations, which can be obtained from geocentric and

heliocentric views. Asynx Planetarium is an excellent choice for users who want a lean and efficient application for learning the basics about our Milky Way, making it suitable for a wide audience.

Celestia

Celestia is one of the best free astronomy programs available, which boasts a similar set of features to Stellarium. Like all good astronomy software, Celestia allows you to tour the Universe by escaping the limits of viewing from Earth. You can travel through the cosmos to observe a wide collection of galaxies, nebulae and stars. In fact, Celestia features a star catalogue in excess of 100 000 stars. Another great feature of Celestia is the smooth transitions from one frame of view to the next, including a nicely articulated zoom feature (Figure 1). Another popular feature of Celestia is its ability to point and go to a specific destination.

If Celestia's wide selection of stars, galaxies, planets and smaller terrestrial treasures is not enough, there are numerous add-ons to the application. Celestia Motherload¹ is an active and well-maintained website that offers a wide range of additions, including typical Solar System objects, spacecraft and extrasolar objects. Celestia Motherload even offers a set of fictional components for users interested in *2001*, *Star Trek* or *Star Wars*.

Deepsky Free

The free version of Deepsky Astronomy Software is known as Deepsky Free. The one benefit of Deepsky Free is its use as an organising and planning tool. Deepsky Free is especially useful for astronomers who want to create observing plans or star charts. Users should note that while Deepsky Free is a simple tool suitable for astronomical viewing, its functionality is limited by a narrow object database. At approximately 11 000 objects, the Deepsky Free database is limited but focused, providing information about planets, stars and the Messier objects.

DeskNite

Unlike the other applications on this list, DeskNite offers a live view of the night sky from your computer's desktop. DeskNite operates as desktop wallpaper that is constantly updated using real-time data, tracking the motion of the Earth. DeskNite relies on a limited catalogue of more than 3000 stars, the planets, Sun and Moon. NGC and Messier objects are also available. DeskNite also features a range of viewing perspectives, which includes equidistant, orthographic and stereographic projections.

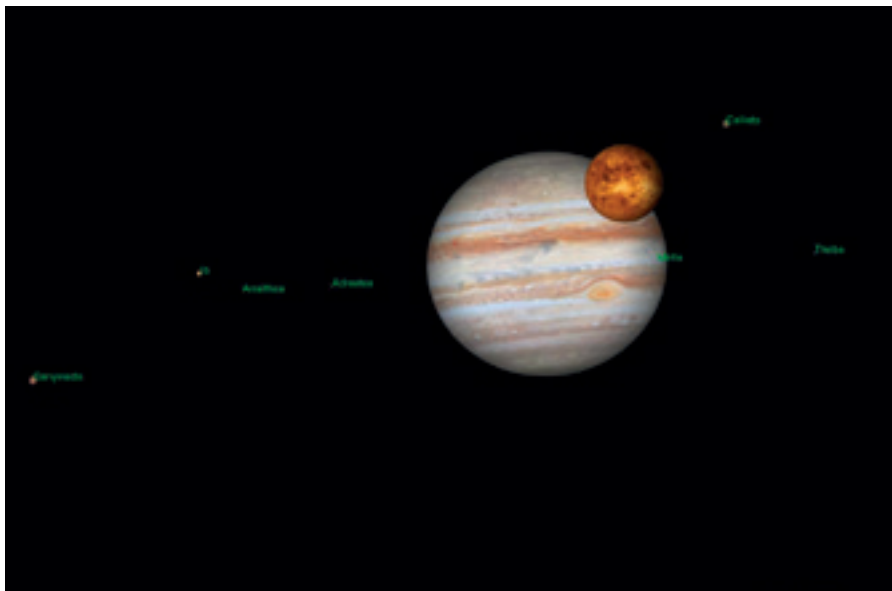


Figure 1. Screenshot of the Celestia astronomy software. Credit: Celestia

Partiview and Digital Universe Atlas

Offered by Hayden Planetarium in New York, the interactive data visualisation tool Partiview, in conjunction with the Digital Universe Atlas database, features a simple interface for views of nearby stars, star clusters, nebulae and nearby galaxy clusters. The software also features content from the Sloan Digital Sky Survey, a New Mexico-based programme that focuses on redshift phenomena (objects moving away). One of the more interesting features of Digital Universe Atlas is the opportunity to view objects in different types of electromagnetic radiation, ranging from radio to infrared radiation, visible light and gamma rays. Digital Universe Atlas is a simple but useful tool for beginner and intermediate astronomers.

Google Earth

Google Earth is the desktop astronomy application made by the famous search engine company. The application originally made a name for itself by providing seamless views of our planet by stitching together satellite photographs. Astronomers now have a chance to test drive the application for space, thanks to a group of ambitious Google developers. Using the feature called "Sky in Google Earth", you can travel throughout the cosmos on a set of images pulled from the Digitized Sky Survey and the Sloan Digital Sky Survey. The Digitized Sky Survey provides a nearly complete picture of the entire night sky from any point on the globe. The Sloan Digital Sky Survey is only partially complete, but provides greater depth and detail. The real benefit of Google Earth is the inclusion

of Hubble photographs. Navigating to M31 reveals not only a panoramic portrait of the Andromeda Galaxy, but also a Hubble image. There are also additional details about the image and suggested resources for finding more information on the web. It is this kind of integration between the sky surveys and the Hubble Telescope that make "Sky in Google Earth" a valuable educational tool.

MHX Astronomy Helper

Probably the most limited application in the group, MHX Astronomy Helper is an ideal tool for young students who want to learn the basic principles of local astronomy. Detailed information is available for major objects in our galaxy, which includes planetary orbits, rotation periods, moons and object composition. Although MHX Astronomy Helper lacks the comprehensiveness of other applications, it is an ideal start for young students and novice astronomers.

Solar System 3D Simulator

A more advanced tool than MHX Astronomy Helper, Solar System 3D Simulator accomplishes its title claim by providing a dynamic application for viewing the Solar System from a variety of angles. Solar System 3D Simulator offers views of planetary orbits, their moons, and the Sun. Information about the chemical composition and physical characteristics of each planet can be displayed. One of the nicer features of Solar System 3D Simulator is the variety of angles that can be used for viewing. Even the speed of the simulator can be altered. The target user of Solar System 3D Simulator includes young students and novice astronomers.

Stellarium

Stellarium contains many features that make it a fine addition to your astronomy software collection. Stellarium has a built-in catalogue of over 600 000 stars with the potential to add an additional 210 million stars (Figure 2). It also contains illustrations of constellations and a series of asterisms, which are clusters of stars that appear to be together, but are actually quite far apart.

Stellarium offers constellations for eleven different cultures, making it a globally-conscious application. It also has a multi-lingual interface, a pleasant user experience with keyboard control, zoom features, time controls, spherical mirror projection for use with a personal dome, and even a telescope control system. Visualisation with Stellarium is also very good and includes extra details such as shooting stars, eclipse simulations, a variety of landscapes, twinkling stars and equatorial and azimuth grids. Advanced users can have fun customising Stellarium by adding deep sky objects and constellations.

WorldWide Telescope

Microsoft's WorldWide Telescope is the last free astronomy application to be examined. Unlike most of the options on this list, the WorldWide Telescope is truly a rich, robust and dynamic tool for exploring the cosmos. One of its nicest features is its ability to view the sky in electromagnetic wavelengths other than visible light, such as X-rays. This versatility provides outstanding views of hydrogen clouds, supernovae and high energy fields emanating from nearby stars and star clusters. You can zoom in and out throughout the Universe, view selected planets, and then move forward or backward in time to see how the night sky looks at another time (Figure 3).

One of the best features of the WorldWide Telescope is the set of guided tours, each narrated by world-renowned astronomers. You can take tours that cover topics as diverse as how the planets in our Solar System formed and the state of the Universe two billion years in the past.

The real benefit of Microsoft's WorldWide Telescope is its ability to be used by a wide range of users. Young students and novice astronomers may begin with objects closer to home, learning about the planets and their properties. More advanced users can move out into the stars without the aid of a guided tour. The one downside to the WorldWide Telescope is that it is a large application. Guided tours require specific modules to be downloaded, which can take time on slower connections. But in the end, Microsoft has done an excellent job of



Figure 2. Screenshot of the Stellarium astronomy software. Credit: Stellarium



Figure 3. Screenshot of the WorldWide Telescope astronomy software. Credit: Microsoft

delivering an educational and entertaining astronomy application to most computers that use the Windows operating system.

Summary

There is a wide selection of free astronomy software available to an equally wide audience. While several applications provide excellent all-in-one solutions to meet most astronomers' needs, other tools feature narrow but focused functionality. Young students and novice astronomers may want to begin with MHX Astronomy Helper or Solar System 3D Simulator. The next step up from these starter applications includes DeskNite and Deepsky Free, tools aimed at more advanced users. The best overall experience may be found in Celestia, Stellarium and Microsoft's WorldWide

Telescope. All three of these astronomy applications provide a robust and rich viewing experience.

Notes

¹ Available at <http://www.celestiamotherlode.net>

Biography

Matthew McCool teaches technical and science writing at Southern Polytechnic State University in Atlanta, Georgia, USA.