CS 499 Senior Project
Project Assignment

Sky Map Utility for Amateur Astronomers

Rationale

Amateur and professional astronomers use star maps as a guide in finding the locations of stars, planets, and other celestial objects for observation. This class project will be to produce a software system which will create on screen displays and printable star maps for observers at any location on the earth for a given date and time.

Features

The features listed below shall be included in the software.

1. The user shall be able to enter the latitude and longitude in degrees and minutes for the observer location, a date between January 1, 1900 and January 1, 2100, and a clock time in local hours and minutes.
2. There shall be several pre-set locations available (e.g., "Huntsville, AL"), with a user able to store new ones with a name (e.g., "cabin in the woods").
3. The software system will generate and save star map images to disk in the Joint Photographic Experts Group (JPEG) format. Resolution shall be a minimum of 300 dpi and the image should fit on a standard 8.5 x 11 sheet of paper when printed.
4. Images shall be displayed on screen in a scrollable window.
5. The star map images shall include the approximately 20,000 stars in the Yale Star Catalog. Stars must be drawn so as to indicate visually the magnitude of the star. Only stars of 6^{th} magnitude and less need to be included. Named stars shall have a label next to them. For the on-screen display the user shall be able to show or hide the labels.
6. All major constellations shall be labeled and lines shall be drawn to connect the stars of constellations in the form familiar to all amateur astronomers. For the on-screen display the user shall be able to show or hide the labels.
7. The star map images shall include the locations of all major planets (Mercury, Venus, Mars, Jupiter, Saturn, Uranus, and Neptune) visible at the given date and time. Labels and icons on the map shall identify each. For the on-screen display the user shall be able to show or hide the labels.
8. The star map images shall include the location and phase of the moon, if visible, at the given date and time.
9. The star map shall include the location with appropriate labels of all the Messier deep space objects. For the on-screen display the user shall be able to show or hide the labels.
10. The software shall be upgradeable so that additional objects such as comets, minor planets (Pluto, Ceres, Juno, etc.), and other deep sky objects can be added without extensive modifications to the software. (hint: study *Design Patterns: Elements of Reusable Software* by Gamma, Helm, Johnson, and Vlissides)

Constraints

The system will be considered to be open source and in the public domain, therefore **all code must be original and may not include any copyrighted material.**

You may find the folder “Resources” (especially the file “StarMapInfoAndFormulas.doc”) to be helpful.