

Scott Busby's program, "Basic Webcam Astrophotography"

Amateurs may wonder if there is anything more after observing "lots of stuff." One possibility is photography. It can be rewarding because the human eye can only see so much. Cameras can see much more.

Technology for amateurs to do excellent astrophotography has become increasingly available. A good way to get started is with a webcam, and the easiest subjects to photograph are the Moon and planets. Webcam photography can be easy, ("kinda") inexpensive, fun, requires minimum skill, and is a great starting point for more advanced astrophotography. Webcams are better for bright objects (not good for galaxies and nebulae). The preferred telescope to use is one with a tracking mount, but webcam photography is possible with altitude/azimuth (Alt/az) telescopes like Dobsonians, especially for the Moon, or the sun with a filter. Two webcam examples are the Philips ToUcam Pro II and Pro III. They 840,000 pixels resolution (small chips) and are only available online now. Newer models generally with higher resolution are in stores now. One requirement is a way to remove the lens and adapt the camera to fit your telescope.

Additional needs are a computer (an older model Pentium IV in your closet will do), software to run the camera, and software to process images. Software to run the camera normally comes with the webcam; also, image-processing software often supports popular webcams. For processing the images, Scott listed a number of options. For this presentation, he showed how to process images using K3CCDTools, a program that is available for download for a trial period and requires registration at a modest price to continue using. Other choices are Registax (freeware), MaximDL, and CCDSoft. The first two are available online and are regularly updated by their authors. The latter two are commercial. Scott prefers to make final image adjustments with image-processing software built for general photography. Examples are Adobe Photoshop and Corel Paint Shop Pro. A freeware possibility suggested from the audience is Gimp.

Scott gave us a step-by-step illustration of creating an image of Saturn. He had taken about 1,000 images of the planet at 5 frames per second for the raw material. Taking video allows the image processing to remove effects of drift of the image and of variations in seeing that cause quality to vary from image to image. Scott said taking more images allows you to be selective in throwing away poorer quality images and combining the good images to get a better result than any single image. The limit with planets like Jupiter and Saturn is their rotation. Features blur if the total time of the sequence is too great. We saw how he located the image sequence with the image processing software, selected the area with Saturn for processing from the display of the first frame, and ran the calculation to compare the frames and rearrange them from best quality to worst. The K3CCDTools software has a "planetary wizard" to simplify the process and to provide some good default choices of the processing options.

After the calculations, the software displays a suggested reference image and graphs of the relative quality of all the images. It allows the user to review and change the choices of reference image and the highest quality images to use for "stacking." A simple way is to decide how many should be stacked to make the final image: for example, Scott used the top 100. The stacking involves aligning the individual images so that the planet is in the same place and orientation. (Alt/az telescope mounts may track to try to keep the object in the same place, but allow the image to rotate. Equatorial mounts could allow some rotation if not accurately polar aligned.) Then the selected images are added together, providing the benefits of time exposure.

By this point, we had seen the image of Saturn improve from a typical single frame, to a selected top quality frame, to a stacked image. The software allows further adjustments such as color balance, contrast, and sharpness. The image can also be adjusted with programs like Photoshop. Scott finished with a nice image showcase including the Moon, Mars, Saturn, and Jupiter.

Someone asked about focusing technique. Scott said it can be a challenge because it takes time for an image to build up compared with the noise for advanced CCDs. He picks a bright star and uses something like a 5-second exposure time, makes a small adjustment, and waits for the result to display. Then he decides on the next small adjustment and repeats the process until he judges he has reached a good focus.