**ASSESSMENT 37**

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| **Course:** | IIRS Outreach Program on Satellite Photogrammetry | **USN:** | 4AL16EC068 |
| **Topic:** | Concepts of stereophotogrammetry | **Semester & Section:** | VIII  ‘B’ |
| **Github Repository:** | Sheela-Course |  |  |

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| **Report:**  C:\Users\india\Pictures\Screenshots\Screenshot (1018).png  C:\Users\india\Pictures\Screenshots\Screenshot (1021).png  C:\Users\india\Pictures\Screenshots\Screenshot (1027).png  C:\Users\india\Pictures\Screenshots\Screenshot (1037).png  C:\Users\india\Pictures\Screenshots\Screenshot (1048).png  C:\Users\india\Pictures\Screenshots\Screenshot (1057).png Stereovision and 3D Sensing Stereovision techniques use two cameras to see the same object. The two cameras are separated by a baseline, the distance for which is assumed to be known accurately. The two cameras simultaneously capture two images. The two images are analyzed to note the differences between the images. Essentially, one needs to accurately identify the same pixel in both images, known as the problem of correspondence between the two cameras. Features like corners can be easily found in one image, and the same can be searched in the other image. Alternatively, the disparity between the images can be found to get the indicative regions in the other image, corresponding to the same regions in the first image, for which a small search can be used. The disparity helps to get the depth of the point which enables projecting it in a 3D world used for navigation.  It is also common to use 3D vision sensors like a 3D LIDAR which scan the entire world for all angles and make a point cloud. Every point in the point cloud corresponds to one solid angle of operation and the distance from the obstacle in that direction. In this way, the sensor can scan for all possible solid angles, and return a point cloud. The point cloud reports the distance corresponding to every angle, and is a 2.5-dimensional (2.5D) data structure. The same can be projected into a 3D world and given to the mapping server after the point cloud has been transformed into the global world reference frame. A way of having the sensor is to mount the laser on a pan–tilt unit and to operate it for all possible pans and tilt angles.  3D photography or stereoscopic photography is the art of capturing and displaying two slightly offset photographs to create three dimensional images. The 3D effect works because of a principle called stereopsis. Each eye is in a different location, and as a result, it sees a slightly different image. The difference between these images is what lets us perceive depth. This effect can be replicated with photography by taking two pictures of the subject that are offset by the same distance as your pupils (about 2.5 inches or63 mm). The two images are then viewed so that each eye sees only the corresponding picture. Your brain puts the two images together just as it does for normal vision and you perceive a single three dimensional image.  Step 1: How to Take Stereoscopic 3D Picture. Taking stereoscopic pictures is simple. All you need is a camera and a tripod. Set up your camera and tripod on a level surface. Compose your shot with the main subject in the center and take a picture. Then slide the tripod 2.5 inches (about 63 mm) to either the right or the left. If necessary adjust the direction ofyour camera so that the subject is again in center of the shot. This should only be necessary for close up shots. Then take a second picture from the new position. Your camera so that the subject is again in center of the shot. This should only be necessary for close up shots. Then take a second picture from the new position. This method works great for subjects that are still. But if you want to capture3D images of moving objects, then you will need some additional hardware. If you have two cameras, then you can construct a simple two camera rig that mounts onto your tripod. In this kind of setup, the cameras are mounted 2.5inches apart from center to center. To see a good example, check out this rigbyuserciscu92. Then when taking the picture, you need to activate both cameras at the same time. If you don't have two cameras, you can construct a mirror splitter like this one by user courter video. This rig uses mirrors to split the image and space each part at the appropriate distance. This lets you capture both views with a single camera.  Step 2: Methods for Display and View 3D Images: There are many different ways to display and view a stereoscopic 3D image. Here are some of the mostcommonforms. 3D viewing systems with glasses: These systems superimpose the right and left views on the screen. The observer wears glasses that filter the image so that each eye sees only the appropriate view. Color filtering glasses: The picture is displayed in two colors (one for each view). These glasses use a colored gel to selectively filter out the opposite color image. The most common colors used are Red/Cyan, Green/Magenta, and Blue/Yellow  Step 3: How to View Cross-eyed 3D Image The simplest method of displaying and viewing 3D images is the cross-eyed method. This is the only method that doesn't require any additional viewing tools. To display these images, the two pictures are positioned side by side with the right view on the left side and the left view on the right side. Occasionally, as mall dot is added above each picture to mark the center point. To view these images, place the pictures centered in front of you. Then gradually cross your eyes so that the pictures appear to overlap. Eventually you will see three images. Try to bring the center image into focus. When in focus, this center image will appear to be in 3D. This is techniques is also used to view many Magic Eye puzzles. Unfortunately many people find the cross-eyed viewing method uncomfortable to maintain for more than a few seconds. If you experience this problem, you may wish to use the parallel viewing method detailed in the next step.  Step 4: How to View Parallel 3D Images With a StereoscopeParallel3D images are typically viewed using a tool called a stereoscope. This device uses lenses to help the observer to focus one eye on each picture. There are many different styles of stereoscopes. You are probably most familiar with the View-Master that is produced by Fisher-Price. Older styles such as the Brewster stereoscope and the Holmes stereoscopes can still be found in many antique stores. The viewing cards (called stereographs) can also be found atsome antique stores or you can make your own. Just print off a pair ofstereoscopic pictures so that each image is about 2.5-3 inches in width. |