ETC-Lockheed Martin 3-D

WEEKLY NEWSLETTER

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WEEK 1-2

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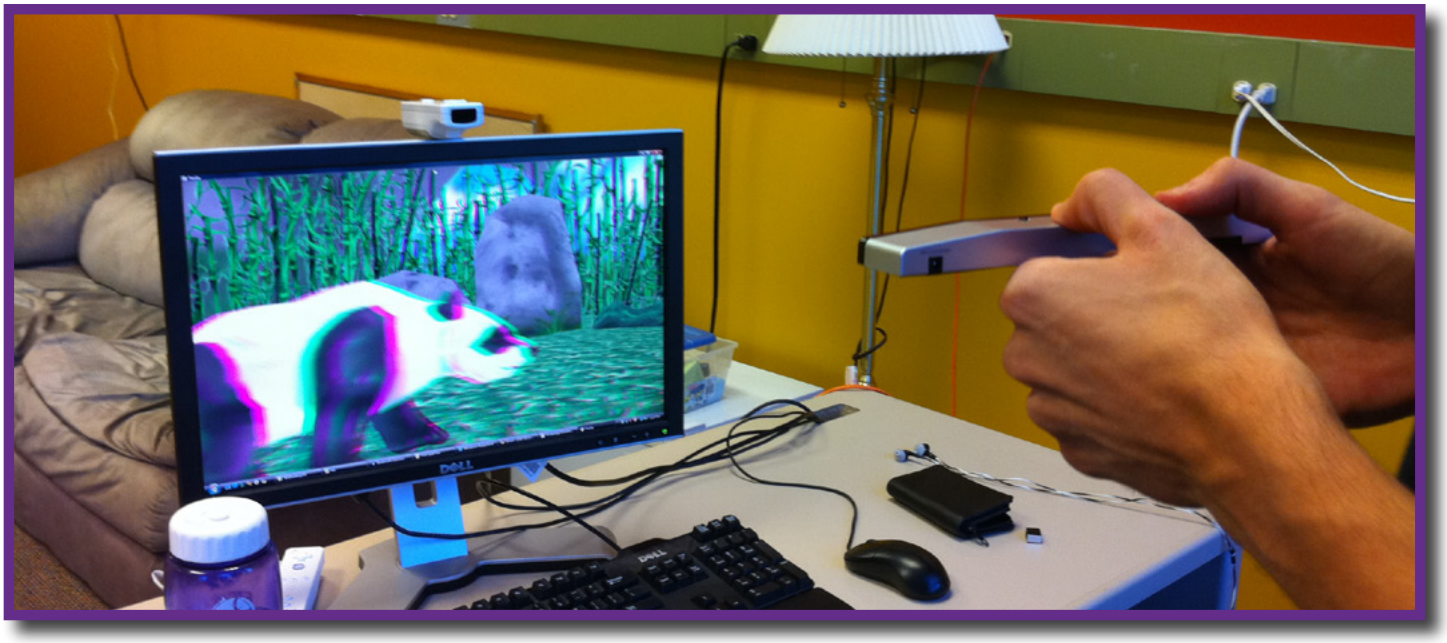
3D TECHNOLOGY RESEARCH

While developing ideas for this semester's project we came across many different types of 3D technology. We decided to do extensive research on the different types in order to better understand what will benefit Lockheed Martin this semester. The different options that we are researching include: anaglyph, linear polarized, circular polarized, active shutter, 3D televisions, 3D camera rigs, and 3D projectors.

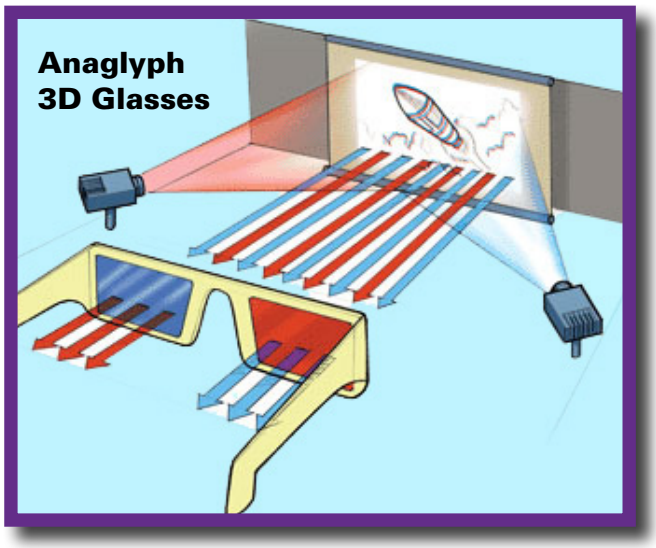
Anaglyph 3D is used to provide a stereoscopic 3D effect, when viewed with 2 color glasses (each lens a chromatically opposite color, usually red and cyan). This is the first technology that we decided to test and we built a 3D camera rig to help us work with the anaglyph technology.

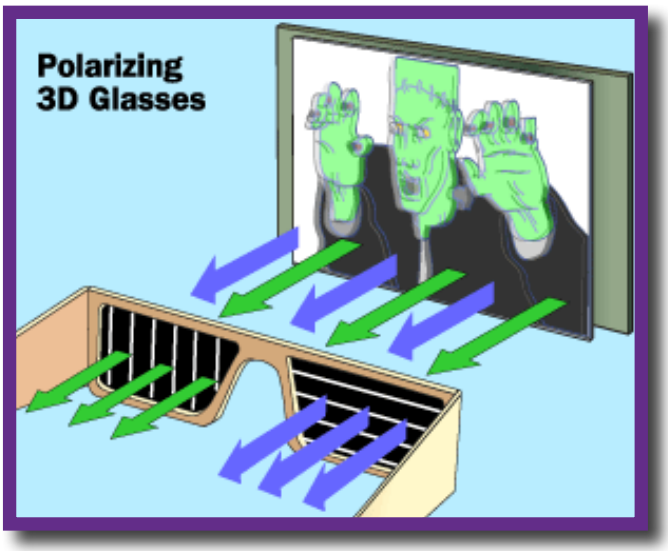
For this rig to work correctly, two cameras are mounted next to each other (roughly 65mm) apart on a single rig. This distance simulates the binocular vision of the human eyes which gives the video that we shoot its depth. The focal point of the two cameras is also very important to achieving a believeable 3D effect. If they are not aimed at the object that you want to be in focus, the 3D effect will have ghosting and shadows. After working with the different focal points, we began to learn how to achieve our desired effect. After shooting some test shots, we then captured the video and opened it into Adobe Premiere. One color filter is then added to each video. These filters are the same colors as the glasses that will be used to view it (in our case red and green). After viewing these videos we quicly learned how best to achieve different depths and focal points.

We also used this same anaglyph 3D technology to build a 3D environment in Panda. This works the same way as the live action video. Two color filters are added to the environment to achieve the same effect. We also began to experiment with Johnny Lee's Wiimote technology to add an aspect of head-tracking to our 3D world. This works the opposite of the nintendo Wii. The Wiimote is placed on top of the PC display, and we attach the sensor bar to a hat or glasses to track the head so that you can explore the 3D environment. This effectively transforms your display into a portal to a virtual environment. The display properly reacts to head and body movement as if it were a real window creating a realistic illusion of depth and space.

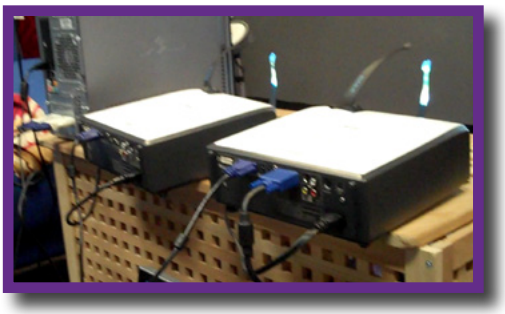


We are using the same 3D camera rig process to work with **Polarized 3D** glasses as well. Polarization works when two images are projected superimposed onto the same screen through different polarizing filters. The viewer wears low-cost eyeglasses which also contain a pair of different polarizing filters. As each filter passes only that light which is similarly polarized and blocks the light polarized in the opposite direction, each eye sees a different image. This is used to produce a three-dimensional effect by projecting the same scene into both eyes, but depicted from slightly different perspectives. The polarized system lets us achieve a more realistic color palette than anaglyph 3D because we are not using color filters in the glasses or projector. The polarized glasses use linear or circular line filters to achieve this effect.



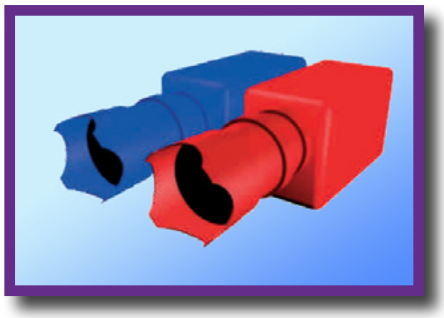


Our team is using polarized technology in conjuction with polarized projectors and a special silver projection screen to learn more about how this process works. Using linear polarized 3D glasses we network two projectors with similar filters and project both images onto a screen. Then using the keystone adjustments on the projectors we can overlay the two images on top of each other.

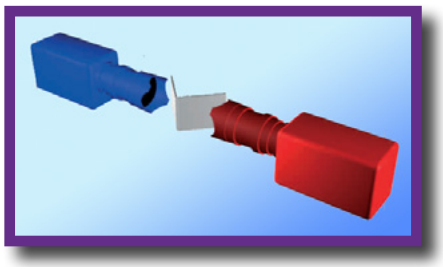


This week our team took a trip to best buy to learn more about **3D television technology**. This process uses active stutter glasses to achieve 3D viewing through an LED television. Each image is shown on the display separately, one after the other, left, right, left, right, at a fast enough rate to overcome flickering. The display also extracts an infra-red synchronisation signal which is sent to the glasses to tell them which image is being displayed. The glasses are active, and use an LCD shutter in each eye to sequentially shut each eye, while opening the other. The signal keeps the glasses synchronised with the display, and each eye only sees images intended for it.

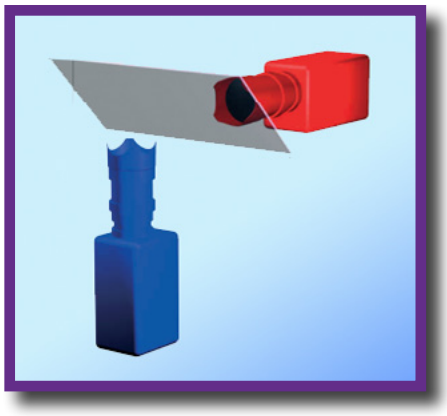
The 3D camera rig will be an integral part of our project if we are doing any type of live action shooting. There are four types of camera rigs that we will be researching this semester. As we discussed earlier, the most compact dual camera 3D rig is the **parallel rig**. This places the two cameras next to each other. Parallel rigs generally work better with more compact cameras and lens designs. Otherwise it becomes difficult to achieve a good interaxial distance between the cameras.



The opposing rig places the cameras in a position where they are both pointing towards each other. A pair of mirrors placed between the camera reflects the images for left and right eye into the cameras. Both images are horizontally flipped. This type of rig is bulky and is not generally used in modern rigs. However it was
popular with film cameras because it allows accurate camera line-up by removing the film plates and mirrors.



The mirror rig places one of the cameras vertically. A semi-transparent mirror reflects the scene into the vertical camera while also allowing the horizontal camera to see through the mirror. There are two basic forms of mirror rig. One with the vertical camera on top, and the other underneath, which has the advantage of a better centre of gravity, less spurious mirror reflection. A good quality mirror is vital in this type of rig.



3D PROS AND CONS

Anaglyph 3D

PROS:

- Anaglyph glasses are cheaper than any other type of 3D glasses.
- Color filters can be added directly to the video files on your PC. will display 3D on any 2D display. That means any cell phone, laptop, monitor or TV can display a 3D image that is viewable with the matched anaglyph glasses. No 3D capable display is needed.
- can be used for 3D prints (posters, magazines)

CONS:

- The color filters in the glasses and on the screen distort the true color of the image or video.
- If the filters in the glasses do not accurately match the filters on the video, distortions in the images may occur.

Polarized 3D

PROS:

- Polarized glasses are relatively cheap.
- Polarized 3D projects a more realistic color onto the screen because the filters are not colored or tinted.
- The user can choose from either linear or circular polarization depending upon their setup.
- Most feature length films that are being released are using and researching this technology.
- The polarized technology allows for drastic 3D depth to be achieved.

CONS:

- The projectors and special silver screens can become quite expensive.

Active Shutter 3D

PROS:

- Glasses do not use color filters which allows the picture to be viewed without any color distortions.
- The active shutter design is so much faster than the human eye that no state-change can be seen through the glasses.

CONS:

- The 3D televisions don't provide the depth that polarized technology does. The TV acts like more of a window into a 3D world.
- The active shutter glasses are the most expensive glasses that we have researched.
- 3D television technology is still relatively new which accounts for high costs.

Parallel 3D Camera Rig

PROS:

- Compact & light design. No mirrors.

CONS:

- Difficult to achieve small IAD with large cameras or lenses.

Opposing 3D Camera Rig

PROS:
Easy lineup with film cameras. IAD set by mirror spacing.

CONS:
- Bulky design.

Mirror 3D Camera Rig

PROS:
- Can achieve very small IAD even with large cameras.

CONS:
- Requires very highquality mirror. Prone to dust, rain & light interference on the mirror. Heavy design..

TEAM BUILDING

Our Lockheed Martin 3D team has scheduled weekly advisor meetings every Friday afternoon to discuss progress and future research and implementation into our project. We are also holding weeking phone conference meetings with our Lockheed Martin clients and representatives to be sure that we are on schedule and delivering a product that will be beneficial to their company.

We are documenting our progress and schedule through a team project and planning website called Huddle. This site allows us to update, add, and edit any aspect of our project planning. We can post meeting notes, insert pictures, schedule meetings, and update dailys all from this website.