Experiments with Stereoscopic Comics

Special Project

Anindya Kundu,

Animation Design

09634803

Guide

Phani Tetali

Acknowledgement

I would like to sincerely thank my project guide Prof. Phani Tetali for is guidance and support. I am grateful for getting the opportunity to work with the medium of comics which has always fascinated me, and make an attempt take to the next level by making it into stereoscopic 3D.

I would also like to thank my friend and batch-mate Naveen Kiran for initiating me with the initial idea of using Adobe AfterEffects to achieve realistic stereoscopic images.

Declaration

I declare that this written submission represents my ideas in my own words and where others' ideas or words have been included, I have adequately cited and referenced the original sources. I also declare that I have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea/data/fact/source in my submission. I understand that any violation of the above will be cause for disciplinary action by the Institute and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been taken when needed.

_____

(Signature)

_____

(Name of the student)

_____

(Roll No.)

Date: _____

Contents

Synopsis

In my Special Project my purpose is to experiment with stereoscopy in the domain of comic strips. The 3D appearance is achieved using anaglyph images that require red-cyan filter lens frames for viewing.

Introduction

Comics strip or the graphic novel is an immensely popular and highly evolved art form. Its unique feature is the way it allows the reader to mentally create the transition from one panel to other, making it highly engrossing to the audience.

I have been always fascinated by this medium. Tintin, Asterix, Archies and DC comics have motivated me since childhood. The newspaper comic strips like Calvin and Hobbes, Denis the Menace, Hagar the Horrible and many others remained to be my cherished inspirations.

When I started making my own comics, I developed my own personal style of cartooning and making illustrations. But I felt restricted by the flatness in them. The process of using 3D layers and stereoscopy enabled to create the sense of depth and make the images more interesting visually.

Story Concepts

Initial Concept – 'From the Shadows'

The story is inspired from the experience of the mountaineer Don Whillans scaling the Annapurna Mountain in the year 1970.

An adventurous mountaineer, James Frost decides to climb the treacherous Annapurna I mountain peak on his own with a single Sherpa, Nawang as his companion. As he marks upon his ascent to the peak from the base camp below the weather turns cloudy. Despite the Nawang's severe warning, James embarks on his climb. After sometime a heavy snowfall occurs. Due to lack of visibility Nawang accidentally slips on the snow and loses connection with James. James takes shelter under an overhanging rock. When the snow storm passes away he is totally lost. He feels exhausted and loses hope.

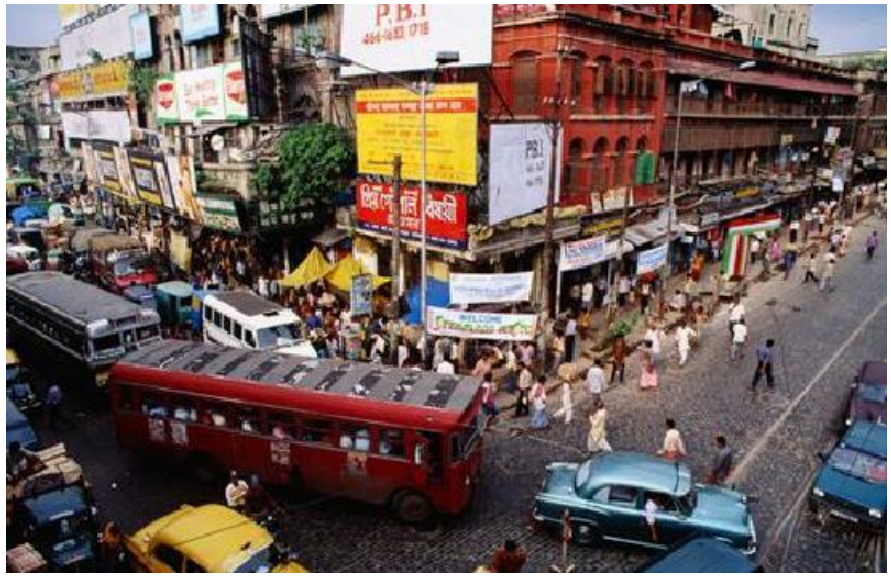
Then due to lack of oxygen, he hallucinates upon a shadowy biped form at a distance. Believing it to be Nawang he goes towards it. But the creature keeps moving away. Following it he reaches the base camp where the creature disappears. Inside the tent he finds Nawang making refreshing hot tomato soup. Coming back to his senses, James and Nawang venture outside the tent to look for the mysterious creature. They find footprints which Nawang identifies as Yeti tracks.

With this story I specially intended to portray the scale and majesty of the Himalayan Mountains using 3D stereoscopic imagery.

Final Story – 'An Encounter'

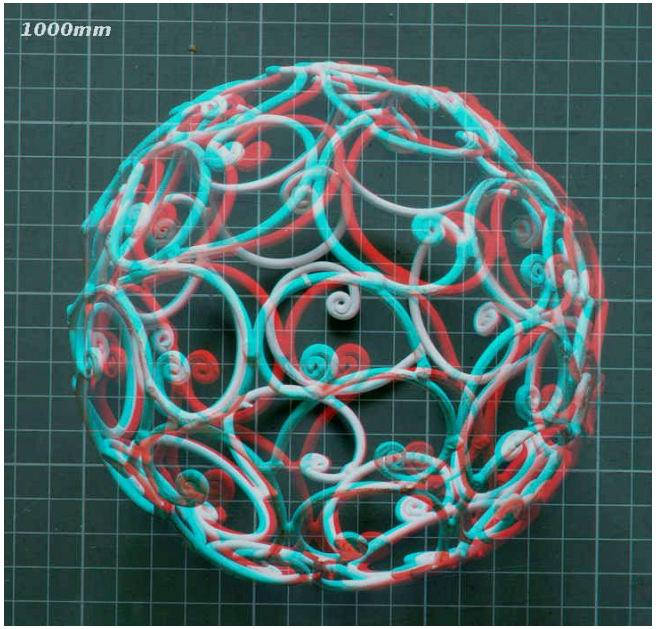
Anirban runs a computer repair shop in room at an old house hid within a narrow lane close to Aamar Street. He is a workaholic and works till the wee hours of dawn fixing a lot of computers for a pesky client. When he closes his shop and heads home to his tiny two room apartment where his 13 member joint family resides, the streets are deserted. He lights up a cigarette and walks. Suddenly he notices a human figure clad in white walking unmindfully across in the road. Going close Anirban realizes it his old school friend Shyamal Mitra. Anirban is overjoyed and asks his friend many questions. But Shyamal keeps a distance and gives vague answers. Then they go on a nostalgia trip about their school days when they were closest buddies. Anirban confesses that he was always jealous of Shyamal since Shyamal had rich pampering parents. Shyamal tells Anirban that he is always very proud of his friend who could stand on his feet and uplift his family from poverty. As they walk a distance, Anirban loses his attention as the first rays of sunlight come. When he turns around, he finds his friend missing.

Taking a newspaper before entering home, Anirban takes a brief look at the front page. There is a report that millionaire son Shyamal Mitra died in an accident the evening before.



Why

Although the first story interesting and provided scope for showing a vast scale in the imagery I opted for the second story. This was because I realized due to my limited knowledge of mountaineering and lack experience of being at punishing altitude I wouldn't be able to do justice to the story. Also I wished to refrain from the obvious references to the epic comic book 'Tintin in Tibet' and work on an environment familiar to me. So I chose to build a story on the streets of Kolkata, the city where I was born and spent most of my life so far.



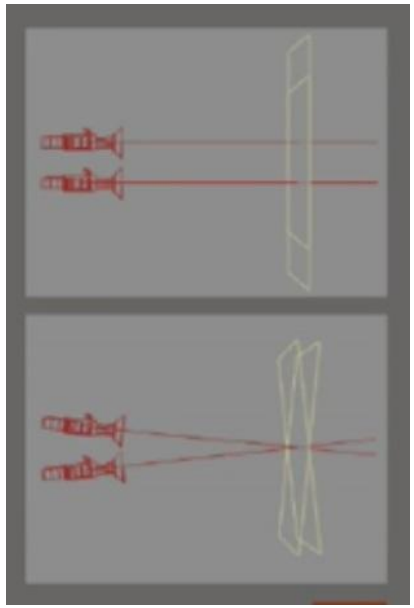
Preliminary Research

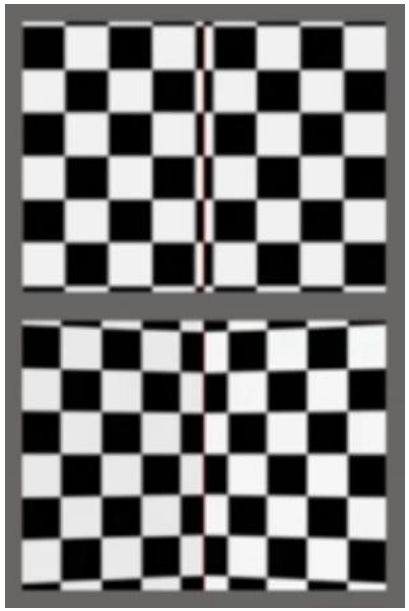
Stereoscopy

Stereoscopy can be simply defined as the technique for enhancing the illusion of depth in an image by presenting two slightly offset images separately to the left and right eye of the viewer. In the visual cortex of our brain the images are combined to give the perception of 3D depth. There are many strategies to accomplish this like using active liquid crystal shutter glasses, passive polarized glasses and Anaglyph images and colour filter frames. The method of anaglyph images has been explored in this project.

Anaglyph Images

Anaglyph images made up of two coloured layers, superimposed but offset with respect to each other to produce a depth effect where the two lenses are of chromatically opposite colours like red and cyan. Thus an integrated stereoscopic image can viewed.





Camera Setup

In case of obtaining stereoscopic images the two cameras (for left eye and right eye) can be set up in either parallel setup or toed-in set up. In the former case the two cameras are set up exactly parallel to each other. While in case of toed in the cameras are tilted to focus at the same point. Both these have advantages and disadvantages.

Parallel setup

Convergence of the images can be adjusted post production.

Audience can look everywhere in the picture.

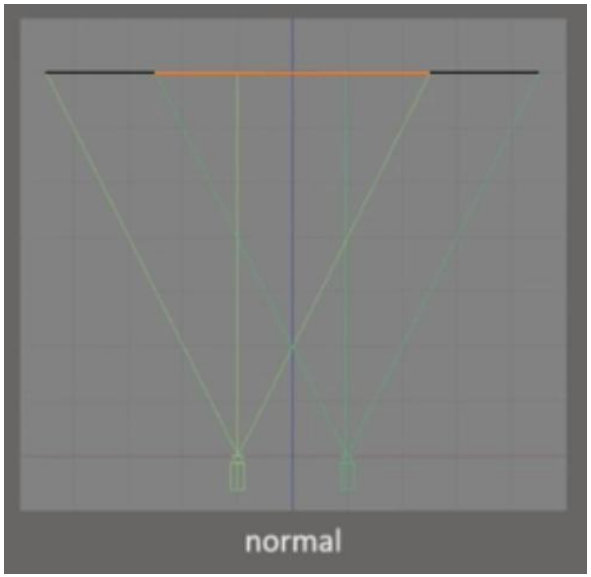
But cropping is required which is not the case in toed-in.

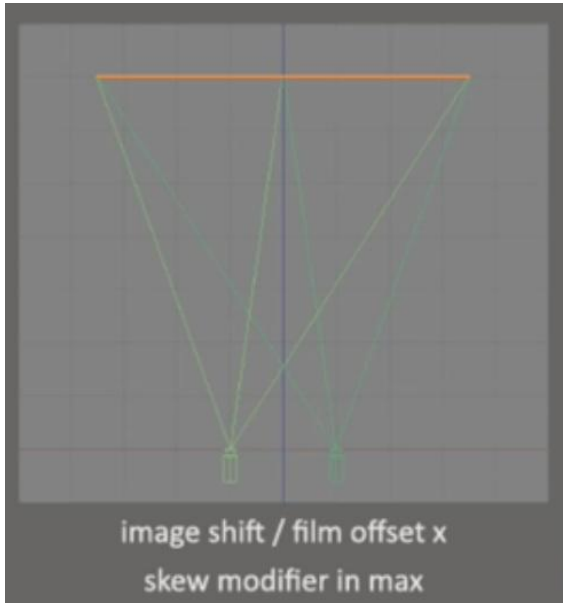
Toed-in

No convergence change is possible later after images shot.

The focus point is at centre making the audience squint.

The images don't match exactly giving keystoning problem.





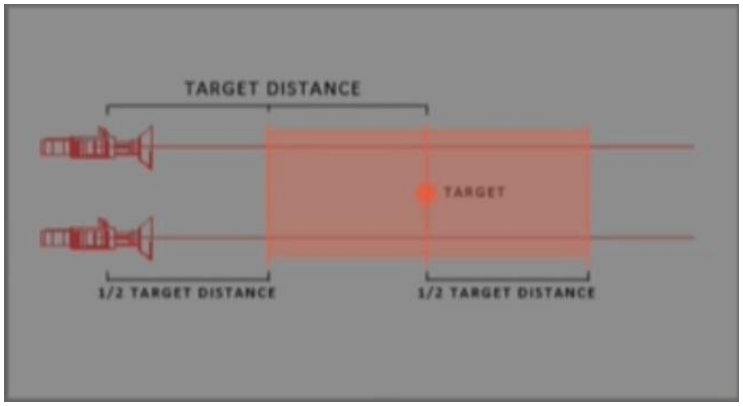
Cropping in Parallel

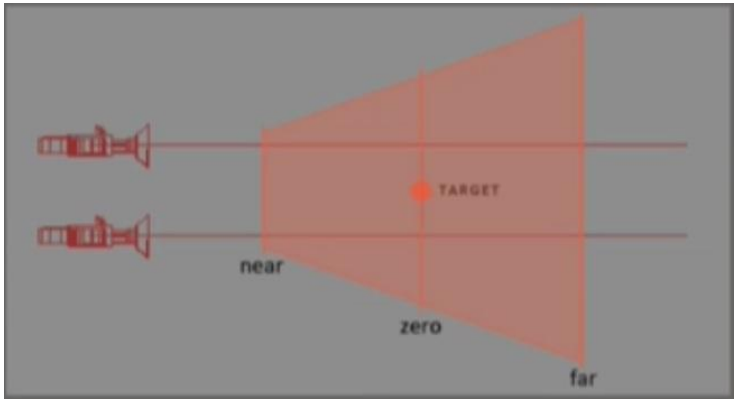
In parallel setup only the region of the image which both the camera capture can be used and the rest needs to be cropped. This means that we have to render a larger image and then crop. In order to avoid cropping the skewed setup is used.

Skewed setup

In 3D we can do an image shift to line up the image planes exactly. This is done using *skew modifier* in some 3D software. In case of AfterEffects the camera has needs to be aligned slightly to get this effect.

In my project I have experimented with parallel setup and skewed setup to get the appropriate 3D effect.





Near and Far Planes

The target object helps us to determine the viewer plane (also known as the window). We have to calculate half the distance between the camera and target. This half the target distance before the window is the near plane. Similarly half the distance behind the window gives the far plane. The elements placed in this region between the near and far plane gives the best stereoscopic effect. It has been noted that things which are coming towards the viewer popping out of the screen (the window) strains the viewer's eye. Things behind the window are comfortable to watch. Hence in my experiment with stereoscopy I have used one third of the distance ahead of the screen as the nearest object.

Distance between the cameras

The distance between the cameras is one by thirtieth of the target distance. This an approximation based on the formula using the commonly used depth factor which is 1/30.

$$\text{Separation} = \frac{1}{\text{depth factor}} \times (\text{near point}) \times \frac{(\text{far point})}{(\text{far point} - \text{near point})} \times \frac{(\text{focal length of viewing lens})}{(\text{focal length of camera lens})}$$

The Process

Steps Involved

1. The technique used is to make each composition with several hand-drawn layers.

2. These layers are then coloured using Photoshop.

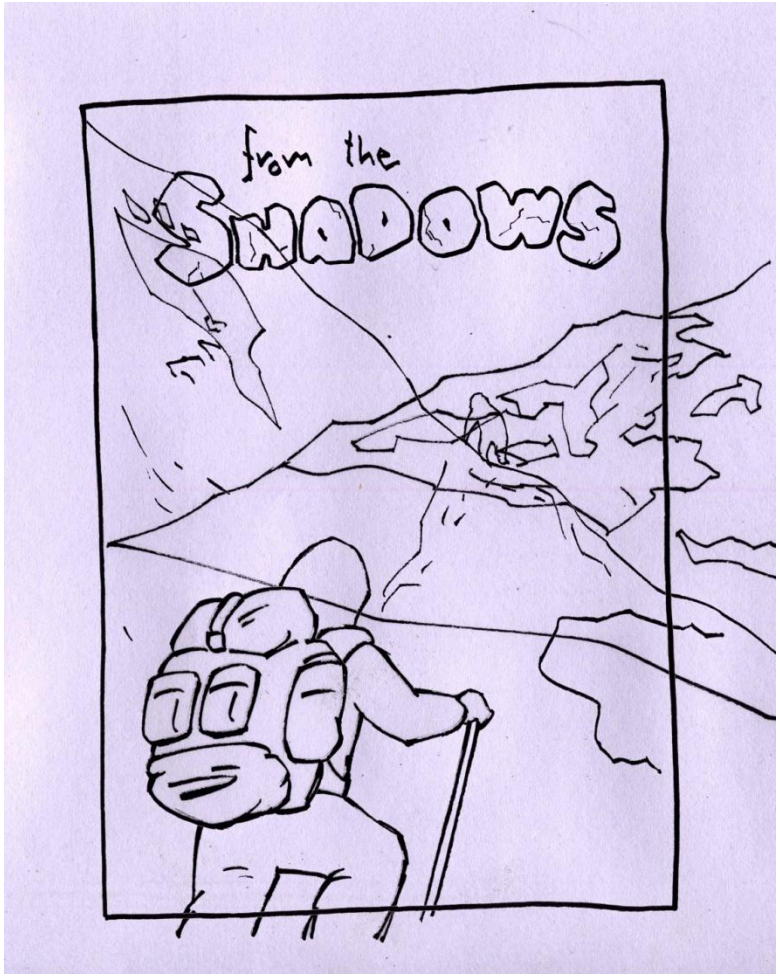
3. The Photoshop file layers are imported in AfterEffects with editable layers.

4. The layers arranged in 3D according to their distance between the objects.

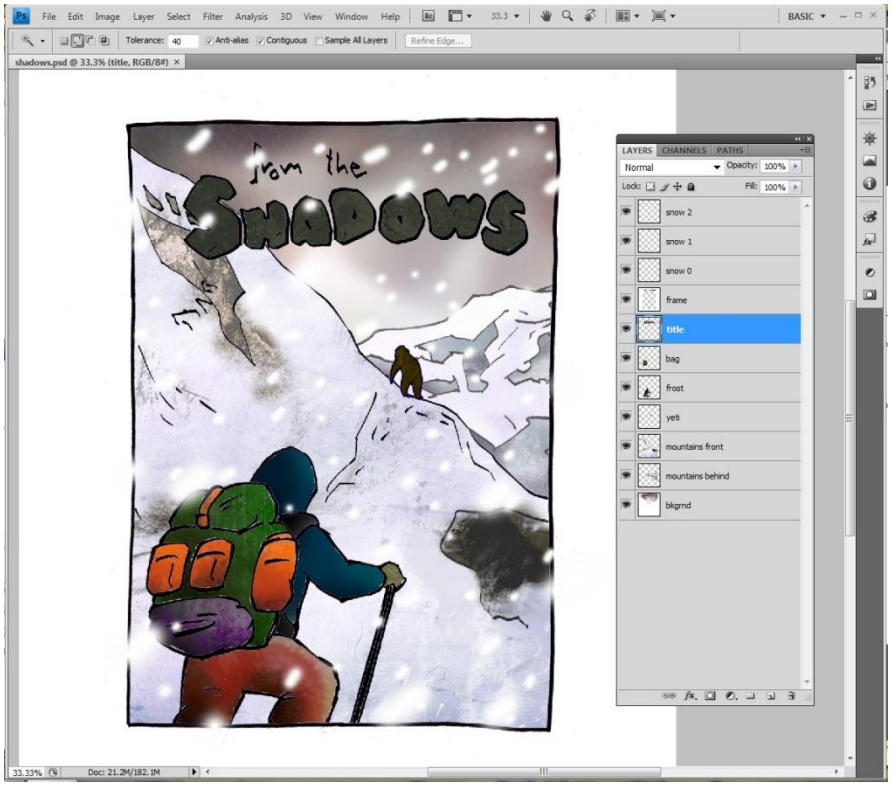
5. In AfterEffects two camera positions are used to get the left and right eye images.

6. The left and right eye images are combined again in Photoshop to obtain the final *anaglyph* image which is required to be viewed using red-cyan filter glasses.

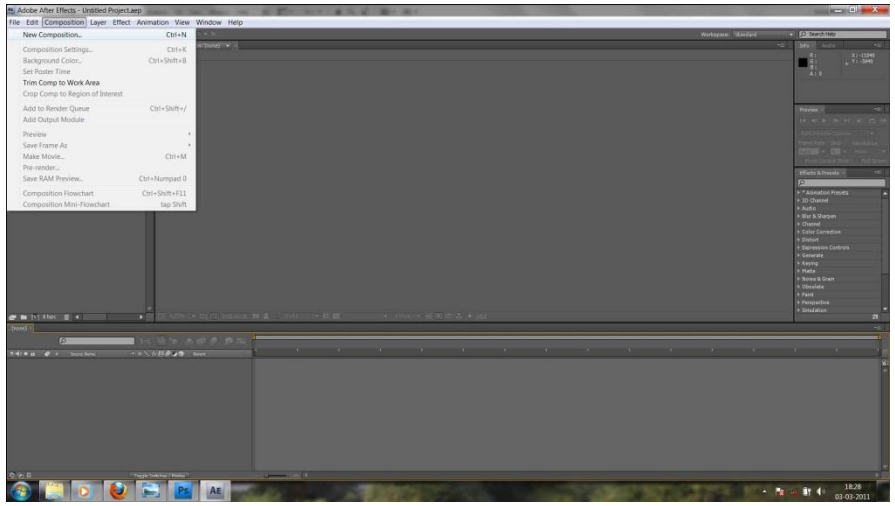
Steps I – The hand drawn sketches

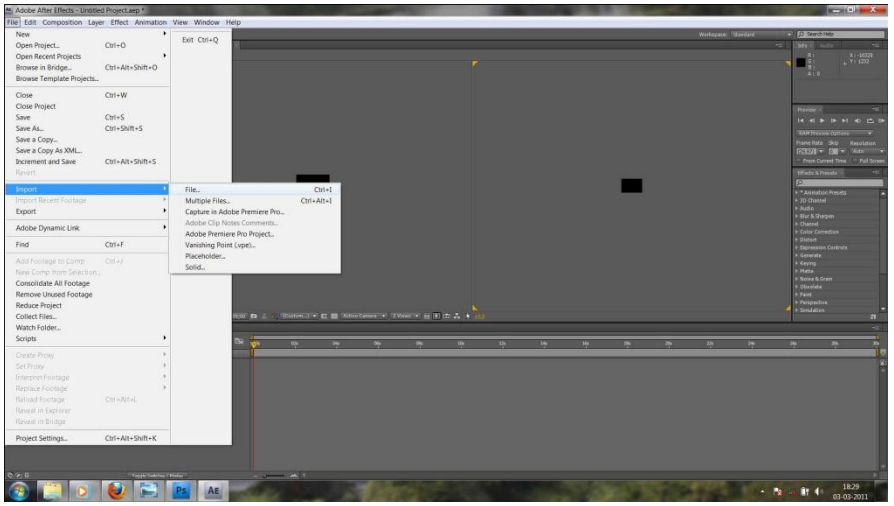


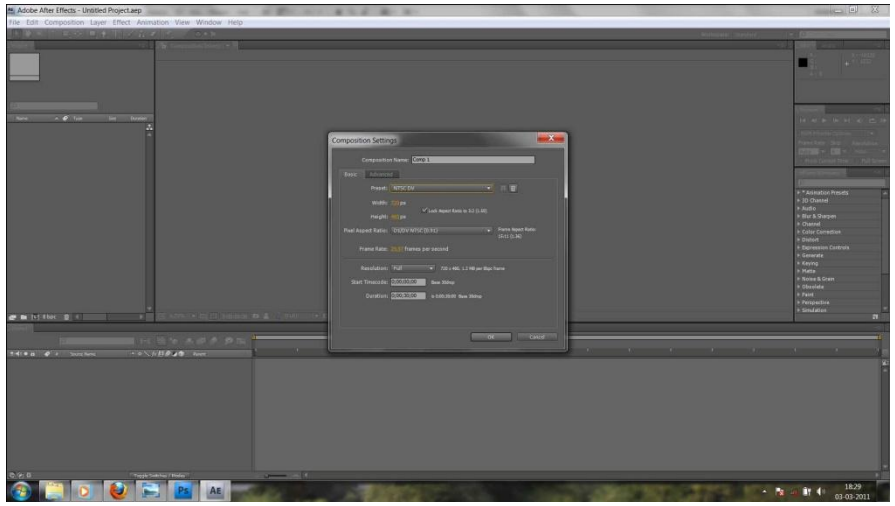
Steps II – Colouring and layering in Photoshop

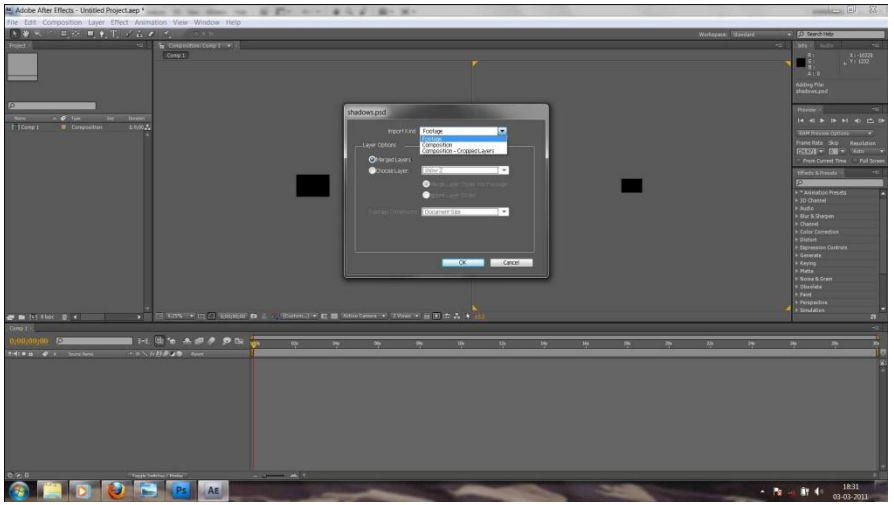


Steps III – Importing layers in AfterEffects

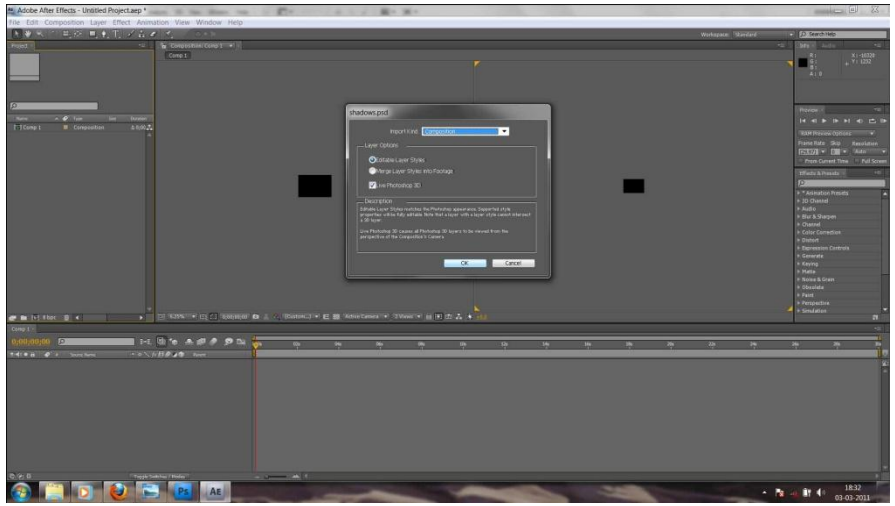


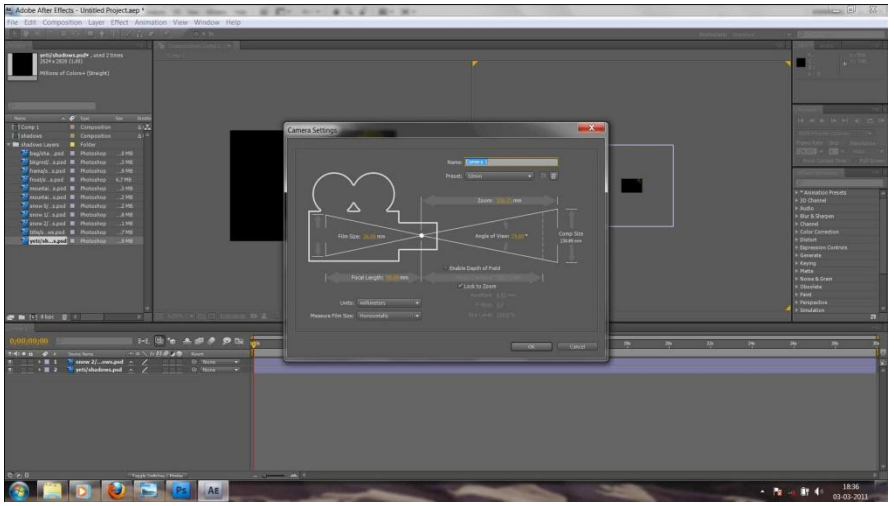


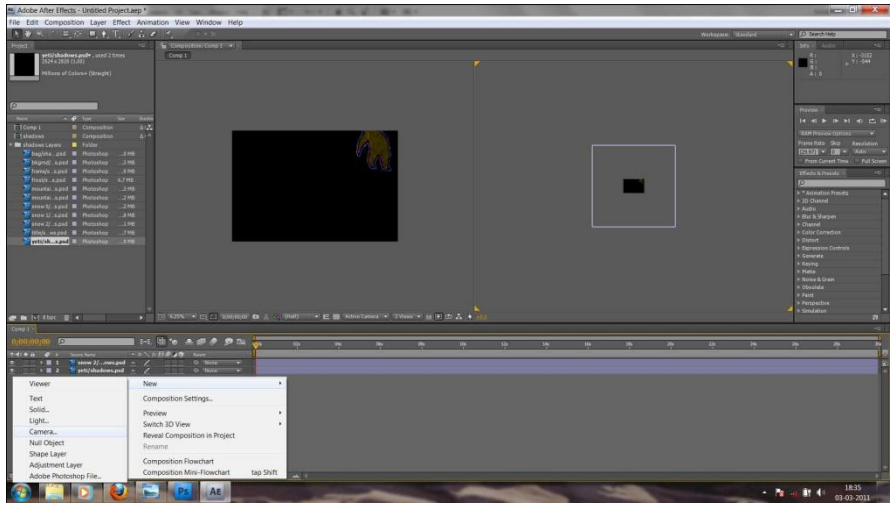


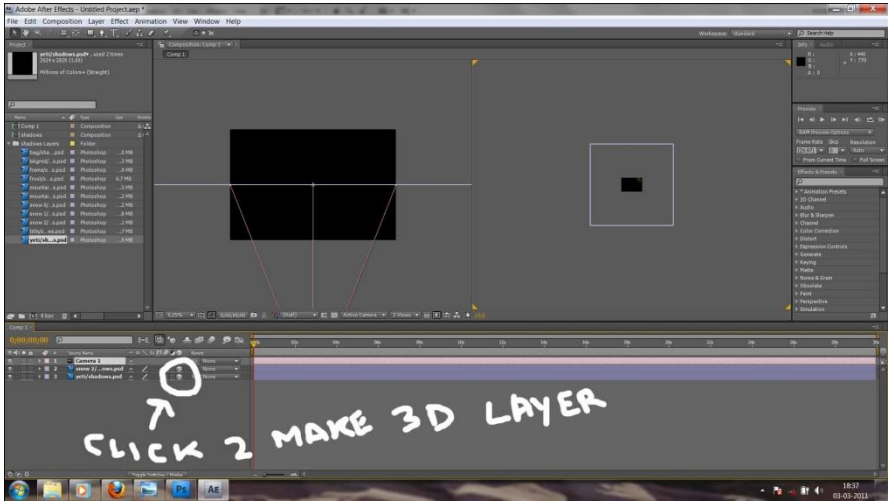


Steps IV – Arranging layers in 3D

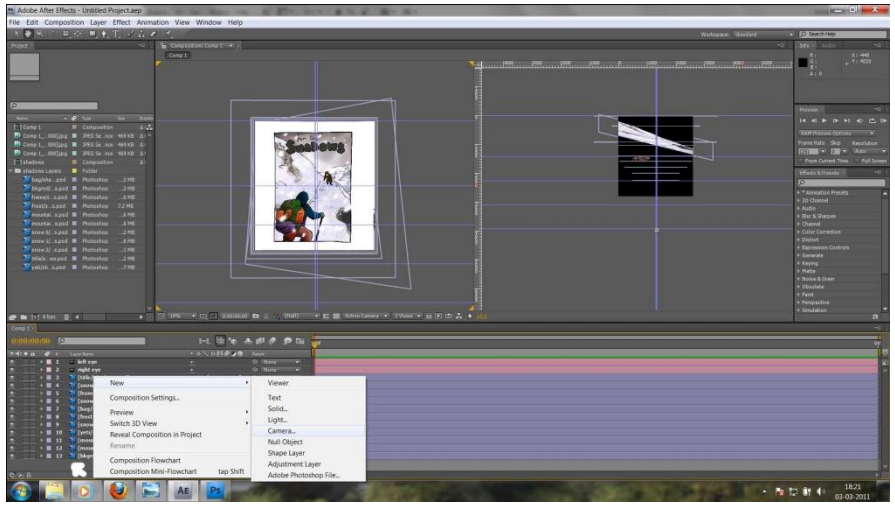


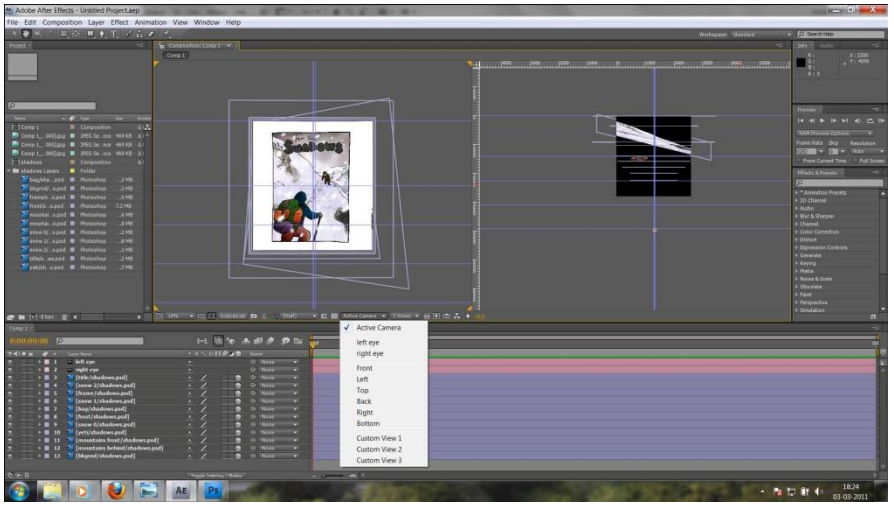


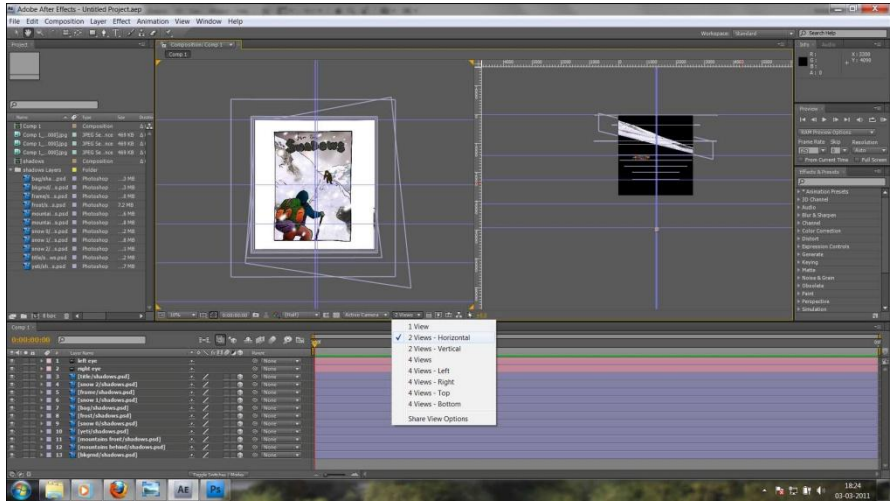


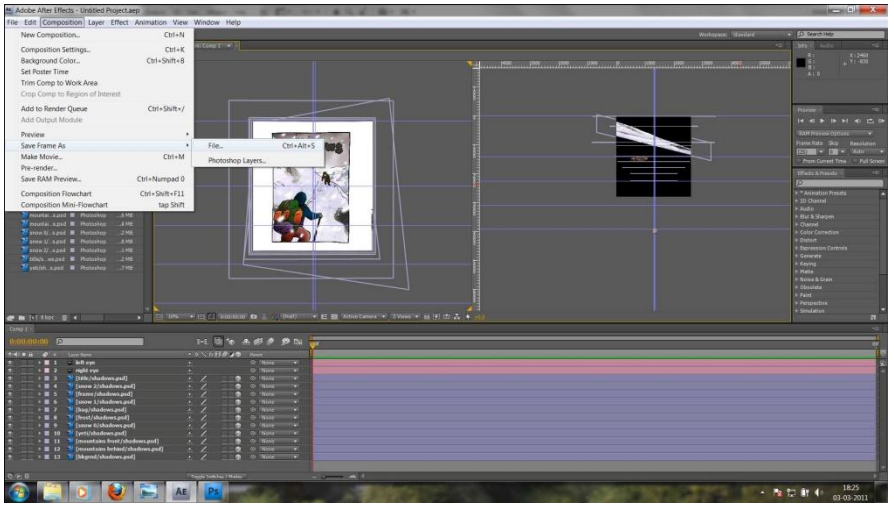


Steps V – Camera positioning

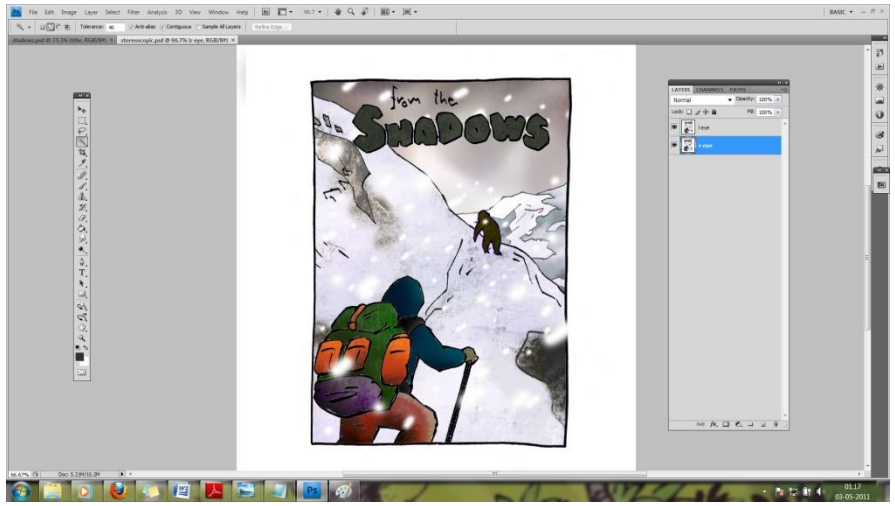


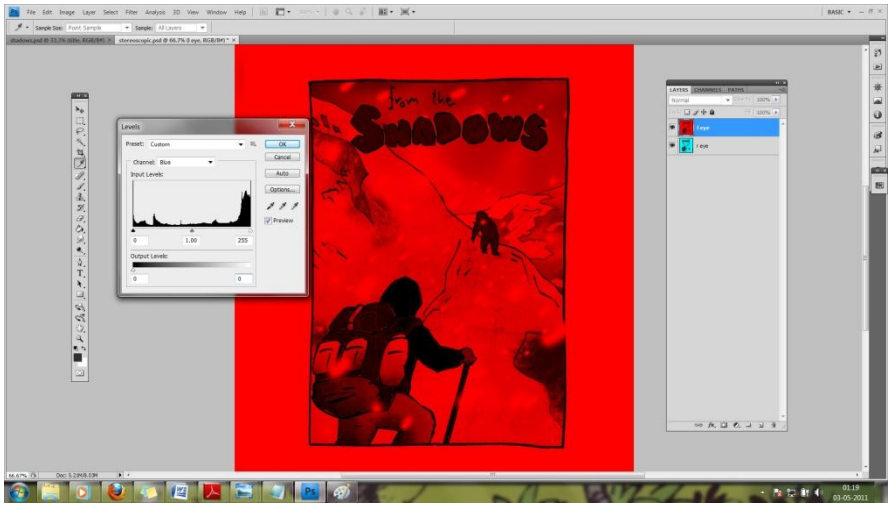


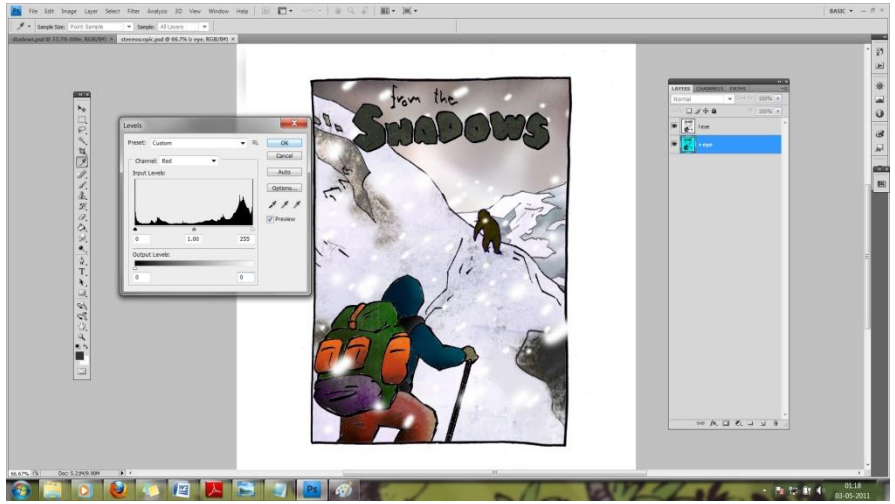


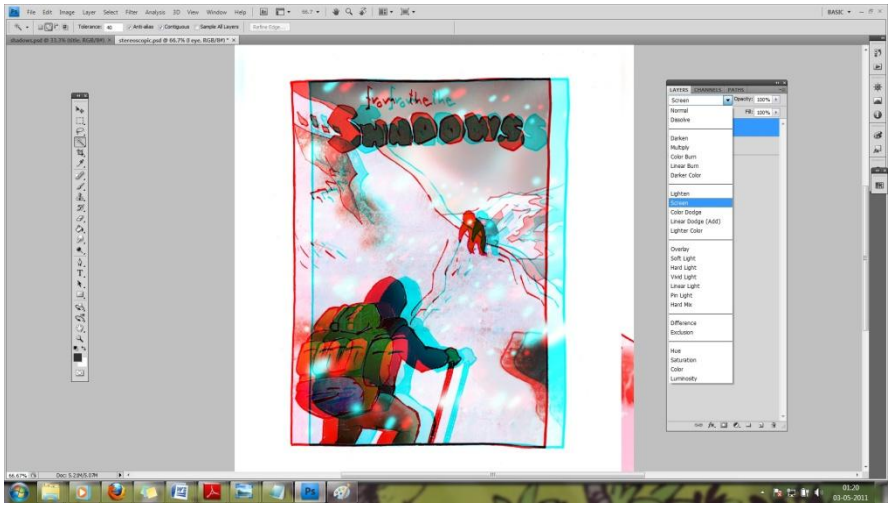


Steps VI – Combining left and right eye images

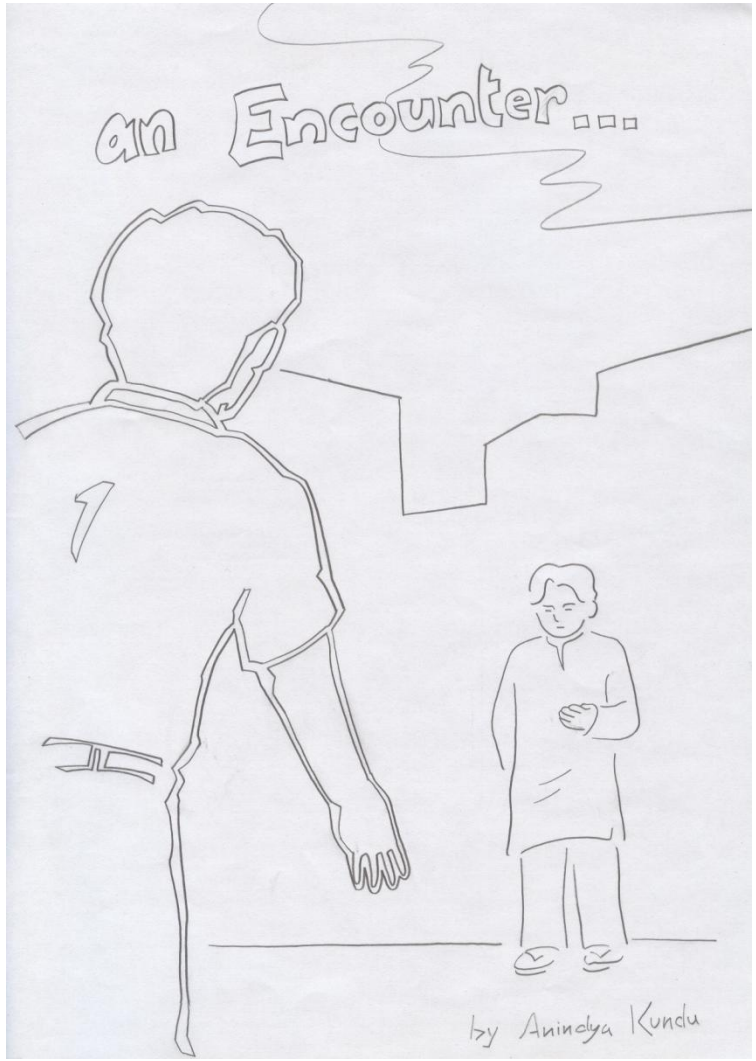






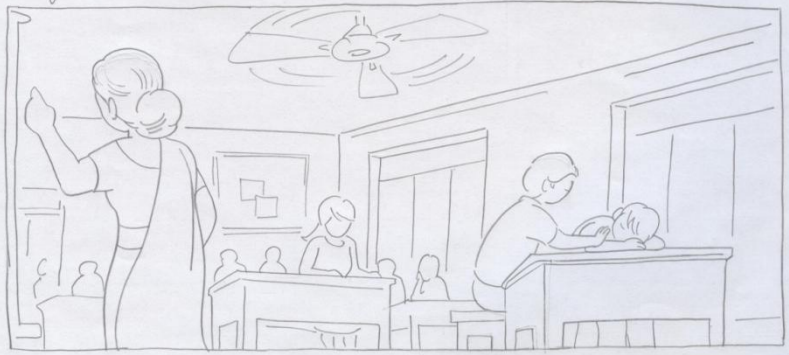


Comics Layout



As I walked ahead I noticed a shadowy figure coming towards me. Just as it reached closer....

And as we spoke I began to recall our idyllic school days. We were thick as thieves, but later drifted apart.

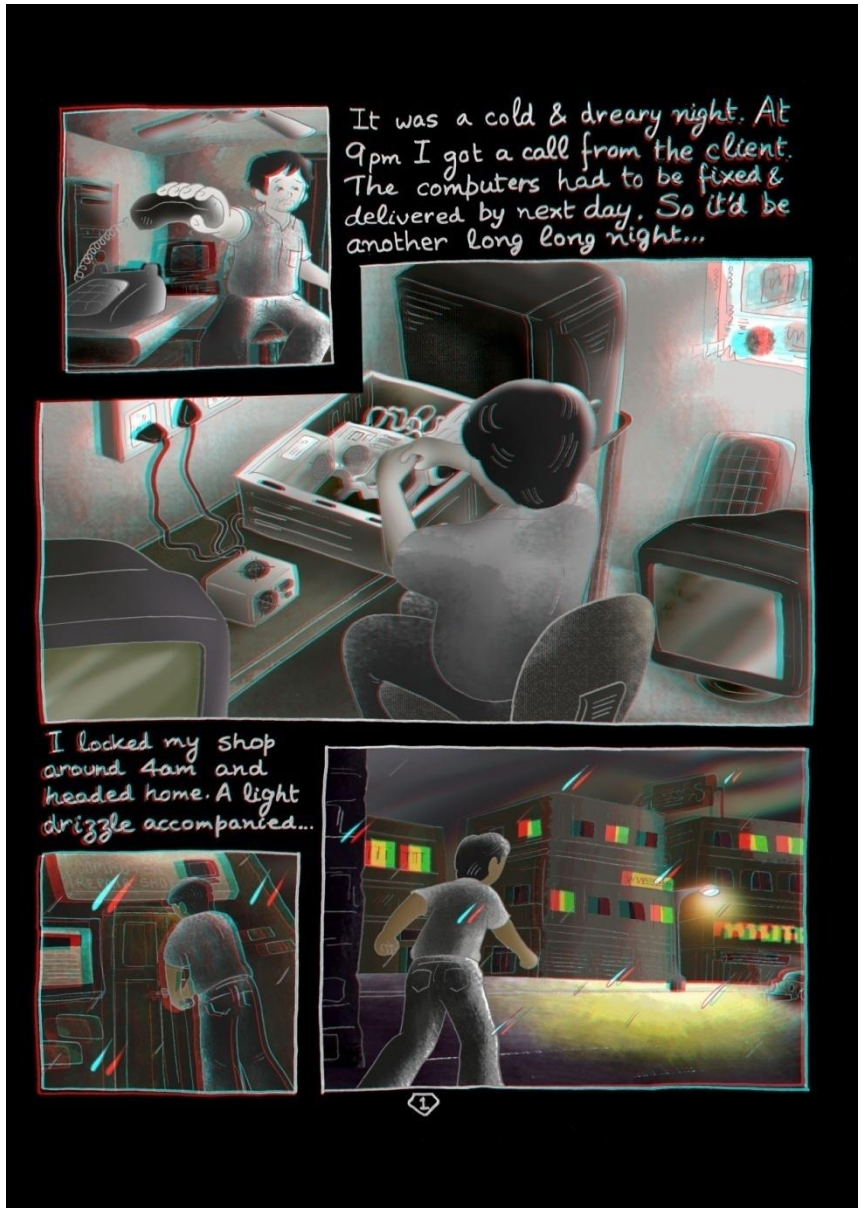


We had a long conversation. Slowly the first rays of sunlight shone.

I stopped at the early morning newspaper vendor.

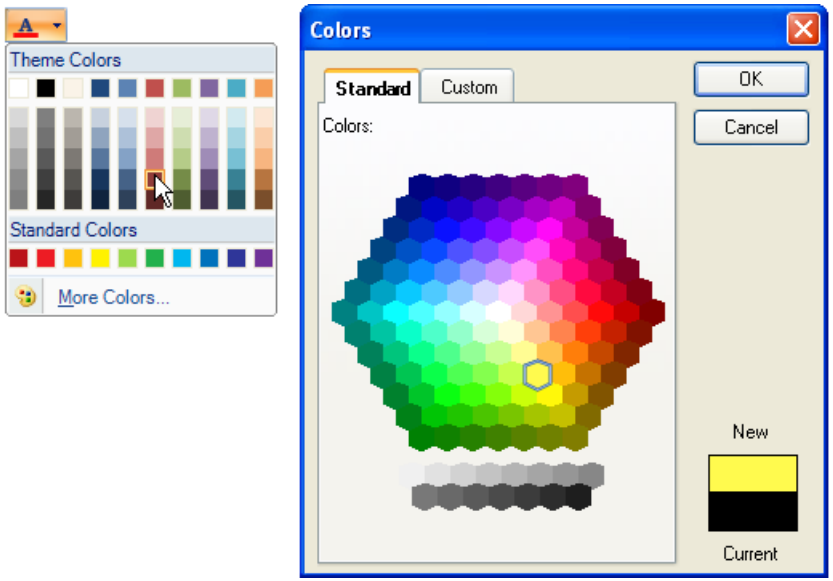
The End!

The Result – Anaglyph Images



The images have been designed in a way to produce depth while viewing with red-cyan filter glasses. But the extent of objects ahead of the window has been kept to the minimum to reduce strain on the eyes of the viewer.

One of the major issues regarding working with stereoscopic comic book panels is the large number of layers which need to be arranged. In this case there were 30 Photoshop layers which had to be adjusted accordingly to obtain the desired results.



Observations with Colours

From my initial experiments I observed that when we view anaglyph images using Red-Cyan filter glasses the portions of the image with colours close to red or cyan (or blue or green) are not distinct. These colours look blackened and the overall aesthetic quality gets reduced.

So I tried to experiment with colours which are away from red and cyan in the colour chart while making the stereoscopic image. It turned out that yellow and violet are the colours which are properly recreated when an anaglyph image is viewed with red-cyan glasses.

Similarly I noticed that in a backlit stereoscopic anaglyph image (for example a computer screen) black is more comfortable to view than stark white. Hence I opted to the frame which encloses the comic strip panels to be black instead of usual white. This again gave a better viewer comfort and aesthetic quality to the anaglyph images.

Conclusion

While working on this project I faced many challenges. One challenge was to deal with multiple panels which made cropping due to parallel setup difficult. I realized the solution was to use a skewed camera setup.

Another mistake was made when I had placed the nearest objects too much ahead of the viewing window. This lead to acute discomfort while viewing the anaglyph. I had to rectify my near point to being from window one third of the distance between window and camera.

It's been an enriching experience for me to discover the several minute details that lead to the formation of a good 3D stereoscopic image.

References

- 'Making Anaglyph Images in Adobe Photoshop', http://www.scec.org/geowall/makeanaglyph.html
- 'Stereoscopic session 02 – camera setup', by Stefan D. Voigt, www.svoight.net/index.php/tutorials
- 'Lens Separation in Stereo Photography', Berezin Stereo Photography Products by David Lee, http://www.berezin.com/3d/Tech/lens_separation_in_stereo_photog.htm
- 'Setting the Stereo Base: Introduction' by John Wattie, http://nzphoto.tripod.com/3d/300stereobaseintro.html