



Summer Fellowship Report

ON

SHORT ANIMATION MOVIE IN BLENDER

Submitted by

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Acknowledgement

We are overwhelmed in humbleness and gratefulness to acknowledge our deep gratitude to all those who have helped us to put our ideas to perfection and have assigned tasks, well above the level of simplicity and into something concrete and unique.

We, wholeheartedly thank **Mrs. Nancy Varkey Ma'am** for having faith in us, selecting us to be a part of this valuable project and for constantly motivating us to do better.

We also express our warm gratitude towards our mentor **Mr. Saurabh S. Gadgil Sir** and **S. Praveen Sir** for their aspiring guidance, invaluable constructive criticism and friendly advice during the project work.

This project won't have been materialized without their encouragement and constant guidance.

We would also like to thank **Ganesh Sir** and **Dhananjay Sir** who provided us with the facilities being required and conducive conditions for our project.

At last , we would like to take this opportunity to express our gratitude to the person who has been instrumental for the conduction of this great programme . We show our greatest appreciation to **Prof. Kannan M. Moudgalya** for his guidance and tremendous support throughout the internship.

We perceive this opportunity as a big milestone in our career development. We will strive to use gained skills and knowledge in the best possible way and we will continue to work on their improvement , in order to attain desired career objectives .We also hope to continue cooperation with all of you in future.

With Regards,

Raj and Tushar

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CHAPTER 1

Introduction



What is Blender?

Blender is a free and open-source 3D computer graphics software toolset used for creating animated films, visual effects, art, 3D printed models, interactive 3D applications and video games. Blender's features include 3D modelling, UV unwrapping, texturing, raster graphics editing, rigging and skinning, fluid and smoke simulation, particle simulation, soft body simulation, sculpting, animating, match moving, rendering, motion graphics, video editing and compositing.

Why Blender?

- Blender can be used to create 3D visualizations such as still images, video, and real-time interactive video games.
- Blender is well suited to individuals and small studios who benefit from its unified pipeline and responsive development process.
- Blender is a cross-platform application, running on Linux, macOS, and MS-Windows systems. Blender also has a relatively small memory and drive requirements compared to other 3D creation suites. Its interface uses OpenGL to provide a consistent experience across all supported hardware and platforms.

Who uses Blender?

Blender has a wide variety of tools making it suitable for almost any sort of media production. People and studios around the world use it for hobby projects, commercials, feature films, games and other interactive applications like kiosks, games and scientific research.

What is an Open Source Software?

The term “Open source” defines software whose source code is made publicly available. They are eligible for use and modification by users, developers subject to certain conditions.

Some key point of “Open Source”

- No need to buy Software
- Large community (Users, developers, admin).
- Many open sources like Blender are under the GNU Public License.

FOSSEE & Our Aim

FOSSEE (Free and Open Source Software in Education) project promotes the use of free and open-source tools to improve the quality of education in our country. They aim to reduce dependency on proprietary software in educational institutions. They encourage the use of FOSS tools through various activities to ensure that commercial software is replaced by equivalent FOSS tools. They also develop new FOSS tools and upgrade existing tools to meet requirements in academia and research. Incorporated to FOSSEE program, this fellowship’s main aim is to introduce students to the FOSS in various engineering fields and to become a part of this big community.

We were selected for this fellowship on the basis of screening tasks submitted by us. As part of fellowship program, we got opportunity to work on Blender. Our task was to create a 2 minute animation movie conveying a social message.

At the beginning of the fellowship we formulated several learning goals, which we wanted to achieve:

- To understand the functioning and working conditions of a government organisation
- To see what it is like to work in a professional environment
- To see if this kind of work is a possibility for our future career
- To use our knowledge and skills and to further increase them
- To learn about organising an open source project
- To enhance our communication skills
- To strengthen professional and social network

This report is a short description of our 48 days fellowship under FOSSEE. This report contains our activities that have contributed to achieve a number of our stated goals.

Introduction To Blender

- Blender is a fully integrated 3D content creation suite, offering a broad range of essential tools, including Modelling, Rendering, Animation, Video Editing, VFX, Compositing, Texturing, Rigging, many types of Simulations, and Game Creation.
- Cross platform, with an OpenGL GUI that is uniform on all major platforms (and customizable with Python scripts).
- High-quality 3D architecture enabling fast and efficient creation workflow.
- Excellent community support from forums and IRC.
- Small executable size, optionally portable.

CHAPTER 2

Getting Started with Blender



Installing Blender

Blender is available for download for Linux, macOS and MS-Windows.

Minimum Requirements

Check if your system meets the minimum or recommended requirements at <https://www.blender.org/download/requirements/>

Always check that the graphics drivers are up to date and that OpenGL is well supported.

Download Blender

The Blender Foundation distributes Blender in three different ways that you can choose from, to better suit your needs.

The options comprise binary packages for all the supported platforms and the source code. Within the binary packages, you can choose from a stable release or a daily build. The first has the benefit of being more reliable, the latter provides the newest features, as they are developed. Blender is released approximately every three months. You can keep up to date with the latest changes through the release notes.

Latest Stable Release

This is a binary distribution of the latest version of Blender. It is considered stable and without regressions.

Daily Builds

This is a binary distribution of Blender that is updated daily to include the newest changes in development. These versions are not as thoroughly tested

as the stable release, and might break, although they are official and generally not highly experimental.

Build from Source

Blender's source is available for reference and installation, with the following advantages:

Blender is always up to date.

It allows access to any version or branch where a feature is being developed.

It can be freely customized.

Install Blender

Refer the following links for installation as per your operating systems:

MS Windows-> https://docs.blender.org/manual/en/latest/getting_started/installing/windows.html

Linux OS-> https://docs.blender.org/manual/en/latest/getting_started/installing/linux.html

Mac OS-> https://docs.blender.org/manual/en/latest/getting_started/installing/macos.html

CHAPTER 3

Animation Project Development



PROBLEM STATEMENT:

In 3D animation development , the most critical problem is to create a good character which would attract user's attention. The character being developed should be suitable with the storyline and could bring the message of the story. The weakness in character design can cause the story to be interpreted incorrectly.

GOAL:

The goal of the project is to develop a 3D animation short story from scratch that has a moral value and can be emotionally entertaining while educating people.

OBJECTIVE:

In developing this 3D animation there are some objectives that would like to be achieved

1. To develop an interesting 3D animation which may attract users.
2. To entertain people watching 3D animation besides promoting good values .

CHAPTER 4

Design



Design is the most important part of 3D animation development. One has to come up with a good idea.

Turn that idea into a good story and turn that story into storyboard.

It is important to ensure that the creator is able to animate the characters and the stage they have designed and they also its important to determine the suitable color/texture to be used in real animation.

All of this is important to make the 3D animation being created are interesting and fulfil the objective of project being done.

STORYLINE

Given below is the storyline we have worked on during the fellowship:

- The boy is fishing and the man is rowing the boat
- The boy is upset as he hasn't caught any fish.
- The boy gets tired and is sweating.
- Takes the bottle to drink water but finds it empty.
- Out of anger throws the bottle and the bottle cap in the lake.
- The man gets angry at the boy and scolds him.
- The plastic bottle and the cap settles down
- A fish eats the plastic.
- Next day both come for fishing again and manages to catch some fishes .
- Accidentally one of the fish was the same that ate the plastic.
- The boy gets excited and takes it home to eat it.
- As he cuts the fish he is shocked to find plastic inside the fish.
- He recalls and realises his mistake.

Storyboard: Blender short movie

Name: Raj Abise and Tushar Thakkar

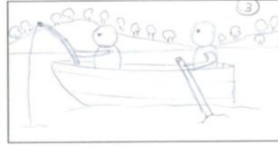
Date: 24-5-19 Page Number: 1



Duration: 05 sec | Transition: Folly In
Description of the scene: Scenery of the lake etc.



Duration: 03 sec | Transition: Slide
Description of the scene: Top view of the character riding boat.



Duration: 04 sec | Transition: Teach
Description of the scene: Boy is giving a bottle to man to remove the bird.



Duration: 03 sec | Transition: Slide
Description of the scene: ...



Duration: 05 sec | Transition: Slide
Description of the scene: The boy is...

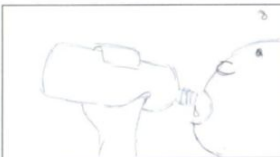


Duration: 04 sec | Transition: Tilt
Description of the scene: Man takes the bottle...

Storyboard: Blender short movie

Name: Raj Abise and Tushar Thakkar

Date: 24-5-19 Page Number: 2



Duration: 03 sec | Transition: Close up to boy
Description of the scene: No water is left in the bottle for the boy to drink.



Duration: 03 sec | Transition: ...
Description of the scene: Boy's angry as there is no water in the bottle.



Duration: 05 sec | Transition: Mid range shot
Description of the scene: Without the bottle is angry.



Duration: 05 sec | Transition: Close up man
Description of the scene: The man is disappointed and gets angry at the boy.



Duration: 04 sec | Transition: ...
Description of the scene: The man scolds the boy.



Duration: 05 sec | Transition: Truck down
Description of the scene: The plastic bottle is cap fallen down. And a fish ate that plastic cap.

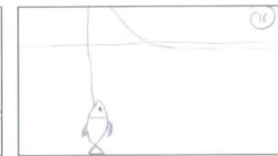
Storyboard: Blender short movie

Name: Raj Abise and Tushar Thakkar

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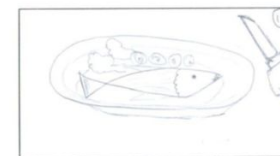
Duration: 04 sec | Transition: Slow day like shot
Description of the scene: Next day both came for fishing again, and managed to catch some fishes.



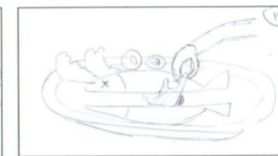
Duration: 03 sec | Transition: Truck down
Description of the scene: Accidentally one of the fish was the same that ate the plastic.



Duration: 04 sec | Transition: Truck up
Description of the scene: The boy gets excited by catching the fish.



Duration: 03 sec | Transition: Close to home
Description of the scene: They took the fish and begin to eat it.



Duration: 04 sec | Transition: ...
Description of the scene: Boy finds plastic inside the fish after cutting it.



Duration: 05 sec | Transition: Close to face
Description of the scene: The boy gets shocked by seeing plastic in the fish.

CHAPTER 5

Implementation



The implementation phase comes after design. It is a critical part in 3D animation development because here animator has to create the real character and model which are already sketched in the design phase.

Various phases involved in implementation part are :

- Modelling and Texturing
- Rigging
- Animation
- Lighting
- Rendering
- Video

5.1 Modelling and Texturing:

Modelling is the first stage of implementation phase. Here, animator creates the model that will be used in the animation story.

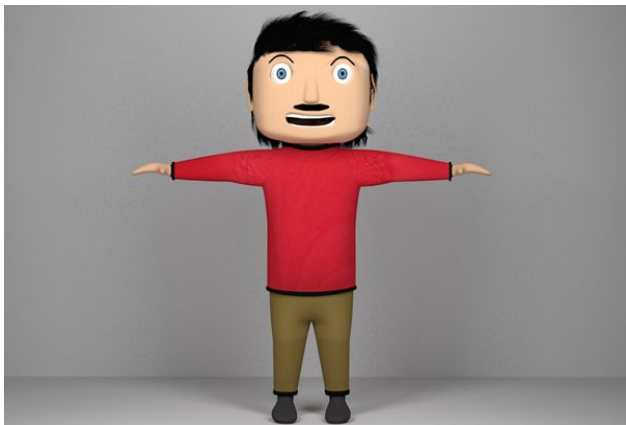
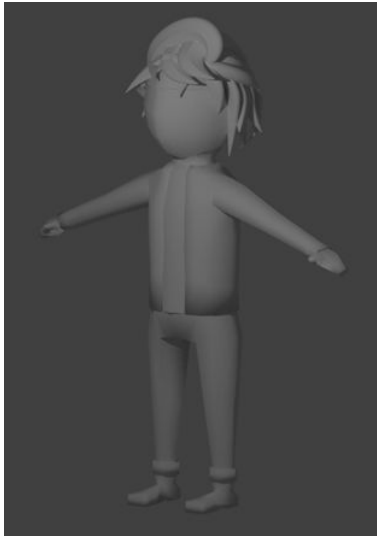
For this project, modelling process was divided into three types i.e modelling the character, modelling the environment and modelling the objects. All of these modelling in this project is done in Blender 2.79 3D software.

5.1.1 CHARACTER MODELLING

In character modelling, the character is created using combinations of basic geometry shapes. The basic model such as cube, sphere is already available in Blender and the creator just needs to change the shape into their model shape.

In the character modelling of this project, two character models were created a boy and an old man.

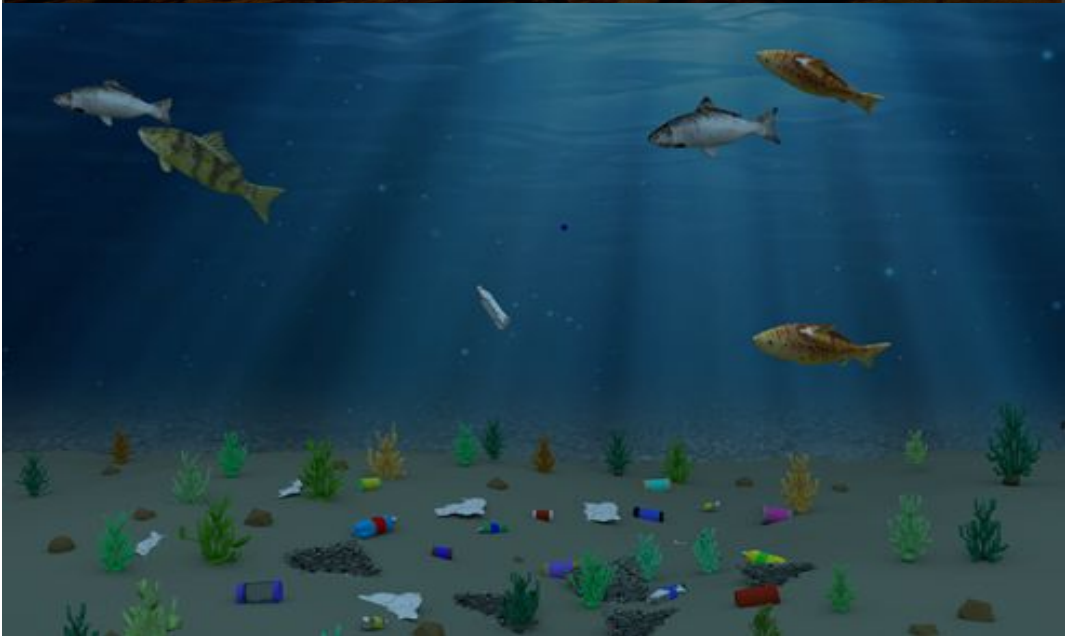
The basic standard shapes used in creating these characters were cube,sphere,cylinder. Required materials/texture were added to the in Blender by using Nodes and by UV unwrapping the character mesh.



5.1.2 OBJECT MODELLING

In this project, there were few objects that were needed to be created such as the boat, bottle, basket, fish, oars, table, chair, fork, knife, dish etc. The method of creating object is the same as that was used in character modelling i.e. by using simple geometry shapes. The way to color the object models is also the same as to color the character model.





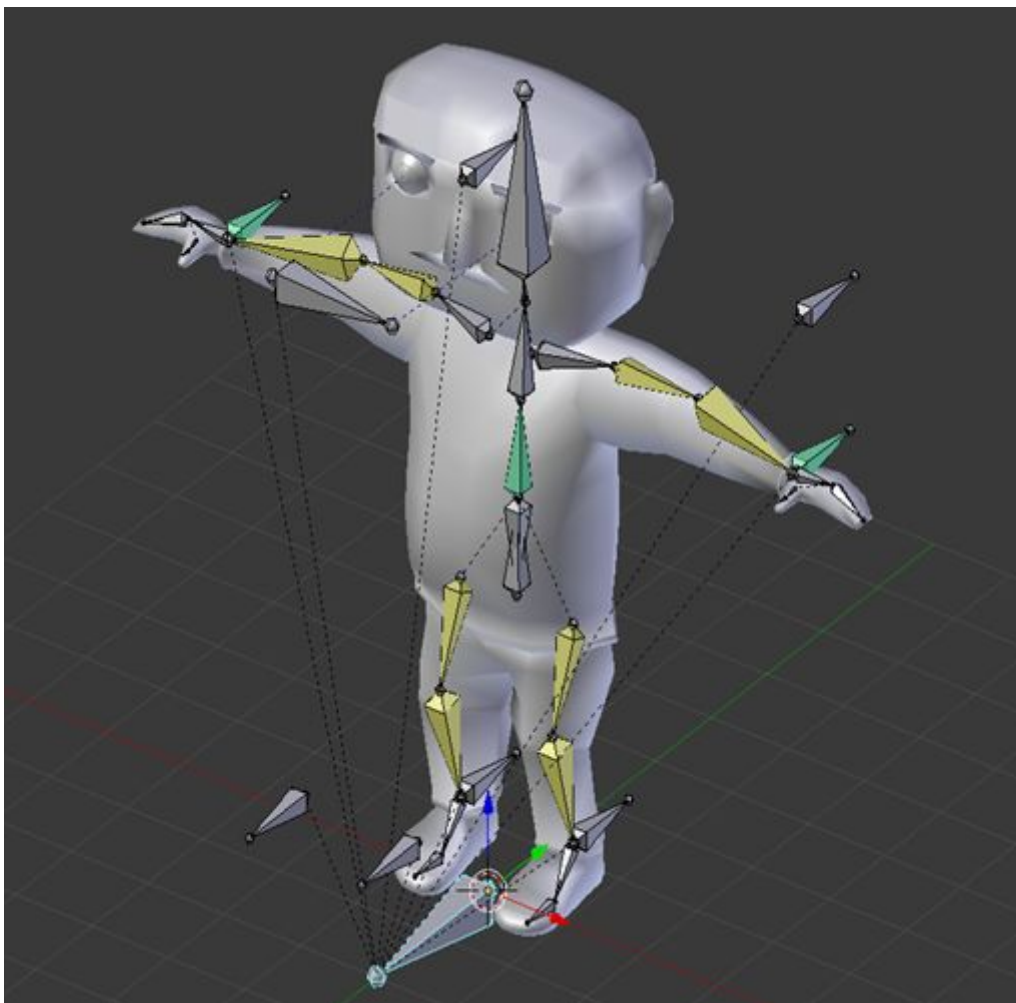
5.2 RIGGING

The Rigging process refers to the process where bones are inserted into the character model to enable the movement of the character. Rigging is very important in 3D animation because it helps to animate the character with ease.

In this project, a main root bone was created to which all the others bones were connected. Firstly, the spine bone chain was created by using series of bones then bones for the arms and the legs were created which were parented to the spine bones. Separate bones were created which are known as pole targets to adjust the position of the elbow and knee.

After creating the entire armature it is parented to the base mesh so that the character can deform by using the bones.

A bone for eyes was created and eyes were given a track to constraint so that the eyes could follow the position of the bone.



5.3 ANIMATION

After completing the process of modelling and rigging , animation of the characters can be started. The characters are to be brought in the environment stage. The character could be posed as required by deforming the bones in the pose mode in Blender.

Blender provides an option of automatic key-frame insertion by which it automatically sets a key-frame whenever there is a change in the position of object/character.

Animation of fish was done by providing it a path which it needs to follow. The length and shape of the path can be modified in edit mode.

Camera movement can also be achieved by providing it with a path that it needs to follow.

Markers are used in blender to switch between two camera at a specific frame. For this, a marker is to be inserted at the required frame by simply pressing 'M' on the keyboard and making sure that the cursor is over the timeline and that the camera required is selected then press 'ctrl+B' on the keyboard.

5.4 LIGHTING

Lighting process gives a big effect to 3D animation. This is because we can make the scene and environment look alive with lighting effect. In order to expose an image on video, a sufficient amount of light must be present to illuminate the model or objects involved.

In this project point light, planes with emission material were used to achieve desired output by placing them at appropriate location and angle.

5.5 RENDERING

Rendering process is the last action done in this project before video editing. After completing all the above processes rendering process can be started. The animation created can directly be rendered in a final MP3/MP4 format or can be first converted into a series of images in PNG format that can be converted into a MP3/MP4 file.

In this project, the animation was rendered frame by frame in PNG format, which could be later converted into a video file format.

Various scenes can be rendered and kept in separate folders to organise it properly

5.6 VIDEO EDITING

Blender can also be used as a video editing tool. There is a standard layout for video editing in Blender. Image strips or movie strips can be added in the video sequence editor and length of the video can be adjusted by changing the FPS rate in the properties panel.

To get a video file for this project FFmpeg format was chosen and the encoding preset was set to h264 in MP4. Output quality and encoding speed were set to 'High' and 'Medium' respectively.