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A THESIS SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF

MASTER OF FINE ARTS
IMAGING ARTS/COMPUTER ANIMATION
SCHOOL OF FILM AND ANIMATION
COLLEGE OF IMAGING ARTS & SCIENCES

ROCHESTER INSTITUTE OF TECHNOLOGY
ROCHESTER, NEW YORK
DECEMBER, 2014
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# Table of Contents

Abstract .......................................................................................................................... 5

Acknowledgment ........................................................................................................... 6

Introduction/Overview .................................................................................................. 7

  Inspiration for my film ................................................................................................. 8
  Determining final idea ................................................................................................. 8
  Production Workflow/Techniques .............................................................................. 12

Pre-Production ............................................................................................................ 15

  Story Development .................................................................................................... 15
    Storyboard ................................................................................................................ 15
    Animatic ................................................................................................................... 17
  Concept Design ......................................................................................................... 18
    Character Design ..................................................................................................... 19
    Environment Design ................................................................................................. 24

Production .................................................................................................................... 27

  Modeling ..................................................................................................................... 27
  Rigging ........................................................................................................................ 31
  Dressing (Shading and Procedural Texturing) ............................................................ 33
  Animation ................................................................................................................... 36
  Lighting and Special Effects ....................................................................................... 38

Post-Production ............................................................................................................ 42

  Motion Graphic ......................................................................................................... 42
  Compositing ................................................................................................................ 44
  Editing ......................................................................................................................... 45
  Sound and Music ........................................................................................................ 46
Critique Reception/Feedback.........................................................................................47
  SOFA Screening........................................................................................................47
  Festivals..................................................................................................................48
Conclusion..................................................................................................................48
  Experience...............................................................................................................48
  Challenges.............................................................................................................49
Appendix....................................................................................................................50
  Appendix A - ORIGINAL THESIS PROPOSAL - May, 2012.................................50
  Appendix B - CHARACTER DESIGN SKETCH......................................................58
  Appendix C - STORYBOARD AND ANIMIATIC EXCERPT.................................58
  Appendix D - ANIMATION POSTER AND STILLSS...........................................60
  Appendix E - Dave Sluberski’s response, SOFA Screening, May, 2014..............62
Abstract

“X” is an animated graduate thesis film. The entire animation including credits was 5 minutes 36 seconds long by the time of my thesis screening at SOFA, RIT. The story was initially developed to express the emotional side of robots (or intelligent machines) and finally was changed with a new idea to put the emotional elements into the robot program itself. The story takes place in a robot factory and the main character is a newly produced robot named "X-100". X-100, as the 100th robot product, is facing a crucial test determining his eligibility for being a qualified product. All ineligible robots will be destroyed. In the test, X-100 decides to save the life of his teammate so he loses his chance to pass the exit. Finally X-100 is successfully determined to be a qualified robot because he activated the final teamwork system by saving the life of his friend, which is the true goal of the test.

This short film is an animation utilizing 3D animation production techniques. It was created in 720P HD with a high quality stereo soundtrack and was completed with a number of 2D and 3D digital media software programs including Autodesk Maya, Sidefx Houdini, The Foundry Nuke, Adobe After Effects, Adobe Premiere, Adobe Photoshop, Avid Pro Tools, etc. This thesis essay outlines my overall production process for “X”, every single stage of creation as well as each success and failure is described.
Acknowledgment

There were many people who helped me throughout the whole process of my thesis production. I would like to say that without all their support, it would be almost impossible for me to accomplish my thesis movie. Professor Atia Quadri, who was my chair, played a very important role on instructing my animation production. She was a very crucial support to me whenever I felt depressed under the difficulties of completing the movie, and she always encouraged me which made me feel confident about my film. She was also very informative and provided great suggestions on both the storytelling and technical aspects of my film. Again, without her all-important help, I would not have been able to complete this 6-minute 3D animation. Also, I want to express my thanks and appreciations to Professor Peter Kiwitt and Lecturer Mark Reisch, as my thesis committee members. They made quite a few efforts on my thesis production with rigorous criticisms and tremendous invaluable suggestions. Apart from the above, I also would like to thank Tianhe Han and Tianyu Yang for their help on some of my 3D character animation, Tang Tao for his great job on the character rigging and Alexander Montoya-Melendrez, for his fast and fantastic sound production. There were still many of my classmates that helped me, I could not have finished my thesis project without any help from them. Also, I must thank David Sluberski for being my respondent and Professor Malcolm Spaull, Stephanie Maxwell and David Long for their
understanding of the render farm issue and permission to extend my screening deadline.

Finally, I want to thank my family for supporting me on my Master of Fine Arts program study and my girlfriend for taking care of me during the hardest period before my thesis screening.

Introduction/Overview

The production of my thesis film started in September 2012 and it was eventually completed in May 2014. It was screened in the School of Film and Animation at Rochester Institute of Technology on May 18th 2014.

My first proposal was a story about Robots and Human taking place on a spaceship but it was rejected due to the lack of storytelling. Then I proposed my second idea, which was a rough prototype for my final thesis film, it was passed but still needed more work on the story aspect. I changed my story structure and some major elements many times after my last proposal in March 2013.

I was initially under the supervision of Robert Deaver who left the School of Film and Animation before Fall, 2012. Then I asked Atia Quadri to be my thesis chair and we spent some time communicating different ideas for my thesis. In the meantime, I was teaching a class at School and took a leave of absence for three months, so I did not manage to start the actual production until late Spring, 2013. Afterwards, Peter Kiwitt and Mark Reisch joined in and became my committee members.
The overall production consisted of preproduction, production and postproduction. All of the preproduction and part of the production was finished in fall of 2013. The bulk of the production and post-production was completed by May 2014.

**Inspiration for my film**

My major inspiration comes from the famous visual effects movie series “Transformers”, directed by Michael Bay.

I have loved watching visual effects blockbusters since I was very young and Transformers is still my most beloved film series.

**Determining final idea**

Originally, I wanted to make a special effects short film combining 3D animation and live-action materials that let me focus more on live-action special effects. This story was about a robot arriving on Earth and became a threat to the people surrounding it. I wanted the style of the movie to be as realistic as
possible. But this idea did not last for too long. Receiving feedback from my classmates and professors, I realized that the story was quite a cliche and there were too many movies with similar plot-lines, so I decided to think of the story again. After that I ended up with a story about a robot’s memory that takes place in the distant future. A human spaceship finds a robot (named X-100) lying on the moon who tells his story to a spaceship officer: their robot realm was destroyed by an alien race and many of their robots were killed and lost. X-100 wanted humans to form alliance with the rest of their robot race and fight back to protect both Earth and their robot realm. I really liked some of the ideas in this version of story but regretfully this robot story was rejected. The reason for that is due to the lack of storytelling which gave me a hard time determining the idea for my next proposal because I did wanted to strengthen my story but I do not want to lose the interesting elements in my previous versions such as human-robot interaction, realistic rendering and robots’ emotional expressions.

After several revisions, I redid my story with several major changes. There were still some elements from previous sketches that were preserved, because they were my passion for that film. This one told a story about a swindle, a tragedy.
It happens in the future where technology is able to let people create intellectual, emotional and powerful robots to serve them. One troop of robots is sent to an “X” planet for a very important mission, they must help to fight against a powerful enemy alien-race army. After a long and difficult war, the robots accomplish their missions with severe casualties only to find that they were sent as bait. The robots that are still alive decide to help each other and make their own spaceship to help themselves retreat from this dangerous planet. Unfortunately, they all get killed by the next wave of enemies and are
buried permanently. I really liked the improvements on expressing the emotional side of robots and the content of the film plot. My second proposal with this story finally got passed but based on the feedback of the proposal committee members, I still had to refine my story and make it more concrete.

At first I thought maybe I could achieve some enhancements in my animation without changing too much on the overall storytelling structure, but finally I realized a very severe problem. The scope of the story was too big for a student project. I would have to create models for tens of robots as well as hundreds of aliens along with their animations and special effects. So again I revised my story, this time to fit into a smaller scale but still about the emotions of robots. It was a story about the friendship between two robots and how one of them sacrifices himself so that the other can have the chance to pass quality inspection and live on. At around this time my advisor Bob Deaver left RIT and Atia became my advisor so we had to adapt to each other. At this point at least the basic concept of the story was set already although details were continuously modified during production.

Through all the revisions and improvements, I was glad to have a rough structure of my new story. I thought the content was good because in contrast to other existing films, it was a non-dialogue film, which made the film somewhat unique. And it was also a film with a smaller story scale, so it was feasible. Compared to my previous ideas, it had less visual effects elements
but I actually thought that was a good thing because then I could have more room for telling a better story, which will in turn enhance my visual effects works. I thought I got a good balance between visual effects and storytelling.

**Production Workflow/Techniques**

It was hard to layout my thesis project workflow with just one draft or in one day, because there were so many techniques and software programs involved in my thesis project. First of all, it was a 3D animation and the render style that I wanted to achieve was realistic, which meant that I had to do a huge amount of works on 3D production and post-production. In order to effectively complete this film within a limited amount of time, sketching an efficient workflow was absolutely necessary. The picture shown below is the production workflow for the film.
Starting from the top of the chart, I thought I had to nail down the style of my animation before anything else. I conducted multiple tests before settling on my desired style. Deciding on the style of the animation set down the groundwork for the rest of the production flow.

In this flow chart, you can find some steps that were not included on many other thesis projects since they are highly specific for a realistic 3D animation. For example, the compositing step can sometimes be ignored since most of the compositing works can be done within after effects along with film editing. And for the Dynamics and FX Rendering steps, I think maybe my thesis
was the only one that was heavily occupied by some time-consuming FX simulation and rendering.
Pre-Production

My preproduction was made up of two steps, story development including making storyboard and animatic, and concept design for my characters and scenes.

Story Development

Storyboard

Storyboard was a very important first step after I had nailed down my story, since it would heavily affect the camera positioning, framing, shot arrangement as well as the editing styles of the completed film.

(Storyboard Images)

I did not commit all of my storyboard to paper. My story was not solid enough at that time so I chose to switch to work in 3D environment for my storyboard creation. The reasons were that firstly I was more comfortable shaping and moving objects in a 3D environment rather than with a pencil. Secondly, I thought if I could do quicker storyboard prototyping in 3D and make various versions of the storyboard and show them to professors and other
people for quick feedback, which would be helpful for me to get a better and solid story as soon as possible.

(3D Storyboard - Images)

In my story, a couple of places required fast motion sequences with fast editing. Although creating multiple versions of storyboards did help to improve my story, it still raised problems. It is difficult to express a relatively complicated motion sequence through still pictures. After the structures of shots were established to a degree, I started making animatics to help overcome this issue.
Animatic

I received some positive feedback on my camera placement and the design for my action sequences. My main task was to roughly set the timing for my animation in the animatic.

All my animatic shots generally expressed what the storyboard did, but there were three major sections of my animatic that were tricky and I made the following changes based on the original story board.

1. Logical order of the series of events
2. The longest shot in my story
3. The shots arrangement for my montage sequence.

I made efforts to sort out all the events and put them in an ideal order so that they could function and make my storytelling clear, and not to confuse the audience, but it was very hard. I changed my animatic about seven times in order to figure out the best order for the story.

The longest shot in my story was about 25-30 seconds and originally I used live-action footage to show the camera placement because it was hard to do this shot in 3D at earlier stages, then I made several versions of blocking animations and put it in the animatic timeline. Afterwards I gradually updated the shot little by little and finally put in the fine-tuned animation.

In my animatic, I had a very long montage sequence starting from the long shot with two robots fighting the enemy spaceship. A series of quick shots
were added in order to give some tension for the scene until the point where the hero saves his friend’s life at the very last moment. It took several versions to get the all the action shots edited together in an acceptable way and the most difficult one was where I should put the shots showing the hero making the decision to turn around for his teammate. For example in early versions of my animatic I made the robot realize his teammate was being shot and then stop at the exit, make his decision and then start rushing back. But finally after getting feedback from advisers, I made the hero turn around right after he realize the danger. After that, there is another problem: should I make my hero turn his head back and forth before he makes the decision? If so, how many times should he turn his head…? I almost forgot the complex steps of developing my animatic on this part but what I was glad to see was that I finally got all the shots working and received some good feedback in my thesis screening.

**Concept Design**

The concept design for my thesis movie consisted of two major parts, Character design and environment design. Technically the concept design part of a movie can be divided into smaller pieces but I divided it like so because I was working on my own and it was a relative small-scale story, so keeping the steps simple was a good choice for me. I began to think about my design in winter 2012 and started practically doing it in Spring 2013. With my story idea nailed down and the ongoing progress of my animatic, it was sketched out by Fall 2013 and was done in that semester, ready to be used for modeling.
Before I started doing my actual design, I did a bunch of research from which I extracted the design concepts and inspirational elements for shaping my characters and environments. Also, many of my design elements came from not only my artistic choices but also the practical uses of them in my story. Some thoughts and thinking processes will be explained later.

**Character Design**

I needed two robots in my story, but since they were essentially the same type of model with the only difference on their labels showing their unique product number, I could focus on designing just one robot model and making it as good as I can.

Doing research online was quite time-consuming and was sometimes overwhelming since there are too many styles to refer to. It was eventually a good way of getting enormous sources of inspiration which influenced my final design to a certain degree.
I had a very deep impression on the designs of transformers, but I didn’t want my design to be simply a “copy” of them, so I went to find many good robot and machine design references, many of them were not belong to the transformer family. Another source of reference came from an assignment of my previous modeling class with Mark Reisch, I was thinking of my thesis project when I was doing this assignment, so I thought this might be a good starting point.
The model design from my previous class

So, back to my design process, my initial thought was that my robot should be of human-like shape. We all know that robot is one kind of machine, and of course machine does not need to be human-like. My style research showed better results when robot design is not restraint to be completely human-like. In the picture above it is obvious my previous robot model was not a hundred percent human-like design. It had a power gun on one side and a vehicle thread on the bottom, etc. And these elements of design were not great but they were likely to be relatively unique without being completely restricted to human proportions.
However, my intention of the story was to show the emotional side of robots, and the core of this was expressed by letting one save the life of another. So what was an understandable definition for my robots? They were soldiers. Because soldiers are brave, moral, they have souls, they have teamwork abilities, and they have human minds. It was helpful to think of them this way, finally, I decided to put my robots into human proportions, which will help the audience to recognize them as something closer to the ones with souls and hearts. If not they might looks like monsters or war machines; simply controllable gadgets without any thought in their minds.

Starting design to final design comparison

The images above show how I changed my original sketch and turned it into a new one.

As you can see, I kept some parts that I like in my old design, and put in many new elements and shapes based on my new creation, so the major shape was very different. Obviously the new one was more intellectual and like
a humankind, the overall shape and the sub parts made more sense as being a soldier. Also, many parts of the robot design was of practical use to my story. For example, I kept the power gun because the robot had to fire at the enemy with different laser intensities and the side shield and shoulder shields for my robot because he had to use them to block enemy's bullets and lasers, etc.

I also had some personal ideas and plans for the robot colors, which I didn't put in my design sketches. I wanted both of my robot characters to have a uniform color style but still be able to be easily differentiated. I decided to create a two-tone, low-saturation color design. The purpose of this was to keep the colors in a specific range without color conflicts and chaos, and low-saturation was simply my own choice because I believed realistic robots would not have heavy or high-saturation colors as characters in a cartoon series. Robots will most likely have hard surfaces to match their building materials so I chose a customized shiny metal for them that would go well in a 3D workspace.
Images showing the color design

From the images you can tell that they definitely belong to the same robot family, not only by the shape but also by the color. I used yellow and dark gray for my main hero (X-100), a lighter and darker gray for the secondary character (X-99). I wanted X-100 to be more “colorful”, so that he can stand out and I used gray scale on X-99 to help fortify that. Also I put in some very cool glow bars around their body when I did the 3D modeling (as explained later), they are not in my original sketches.

Environment Design

Before I designed my environments, I thought it was much easier than creating character design, but it turned out to be not that easy at all. I had three environments in my story; I wanted them to be very modern, electrical and abstract, yet still be different from each other.

The first one was the robot factory room; it was very much like a prototyping or production room, a mother-capsule, or a robot garage. The second one was an open space; I would like to think of it as an arena, or a platform. The third one was a completely empty room where the robots’ story ends and where people get the answer from the story.
I could not give any specific definition or description for my environment since they were all need to be very abstracted in my story. It was a good setup for freeing my imagination, but it was hard to create distinctive looks for them. Again, references helped me but I had to create my own artwork.

I did not do any paper sketches for designing the environment; rather I did the design in 3D workspace. In my story, the environments were not very complicated. Ideas, major shapes, forms and layouts were more important, so I needed my characters and environments to get together in 3D space, then I could know what was the optimum size for each parts, what kind of design could work the best for my camera. 3D space is very good for laying out stuff and tweaking sizes: working with pencil and paper was quite slow for me.
For the color I used the same strategy as for designing the character. I used white and green for my first scene, because I consider light green as representing mystery, electric and modern. I put red and blue into my second scene to represent the eternal struggle between good and evil. For my final scene, I colored it with white and gray, because this is just a empty room.
Production

My production stage included six steps, modeling, rigging, dressing, animation, lighting and effects.

Modeling

3D modeling was the final step to turn my designs into the actual 3D objects that would later be animated and rendered. I was not a specialist on modeling but I knew most of the basics. It was a good chance for me to practice my skill. The most important fact is that I love my robots. I designed them, so I was excited to model them too.
I planned to model my character and environment in a software other than Maya, but later I decided not to do that. If I finished the modeling outside of Maya, I would have to re-topologize it back in Maya. And if any changes are introduced, it would make this process too complicated.
There were many types of modeling methods in Maya, what I used was polygonal modeling, with all its tools and functions. I was familiar with all the polygonal modeling tools inside Maya. I also got my modeling skills improved by modeling almost everything in my story by myself. It gave me a good grasp of recognizing the proportions and relationships between various objects, I also learned utilizing different functions to put pieces together or tear them apart, etc. This made me feel more comfortable and confident about working with modeling in the future.
As I just expected my model was updated many times after the modeling step, and the interesting thing was that I found a lot of fun in modifying and improving the design after the modeling process. As I wrote in my design section, the glow bar around the robot body was the re-creation I added when I was modeling the robots. It was definitely a great improvement on my original sketch.
Rigging

The rigging for my movie was mostly for characters, not so much for environments or other objects. I did not complete the character rigging all by myself, I got a lot of help from other people, but still I learned stuff through this process.
Rigging Structure Snapshot

In order for a rigging to work properly, the bones and joints must follow a logical hierarchy. When setting up a character's skeleton, you have to put in your joint in a hierarchy order. I built the major bone structure for my robot character. When I ran into problems with my joints placement, I did research and discovered many pictures and illustrations related to human bones that were great references for me. Having good joint placement is very important since it can make your life easier when you do the joint constraints and skinning.

In my rigging process, there was a problem when I tried to rig the ankle of my robot.
Because I got some weird rotation setup there so it gave some trouble to make it work properly. I kept getting some “-cycle” warning messages in the Maya script editor and thought perhaps these were some cycle constraints. I tried to fix it with this in mind but no luck.

The problem existed even after I spent quite an amount of time trying to fix it and finding other riggers to help. I decided to solve the issue in the animation stage, and I fixed them, not in all the shots, but most of them,

**Dressing (Shading and Procedural Texturing)**

I got a temp job during the summer before I finished my thesis, I learned a new term in company called “dressing”, a word that combining the two words “shading” and “texturing” together. Now more and more companies have started using this term because the boundary between shading and texturing is getting more and more blurry. Artists working on both 3D shading and texturing are called Dressing Artists.

I used Mental Ray render for shading my objects, because it was the best available on RIT’s render farm. I used the MIA Mental Ray materials to build almost everything in my film because it was a generic shader that could be modified to make most of the materials in the world. I wanted to use mostly hard surface materials such as metals, hard plastics, bricks, so this shader was good enough for most of my 3D objects.
Shading - Attribute Editor

In my opinion, the texturing was more interesting than the shading in my project. I used procedural texturing techniques for all of my texture work, which was very different from making textures from existing or modified texture images.
Procedural Texturing in Maya Hypershade Window

The above image was the snapshot of the Maya Hypershade Window in my project file. This is a dressing network snapshot for one of my metal materials. As you can see that I did not use any existing images as my texture inputs, all the textures were generated with those internal Maya nodes and Mental ray nodes, they made textures based on certain algorithms. I did lots of
works studying procedural texturing before I started doing my thesis, so I was pretty comfortable doing this. The texture node I used in Maya includes 2D noise, 3D noise, crater node, cloud node, some utility nodes, gamma correctors, math nodes, ramp nodes, bump nodes, displacement map nodes and many more...

Procedural Texturing on Materials

I really enjoyed creating realistic materials with procedural texturing and shading methods. Although this method requires quite amount of knowledge of many node's algorithms and some math operators and creates many nodes it will bring more control on the looks of the material, and this is my preferred way to create 3D materials.

Animation

Animation was one of my favorite part of the filmmaking process. I had more than 85 shots in my movie and many of the shots required many different
kinds of animations so it was extremely fun to do all those robot animations including fighting, walking, sliding and dodging. But doing the animation for my film was not easy at all. I asked two other animators to help me animate some of the shots.

*Animation Playblast*

There were not really any difficult techniques I want to talk about, doing animation is more about patience and experience, the more you do it, the more chances you can make your animation great. But apart from that, after I went through my thesis, I realized that a good animator should not only make great animations, but also make them effectively. In my animation production, I often encountered tight deadlines, which gave me a very hard time and pushed me to work as fast as I could without losing the overall quality of my animations. I had to work very effectively unlike in the past where I always strive to perfect every detail. But now I think that a good animator should be smart and know what is essential and put less emphasis on things that are less important.
Maybe it is not perfect for all views, maybe it is not excellent from all angles, but if it is good enough for your story, then make animation fast.

**Lighting and Special Effects**

Before I talk about the process of lighting and special effects, there is one thing I want to point out. In my opinion, the word “visual effects” does not have the same meaning as “special effects” (or “effects”). Visual effects should be a collection of lighting, dynamics effects and compositing. Dynamics effects refers to any visual effects that is the result of physical simulation animation, such as fire, gas, smoke, water, earthquake, avalanche, etc. If we light our 3D geometries and render them, what we see is also one kind of “visual effect”, this is the normal way to achieve visual effects by lighting your 3D objects. As for the compositing, I probably want to categorize them into another type of visual effects; maybe we can call it post visual effects. And I would like to call compositing effects and dynamic effects together as special effects. I will mention some compositing effects in the compositing section.

Lighting and Dynamics Effects were probable the two most interesting parts to me. Doing visual effects was very difficult, for the sake of time, I did not put in too much visual effects materials, but I still felt excited each time I got a visual effects shot achieved.
In the three environments of my animation, I used three different lighting techniques.

In the first scene, my lighting replied on arrays of area lights and high quality indirect light (Final Gather and GI). Because this was my first scene and was also the scene with the most objects, so I wanted to make it look as fancy as I possible. Of course, the cost of this was extremely long render times.

For my second scene, I used image-based lighting methods with two or three directional lights to simulate sunlight and other different light sources. In the space I avoided using indirect lighting and very high render settings so the rendering speed was fast. The image-base lighting made the robots look real, the directional lights gave me a good control of the silhouette and lighting shape on the robots’ bodies. All these make the robots sharp, they had a modern look and gave a feeling of intellectual.
Lighting Sample

The end scene was the easiest one in terms of setting up the lights, there were only two major area lights in the scene. I did this because too many lights would break the atmosphere which was to be a relatively quiet scene. But I spent a long time finding the correct angle for my lights. I only had two lights, so I had to aim them at the perfect angle to achieve the most pleasing illumination that they could provide. By doing the above, the lighting for the scene let people think more about the end of the story.

Before my thesis, my primary learning focus was on special effects, so I knew exactly how much time it would take me to do special effects works. And that was why I did not want too many effects elements, because they would be tricky and hard to simulate and render.
For the elements I put in, they were enough for strengthening the idea of my story, so even though what I designed was probably the minimum I could imagine, but all of them were indispensable and served my storytelling very well. To give an example, there was an FX explosion at the very beginning in my second scene, this effect was definitely needed there because if I don’t make a believable explosion there the audience would not think that the enemy was strong enough to kill any of the robots.

FX Sample
FX Sample

In the fighting scene, I planned to make many fantastic explosions and power lasers using fluid simulation in Maya, but as I made my animation, I thought maybe I could achieve almost the same feeling and motion by using the particle system instead, which would make the rendering process a hundred times faster.

Using particle system to do the FX, not fluid.

Post-Production

Motion Graphic

In my story, many shots were Point-of-View shots with the camera looking through the eyes of the main robot. So I had to design the robot’s UI and the UI animations to make all the POV shots interesting to watch.
Designing and making such motion graphic elements was a brand new area for me. I started doing this a bit late so I found some friends to help me conduct research and find interesting UI patterns as references. Some of them also helped to design. Finally it was my job to integrate every motion graphic element into my layout and animate them.

Enemy UI

Robot UI

I used Cinema 4D and After Effects for my motion graphic creation.
Compositing

The compositing stage took the last three weeks to complete and it was done using The Foundry Nuke software. I rendered multi-pass image sequences in Maya and later imported those sequences into Nuke and did the compositing here.

The main goal for my compositing was to do color-correction, and some other special effects.

I did color correction on each layer in each shot, so that I can fully control the color style, the brightness and contrast of all the shots, then I could make sure that each scene will have a unique look, and all the shots in the same scene will have a uniform color and contrast.

Nuke Project Panel
Some of the special effects are really hard to do in Maya but are easier to make in Nuke. In one of my shots, there was a bright tracker tracking the position of the robot, you can simply use the 2D tracking function in Nuke and then draw a target marker onto the tracking position, but it would be hard to do in Maya since Maya is good at making 3D objects but not 2D graphics.

![Tracking Shot Snapshot](image)

**Tracking Shot Snapshot**

**Editing**

The editing of my film began as soon as I started making my animatic. After I almost set my animatic, I rendered my shots and then put them into the timeline to replace the old stand-in playblast shots. I did it for each shot one by one until I finally had a version of a fully rendered edited sequence. After I placed all my rendered shots, I tweaked it according to advisor’s feedbacks and I also changed some of my editing base on how well it would interact with the sound.
Sound and Music

I finished my sound and music in the last several weeks, with the help from my sound designer. We talked about the sound style at the beginning of the Spring semester and started gathering sound materials several weeks later. We completed the sound prototyping before May 2014 and did the core sound design and editing during the last two weeks.

I was thinking of composing the score for myself because I had previous experience making music and I was very interested in it. Later it turned out to be a impossible thing for me due to my heavy workload on 3D. There was another option which was to find another composer to do a film score for me, but I didn’t do that neither because I had heard some song that many composers made for my friends, they were just too classical for my film, I want the music for my film to be abstract and modern, impulsive and electrical, so I asked my sound designer to find some sound-effects-like scores from RIT sound library and it turned out to be a right choice, they were the ones I was looking for.

The sound elements also came from the sound library and my sound designer did a fantastic job on the sound for my film. He chose many fictional sound effects that I liked and synchronized them perfectly with my animation.
Critique Reception/Feedback

SOFA Screening

Thesis animation “X” was completed and presented at the SOFA screenings on May 18, 2014. Professor Dave Sluberski was my respondent and made a very constructive analysis of the film (Appendix D).

Before the final screening, I was a little worried about my story and wondered if the audience would understand my movie. But it turned out that most of them got the idea of the film without too many problems. People’s feedback showed that they really like the movie and especially the realistic lighting, rendering and special effects. Some of them pointed out that the animation for my film is a bit stiff in several shots but others said that they like the stiffness of my animations because it made my characters behave like
robots. Some told me they could not recognize the final gesture of my gray robot but some said they could. Faculty feedback was generally positive, and student opinions were very interesting to hear. So all in all, I think it was a successful screening with some constructive feedback.

Festivals

After the screening, I did some re-render and re-compositing of my animation and then submitted it to some festivals.

At the time of this writing the animation has been officially selected by seven festivals from countries around the world, including USA, Spain, Brazil, Italy and Britain.

Conclusion

Experience

The experience I gained during my thesis project is huge. Before I started my thesis production, I was not very good at several areas of 3D animation, but with many efforts on every aspect of the film, I am now very confident about almost every aspect of 3D animation. I also realized how much I still have to learn and hone myself in knowledge and skills to make a much better version of my thesis. I am very clear that this was not the final step of my animation education, however, this was just the first step for me on my road to a professional computer graphic artist and filmmaker. Moreover, I found that in
order to create a great film, you have to have a great story, be willing to work with other people, be ambitious about your film, have patience and the ability to deal with tight deadlines.

**Challenges**

Aside from the experience, what I remembered the most were all the challenges.

I had a very hard time even before I did my thesis proposal. My initial ideas were not welcome among my peers and professors, so I had to change my mind completely. Later on my first proposal did not get passed which made me very nervous about my next proposal, it was very hard to nail down my story at that moment because I didn’t want to change my story into something that I didn’t like just to pass the proposal, so it took a long time to figure out how to balance my passion while still getting my proposal passed. After I passed my proposal I still needed to spend time working on my basic story structure to try to make my story more solid and reduce the scale of my story. In the meantime, my previous advisor left school and I had to find a new professor and tried to get used to a new advisor. During the process of creating my animatic, I had so many problems with my shots arrangement, I spent more than one semester on arranging my shots in the timeline. Finally before the screening there were a huge mount of 3D works to complete by my own and I also encountered the renfer farm failure...
Overall, looking back at my thesis I find that I acquired many skills and techniques for making better animations and developed a better understanding filmmaking, and the patience and confidence to overcome any difficulty. I will bring all of this invaluable wealth with me and forward on my way to success.

Appendix

Appendix A - ORIGINAL THESIS PROPOSAL - May, 2012

Working Title: X-100 - May, 2012

Synopsis

A war is being waged on the planet X in 2188 A.D. X-100 is one of many robot soldiers defending their home and their human leaders. Each group of soldiers must fulfill 100 days on the battlefield, then they can be emancipated and new robots will supposedly come to replace them. But this battlefield is actually the end of the line, and all robots will be sacrificed in human's plan. X-100 is the last one in his group alive and is on his final day of duty, he recalls the time with his friends fighting against the enemy. In the end, time is up and the spaceship comes. X-100 wants to tell them the truth but the bomb inside his body explodes and he dies. Finally, the ship leaves and all the new robots are going into the battle without knowing about the evil plan. This film will focus on strong visuals and imagery more than traditional story structure to evoke the emotion and drama of war.

Rationale

I want to make a short animated film around 6 minutes long. This is a 3D animation that includes special effects (Maya Dynamics). The major idea is to show the emotion of robots, tell the friendship of robots and reveal the cruelty of
war and strategy. By making this film, I want to use and improve my skills in 3D animation, special effects and compositing. The primary software packages being used will be Maya, Photoshop, After Effect and Nuke. The style of the visuals will be photorealism and I want to give the impression that this is a true story that happens in the not too distant future.

The special effects I will make are mostly in the war scenes and will include fire, smoke, lasers, and explosions.

(Reference 1, My 3D model)
Camera is zooming through space with voice over. [In the year 2188 A.D., a war between humans and aliens is being waged on the planet Geo (there should be a brief voice over or newspaper montage telling that human beings are producing more and more robots for space war). Planet Geo is a strategic point and robots are continually sent there to defend the frontline. The robot union protest for robot rights and has a contract with human that each robot must be emancipated after their duty time. (I will use the sound of robots and human to establish the background)] (Dissolve) Robot X-100 is sitting on the battlefield, protected by a small wall. He is injured and depressed and staring in front of him. There are no other living robots in sight, only the
scrap of dead ones littering the ground. He has an electric-countdown device around his neck and it says "1". The camera moves to the device and the color of the shot changes to indicate a flashback. (Memory 1) (begin with the close up of the device, the counter says “100” ) X-100 is sitting inside a spaceship with his teammates, they look very nervous like new soldiers. When the spaceship is landing on the ground, they hear a huge explosion from the battlefield and gets more nervous. (electric human sound from spaceship with alert) “Don’t be nervous, don’t be nervous...”, after the ship landed, Robots come out, (meanwhile, electric human sound from spaceship) “enemy’s main force is on the west side, it’s safe here, after 100 days we will bring you back...if enemy attacks here, signal for help, we will send human reinforcement...”, ship closes the door and leaves. The robots go around the fortification but finally they find all their comrades dead on the battlefield and they are very disturbed by this. X-100 lifts his fist and all the robots join in and show their courage and determination. “We, together!”(robot sound)(Back to reality) X-100 is walking along the defense fortification and he finds the remains of campfire. (Memory 2) The fire is burning and the robots are gathered around the campfire. One of the robots tries to get connected with human force (with wireless device) but no one responds “they will not come we are only the bait...” (robot sound), another robot says, X-100 and all the robots are exhausted and discouraged. The camera pulls out to show the devastation and dead robots all around them. Suddenly, "Their main force!" says one robot, they hear the enemy coming and they grab their weapons and prepare to fight. (Back to reality) X-100 keeps walking, with the grief and memory of his friends. He looks down into a large hole in the ground. (Memory 3) He is in a foxhole with his one last friend. They are surrounded by many enemies but are planning a counter attack. They jump out of the hole and carry out their scheme, running amongst dead robots, but the huge enemy machine starts attacking them heavily. His friend gets hurt and is about to die and he says to X-100 “Be survive...tell them the truth...", (Back to reality) X-100 looks at the dead body of this robot and then he sees all
his friends are lying dead on the ground. He sits down, feeling like a failure. Then there is a sound coming from the distance; a spaceship is landing on the ground. X-100 stands up slowly and reaches out to greet the ship but all of a sudden, "Beep!", the number jumps to 0. (camera zoom into the body quickly) The bomb inside him explodes and he is blasted into pieces (the sound is like the explosion sound in memory 1), and the remains of the other dead robots also explode at this time. The ship's door opens and new robots come out. “it’s safe here, after 100 days we will bring you back…”

The End

**VFX Treatment**

In the animation, most VFX elements will be created when our hero and his friends are fighting against the alien invader. My primary visual effects job is to create pyrotechnic effects (explosion, smoke, fire, dust, and laser), flash (gun and explosion) and camera shake to create the atmosphere of a battlefield. For example, at the end of X-100’s second memory, the enemy’s laser and missile, and in the third memory, X-100’s gunfire, the dust of his feet, and the explosions caused by enemy's weapon.

The primary software packages that will be used for VFX are Autodesk Maya, Adobe After Effects, The Foundry Nuke and Photoshop.

Maya is the main software to create the effects animation. Maya Fluids will be used to create the explosions, smoke and fire. Maya Particles and nParticles will be the key to creating the lasers and dust. Some effects like the smoke tail of the missile will be achieved by combining both fluids and dynamics. Other effects (flash, camera shake, motion blur etc) will be added in the compositing process with After Effects and Nuke.

This VFX Demo Reel can show the concept and basic process of VFX and compositing.
My VFX Demo Reel: vimeo.com/ruudy/vfx

(VFX Reference 1, my test)

(VFX Reference 2, my test)

The transaction between reality and memory can refer to the 3D animation film "9".
Timeline and Budget

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Fall

- Week 1: Script
- Week 2: Character Design and Modeling
- Week 3: Animatic
- Week 4: Rigging
- Week 5: Blocking and Animation
- Week 6: Texture & Light
- Week 7: Special Effects
- Week 8: Sound
- Week 9: Rendering
- Week 10: Final Editing

Winter

Spring

Music
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| TOTAL          | $2159 |
Appendix B - CHARACTER DESIGN SKETCH

Images of character design.

Appendix C - STORYBOARD AND ANIMIATIC EXCERPT
Appendix D - ANIMATION POSTER AND STILLS

Poster:
Production Stills:
Appendix E - Dave Sluberski’s response, SOFA Screening, May, 2014

Compassion transcends even a short existence: whether one is human, or otherwise.

This entire film is an allegory for our human existence:

Birth occurs when the gold robot emerges from manufacture, exhibiting the first sign of self-awareness when it looks at its hands.

Childhood and growth occur during the testing with mock warfare, gaining appreciation for teamwork with another, signified by the silver robot.

Childhood ends with the “death” and recycling of the teammate silver robot, leaving the gold robot to enter Maturity, or Adulthood, fully trained and with compassion for another, to begin fulfilling its true purpose.

My youngest son is on active duty in the Marine Corps. It has given me a completely new understanding of the human element in modern conflicts. It all starts out with good intentions, but at the end of the day, how is it all driven?
In this film, I feel empathy for both of these characters, and despite whatever their intentions may be, programmed or not, they are ultimately manipulated, with little or no control over their own destiny, much like modern human conflicts.

I love the look of this film, the soundscape is spectacular, with particular regard to the effective non-verbal communication, timing sensibilities and photographic use of light and shadow.

I think this thing is fantastic, and I absolutely love it!