

**THE CHIMAERA PROJECT: AN ONLINE DATABASE OF  
ANIMAL MOTIONS**

A Thesis

by

JULIE KATHERINE GELÉ

Submitted to the Office of Graduate Studies of  
Texas A&M University  
in partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE

December 2007

Major Subject: Visualization Sciences

**THE CHIMAERA PROJECT: AN ONLINE DATABASE OF  
ANIMAL MOTIONS**

A Thesis

by

JULIE KATHERINE GELÉ

Submitted to the Office of Graduate Studies of  
Texas A&M University  
in partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE

Approved by:

Chair of Committee,	Carol LaFayette
Committee Members,	Ergun Akleman
	B. Stephen Carpenter, II
Head of Department,	Mark J. Clayton

December 2007

Major Subject: Visualization Sciences

## ABSTRACT

The Chimaera Project: An Online Database of Animal Motions. (December 2007)

Julie Katherine Gelé, B.S., Texas A&M University

Chair of Advisory Committee: Prof. Carol LaFayette

Digital animators will save vast amounts of project time by starting with a completed skeleton and some base animations. This result can be accomplished with Web 2.0 technologies by creating a repository of skeletons and animations that any animator may use for free. While free Maya™ skeletons currently exist on the Internet, the websites housing them have only brief features and functions for browsing and interacting with these files. None of these websites contain downloadable animations for the provided skeletons.

The Chimaera Project improves the field of Web 2.0 sites offering free rigs by offering many new features and freedoms to the animation community. Users may upload and download Maya™ skeletons, share comments and tips with each other, upload animations associated with the skeletons, and search or browse the skeletons in a variety of ways. The skeletons include descriptions and information provided by the creator and are categorized by class, order, and species.

Users may access a freely provided script called “zooXferAnim” to import and export animations into text files to be uploaded and downloaded on the website. Many animations per skeleton may be uploaded. The Chimaera Project extends the Web 2.0

community by creating an interactive resource for animators to contribute and share content in a better, more organized format than previously seen on the Internet.

## **DEDICATION**

This thesis is dedicated to my parents for buying that first computer way back when, and indulging my endless fascination with all things electronic, without which I would not be where I am today.

## ACKNOWLEDGEMENTS

I am thankful to my committee members, Carol LaFayette, B. Stephen Carpenter, II and Ergun Akleman, whose unerring guidance, and excellent suggestions and comments have pulled me through this project.

I would also like to thank the Visualization Program of Texas A&M University and its students in their support and contributions to this project. I couldn't have done it without your feedback. Gig 'em!

Last but certainly not least, I would like to thank my family for supporting me during these trying years at Texas A&M and pulling me through the hard times.

## TABLE OF CONTENTS

	Page
ABSTRACT .....	iii
DEDICATION .....	v
ACKNOWLEDGEMENTS .....	vi
TABLE OF CONTENTS .....	vii
LIST OF FIGURES.....	ix
LIST OF TABLES .....	x
1. INTRODUCTION.....	1
1.1 Statement of Purpose.....	6
2. BACKGROUND AND REFERENCE MATERIAL .....	7
2.1 Web 2.0 Communities.....	7
2.2 Animal Movement Research.....	10
2.3 Animation Databases.....	10
2.4 MEL Scripting in Maya™.....	11
2.5 Other Software .....	11
3. METHODOLOGY .....	13
3.1 MEL Script - zooXferAnim .....	13
3.2 Character Setup .....	13
3.3 Animation Transference Implications .....	14
3.4 Animation Methodology .....	15
3.5 Application to Other Species.....	15
3.6 Designing the Website .....	15
3.7 Graphical Layout.....	16
3.8 Site Map .....	18
3.9 Pages and Sections .....	19
3.10 Use of Icons.....	20
3.11 Interactivity Design .....	24
3.12 Coding the Website .....	25

	Page
3.13 Cross Browser Compatibility .....	25
3.14 Registration / ToS.....	26
3.15 User Account Features .....	27
3.16 Uploading Rigged Skeletons and Animations .....	28
3.17 Downloading Rigged Skeletons and Animations.....	29
3.18 Website Features .....	29
3.19 Security Issues.....	29
3.20 Creating the Community .....	30
3.21 Creative Commons License .....	30
4. EVALUATIONS.....	32
4.1 Questionnaire 1 .....	32
4.2 Questionnaire 1 Results.....	33
4.3 Questionnaire 1 Question 7 Responses .....	35
4.4 Questionnaire 1 Results Discussion .....	36
4.5 Questionnaire 2 .....	37
4.6 Questionnaire 2 Results.....	38
4.7 Questionnaire 2 Results Discussion .....	42
5. ADDITIONAL WORK.....	43
5.1 Additional Website Features .....	43
5.2 Additional Content .....	43
5.3 Spreading the Word.....	44
6. FUTURE DIRECTIONS.....	45
6.1 Future Thesis Directions .....	45
7. CONCLUSION .....	46
REFERENCES.....	47
VITA .....	51



## LIST OF FIGURES

FIGURE	Page
1	Buckbeak the hippogryph from <i>Harry Potter and the Prisoner of Azkaban</i> ..... 2
2	Andy Serkis in his King Kong motion capture suit ..... 3
3	Gryphon in flight from <i>The Chronicles of Narnia: The Lion, the Witch, and the Wardrobe</i> ..... 4
4	Screenshot of the layout of The Chimaera Project..... 17
5	Site Map of the main portion of The Chimaera Project ..... 18
6	Site Map of the Your Account section of The Chimaera Project..... 19
7	Screenshot of the icons of The Chimaera Project view rig page ..... 21
8	Icons used to define animal classes while browsing rigs ..... 23
9	Icons used to define motions while browsing animations..... 24

**LIST OF TABLES**

TABLE		Page
1	Questionnaire 1, Questions 1 - 6 Results .....	34
2	Questionnaire 2 Results.....	39

## 1. INTRODUCTION

This thesis describes a methodology for creating a web-based resource for a community of riggers, animators, and modelers. The process involves creating an intuitive user interface and populating the website with resources for both professional and hobbyist animators and riggers.

Computer animation has clearly become a mainstay in mainstream media. Whether the project is a feature film, a commercial, video game cinematics, or a 2D billboard, demand steadily grows for 3D creatures and animations. Companies need creatures to move as realistically as possible. By examining successful creatures from Hollywood, a viewer will notice that they are composed of very recognizable parts; these familiar parts and motions cause them to appear realistic [Fleming & Schrand, 2007]. The audience accepts the illusion of realism and retains the suspension of disbelief; the motion appears realistic when the audience identifies, consciously or not, the creature's movement as something from the real world. Nearly every gruesome science fiction monster has been of biped design; this lends the creature a more acceptable appearance to the audience. [Fleming & Schrand, 2007]. Humans are used to viewing bipeds every day and find themselves most comfortable with them [Fleming & Schrand, 2007].

Similarly, creatures with more than two legs are based upon familiar real animals in order to preserve the illusion of realism. Even very alien creatures possessing many limbs and strange body configurations possess movement based upon real animals

---

This thesis follows the style and format of the *ACM Transactions on Computer-Human Interaction*.

which gives the creature a semblance of life it otherwise would lack [Fleming & Schrand, 2007].



Figure 1. Buckbeak the hippogryph from *Harry Potter and the Prisoner of Azkaban*. © 2004 Warner Bros. Pictures [Buckbeak, 2007].

In the film *Harry Potter and the Prisoner of Azkaban*, a hippogryph appears as a mixture of eagle and horse parts as seen in Figure 1. The animators chose to move this creature with an equine gait. The audience members easily identify with the familiar gait, even though the creature only partially resembles a horse. Thus, dramatic scenes in which the creature appears remain seamlessly realistic to viewers.

Even quadrupedal animals may feature bipedal motion to anthropomorphize them to a greater degree. In the recent film *King Kong*, the giant ape Kong was animated

using motion capture from a human actor mimicking an ape as seen in Figure 2. This approach resulted in a familiar character with recognizable emotions of anger, frustration, confusion, and wonder. The giant ape exhibited both gorilla and human behavior, making his emotions and intentions clear and precise to the audience [Tolles, 2005].



Figure 2. Andy Serkis in his King Kong motion capture suit. © 2004 Universal [Kong, 2007].

A wide variety of digital creatures appeared in *The Chronicles of Narnia: The Lion, the Witch and the Wardrobe*. From real animals, like leopards, cheetahs, rhinoceroses, and polar bears, to mythological creatures, such as gryphons and bat-like demons, this film created realistic creatures with believable motions. These digital

creatures gathered their motions directly from real animals. The mythological creatures were assembled from various parts of the real animals they resembled. In the film, gryphons resembled leopards when running on the ground and eagles when in flight as seen in Figure 3.



*Figure 3. Gryphon in flight from The Chronicles of Narnia: The Lion, the Witch, and the Wardrobe. © 2005 Disney Enterprises, Inc [A Gryphon Flying Into Battle, 2007].*

Professional animation studios have used various techniques for many years to create realistic motion. The studios often draw upon libraries of rigged skeletons and animations. Hundreds, even thousands, of hours have been spent in creating these animations and libraries; however, these animations and rigged skeletons are not available for public use. The goal of The Chimaera Project is to create a free, web-based

community in which people may congregate to contribute and share animations and rigged skeletons.

Animators of all proficiencies benefit from a “Web 2.0” website dedicated to providing free Maya™ rigs and animations. Professionals and students alike have deadlines to meet. As part of an anonymous questionnaire, I gathered estimates of time fellow students spent on rigging. These students can save up to seventy percent of project time by finding a suitable skeleton ready for use. Novice riggers and animators may choose to download popular, well-developed rigs and animations and learn from these by example. Additionally, the website features a useful forum where users may post links to favorite tutorials and a variety of resources.

Currently, few websites exist that contain free, albeit limited, content for rigging. Websites, such as Rigging101 (<http://www.rigging101.com/>), hosted by two Vancouver Film School students, features five unique rigs. These rigs are well documented with well developed instructions, but they feature no associated animations. Only one of the rigs is a quadruped. The website also houses a variety of scripts and visual tutorials, a great resource for animators of all types [Solsona & Llobera, 2007]. HighEnd3D.com also hosts a variety of rigs. However, like Rigging101, these rigs have no associated animations. Most of these rigs feature bipedal humans or human-like creatures, interspersed with a few machines, such as cars, airplanes, and a reclining chair [Character Rigs for Maya, 2007].

The website I created houses rigs and animations for real animals. These animations are categorized into walking, running, swimming and flying cycles. Imagined

creatures, such as gryphons or dragons, will also be found on the website accompanied by associated animations. Cross animation from real to imaginary creatures will also be possible if the rigs are compatible. A Maya™ Embedded Language (MEL) script transfers motion from the animation file to the rig, and vice versa. Further discussion on rigged skeleton compatibility can be found in the “Animation Transference Implications” section.

### **1.1 Statement of Purpose**

The intent of the research presented in this paper is to create a web-based community from which both novice and professional animators may find resources to help finesse projects. The website houses rigged skeletons and animations free for use. Tools are also provided for animators to contribute to the community. They may add rigged skeletons and animations associated with them. The process of downloading and using the rigged skeleton and animations should be easy to implement. This will save users many hours of rig setup and base animation time.

This thesis aims to create a solution to the problem of creating realistic motion for real or imagined animated creatures. Maya™ users may create a wide variety of creatures with various gaits from existing files already in the database. While the website may be aimed at novice and student animators, professional animators may also find useful resources. All results are free for both parties, and all content will be protected by a Creative Commons license.



## **2. BACKGROUND AND REFERENCE MATERIAL**

### **2.1 Web 2.0 Communities**

In the late 1990s, the Internet came into power during the technology boom. Websites began to exhibit a distinct divergence. Older websites were termed “Web 1.0” while newer, interactive websites were labeled as “Web 2.0.” Web 1.0 sites featured static information that was created and uploaded by one person or group of people. Web 2.0 sites “embraced the power of the web to harness collective intelligence” [O'Reilly, 2007]. For example, Britannica Online™ offers a Web 1.0 website while Wikipedia offers a Web 2.0 website. Britannica Online™, developed in 1994, was the first encyclopedia for the Internet and made the entire text of the Encyclopædia Britannica™ available worldwide [History of the Encyclopaedia Britannica and Britannica Online, 2007]. These texts were researched and written by a group of people employed by Encyclopædia Britannica™. A user browsing the website may only read what has already been written. The user may not change or add content. Wikipedia transcends this older style of website by creating an encyclopedia that encourages the audience to contribute. While not the first of this type of informative website, Wikipedia is by far the most successful. Started in 2001, Wikipedia now contains millions, perhaps billions, of pages of unique articles in a dozen different world languages [History of Wikipedia, 2007]. Using Wikipedia, a user creates an account and submits new information to an article. Inappropriate changes are usually removed quickly, and repeat offenders can be blocked from editing [History of Wikipedia, 2007]. Thousands of changes are made

every hour to this vast collection of information [History of Wikipedia, 2007]. While this website, with its interactive content, may be updated much more frequently and contain much more information than Encyclopædia Britannica™, its integrity has also been compromised by allowing anyone to edit content [ZDNet Government, 2007]. Users combat this by referencing sources in Wikipedia articles, but all information must be taken with a grain of salt [ZDNet Government, 2007]. While some information may be false, the vast majority of the information tends to be accurate. Wikipedia clearly harnesses the collective intelligence of humanity.

Many other Web 2.0 examples exist. Sites, such as Flickr.com™ and del.icio.us™, base themselves upon user contributed content. Flickr.com™ allows users to create online galleries of personal photos. Users may upload photographs and insert captions, comments and titles. Del.icio.us™ houses a community of links created by users to be shared among friends and people of like interests. These websites employ a concept called “tagging”. Tagging allows users to create a list of keywords or phrases associated with non text-based content. When another user searches for something, the search returns the most appropriate results. A puppy image may be tagged “dog, puppy, cute, young.” The search would return this image to a user searching for “young dog.” Tags are infinitely useful in categorizing non text-based content, such as links or images. Typically, computers cannot identify image content. The user must provide these tags to correctly categorize the image. These tags are also called “metadata.”

Information in Web 2.0 sites tends to be updated constantly. This is an advantage, as a user will return much more frequently to view new content. While an

article about a famous character is updated many times a week on Wikipedia, a static article on Encyclopædia Britannica™ may only be updated every few years. With the work of updating content divided across the entire world, a task that may take a team of a few people months to complete will take one hundred people a few hours.

There are disadvantages to Web 2.0 sites. If the community site is not watched, malicious acts may become common. For example, a person may enter offensive or obscene material in a Wikipedia article. If the community does not notice immediately, this content may be viewed by young children and cause emotional harm. Wikipedia combats this abuse with a worldwide network of “police.” These police monitor changes to the content; however not all websites have similar resources. Smaller Web 2.0 sites may find that information is corrupted faster than it can be policed. Problems like these require a web community to enact protections and to dedicate human resources to protecting valid content against malicious intruders.

While free content is not a requirement of Web 2.0 communities, many of the most successful websites focus on offering free content. All features of these websites are accessible to anyone who wishes to sign up for a user account. This may include photograph uploading, text additions, blogs, biographies, and commenting on other users’ endeavors. The Internet has evolved from a visual catalog to an interactive, world-wide community.

## **2.2 Animal Movement Research**

Recreation of existing animal motions may be one of the most difficult jobs an animator can undertake. A viewer may simply observe the real animal to see if the motion on the animated creature matches. Modern animation studios have many more resources than the average hobbyist or student animator such as extensive motion capture devices that can be pasted on a physical creature to record muscle movement. While an animator may not always choose motion capture for a project, it can save huge quantities of time and can provide a cheaper alternative than key frame animation [Geroch, Hirsch, Staveley, Tolles, Helfer, & Varadarajan, 2002]. When facing a deadline, an animation provided from motion capture or downloaded from a website will allow time for the animator to finesse movement, rather than the animator having to recreate basic motion.

## **2.3 Animation Databases**

Nearly every animation company in existence uses an animation database. These databases house a repository of models and motions that can be reused to generate new sequences [Huang, Huang, Prabhakaran, & Ruiz, 2003]. For example, a model of a dog with a kicking leg may be tweaked to show the dog kicking a ball. The model and animation are already provided, saving the animator time he would have otherwise spent creating them. However, the originating studio copyrights these models and animations, preventing free use by student and hobbyist animators. Students can greatly benefit from

a free, public animation database for projects that require a model and skeleton. A free model and rig allows the student to spend time focusing on the project of animation.

## **2.4 MEL Scripting in Maya**

Maya™ uses Maya™ Embedded Language (MEL) scripting for programmers to create plug-ins and interact with the software. Animators frequently use MEL scripts to import and export portions of creature skeletons, animations, and objects. Information can be saved in a permanent location, such as a text-based file. Another user can then read this file with a specific MEL script created to load that information into the Maya scene. Since animation is composed from a series of numerical values representing motion and rotation of joints, these values can be exported and imported using MEL scripts. The user can then save these values to a file, and another animator can import them. MEL scripting is widely supported by an active development community and a large variety of resources.

## **2.5 Other Software**

In order to remain competitive in the market, other animation programs offer capabilities similar to those in Maya™. A variety of scripts exist for these animation packages that allow animation to be imported and exported from programs other than Maya™. Blender™, a free, popular modeling and animation program, includes script writing tools. SoftImage™ is also capable of importing and exporting animation, as utilized by Human Head Studios in the video game “Rune™” [Gwynhala, 2001]. These

programs are in use by animators around the world. Creating a database in one program's format would render it useless to animators who use another; however, no matter which software is used, these scripts use the same animation values. For example, in all programs, a joint will rotate ninety degrees; the math does not change between programs. A translation may be applied between the exported data from one software package to be used in another software package. This may require something as simple as reordering the values for the new program to input the values properly. It may also require more advanced mathematics, such as 3D rotations if axes need to be rotated for the new program.

### **3. METHODOLOGY**

#### **3.1 MEL Script – zooXferAnim**

Hamish MacKenzie of MacaroniKazoo.com has graciously allowed The Chimaera Project to use his Maya™ MEL script entitled “zooXferAnim .” This script allows a user to export animation values from a Maya™ skeleton into an external text file. In doing so, the user may then upload this text file to The Chimaera Project to share with others. Similarly, “zooXferAnim” allows a user to import animation from a given text file onto a Maya™ skeleton. Instructions for installation and the importing and exporting of animations are provided on The Chimaera Project website with graphical references and accompanying text. Step by step instructions render this process easy for even the most novice computer users.

#### **3.2 Character Setup**

A rigger should follow standard practices when creating a skeleton for The Chimaera Project. The “zooXferAnim” script relies upon properly named joints and controls; the user should identify each one with a unique name. This prevents confusion within the script when importing and exporting animations. Named properly, the imported animation will be identical to the source. Should a joint be named improperly or identically to another joint, the resulting imported animation will appear incorrect. It will either lack animation for both joints, or one of the two joints will try to move with the motions of both joints at the same time.

### 3.3 Animation Transference Implications

Forward kinematics involve rigging a skeleton such that a joint is moved by specifically rotating that joint. Inverse kinematics involve creating two or more joints connected by a third structure called an “IK Control” that is inserted between the furthest two joints so that the entire limb is controlled by the tip of the IK control. This allows all the joints in between the two tips of the IK Control to move automatically. The values that drive these animations differ greatly. Forward kinematic joints export rotation values. Inverse kinematic joints are controlled by the absolute position of the IK control point. Thus, transferring animation from an inverse kinematic limb to a forward kinematic limb is not possible. Similarly, should one try to transfer animation from a forward kinematic limb into an inverse kinematic limb, the resulting animation will not function.

Rigs using absolute values in key framing will need to contain similar scales for motion to properly transfer. For example, if an animator attempted to transfer a walk animation from a large dog to a small dog, the small dog would be take steps too large for its small body.

To solve this problem, animators should ensure the two rigs, if not identical, have similar bases when transferring animations between two different rigs. Important factors include inverse or forward kinematic limbs and similarity of scale. Rigs may have different shapes and sizes, but if the configurations are similar, animations will transfer smoothly between the two.



### **3.4 Animation Methodology**

To ensure proper animation exports from the rig in Maya™, the animator selects all joints and controls that have animation key framed to them. If the animator misses a joint or control, the exported animation file will not contain the motion for that joint or control. This can result in a very awkward motion.

### **3.5 Application to Other Species**

Animations may be transferred from species to species. An animator needs to study the originating rig and its motion and then name the joints of the target rig with the same names as the originating joints. As mentioned above, the animator should be careful to transfer motion to acceptable rigs, such as forward kinematic limbs to forward kinematic limbs, inverse kinematic limbs to inverse kinematic limbs, and transfer to rigs of similar scale over all.

### **3.6 Designing the Website**

Modern monitors have greatly affected the design of today's websites. High resolution, millions of colors, and brighter more accurate displays have increased the need for a thoughtful approach to website design. The Chimaera Project was designed to follow most standard web design practices. Any variations from standard practices are due to personal choice rather than error.

### 3.7 Graphical Layout

Modern monitors tend to have much higher resolution (the number of pixels in a given display) than monitors of five years ago. Today's standard is 1024 x 768 pixels [Display Resolution, 2007]. With this in mind, websites need to be designed in a way that suits the vast majority of viewers. A website annoys users if it is too large to fit on the screen, requiring the user to scroll horizontally and vertically [Smith, 2007]. Vertical scrolling has become the standard for users. The advent of the mouse scroll wheel, which allows quick and easy vertical scrolling, reinforced the vertical nature of most websites [Smith, 2007]. With this in mind, The Chimaera Project was executed with a maximum width of 1024 pixels, which will fit within the current standard resolution and easily fit within higher resolutions typically used by artists and animations.

Color choices for websites are very subjective: what one person may like, another may intensely dislike. Bright yellow and red catch the eye faster than other colors [Your Choice of Web Site Color, 2007]. The Chimaera Project was designed with primarily neutral tones of beige with subdued dark red elements. The dark red areas do not overwhelm the users' eyes and draw them to each link as well as to the title portion of the website. To avoid overwhelming the user, only two colors are employed. The addition of a third color element is not necessary and would throw off the visual harmony within the website. Figure 4 shows a screenshot of The Chimaera Project's layout and color scheme.

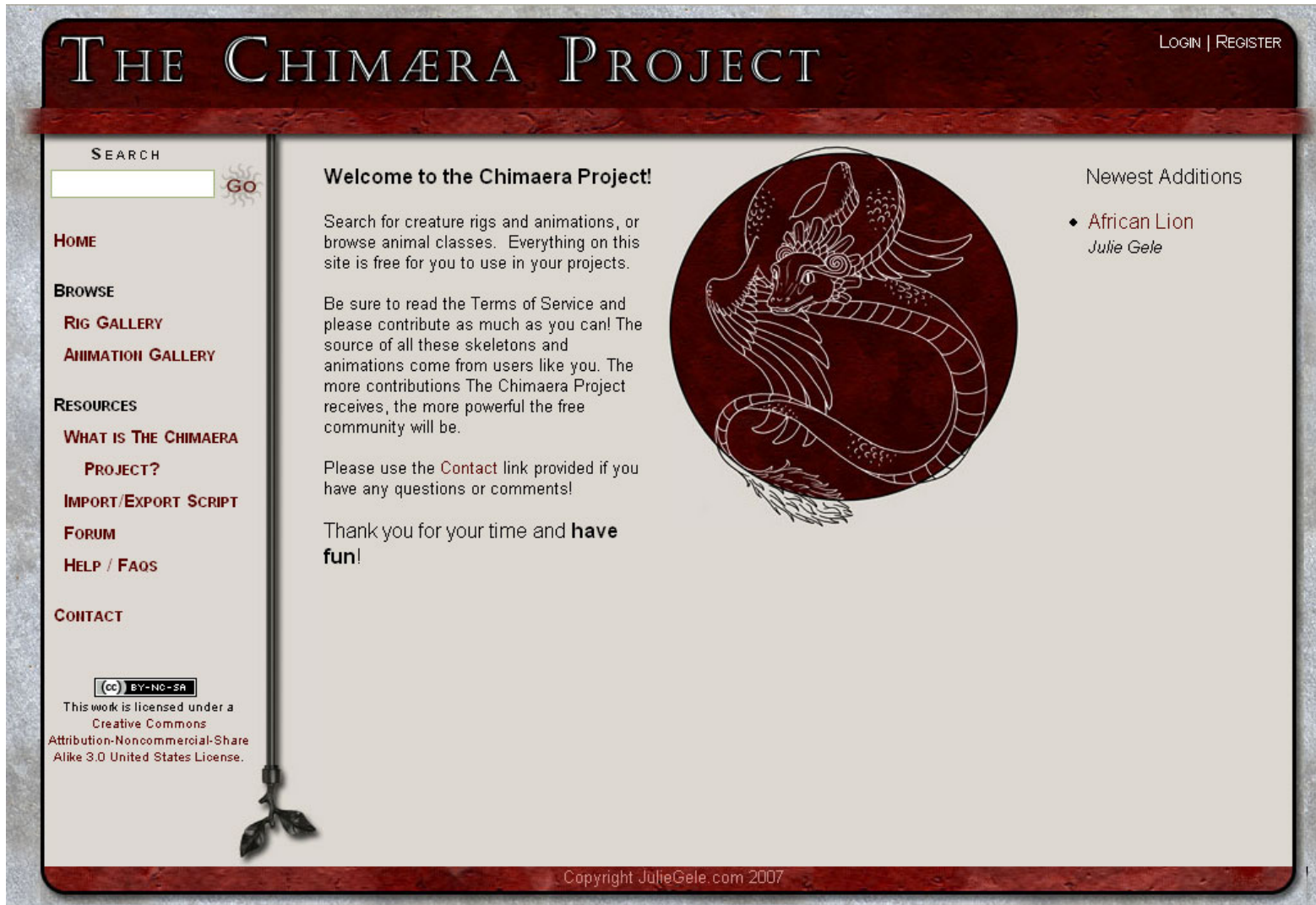


Figure 4. Screenshot of the layout of The Chimaera Project. © 2007 Julie Gele.

### 3.8 Site Map

Figure 5 shows a graphical representation of The Chimaera Project's links and main pages. Figure 6 continues this chart by showing all pages associated with the "Your Account" section.

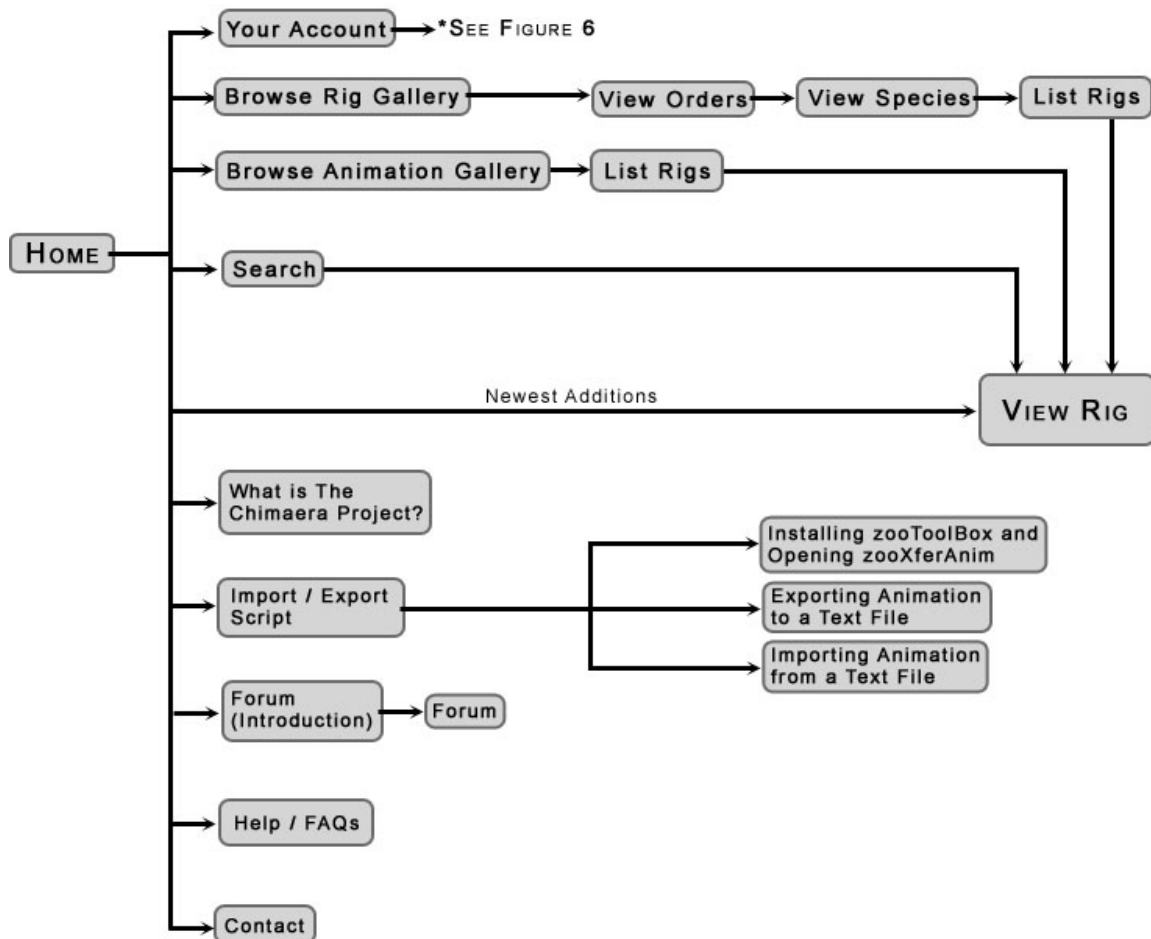


Figure 5. Site Map of the main portion of The Chimaera Project. © 2007 Julie Gele.

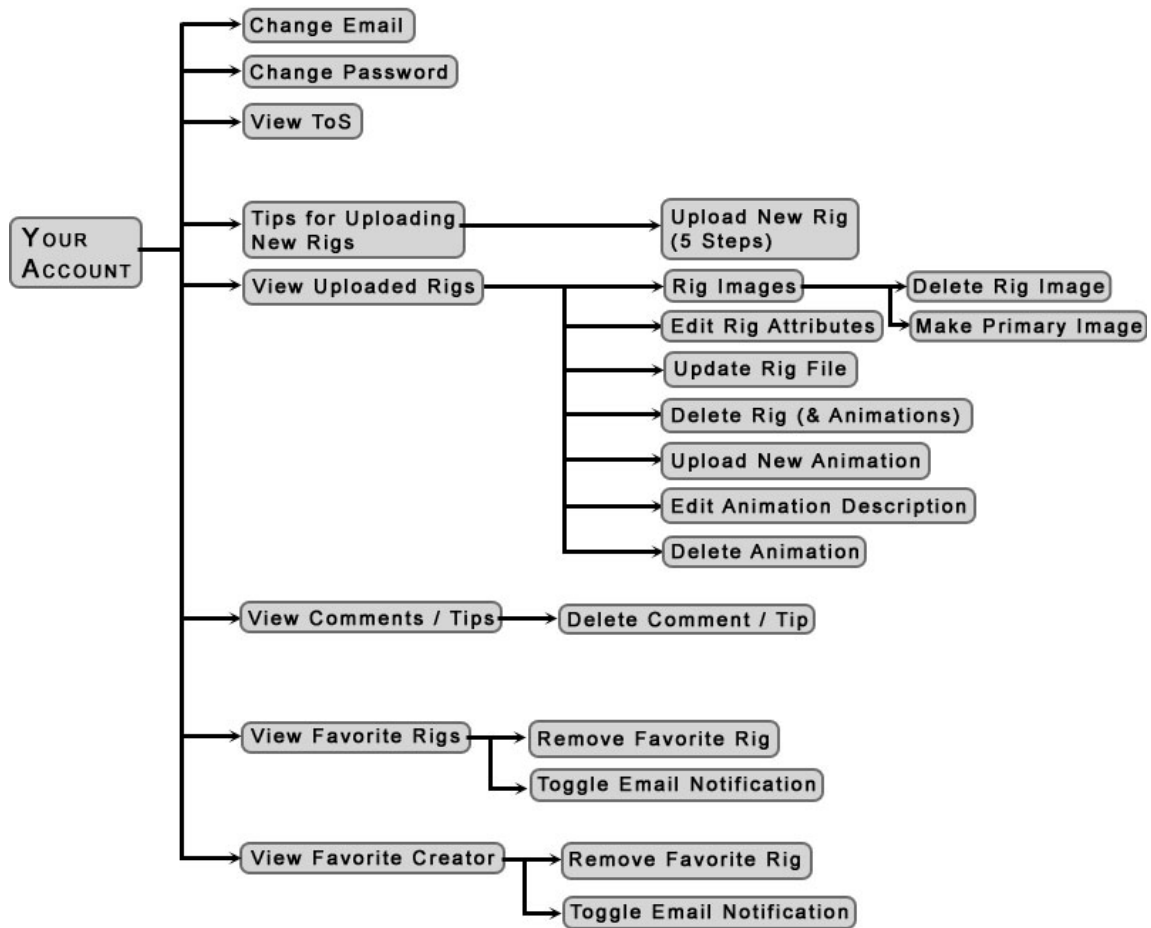


Figure 6. Site Map of the Your Account section of The Chimaera Project. © 2007 Julie Gele.

### 3.9 Pages and Sections

The Chimaera Project is divided into five major sections.

*Browsing: Rig Gallery.* A user is able to browse rigs by class, order, and species.

For example, to view all uploaded rigs of African lions, a user would click the “Mammals” link, then “Cats,” then “African lion.”

*Browsing: Animation Gallery.* Users may browse rigs sorted by specific motions: walk, run, swim and flight cycles, full and partial body movements, and other movements.

*Your Account.* Users may control all aspects of their accounts in this section. They may update personal information, view the “Terms of Service,” upload new rigs, view all uploaded rigs, update and edit those rigs and descriptions, view and delete comments created, and view favorite rigs and creators. They may also delete any of the previously mentioned items and toggle whether or not e-mail notifications are received when that rig or creator is updated.

*Resources: What is The Chimaera Project?, Import/Export Script, Help / FAQs* These pages describe the purpose of The Chimaera Project, provide extensive instructions on how to use the “zooXferAnim” script with Maya™, and provide answers to frequently asked questions.

*The Forum.* The forum features sections that allows users to share skeletons and the names of skeleton creators they particularly likes with others, ask for help, find answers concerning the website, link favorite tutorials, links to other resources, and collaborate on how to use Maya™.

### **3.10 Use of Icons**

The repeated use of icons helps the user perceive a sense of consistency in all pages of a website, even if the content differs greatly [December, 2007]. The Chimaera project liberally uses icons combined with enclosing titled boxes to help locate

information quickly and efficiently. Each icon is defined with a word or two clearly describing what each mean. While many of the icons are arbitrary symbols chosen for their relation to the information they represent, the Download icon is a web standard for file download. This icon features an image of a floppy disk with a down facing arrow. All icons used on the primary rig view page may be seen in Figure 7.



Figure 7. Screenshot of the icons of The Chimaera Project view rig page. © 2007 Julie Gele.

Many websites have cumbersome vertical navigation where the user is left to search through too much vertical screen space for the information requested. The Chimaera Project employs a horizontal navigation bar at the top of the page that allows the user to access information quickly and efficiently. This bar contains links to the skeleton's download link, description, animations, and comments. If a page contains a very long description, the user may jump immediately to animations or comments following that description. Otherwise, the user may be forced to scroll through this long description to find the sections he wishes to view.

Similarly, icons are provided for a user to mark a certain rig or a certain creator as a favorite. Rigs may be selected as a favorite by clicking on the red star next to the creature name. A creator may be selected as a favorite by clicking on the red outline of a star next to the creator's name. An icon of a red star with a yellow burst in the center indicates that that particular rig or creator is currently watched by the user. Selecting favorite rigs and its implications are discussed later.

When viewing the Rig Gallery or Animation Gallery page, a set of icons are provided that help users identify the section they may wish to browse. The Rig Gallery is ordered into rough classes of creatures, such as mammals, birds and reptiles. Insects belong to a different phylum and are categorized into many classes. In order to not have a dozen classes listed for different insects, all insects are grouped into a master "Bug" class. Similarly, all other invertebrates can be found in the "Squishies" section. Anything that may not fall into the above categories and is a real animal can be found in the "Other" category. All non-existing monsters and creatures can be found in "Chimaeric



Creatures.” Figure 8 shows these animal icons associated with their classe, while Figure 9 shows the icons associated with motions.

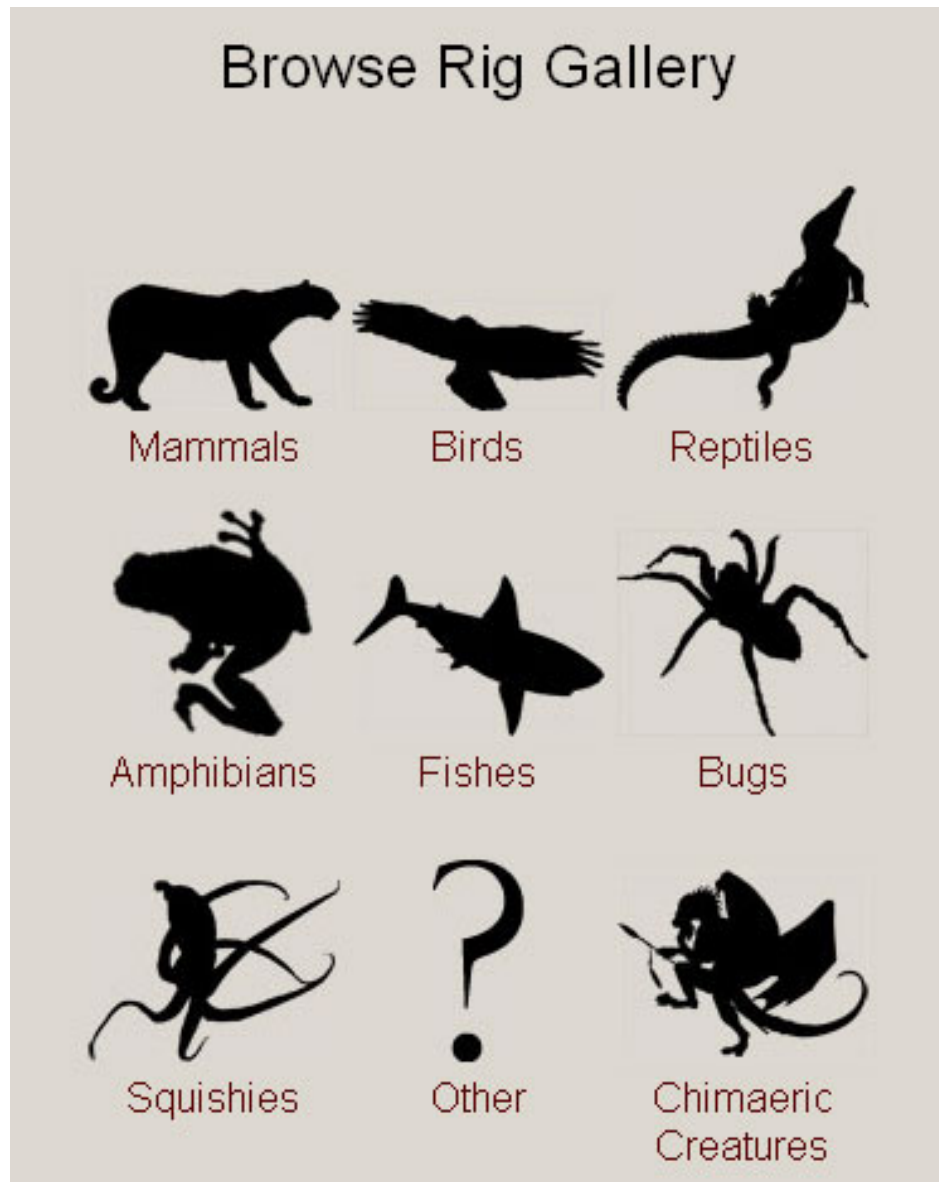


Figure 8. Icons used to define animal classes while browsing rigs. © 2007 Julie Gele.

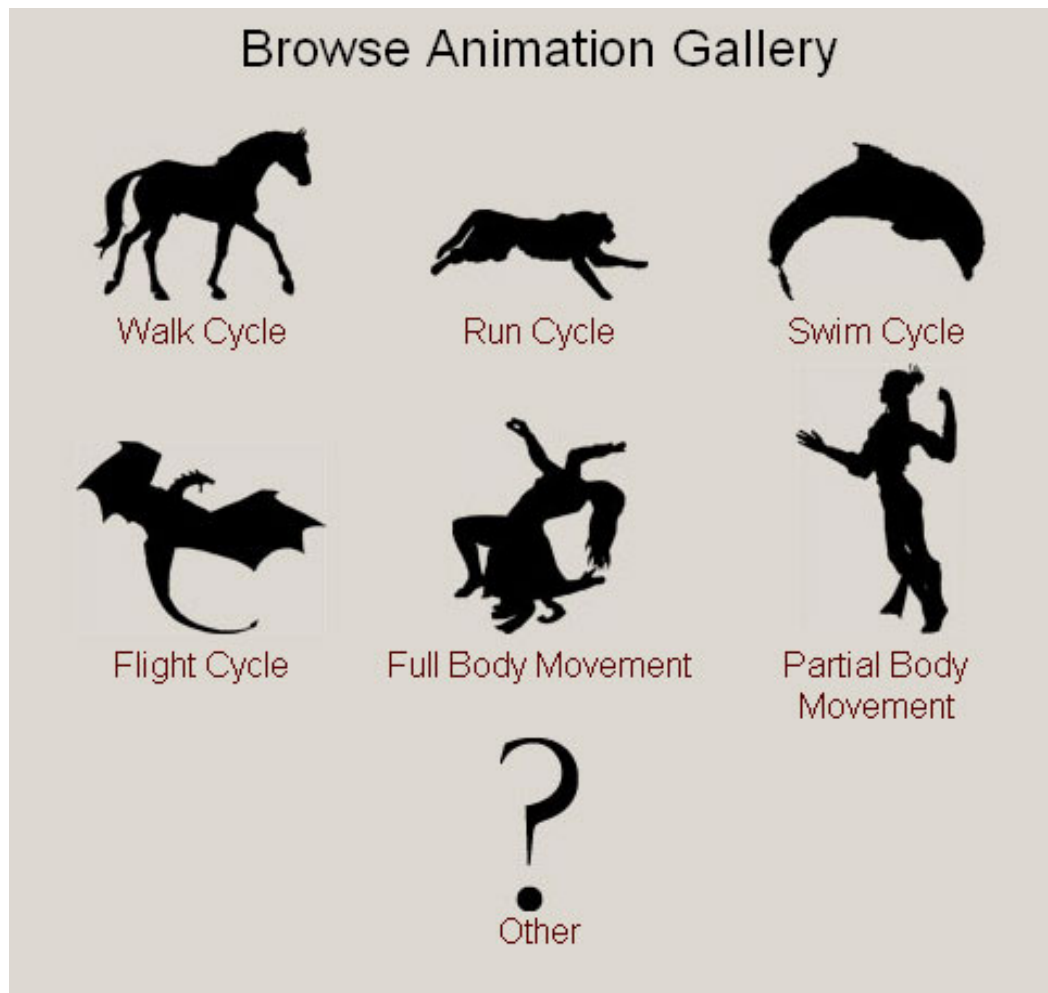


Figure 9. Icons used to define motions while browsing animations. © 2007 Julie Gele.

### 3.11 Interactivity Design

The success of the modern Internet can be based upon the responsiveness and intuitiveness of a given website. Instant gratification has become the standard for most Internet practices [Linden, 2006]. All controls on The Chimaera Project are designed to be intuitive and accessible. The main menu provides quick and easy links to major

sections. Static links at the top of the layout provide links to log in, log out and access the user's account instantly.

### **3.12 Coding the Website**

PHP: Hypertext Preprocessor (PHP) is a server-side scripting language that allows a coder to create web pages containing dynamic content. In this way, one page may be written that shows the skeletons' information and animations one at a time depending upon the variables passed to the page. Similarly, it allows users to input and handle content so that the website may be contributed to by users. All information input by users is contained in a Structured Query Language (SQL) database. This information is referenced, added to, edited, and deleted using PHP commands.

### **3.13 Cross Browser Compatibility**

The Chimaera Project is compatible with any browser. The site is coded in PHP, which the server handles. After the PHP page compiles and executes on the server, the information sent to the users' client-side machines contain only standard Hypertext Markup Language (HTML). HTML, shared by all browsers, requires no special software or scripts on the client side. The Chimaera Project also only uses the most basic HTML tags since some advanced HTML tags may cause problems in older browsers. By eliminating these tags, the website will function properly across all browsers and browser versions.

### 3.14 Registration / ToS

Users must register before they may download, or add a skeleton or animation to the website. Registration requires the user agree to the Terms of Service (ToS), which state:

#### **Downloaders**

You may only use these skeletons and animations for personal projects.

No end result may be sold while the provided file is free. You may not sell any Maya files to a given user unless you have purchased a license to do so from Autodesk. To do so, you may email them at:

advbus.abc@autodesk.com.

Means to sell your Maya files will not be provided on this website. All content will remain free of use to any user.

#### **Contributors**

All files must be created wholly by the contributing user. No skeletons or animations from the base of another's skeleton or animation will be allowed **without the creator's express permission**. Should a skeleton or animation be discovered to have broken this rule, the skeleton and animations will be removed from The Chimaera Project and the user warned. Should the user persist in uploading files using another's work

without that person's permission, the user will be banned from further interaction on The Chimaera Project.

After accepting these terms, the user may then log in and download and submit files to The Chimaera Project.

### **3.15 User Account Features**

Once users create an account and log in, a variety of options are available. People frequently make mistakes when authoring content [Nielsen, 2000]. It is very important for a website that allows user submissions to allow those users to edit content previously submitted [Nielsen, 2000]. Users may control their accounts by changing the associated email or password or view the Terms of Service again. There are also clear controls for uploading Maya™ skeletons and animations. All inputs are clearly labeled. After submission is complete, the user may edit any part of the information including updating the file. When a file is updated, the listing which all other users view on the main portion of the website shows precisely when it was last updated. Using this value, users can determine if a rig they previously downloaded needs to be updated in their own projects.

Users may upload images associated with their skeletons. These may be screenshots of their skeletons or pictures of the animal the skeletons represent. These images will be accessible to users who wish to visually browse skeletons and animations. When a user searches for a specific animal, the search result shows the user an image of the rigs returned. Skeletons may be browsed quickly and efficiently in this way. Multiple images may be viewed when the user views the full details of a skeleton.

According to a survey by Forrester Research, only six percent of people say they believe a marketer's advertising claims, but over half say that recommendations from family and friends change their plans [Sterling, 2006]. Given this study, few people will believe a skeleton creator's claims of easy use. However, a few users making such claims will cause many more people to trust them. Therefore, it is important for user submitted content to be subjected to user submitted comments and reviews. The Chimaera Project allows registered users to submit and view comments on specific skeletons. These comments can also serve as additional instructions, tips, or tricks users discover with a skeleton. These comments may be deleted in the users' control panels.

A user may also track favorite creators and skeletons. Users may notice they repeatedly choose skeletons created by one person. They may then mark that creator as a favorite and receive e-mail notification any time that creator uploads a new skeleton or updates a current one. These e-mail notifications may be turned off in the control panel. Instead, users may view favorite skeletons and creators with the control panel interface. They may also delete favorite skeletons and creators in the control panel.

### **3.16 Uploading Rigged Skeletons and Animations**

The upload process is divided into five steps with a few pieces of information per step. Thus, users are never overwhelmed with too much information. They are also allowed to create new animal categories as they go along. For example, if a wolf category did not previously exist in the database, the user may create it. Using

interactive species and class inputs, The Chimaera Project avoids predicting all possible species and orders, which number in the thousands, if not millions, for existing animals.

### **3.17 Downloading Rigged Skeletons and Animations**

Users may only download a skeleton or animation after logging in. They must have a registered account and thereby accept the Terms of Service upon downloading.

### **3.18 Website Features**

The website features a prominent search box. Two of the main sections allow users to browse all skeletons of a given species by providing a selection tree. First users select a class, such as mammal, bird or reptile. Then they select an order, such as cat, dog, or frog. They may select specific species associated with that order, such as African lion, cheetah, or leopard, which would be found within the cat order.

Similarly, the user may browse skeletons for which animations are available. The animation gallery features categories such as walk, run, swim and flight cycles.

### **3.19 Security Issues**

Despite a web developer's best intentions, there are users who wish to corrupt website information. Protecting content from malicious activity is very important for a Web 2.0 site [Ben-Itzhak, 2007]. The Chimaera Projects protects itself by removing all HTML tags from data entry. This prevents a user from creating an inline frame within the document that would then pull malicious content onto the server using a remotely

accessed script. Similarly, only uploads of type .mb and type .znm are allowed. The former is the file type for Maya™ files, and the latter is a “zooXferAnim” export file type.

### **3.20 Creating the Community**

Websites are designed to entice users to visit. During the course of my work on this project, I discovered that while many of my classmates were interested in The Chimaera Project, it received very few responses and input once developed. Most people were eager to download available content, rather than contribute content. I saw this situation as a conundrum. Users did not wish to use the website until more content was contributed but were not interested in contributing to the site until they saw more content.

To solve this issue, I developed a user for the website named “Contributions.” I then requested contributions from my fellow classmates as well as from a variety of users from various online rigging and animation communities. In this way, the user “Contributions” begins to fill out the website, which would entice more users. By filling out the website with more content, more users may be attracted to the site, which will entice contributions as well.

### **3.21 Creative Commons License**

Creative Commons (<http://www.CreativeCommons.org>) is a non-profit organization that provides a free license that allows authors, artists, scientists and



educators to easily mark creative work with specific copyright freedoms. The Chimaera Project users are protected under a Creative Commons license, which allows sharing but no commercial use. Similarly, all Maya™ content is protected under this license. Alias, Maya's™ parent corporation, requires all content be provided freely when created by software that does not have a commercial license. No skeletons created in Maya™ may be sold or used commercially from The Chimaera Project.

## 4. EVALUATIONS

Two anonymous questionnaires were sent to classmates in order to gather information about student rigging and animating practices. Both questionnaires were advertised via the Visualization Messages e-mail list. This list contains approximately sixty-five students in the Visualization Laboratory. These questionnaires were completely anonymous, and participation was not mandatory. No identifying characteristics were gathered.

I received IRB exemption and was thus allowed to conduct these questionnaires.

Both questionnaires were administered electronically, hosted on juliegele.com. Information was saved in the SQL database for later retrieval.

The first questionnaire was released before users had been invited to the website and gathered expectations for the website community. The second questionnaire was submitted after users were invited to participate in the live website and gathered responses to their experiences after browsing and interacting with the website. The questions and results are displayed below along with a discussion on how the results of each questionnaire changed the project. All responses gathered were from a pool of fellow Visualization students, who are also novice and hobbyist animators.

### 4.1 Questionnaire 1

1. Have you created your own rigged skeleton in Maya™ before?
2. Have you animated a rigged skeleton in Maya™ before?

3. How much time do you usually spend on the rigging process? (Percentage of total project time.)
4. How much time do you usually spend on the animation process? (Percentage of total project time.)
5. If a free resource of downloadable Maya™ rigged skeletons of creatures, including humanoids, was available, would you try it out?
6. If a free resource of downloadable animations for Maya™ rigged skeletons of creatures, including humanoids, was available, would you try it out?
7. What would you hope to find in such a website? You may include any requests you can think of, such as species of animals, types of motions, and capabilities of the website.

#### **4.2 Questionnaire 1 Results**

I received nineteen responses with very useful information and suggestions. These results were gathered over a period of a week. Students who did not respond may have missed the announcements, forgotten to participate, or simply did not wish to contribute.

In Table 1, responses are listed vertically with the source question listed on the left edge. Comments from Question 7 are on the page after Table 1.

Table 1. Questionnaire 1, Questions 1 - 6 Results.

Questions	Responses																		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Have you created your own rigged skeleton in Maya™ before?	Yes	No	No	No	No	No	Yes	No	Yes	No	No	Yes	No	No	Yes	Yes	Yes	Yes	Yes
Have you animated a rigged skeleton in Maya™ before?	Yes	Yes	No	Yes	No	No	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
How much time do you usually spend on the rigging process? (Percentage of total project time.)	50%	0%		20%		0%	50%		20%	0%	0%	15%	0%	0%	5%	50%	30%	70%	20%
How much time do you usually spend on the animation process? (Percentage of total project time.)	40%	50%		20%		25%	35%	40%	10%	100%	0%	25%	10%	30%	40%	33%	20%	30%	20%
If a free resource of downloadable Maya™ rigged skeletons of creatures, including humanoids, was available, would you try it out?	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes
If a free resource of downloadable animations for Maya™ rigged skeletons of creatures, including humanoids, was available, would you try it out?	Yes	No	Yes	Yes	No	Yes	Yes	Yes	No	Yes	No	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes

#### 4.3 Questionnaire 1 Question 7 Responses

- The skeletons would be more valuable to me than the animations, because they would be more reusable in different situations. As far as creatures go, Quadrupeds would be the most useful, followed by birds. (Obviously, humanoid bipeds are at the top of the list).
- rigs with different numbers of appendages and of different scales. a step-by-step guide to using each rig might be appropriate too.
- walk cycles, customizable animal rigs (bipedal, quadrapedal, height, # of limbs, etc)
- I think good documentation and clear, easy download and use would be most important. Many websites offer free stuff, but it's so confusing to use that I give up quickly.
- I think the most important thing a website like this needs is clear directions on how to apply the rigs and possibly a place for people to write comments/tips (since even with clear directions these things aren't always intuitive). As far as types of creatures, I think you'd at least need a good basic human rig and then maybe you can break animals down into groups based on their basic type of motion (biped, quadruped, avian, reptile,etc).
- Biped and quadriped models and rigs, or models with various numbers of limbs, facial rigs. Rigged models of varying styles (photo- or quasi-realistic to cartoony). And of course, tutorials on how such rigs would be created (video, or text with ample screenshots)

- As little "clip-art" type animations as possible would be good. Probably instructions on how to use the rigs, and similarities between each rig.  
Awesomeness. Download-able Pop-Tarts too much to ask (I like strawberry)?
- Commercial applications: running, walking, standing up, etc..
- A focus on very generic motions, rather than specific, one-time-use things.  
Excellent searching capabilities.
- Nice tools for the user to search and find what he needs, upload and interact without much effort.
- In animation - walkcycles, jumps. falls, running.  
postings of updates, cats, dogs, horses, toddlers, adults,  
also tutorials on basic principles like weight, pacing, acrs...
- robust tagging of each model (ex: human, biped, upright, realistic/cartoon, etc),  
instructions on how to modify skeleton to match a similar model.
- It would be great to have different options so you could build up your own rig.  
That way if you need a simple rig you only add the parts that are needed. I'm not sure how the animation part would fit in. A walk cycle is always helpful. But then it would be nice to alter it to fit your character.

#### **4.4 Questionnaire 1 Results Discussion**

The results of this questionnaire made it clear that rather than creating and contributing, many users look for a source of free rigs and animations. This conclusion is evident because users requested specific rigs and useful walk cycles that they would use

in a project, rather than suggesting things that would help them contribute to the community easier. This revelation did not necessarily change the project itself. It enforced the idea that before a free rigging and animation website can become popular, it needs quality, varied content to draw people in. This presents a catch-22 situation. If users are to provide the content, but not as many users will participate until there is content, what does one need to do to initially entice users? Some solutions enacted were improving the interface such that the website appeals greatly to users, making them wish to remain longer on The Chimaera Project site. Controls were also improved to be more intuitive, and more features were created. Features added directly from evaluation results included the ability to add favorites to an account, add comments to given rigs, and provide clarification on directions and instructions. As discussed in the above “Creating the Community” section, a Contributions user lists skeletons and animations donated by other animators.

#### **4.5 Questionnaire 2**

1. Did you visit the website initially when the announcement e-mail was sent out on September 6<sup>th</sup>, 2007?  
If not, why not?
2. How long did you spend exploring the site initially?
3. Why did you close the site finally?
4. How intuitive were the links and controls upon initial investigation? Please rate on a scale of 1 – 10.

5. Were you able to find what you were looking for, if you looked for anything in particular, in a reasonable amount of time?
6. Do you think you would use the rigged skeletons and animations provided by users in your own projects?
7. Did you download a skeleton to try out?
8. Did you download an animation to load onto a skeleton?  
If yes, were you able to successfully load the animation onto the skeleton?  
If you had trouble, please describe the difficulty you encountered.
9. What did you think was the most useful thing you found on the website? This may be a feature of the user controls, or a specific skeleton or animation you found.
10. What would you like to see changed or added to the website?
11. After your first visit, would you return to the website to look for new additions?
12. Have you encountered a website similar to this one in any before? If so, what was it called?

#### **4.6 Questionnaire 2 Results**

I received six responses from the possible sixty-five Visualization students in the Visualization Messages e-mail list, listed in Table 2, following. The questionnaire was administered over thirty-six hours, and closed after continuously received very similar, telling responses.



Table 2. Questionnaire 2 Results.

Questions	Response 1	Response 2	Response 3	Response 4	Response 5	Response 6
Did you visit the website initially when the announcement email was sent out on September 6 <sup>th</sup> , 2007?	Yes	Yes	Yes	Yes	No	No
If not, why not?					I was busy with my work for the class, when I received your mail and so I thought I would do it later and then it didn't happen.	I thought it was still in development, and not finished yet. Also, I don't work with Maya any more.
How long did you spend exploring the site initially?	about 15 minutes	15 minutes	5 minutes	about two minutes	3 minutes	10
Why did you close the site finally?	The website currently has nothing to offer me since I'm not looking for rigs.	not enough content was there. I have marked it in my "to do" list but as of yet, I have exactly 0 maya skeletons. However, I DO look forward to putting some in as soon as I have them. I am into mythical creatures for sure.	after navigating it and checking out the different parts, I didn't need anything in particular	other pressing matters, not a lot of content, and I don't typically work with mesh skeletons or animations.	There weren't many rigs I could use.	I had gone through all the sections.

Table 2 Continued.

Questions	Response 1	Response 2	Response 3	Response 4	Response 5	Response 6
How intuitive were the links and controls upon initial investigation? Please rate on a scale of 1 – 10.	7	8 --	7	9	7	10
Were you able to find what you were looking for, if you looked for anything in particular, in a reasonable amount of time?	Yes	Yes		Yes	No	Yes
Do you think you would use the rigged skeletons and animations provided by users in your own projects?	Yes	Yes	Yes	No	Yes	Yes
Did you download a skeleton to try out?	No	No	No	No	Yes	No
Did you download an animation to load onto a skeleton?	No	No	No	No	No	No
What did you think was the most useful thing you found on the website? This may be a feature of the user controls, or a specific skeleton or animation you found.		The catalog of different types of creatures... it was neat! The intro and description of the concept were very clear.		Organization of rigs by creature type and organization of animations by movement type	The lion rig	

Table 2 Continued.

Questions	Response 1	Response 2	Response 3	Response 4	Response 5	Response 6
What would you like to see changed or added to the website?	Of course more rigs would be nice. To that end, maybe some publicity or something to get others to load their rigs.	I would like to see more of a list of the different type of cycles, with the actual catalog of what is contained there -- so I don't have to click on one then find that nothing is there. And if something is new, then I can automatically see it there. Overall, too many clicks in the navigation, and not all related content shown at once. It would be nice if it was. Also, preview images (such as animated gifs) for the cycles would be infinitely helpful.		more rig/animation content uploaded by others	Motion capture data and reference videos of walk cycles.	
After your first visit, would you return to the website to look for new additions?	Yes	Yes	Yes	No	Yes	No
Have you encountered a website similar to this one in any before?	No	No	No	No	No	No

#### **4.7 Questionnaire 2 Results Discussion**

All responses indicated the wish to see more content, and only one indicated a wish to contribute. Judging by these responses, the vast majority of the visitors to the website will be looking for content for their own use, rather than looking to contribute themselves.

The website needs much more content before users will return and use the website fully. These responses solidified the need to create a “Contributions” user to actively gather skeletons and animations. After the content is expanded, the website may be more thoroughly advertised.

## **5. ADDITIONAL WORK**

### **5.1 Additional Website Features**

Animations can vary from simple to complex. Animations could be categorized which would allow users to know ahead of time whether the animation contains many values or just a few. Animations that contain many key frames may take much longer to edit than animations using fewer key frames. Features such as “best” skeletons and animations also entice users to participate. Users could find lists of “Top Rated skeletons” and “Most Downloaded” very informative.

### **5.2 Additional Content**

A more fully developed tutorial section may be created. Users would be able to upload images and information on Maya™ use or for another software program. They would be able to accompany this with pictures, movies, and sound. As determined by the questionnaires, a large variety of content must inhabit the website before most users will be enticed to use the website. Future work in this area could involve creating many new rigs for users to use, as well as including instructions and animations for each. Contributions may continue to be expanded with more skeletons gathered from people across the Web and listed under “Contributions” with creators’ names and instructions on how to use these skeletons.

### **5.3 Spreading the Word**

Promoting a website is one of the most difficult tasks a web developer can undertake. Marketing and advertising takes time and resources. A good start would be the submission of advertisements in free locations, such as rigging and animation community forums, encouraging classmates to tell friends, and advertising through email message lists. Small amounts of this have already begun, but more email lists, forums and animation programs around the world can be contacted and notified of The Chimaera Project. Growth will take time. Gathering users to a website is a long and strenuous process that requires time, patience, and good people skills in order to retain website traffic.

## 6. FUTURE DIRECTIONS

### 6.1 Future Thesis Directions

The site could be further extended by the creation of a full modeling and skinning section of the website. Base animations and skeleton rigs could be accompanied by a fully developed model. This would make the website a “one stop shop” for animators searching for a pre-created character. Furthermore, given the modeling section, a shading and texturing section could also be implemented. These sections would need to match the current layout of the website, be coded in PHP and utilize the SQL database.

One could extend the animation database for animators using other modeling and animation programs. One could research popular software packages, such as Blender™ and SoftImage™, to explore how animations from Maya™ may be translated. The website may feature a “translate” function that could take text values for an animation in one format and translate them into another format.

Additionally, the website could be extended with extensive tutorial information. Research could be executed to discover the best way to gather and share tutorial information. Tutorials could be put together in a variety of forms, such as text, visual, and animated forms.

## 7. CONCLUSION

Animators will save vast amounts of project time by starting with a completed skeleton and some base animations. This is accomplished with Web 2.0 technologies by creating a repository of skeletons and animations that any animator may use for free. While free Maya™ skeletons currently exist on the Internet, the websites housing them have only brief features and functions for browsing and interacting with these files. None of them contain downloadable animations for the provided skeletons.

The Chimaera Project improves the field by offering many new features and freedoms to the animation community. Users may upload and download Maya™ skeletons, share comments and tips with each other, upload animations associated with the skeletons, and search or browse the skeletons in a variety of ways. Skeletons include descriptions and information provided by the creator and categorized by class, order, and species.

Users may access a freely provided script called “zooXferAnim” to import and export animations into text files to be uploaded and downloaded on the website. Many animations per skeleton may be uploaded. The Chimaera Project extends the Web 2.0 community by creating an interactive resource for animators to contribute and share content in a better, more organized format than previously seen on the Internet.



## REFERENCES

*A Gryphon Flying Into Battle*. 2007.

<http://www.thestonetable.com/gallery/item.sd?iid=267&headTitle=A%20Gryphon%20Flying%20into%20Battle>. (Retrieved August 27, 2007).

BEN-ITZHAK, Y. 2007, September 10. *Tackling the security issues of Web 2.0*.

<http://www.scmagazineus.com/Tackling-the-security-issues-of-Web-20/print/35609/>. (Retrieved September 25, 2007).

*Buckbeak*. 2005, February 2. [http://www.encyclopedie-hp.org/wizards-](http://www.encyclopedie-hp.org/wizards-non/buckbeak.php)

[non/buckbeak.php](http://www.encyclopedie-hp.org/wizards-non/buckbeak.php). (Retrieved August 27, 2007).

*Character Rigs for Maya*. 2007.

[http://www.highend3d.com/maya/downloads/character\\_rigs/](http://www.highend3d.com/maya/downloads/character_rigs/). (Retrieved September 9, 2007).

DECEMBER, J. 2007, April 13. *Web Development: Design*.

<http://www.december.com/web/develop/design.html>. (Retrieved September 11, 2007).

*Display Resolution*. 2007. [http://en.wikipedia.org/wiki/Display\\_resolution](http://en.wikipedia.org/wiki/Display_resolution).

(Retrieved September 11, 2007)

FLEMING, B., & SCHRAND, S. R. 2007. *3D Creature Workshop, Second Edition*,

*Chapter 1: What Makes a Creature Realistic?*

<http://www.computerbooksonline.com/content/viewer.asp?a=7&z=5>. (Retrieved August 27, 2007).

GEROCH, M. S., HIRSCH, E., STAVELEY, J., TOLLES, T., HELFER, B., & VARADARAJAN, S. 2002. How does motion capture affect animation? In *International Conference on Computer Graphics and Interactive Techniques ACM SIGGRAPH 2002 conference abstracts and applications*. ACM, New York, 103-104.

GWYNHALA. 2001. *Rune Models*. <http://www.runenews.com/runemodels.php>. (Retrieved October 12, 2006).

*History of the Encyclopaedia Britannica and Britannica Online*. 2007. [http://corporate.britannica.com/company\\_info.html](http://corporate.britannica.com/company_info.html). (Retrieved August 27, 2007).

*History of Wikipedia*. 2007. [http://en.wikipedia.org/wiki/History\\_of\\_Wikipedia](http://en.wikipedia.org/wiki/History_of_Wikipedia). (Retrieved August 27, 2007).

HUANG, A., HUANG, Z., PRABHAKARAN, B., & RUIZ, J. C. 2003. Interactive visual method for motion and model reuse. In *Proceedings of the 1st international conference on Computer graphics and interactive techniques in Australasia and South East Asia*. ACM, New York, 29-36, 293.

*Kong*. 2007. <http://www.serkis.com/mocapkong.htm>. (Retrieved August 27, 2007).

LINDEN, G. 2006, November 09. *Marissa Mayer at Web 2.0.*

<http://glinden.blogspot.com/2006/11/marissa-mayer-at-web-20.html>. (Retrieved September 25, 2007).

NIELSEN, J. 2000, October 1. *Content Creation for Average People.*

<http://www.useit.com/alertbox/20001001.html>. (Retrieved September 25, 2007).

O'REILLY, T. 2007. *What is Web 2.0.*

<http://www.oreillynet.com/pub/a/oreilly/tim/news/2005/09/30/what-is-web-20.html?page=2>. (Retrieved August 27, 2007).

SMITH, J. 2007, May 10. *The Importance of Scroll Bars for Websites.*

<http://ezinearticles.com/?The-Importance-of-Scroll-Bars-for-Websites&id=559772>. (Retrieved September 11, 2007).

SOLSONA, J., & LLOBERA, L. 2007. *Rigging 101: Training CDs.*

<http://student.vfs.com/~m07goosh/rigging101/cds.htm>. (Retrieved September 9, 2007).

STERLING, G. 2006, September 05. *The Power and Importance of User Reviews.*

<http://gesterling.wordpress.com/2006/09/05/the-power-and-importance-of-user-reviews/>. (Retrieved September 25, 2007).

TOLLES, J. 2005, December 5. *Peel Back King Kong's Animation Skin and Meet a*

*Familiar Face.* <http://www.firststoponlinedegree.com/articles/peel-back-king-kongs-animation-skin-and-meet-a-familiar-face.php>. (Retrieved August 27, 2007).

*Your Choice of Web Site Color.* 2007.

[http://www.webdesignoffice.us/web\\_design\\_articles7.html](http://www.webdesignoffice.us/web_design_articles7.html). (Retrieved September 11, 2007).

ZDNET GOVERNMENT. 2007, April 2. *Government Moving - But Slowly -*

*Towards Wikipedia Information Model.* <http://government.zdnet.com/?p=3039>.

(Retrieved September 29, 2007).

## VITA

**Julie Katherine Gele** received her M.S. degree in the visualization sciences program at Texas A&M University in December 2007. She received her B.S. in Computer Science at Texas A&M University in May 2004.

She currently resides in Bryan, TX working in the web development industry for BooksOnBoard.com as Chief Web Developer. She has worked on many web projects independently. Other artistic interests include drawing, painting, and costume design.

Julie Gele can be reached at [julie@redfeatherstudios.com](mailto:julie@redfeatherstudios.com) or through the following permanent address:

P.O. Box 160515

Austin, TX 78746