

“Polar Express” is the first successful motion picture starring digital actors.

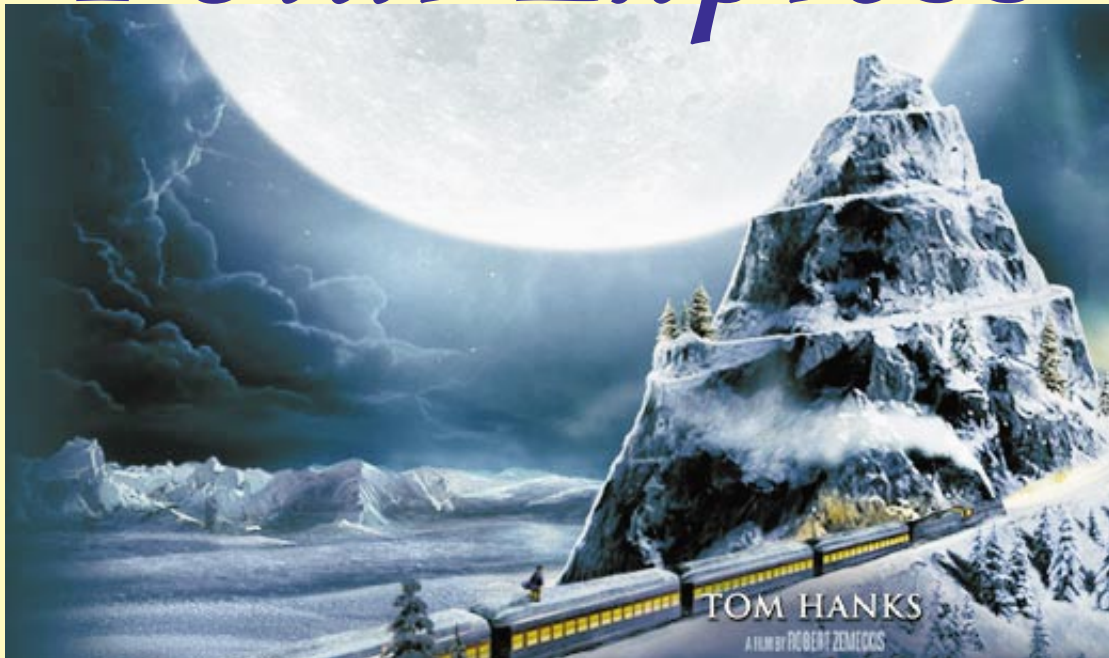


Winter 2004/ 05  
Issue Number 8

# Digital Puppet Magazine

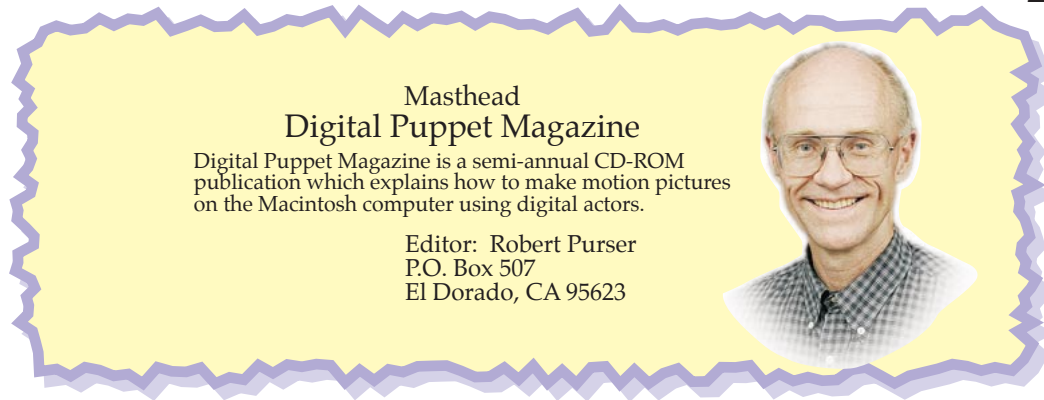
Winter 2005

## *Polar Express*



Digital puppets come to the big screen!

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Apple has two new Macintosh computers. Behringer has two new mixers. Apple released a new version of GarageBand and a set of musical instruments from the symphony orchestra. Greenbriar offers a way to bring digital puppets into Lightwave. The new version of Vue has a nice demo. "Koshini and Friends" moved to RuntimeDNA. Dark Whisper created a wonderful new character called "EmotiGuy" which is free for the next few months at the DAZ Store. (That's him on the left.)

#### 2. "Polar Express"— The Motion Picture

This is the first successful motion picture made using digital actors. Things are finally starting to come together.

#### 3. Dialog Editing Workshop

Included on this CD-ROM disk is a complete editing workshop (film editing lessons, film scoring lessons and sound effects lessons) which teaches how to edit a conversation from a TV drama.

### Welcome to the "Polar Express"



All photographs of "Polar Express" are copyright by Warner Bros Distributing.

# What's New?

by Robert Purser - Winter 2004/2005

From little acorns,  
mighty oaks  
will grow!

Before you can start making motion pictures with digital actors, you need a computer. Fortunately, Apple has some really good computers for consumers. Like all new Macintosh computers, these are Unix computer systems which have most of the functionality of the original Macintosh. Stable, useful and very cool.



## The Mac Mini

Apple has begun shipping a new style of Macintosh called the Mac Mini. This is described as a low cost Macintosh in a compact case. Actually, it is much more. I think that it will become the best selling Mac ever and be the first Macintosh computer to begin increasing Apple's share of the market.

Basically, the Mac Mini is the next generation iBook G4 computer repackaged into a tiny case without a monitor, keyboard, mouse, or rechargeable battery. At first, this does not seem revolutionary but it is. By using the exact same internals as an iBook, Apple has created an unbelievably compact computer which will fit into the Windows' world.

The initial selling price of the Mac Mini appears very low but actually, it is just as expensive as other Macintosh computers. The listed selling price of the Mac Mini is \$500 but the eventual price with all the useful options (SuperDrive, 1 GB RAM, 80GB drive, Bluetooth, AppleCare etc.) is over \$1,200.

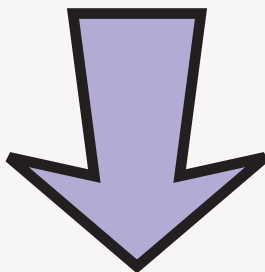
The Mac Mini has two advantages. First, it is extremely portable. Second, it will fit in almost anywhere.



EmotiGuy  
This figure was created by Dark  
Whisper for DAZ Originals and  
is available at the DAZ Store.  
[www.daz3D.com](http://www.daz3D.com)



That's the computer!



The small size and the lack of a monitor and keyboard are a great advantage once you realize that this computer can integrate into a PC system. By adding a KVM switch and an ethernet connection (i.e. crossover cable), the Mac and the PC can run simultaneously (according to the theory, at least) using the same monitor, keyboard, and mouse while sharing all the files and all the disk space.

However, the greatest benefit of the Mac Mini is its portability. For classroom demonstrations, an entire classroom of fully loaded Mac Minis can be brought in quickly and set up using existing Windows PC computers. That is why teaching music education will be very easy in schools simply by bringing a bunch of Mac Mini into a Windows Lab. This is specially true since the Mac Mini comes with a free copy of GarageBand.

Therefore, I believe that the Mac Mini will gain greater success by being a portable computer rather than as a low cost computer. Once the public tests the capabilities of this machine, its full value will become apparent.

The only limitation of the Mac Mini is the lack of an audio line in. Like the iBook, audio in and MIDI functions must be done with a USB or FireWire interface device.

Unlike the G5 iMac, the Mac Mini is not designed to be taken apart by consumers. Repair of the Mac Mini is just as difficult as the repair of an iBook which is not recommended for consumers. While it is possible to upgrade the memory and clock battery, consumers cannot do any other upgrades. Fortunately, the Mac Mini is so tiny, there is no problem taking it into a repair center.

Go to an Apple store and take a look!





## The G5 iMac

I think that the best general purpose Macintosh computer for consumers is the new G5 iMac which looks just like a thick display screen. Now that PCI cards are no longer absolutely vital, the compact G5 iMac is ideal for most professional applications. And because of its graceful design, the iMac looks like the ideal companion for the highly popular iPod.

The G5 iMac has the advantage of being completely upgradeable by consumers. The case of the G5 iMac opens up and everything inside is easily accessible. Older iMacs and eMac cannot do this. Unless you are very near a repair center, I do not recommend an eMac even though it is an excellent machine because you cannot change the battery in the eMac. You must haul it in for repair which is major challenge.

Consider only the fully loaded version of the G5 iMac. You should not even think of less memory than one gigabyte. There is a special reason to buy all the memory that you will ever need when you buy the computer. You cannot upgrade later without throwing away the memory you already have paid for. This is true with almost all of the smaller Macs.

Special Note: I think that it is best to buy the Bluetooth adapter already installed in your iMac. Not all Blue Tooth devices are the same so it is a good idea to get the one that Apple recommends.

See the new G4 iMac at your Apple dealer.

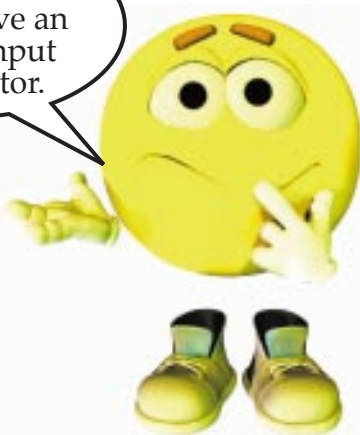


Compact and  
Elegant





Your Macintosh must have an audio input connector.



### Tiny Mixer Board

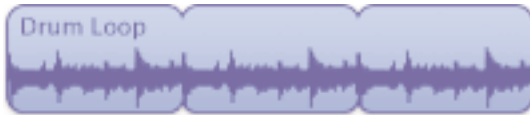
To connect a microphone to a Macintosh, you need an interface device. The current trend is to buy a USB interface or a FireWire interface which accepts XLR microphones. FireWire interfaces have the advantage of higher sample rates and better bit depth.

However, you can still use an analog mixing board if you have an audio input jack on your Macintosh computer. Previously the least expensive mixer board costs over \$100.

Now Behringer has two very tiny analog mixer boards for under \$50 available through Musician's Friend. Look at the UB802 or its smaller cousin the UB502. Compact!

Remember: These boards are limited by the Macintosh's audio input circuitry which can only digitize audio up to 44.1k Hz. It would be nice if someday, Apple upgraded the Macintosh hardware to DV quality audio. (48k Hz)





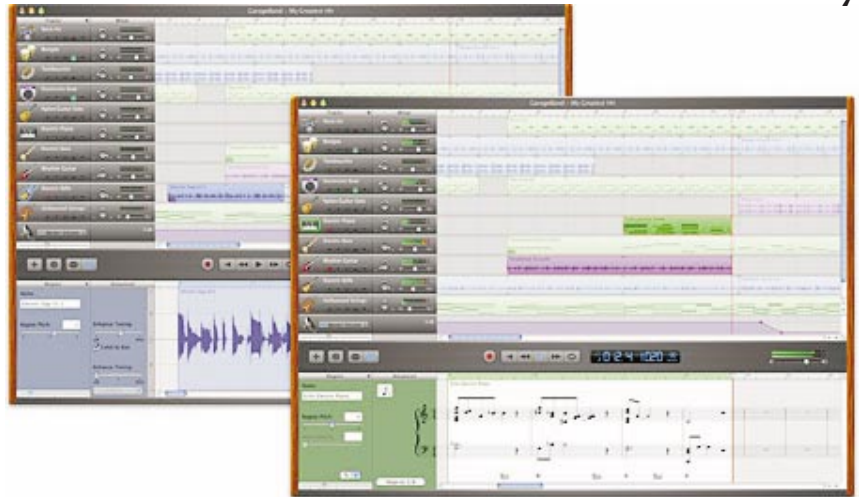
Real Instrument



Software Instrument



Recorded Instrument



Why does GarageBand not play QuickTime movies?



## GarageBand

The most entertaining software from Apple is GarageBand. Apple has just released version 2 and it come free with all new Macintosh computers as part of the iLife package.

This application program is just plain fun yet it is extremely useful for creating film scores for motion pictures.

There are two major parts of GarageBand. The first is the ability to record multitrack audio from either a guitar or from a microphone. (An audio interface or cable is required.)

The second capability of GarageBand is MIDI sequencing combines with its internal MIDI sound module. That means your Macintosh becomes a hundred different musical instruments and the program will remember everything you play. With GarageBand, your Macintosh becomes a multitrack recorder for high quality synthesized musical instruments.

### Jam Pack #4 — Symphony Orchestra

Probably the most exciting news for GarageBand and Apple's Logic is an unbelievably realistic set of musical instruments from the symphony orchestra. They are great!

Apple's website has a demo of music created with this package. Go to the GarageBand page and follow the links to Jam Pack #4. When you listen to the high resolution version, you will be completely blown away with the tremendous quality of the music. It sounds like a real symphony orchestra.

This makes GarageBand ideal for writing musical scores for motion pictures and TV dramas!





## Greenbriar Studio's Tool Sets

Currently, there is no all-in-one software solution for making motion pictures with digital puppets. Therefore, you need to gather a wide selection of programs. Here is a set of utility programs for Lightwave users.

### Moving Digital Puppets to LightWave 3D

Greenbriar Studio sells a complete utility packages for Lightwave which can import and export Poser files and animation. They also sell the Poser loaders for Maya and Cinema 4D.



But I love  
rocket science!

That means all of the Poser models can now be brought into Lightwave, Maya and Cinema 4D and animated. The bad news is it still is rocket science. This is not for the Sunday filmmaker... but it does work.

Greenbriar Studio says, "Figures designed for the Poser market come in up to 75K polygon meshes, with up to 2,500 preinstalled body and animation morphs, with complete skeletons and with multi surface discontinuous UV texture mapping. In other words, everything that is needed for high end character animation work."

"However, accessing these features has been very difficult. Tools available to date have been only able to load single .obj file mesh shells, leaving out morphs and skeletons and requiring re-texturing. All these features are now available through a single tool set."

"Lightwave has been commonly used to develop products for the Poser market, since it can handle all of the features that Poser uses in its meshes and no changes to the mesh are required to work on these meshes in Lightwave."

"But getting work back and forth is a little clumsy due to the separate body part nature of these models and their morphs. So our tools allow you to work on complete figures, or individual parts, to create morphs and then can save these out in the various formats needed for test and distribution, included the 'squeezed' format that even ProPack can read. No more trying to be extra careful with the text editor."

Here are technical descriptions of some of the utilities:

#### CR2 Loader

CR2 Loader imports characters from Poser CR2 format files. It imports the base mesh, all morphs, all materials and the skeleton. It can load multiple figures and props from a CR2 file, creating each as a separate object in Lightwave.

#### CR2 Rigger

This companion plug-in continues the rigging on the scene created by the CR2 Loader plugin. This plugin correctly parents all bones, which can not otherwise be done automatically since the Poser skeleton does not connect in many places. It also scales, moves, rotates and parents props and secondary figures that were in the CR2 file.

Depending on how props are created, when Rigger tries to scale and

#### EmotiGuy

This figure was created by Dark Whisper for DAZ Originals and is available at the DAZ Store.  
[www.daz3D.com](http://www.daz3D.com)





place them, there will be varying degrees of difference from the Poser placement. Many props have to be hand adjusted before the character is finished. While Loader gets the correct and exact geometry, Rigger can not always be very exact due to the different way that Lightwave and Poser scales and handle figure joints. Rigger tries to get as much of the hard work done as possible but it will never be perfect. Some items are loaded perfectly and some are way off. It depends on how they were constructed and posed onto the figure. Poses are the same situation.

Note: The current version of Greenbriar Studio's plug ins do NOT create a completed weight map set. Joints still have to be edited in Vertex Paint or with our Shade Weights tool. Since the CR2 Loader plugin does create a weight map set, the characters are animatable as is, but the joints need to be much smoother.

The CR2 Loader and CR2 Rigger do NOT currently apply Poser pose type files. They import rigged characters, but not pose and pose animation data.

Currently, R2 Loader cannot read Poser 5 cloth and hair. It can read anything else from Poser 5.

### Animation Loader

Animation Loader can import all Poser pose and animation files, Mimic files and .bvh files. Although designed primarily to work with figures loaded with CR2 Loader, Animation Loader can work with any models in Lightwave that have the correct skeletal structure and animation morphs as appropriate for the file you are loading so it works for costumes as well. This also allows you to import a pose even though you may be missing a few morphs, it doesn't throw up its hands and stop if one is missing.

Animation Loader reads single and multiframe keyed poses/animations from .pz2, .p2z, .hd2, .hdz, .fc2, .fcz, .cr2, .crz, .pz3, .pzz Poser files. It also reads frame by frame animations from the two types of .bvh files that Poser can generate.

### Limitations

There are some limitations peculiar to Lightwave due to some important facts about how Lightwave works. Lightwave does not store the starting position of all the joints of a figure. Once you move the model, this information is lost. And you need that information in order to import an animation

The only limitation with Animation Loader 1.0 is with .cr2 and .pz3 files. If you want to import a scene with several animated figures, save each figure to a pose file and then load from there.

Special Note: The instruction manuals for the Greenbriar Studio Tool Sets are available for downloading from the Greenbriar Studio's web site as well as a more detailed description of what can be done with their many tools.

← David and Michael are digital puppet from DAZ Originals. These figures and their fabulous clothes are available at the DAZ Store website.



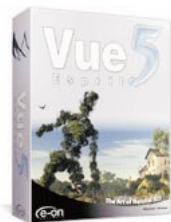
Interesting variations created in Vue.



The male figure was not a Poser file.



Here is my first test picture. I used one triangle, one plant and lots of rectangular boxes. The atmosphere is early morning haze which is probably too much for a movie set.



## Vue 5 Esprit Demo

If you want to create beautiful scenes from nature for your movie sets, you have three choices: MojoWorld, Bryce, and Vue. I am not impressed with MojoWorld. Bryce needs a good update which DAZ is doing now.

The good news is e-on Software has released the next generation of Vue. I feel that the new version of Vue is better than the current version of Bryce in many respects.

Vue 5 comes in three sizes but since the names change with each new release, it is probably easier to remember that Vue comes in "small", "medium", and "large" sizes. Small is now called "Vue 5 Esprit", medium is "Pro Studio" and the large is called "Infinite".

The best news is there is a free demo of the small version of Vue 5. That is what I tested here. It is limited to 30 days and is partially crippled yet I found the demo to be extremely educational since I was able to quickly create and print very beautiful scenes.

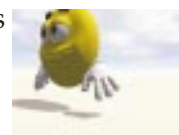
There are four things to understand about Vue:

1. Vue is more simplified and straight forward than Bryce. I am familiar with Bryce so it took me only a few hours to find most the features of Vue. Bryce is more of a challenge to learn.
2. The atmosphere features and rendering of Vue seems to be better than Bryce. I believe that scenes look better in Vue than Bryce.
3. The plants in Vue are a thousand times better than Bryce 5. You can have beautiful flowers in Vue (but not in the demo version.)
4. The small version of Vue 5 only imports still images from Poser and Poser must be installed and running. For importing Poser animation, you need a program called "Mover".

I found a few bugs in the demo version of Vue. The bounding box for the editable sculpted text is not correct when rotated. The default picture format is always BMP even though Vue shows your last used file type. All of these bugs are fixed in the full version.



Note: There are two ways to import characters positioned and saved in Poser. Neither import method brings in the original colors and textures of the poser models into Vue.







### Koshini and Friends

“Koshini and Friends” by Lady Littlefox has moved to the Runtime DNA website at “www.runtimedna.com”.

There is a new version of Koshini. Koshini 2 also comes with a free copy of Koshini 1. Visit the Runtime DNA website for more details on these wonderful figures.



Koshini and Friends  
All of these figures were created by Lady Littlefox and are available at the Runtime DNA Store.  
[www.runtimedna.com](http://www.runtimedna.com)





## EmotiGuy

Created by Dark Whisper for DAZ Originals

Here is a wonderful new digital puppet from the company (3D Universe) that created "The Heavies" who were featured in our last issue.

Most people think that digital puppets are only human or animal figures. Surprise! EmotiGuy is just a head with gloves and a simple selection of props. According to DAZ, the character has 41 facial expressions and 22 poses. He also comes with 12 phoneme mouth shapes which are compatible with DAZ's facial animator called Mimic.

The really good news is that for the first half of this year, you can download the basic package for free. Normally, EmotiGuy is \$19.95 but until 6/30/2005, you can go to the DAZ store website and order him for free. ([www.daz3D.com](http://www.daz3D.com))

All of smiley figures that you see in this magazine were created with Poser 4 and EmotiGuy. For the figures below, I added shoes which come with the package (I tried to animate the shoes but they do not seem to work with Poser 4.)

You can also purchase a girl figure (EmotiGirl Expansion Pack) and additional animations and poses (EmotiMotions Expansion Pack) at the DAZ Store.

So go to the DAZ Store website and give him a try. I think he will be most popular digital puppet ever!

My Gosh!  
We are free for a  
limited time only.





## All aboard the “Polar Express”

When Tom Hanks moves during the making of Polar Express, the position of every one of the dots on his face is digitized and recorded. All of this data is then filtered and transferred to the digital actor.

As you can see, Tom Hanks has a lot of wrinkles in his face which move when he talks. Even though the conductor is a younger man, he should still have realistic muscles in his face that move like Tom's. Instead, most of Tom's performance is simplified to such an extent that much of Tom's personality was lost. This is one of the problems of “Polar Express”.



Photographs Copyright Warner Bros 2004

## “Polar Express”

“Polar Express” is the first successful motion picture made using realistic digital actors exclusively. While the budget for this motion picture is more than an amateur filmmaker can afford, the success of this movie guarantees that more and better computer tools will become available for all filmmakers, both professional and amateur.

What is so great about “Polar Express” is that we can see what works, what does not work, and what is still missing. The good news is almost everything works.

### Hanks, Hanks, and Hanks

“Polar Express” stars Tom Hanks as five different characters ranging from a young boy to an old man. With digital actors, it is possible for one person to play all the rolls of a motion picture but, in this case, Tom performed only five.

### Face and Body Movement

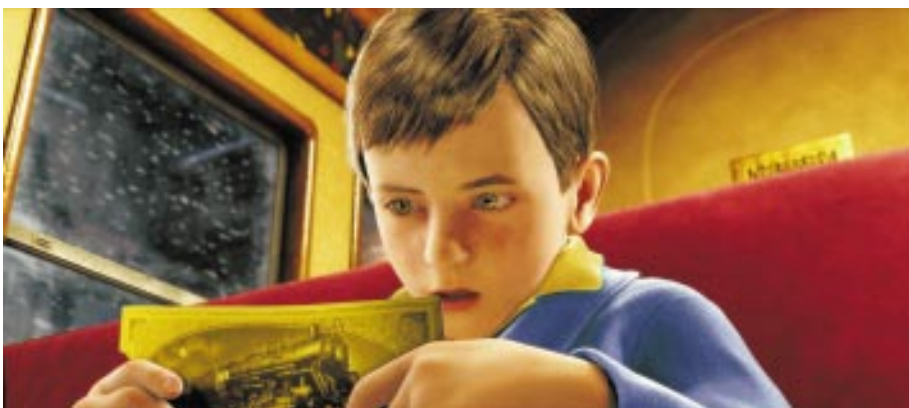
All of the movement and facial expression of the movie were recorded by a process called “motion capture” which records the location and movement of tiny markers placed on the actor's body and face. The picture left shows how this is done.

### Motion Capture Stage

To make “Polar Express”, an entirely new methodology of filmmaking had to be developed. Motion capture has been done for digital movies before but not while using traditional motion picture methods. For “Polar Express”, the concept of building a physical movie set was combined with doing motion capture. The results are interesting... but not always perfect.

For digitizing “Polar Express”, movie sets and props were built of almost invisible material (which was mostly chicken wire and metal rods) so that the motion capture cameras can still see the actors through the walls of the movie set and through the almost invisible props.

cont.



## Hold It, Kid!

Here is the most critical shot of the movie — a close up shot of the boy as he examines the ticket for the Polar Express. The boy froze dead away.

When not moving, real kids appear quiet but they still breathe and move just slightly over their entire body.

Yet, for this shot, the audience had to watch a boy hold his breath for the entire shot. No wonder the audience felt uncomfortable watching this shot.





This is very different from previous attempts using motion capture such as “Final Fantasy” where the actors perform on a blank stage while the actors imagine the movie sets and movie props. Later, their performance must be adjusted to fit the digital movie set created inside the computer.

With “Polar Express”, the movie set was created first inside the computer and then duplicated on the motion capture stage for filming the scene. This seems simple until you realize that the scale of the movie set changes depending on the size of the digital actor in the scene. For the boy, the movie set had to be much bigger than for Santa Claus since Tom Hanks plays both characters and he is a fixed size. The concept of building multiple scaled movie sets has never been done before.

To capture all of the movement, 8 cameras recorded the movement of the actor’s body on the movie set and 64 cameras captured the actor’s facial expressions. Even these cameras were supplemented by video camera to record more facial expression of the actors.

### Post Production

After the motion capture is done, all of this data must be to be combined. Finally, the data is filtered to reduce the huge volume of data. This sounds simple but this was one of the major failures of “Polar Express”.

### Motion Builder

Looking at the scenes of “Polar Express”, you can see that the body movements for the digital actors are excellent for the main characters. The digital actors appear natural when they move the joints of their body.

The program used for this was Kaydara’s Motion Builder. This program takes the motion capture data and applies the data to a skeleton which works great for basic body movements. It looks completely realistic.

But Motion Builder has a hidden problem.

With Kaydara’s Motion Builder, a skeleton is not the same as the skeleton of the human body. Motion Builder uses a simplified skeleton which contains the bones needed for walking and grabbing. The rest of the bones of the human body are thrown away... including the bones in the chest. This is why the digital actors of “Polar Express” do not breath. They have no ribs!

Also, the digital actors of “Polar Express” do not have facial muscles (except for the eyes which received special attention according to Cinefex magazine.) There was no translation of the motion capture data to match the movement of realistic facial muscles. The program treats the figures as if they are balloons which can be inflated to any shape... rather than only realistic shapes.

In “Polar Express”, very unnatural things began to occur to the faces and bodies of the digital actors.





## 1. No Emotion

By ignoring the real muscles and wrinkles in the face, the motion capture data had to be modified to fit a smooth skinned digital actor. All of the stretching of Tom Hank's facial muscles were removed. Every time there was a high point in the actor's emotions, the lack of facial muscles created unnatural and ugly faces.



## 2. Poor Scaling

Using adults to portray children only works for gross body movements. Subtle head movement and facial expression cannot be scaled down to digital children. The only recourse for the animators of "Polar Express" is to throw even more motion capture data away. The "Know It All" kid never looked real and is very difficult for the audience to look at because of his ugly and unnatural facial features and movement.



## 3. Rhythmic Movement

Subtle movements of the head caused by breathing were lost. Breathing should make the entire torso and head move ever so slightly... continually. Eliminating this movement caused the head to look static... or dead!



## The Future

Animating all the bones of the body and muscles of the human face will require a thousand times more computing power. Fortunately, because of Moore's law, computers will be 1,000 times faster in about 10 years. Then a completely realistic simulation will be possible.

## What can be done today?

Until then, we must look for ways to solve the problems of "Polar Express" using simple animation.



## 1. Finding Nemo's lips

I think that the best lip sync animation ever done was for "Finding Nemo". The facial expressions of the fish (which is harder to do than human-looking actors) were extremely realistic. They were created by both a special recording session to photograph intimate facial expressions and a proprietary program which adds personality to digital actors and their faces.



## 2. Simple Motion Tricks

There are simple tricks to making digital actors seem alive. When a real person stands perfectly still, simply add a tiny movement to every joint or facial muscle.

When the boy examines his ticket, he freezes. The solution is to insert random movements of every element of the face. The movements must be so tiny that each movement by itself is not visible. However, the combined movements will create just enough movement to convince the audience that the digital



actor has not suddenly died of heart failure.

### 3. Realistic Blend Shapes & Morphs

Facial shapes must be created to simulate the muscles of the face. In "Polar Express", the program should have limited the possible morph shapes to only the real muscles of the face so that the expressions of the digital actors remain natural. This was not done for the Hobo and Smoky whose faces change occasionally into extremely grotesque figures.

### 4. Hire Artists, not Technicians.

In real life, people look at the faces of other people and mimic their best facial movements. That is why people who have sight make their faces and facial expressions look beautiful while blind people do not. Artists know this but computer technicians do not.

The animators of "Polar Express" must make the faces look beautiful at all times. This problem never happens in "Finding Nemo" so I know it is possible to create realistic facial expressions that look beautiful.

### Things that worked

Fortunately, a lot of things work in "Polar Express":

#### 1. The camera movements correctly simulate real camera movements.

"Polar Express" used a special camera interface so that the movements of the camera in Maya match camera movements of a real motion picture camera.

#### 2. Volumetric lighting looks fantastic.

Even though the lighting is surrealistic rather than 100% realistic, the results seems like a real movie set with a million dollars in lighting and smoke effects. The movie sets feel comfortable to be in.

#### 3. The matte paintings match the animation.

Matte paintings are still the mainstay of the motion picture industry. The backgrounds of many of the scenes are simply paintings created from 3D model programs. In "Polar Express", they look fantastic!

#### 4. The physics of moving objects works great.

Things that move (and a lot of things move in "Polar Express") look 100% realistic.

#### 5. Fabric movement seems realistic.

The costumes move gracefully and seem real but not too gracefully to draw attention to them. This is a wonderful compromise.

This is all very good news for filmmakers who want to make motion pictures with digital puppets.





## Film Editing Workshops for the scene called "Follow Dave"

This scene is special because it contains a conversation, a monolog, action, and reaction.

On this CD-ROM are the instruction for doing the editing, sound effects, and musical scoring for this scene.

Editing a conversation is easy... if you know the secret. To edit a conversation, you must worry about the audio first and worry about the picture second.

The best way to learn film editing is to edit a scene from an actual motion picture or television drama. Television dramas are particularly good because the cast and crew have been practicing for an entire year.

The scene on this disk is only one minute long, yet if you edit this scene, create the sound effects and compose the musical score, you will learn more in that minute that most people learn in a year at film school. (Additional software required.)

Have fun and good editing!



## Table of Contents For The Workshops On This Disk

1. **QuickStart**  
If you are eager to get started, read this.
2. **Animated Instructions**  
Here is a ten minute movie which briefly explains everything.
3. **The Story**  
This is a one-page pictorial look at all the action and the dialog for this scene. This single page acts as both the script and the shot list for the scene. Use it as a referenced.
4. **Film Editing Lessons**  
Step-by-step lessons for editing this scene... along with short instructions for doing sound effects and musical scoring for this scene. Written for high school students to view on their computers.
5. **Sound Effects Lessons**  
Instructions for people who want to learn how to do sound effects for motion pictures. More detailed instructions are included here than in the editing lessons.
6. **Musical Scoring Lessons**  
Instructions for people who want to learn how to compose music for television dramas. More detailed instructions than are included here than in the editing lessons.
7. **The Edited Scenes (QuickTime movies)**  
In addition to sample edit of this scene, there are two special edits of this scene for people who want to practice film scoring or sound effects. One of the edited scenes is the normal edit for the scene without sound effects and music while the other edit has very long with extra gaps that must be filled with sound effects and music.
8. **Open Source License**  
All of the documentation in this package are copyright and distributed under the GNU Free Documentation License. Basically, it says you can add to this package but you cannot subtract anything from the package.

The raw film clips on this disk may be used only for editing this scene. These movie clips may not be used as a part of any other production or used as part of any public performance. All rights are reserved by their respective rights holders as dictated by law and by contract.

All documentations is copyright 2005 and distributed as open source documents as governed by the GNU Free Documentation License which is included on this CD-ROM disk.





Koshini and Friends  
These figures were created by  
Lady Littlefox and are available  
at the Runtime DNA Store.  
[www.runtimedna.com](http://www.runtimedna.com)



## The Bottom Line

“Polar Express” shows us that most things work. If you want to make a motion picture using digital actors on the Macintosh computer, most of the stuff you need is already available.

However, a few things still do not work:

### 1. Body Movement

To do realistic body movement, you must use motion capture for animating your digital actors. Currently, nothing else works. Nothing else looks real. Even stick figures animated with motion capture look natural.

But motion capture is still too expensive. Therefore, I continue to look for alternatives.

So far, I have not found any computer program which can generate realistic body movement. The walking and running movements created in Poser 4 are just not acceptable for ultra realistic human figures.

### 2. Facial Expression

As yet, I have not found a computer program which can create realistic facial expression. The phonemes of Poser are not enough because they only show the ending position, not the complete movement of speech.

### 3. Costumes

There are still not enough costumes. You cannot buy all the costumes that you need for a feature film.

There are no programs which create costumes for the Macintosh. The costume program for the PC is too simple however, this program shows that a costume program is possible and someday you will be able to use such a program to create all your special costumes.

### 4. Rocket Science

There are too many steps which seem like Rocket Science. This is just not good.

The people who do still artwork are overjoyed that Victoria can have 1200 different morphs (basic shapes) of her face. However, for filmmakers, this means more garbage to haul around... and throw away.

We need things made simpler!