Faculty of Engineering and Computer Science (Fall 2006)

Submitted to Dr. Sha Xin Wei

in partial fulfillment of COMP471 requisites

COMP471 Project

Going Super Saiyan

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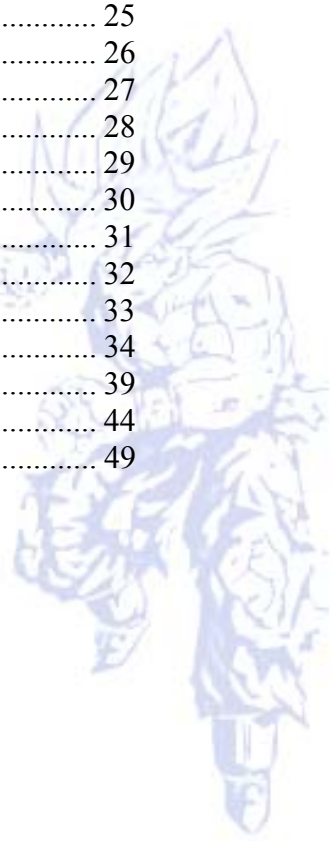

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1 Introduction

The significance of the project is to provide an altered reality where the user will be able to mimic certain abilities of the main characters. The user and live feed will also be displayed on an animated background.

We believe that this is an interesting idea as it can be highly interactive with the users and can be implemented into a type of video game just like the Eye Toy that Sony developed. Aesthetically, we would hope that the user felt like he/she was in a cartoon or video game which could be very amusing.

2 Installation

The following figure illustrates the setup that we implement in order to create our DragonBall Z inspired movie. There were different factors used all contributing to achieve the best results for our video such as the lighting, the position of the iSight camera and the Projection Screen. We used a projection screen so that we could extract the subject standing in front of the iSight camera onto an animated background to be displayed on another projector. Two projection lamps to eliminate any noise on the projection screen were used.

Figure 1 Installation for Going Super Saiyan

The Figure below describes the case when the subject in front of the camera is ready to shoot a fireball. The way it works is that he/she waits until a light goes green (displayed on the projector) with their hand covering the color patch on the other side of their glove.

Figure 2 Without Color Recognition

The Figure below illustrates that once the light turns green, they are ready to shoot a fireball and they do so by showing the color patch (yellow as seen) in front of the camera to detect and move their hand indicating the flow of the fireball. Once they are done indicating the flow of the fireball they return to covering the color patch on their glove. At the point they cover the color patch, the fireball will shoot out following the pathway signaled by the user.

Figure 3 With Color Recognition

2.1 Results

The following Figure describes the pattern recognition of "putting both arms in a muscular movement" to allow the intensity of the fire to grow. If the users' arms are not in the position to be recognized, then the intensity of the fire will not be as high.

Figure 4 Image of Fire Glowing due to Pattern Recognition

The Figure below shows the user moving their arm in the trajectory they would like the fireball to be released. The intensity of the fire around the user will not be as high since one of the users' arms is in the air. (*Obviously there is some distortion in this image due to noise).

Figure 5 Image of Path to Shoot Fireball

The following Figure demonstrates the release of the fireball the moment the user covers the color patch to be detected by the camera. The intensity of the flames is growing as the user returns his arm to a muscular stance.

Figure 6 Image of Fireball Released

3 Technical Interests

3.1 Main System

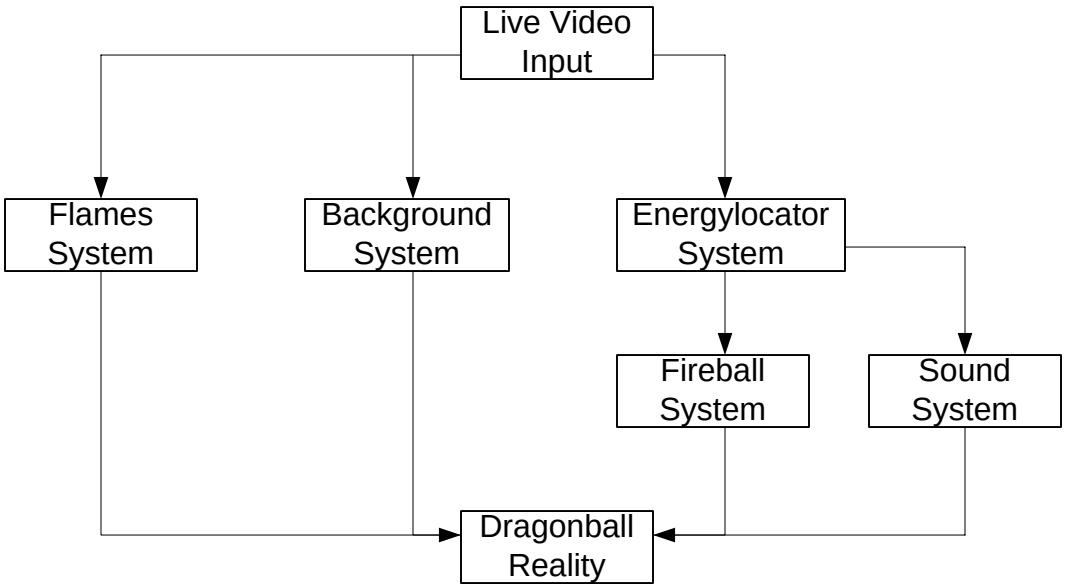


Figure 7 Main System Design

The above system outlines the core functionality of the Dragonball augmented reality system (main.pat). The system is divided into 5 central systems that effectively either communicates with each other or outputs a segment of the altered reality to form the final work of art. The implementation of main.pat can be found in Appendix A.

The flames system is responsible for producing the aura that appears around the user, which resembles flames emanating from the user's body. Particularly, the flames system uses pattern recognition to control the intensity of the aura/flames that radiate from the user.

The background system simply allows a video/image to be displayed in the background of the user.

The energylocator system uses color recognition in order to acquire start and end coordinates to calculate a trajectory path that is outputted sequentially from the end coordinates to the edge of the screen (matrix edges).

The fireball system creates the fireball that is fired/thrown from the user's hands.

The sound system is responsible for playing original Dragonball sound bits that the characters from the show scream in order to launch the fireball.

3.2 Flames System

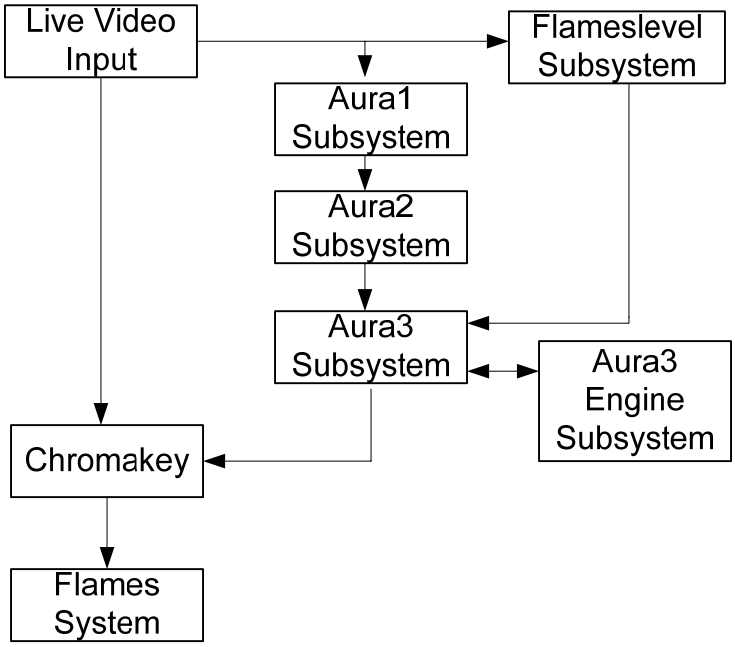


Figure 8 Flames System Design

The above illustration exhibits the design of the flames subsystem (flames2.pat). Each aura subsystem uniquely adds a different layer to acquire the overall flame emanating from the user's body. The flameslevel subsystem is responsible for setting the intensity of the aura to appear around the user. This is done by pattern recognition. The implementation of flames2.pat can be found in Appendix B.

The flames system has undergone two complete version releases, as the original flames system did not adequately produce a flame effect that resembled the Dragonball characters when they emanated an aura.

A video demonstration of the different levels that the flames system can achieve can be found at the following URLs:

http://www.youtube.com/watch?v=VpYbUHyOmeo and
http://www.youtube.com/watch?v=sMl_-VxcEKg

3.2.1 Aura1 Subsystem

The aura1 subsystem (aura1.pat) is comprised of extracting the binary edges from a gray-scale image (cv.jit.canny) and then performing cellwise spatial enveloping. This results in an upwards sliding effect of the image (jit.scanslide) to produce the first level aura result.The image is also tweaked by altering the color (jit.scalebias) to match the yellowish color of the Dragonball aura. The implementation of aura1.pat can be found in Appendix C.

Spatial mapping is applying the below formula to the matrix image:

J(i, j) = I[a(i, j), b(i, j)]

Where a(i, j) = i/π and b(i, j) = j/π , and then J(i, j) = I(i/π, j/π) has non-integer coordinates, which would need to be interpolated in order to acquire the missing data.

3.2.2 Aura2 Subsystem

The aura2 subsystem (aura2.pat) also starts by performing edge detection (jit.robcross), by brightening features with high spatial frequency, such that it enhances large differences from cell to cell, while darkening features with less change. This produces an outline of the first level aura. This image is then displaced by means of probability that a given matrix cell's value will be extended to subsequent cells (jit.streak). The results are random streaks that occur across the image. The implementation of aura2.pat can be found in Appendix D.

Finally, the resulting image is feedback with a convolution stage (jit.wake) in order to enhance the aura effect by means of a trail and an augmentation multi-colored effect.

A convolution is a mathematical operation that describes the action of a linear system on a signal, such as that of a filter on a seismic signal. Two types of convolution were covered in class, which were wraparound and linear convolution.

$$J[i,j] = \sum_{m,n=0}^{N-1} I_1[m,n] I_2[(i-m)_N, (j-n)_N]$$

Figure 9 Wraparound Convolution Formula

The above equation is the wraparound convolution formula, which can also known as the cyclic and circular convolution.

Linear convolution is a more common type of convolution used for video processing, as it is also used in performing circuit theory, optics, analog and digital filter theory. A very simple form of linear convolution is by using the local average operation, this is where each image pixel is replaced with the average of its neighbors within a window.

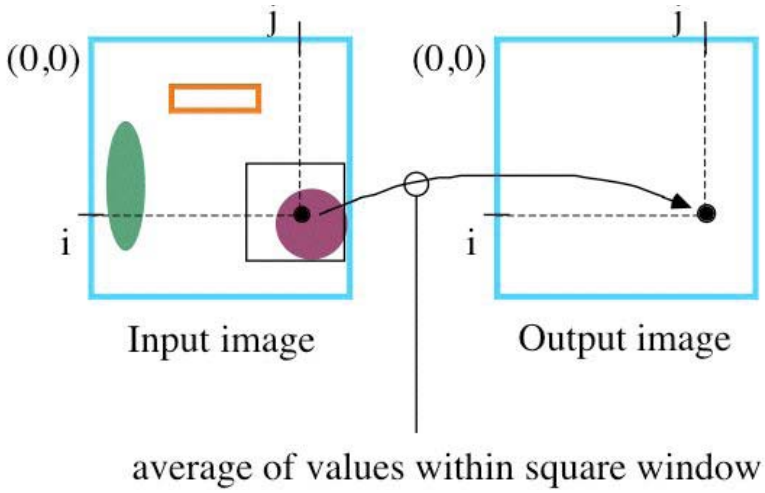


Figure 10 Average Filtering

This technique is also known as average filtering, where the average filter operation may be expressed (at most points) as the wraparound convolution of the image, with an image of a square with intensity 1/M where M = # pixels in the square.

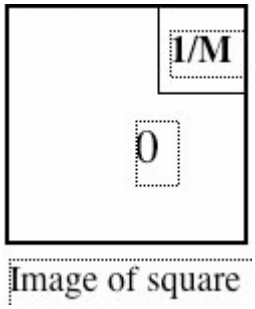


Figure 11 Average Filtering Wraparound Equivalent

Overall, the jit.wake uses the convolution technique to enhance and produce a better quality image of the second level aura subsystem. With a few adjustments to the settings available in the first aura level subsystem, the second level aura subsystem could produce a very eloquent multi-colored aura.

3.2.3 Aura3 Subsystem

The aura3 subsystem (aura3.pat) is more of an interface to the aura3engine, such that it is responsible for manipulating the image positioning (jit.matrix) that is passed into the aura3engine. Also, it relays the aura level settings that are controlled in the aura3engine. The implementation of aura3.pat can be found in Appendix E.

3.2.4 Aura3engine Subsystem

The aura3engine (aura3engine.pat) is responsible for giving the aura effect its smooth texturing through a cross-fade feedback technique between two matrixes. The image that is passed into the subsystem is downsampled (jit.matrix) from its original size, then

upsampled to give a blurred effect. The blurred image is then cross-faded with the original image (jit.xfade) to give the smooth texture appearance. The implementation of aura3engine.pat can be found in Appendix F.

When the matrix is downsampled, the size of the matrix decreases and an algorithm randomly removes pixels from the image to acquire the matrix in a smaller size.

When the matrix is upsampled, the size of the matrix increases and the new blank pixels that are created in the matrix are interpolated to best match the other surrounding pixels.

Two types of interpolation were demonstrated in class. These were nearest neighbor and bilinear interpolation. Nearest neighbor interpolation uses the algorithm below to best approximate missing data:

$a'(i,j) = INT[a(i, j)+0.5]$ and $b'(i,j) = INT[b(i, j)+0.5]$
$J(i, j) = I[a'[i,j], b'[i,j]]$

However, this technique results in a potential jagged edge effect, which can be frowned upon. Bilinear interpolation produces a smoother effect by using the algorithm below:

$J(i, j) = A0 + A1 \cdot i + A2 \cdot j + A3 \cdot i \cdot j$

Where bilinear weights A0, A1, A2, and A3 are found by solving:

$$\begin{bmatrix} A^3 \\ A^2 \\ A^1 \\ A^0 \end{bmatrix} = \begin{bmatrix} 1 & i^3 & j^3 & i^3j^3 \\ 1 & i^2 & j^2 & i^2j^2 \\ 1 & i^1 & j^1 & i^1j^1 \\ 1 & i^0 & j^0 & i^0j^0 \end{bmatrix}^{-1} \begin{bmatrix} I(i^3,j^3) \\ I(i^2,j^2) \\ I(i^1,j^1) \\ I(i^0,j^0) \end{bmatrix}$$

Figure 12 Bilinear Weights Matrix

3.2.5 Flameslevel Subsystem

The flameslevel subsystem (flameslevel.pat) uses pattern recognition to indicate how close the user is to a trained object. Since the user is the only object that the video is capturing, the gray-scaled image produces a single blob (cv.jit.label) which is then tracked by means of color recognition (jit.findbounds). The blob produced was white and to reduce CPU load, instead of tracking the blob through motion, color tracking was used. The isolated blob image is then fed into a pattern recognition system (cv.jit.learn), which was originally trained to an image of a person with their arms separated from their side. When the current image of the user resembles more of the trained user data, the fire level is increased and it is decreased when the pattern of the user diverges away from the trained data. The implementation of flameslevel.pat can be found in Appendix G.

The cv.jit.label algorithm scans the image and gives each connected component a value which results in a size for each blob. This allows blobs to be numbered and extracted to only show the largest blob.

The cv.jit.learn patch performs pattern analysis and recognition from the results of the cv.jit.moments patch.

The cv.jit.moments patch produces a 17 plane single row. The first 7 planes are moments lists labeled as m20, m02, m22, m21, m12, m30 and m03. The next 7 planes are Hu moments lists, followed by the next 2 planes for the x/y centroids list, and then finally the mass of the image.

Moment-based shape analysis is based on the physics concept of moment of inertia, such that for every ON pixel, the x and y indexes are raised to a given power and multiplied together. For example, an ON pixel at coordinates (5,4) would yield an m02 value of: $5^0*4^2 = 1*16 = 16$. The m21 value would be: $5^2*4^1 = 25*4 = 100$.

This technique allows a powerful tool for acquiring image height, width, covariance, and asymmetry. Also, the moment-based shape analysis is very sensitive to orientation, which is captured through the Hu-moments named after Ming-Kei Hu. The Hu-moments is responsible for outputting scale, translation, and rotation data.

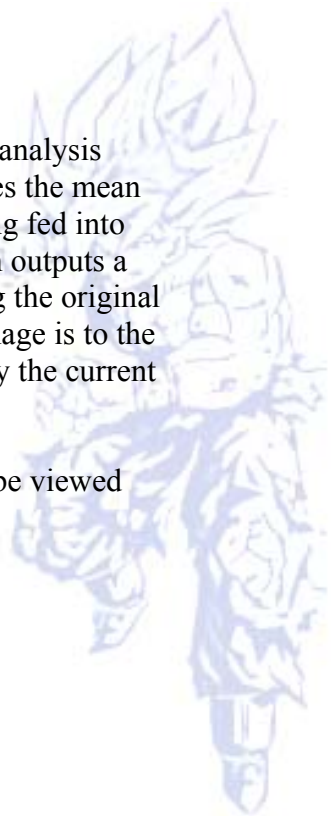
The centroids list (center of mass) algorithm returns the coordinates of the weight of the image. Simplified, the x coordinate is determined by taking the weight of the pixels of the left side of the matrix to equal the weight of the pixels of the right side of the matrix. The same is done for the y coordinate. This is also another form of performing cheap motion tracking, computational wise.

The mass list is the overall weight of the binary or gray-scaled image.

The cv.jit.learn patch uses elaborate pattern recognition by way of statistical analysis from the results of the lists produced by the cv.jit.moments patch. It calculates the mean of the lists data when in “train” mode and compares it with the new data being fed into the patch from the cv.jit.moments patch when in “compare” mode. The patch outputs a single float value, which indicates when the new image is close to mimicking the original trained image. The closer the output results are to zero, the closer the new image is to the original trained image, and when the output results are large, the further away the current image is to the trained image.

Test videos using this system have been uploaded to YouTube.com and can be viewed from the following URL:

http://www.youtube.com/watch?v=4lRmtkLViMY



3.3 Background System

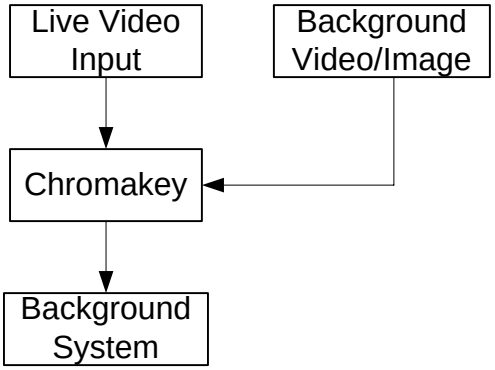


Figure 13 Background System Design

The background system (background.pat) is a simple design that combines two images (jit.chromakey) by placing the background image/video in the background of the user. The implementation of background.pat can be found in Appendix H.

3.4 Energylocator System

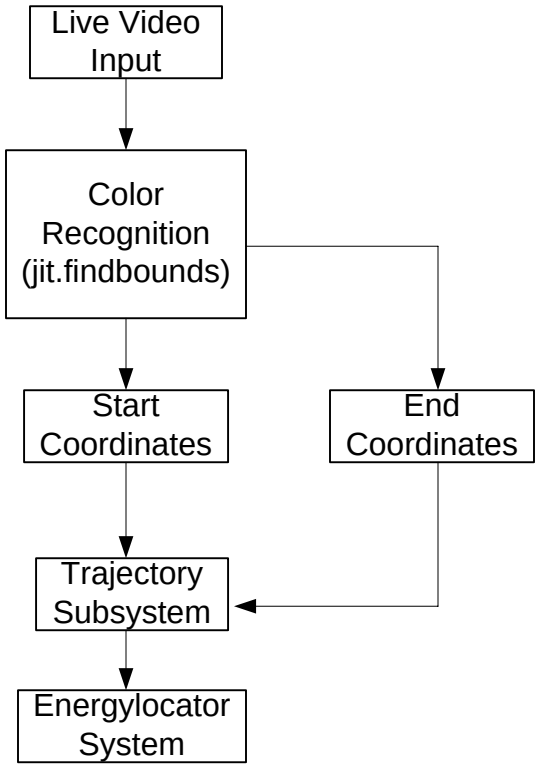


Figure 14 Energylocator System Design

The energylocator system (energylocator3.pat) uses color recognition (jit.findbounds) to locate start and end coordinates in order to calculate a trajectory path for the fireball.

Originally, this system was to use hand recognition in order to indicate when to release a fireball. Unfortunately, this design proved to be too complicated to design from informants and research. The implementation of energylocator3.pat can be found in Appendix I and a video of the system can be found at the following URL:

http://www.youtube.com/watch?v=dH36ts_f2no

The system was re-designed three times and it proved to be the most complicated system in order to get it working precisely. Originally, pattern recognition of a triangular shape was used in order to determine the trajectory path, such that the direction the triangle was pointing would direct the fireball where to go. Unfortunately, the first design resulted in a high CPU load of matching the triangle in several directions, which would either crash or slow down the entire system and prove to be inadequate in overall standards. The second design used color recognition, as this implementation produced adequate results to continue the design with the system.

This system is set to find a particular color, therefore in the presence of this color, its center (x,y) coordinates are saved as the start coordinates. After the start coordinates are located, the end coordinates are determined from when the color is removed from the image. A delayed buffer was implemented using JavaScript, since the max environment did not seem to produce an adequate way of implementing this particular functionality. A delayed buffer was needed since when the color being displayed was removed, no actual end coordinates existed. The jit.findbounds just indicated that there was no color being currently displayed. The delayed buffer held the end coordinates, which was required by the trajectory subsystem.

3.4.1 Trajectory Subsystem

The trajectory subsystem (direct5.pat) is responsible for sequentially outputting the trajectory path of the fireball. Due to difficulties in designing this subsystem, an additional option of only projecting fireballs in a horizontal motion was provided. However, the subsystem is capable of projecting fireballs in every direction. The implementation of direct5.pat can be found in Appendix J.

The trajectory system was implemented around the following mathematical design:

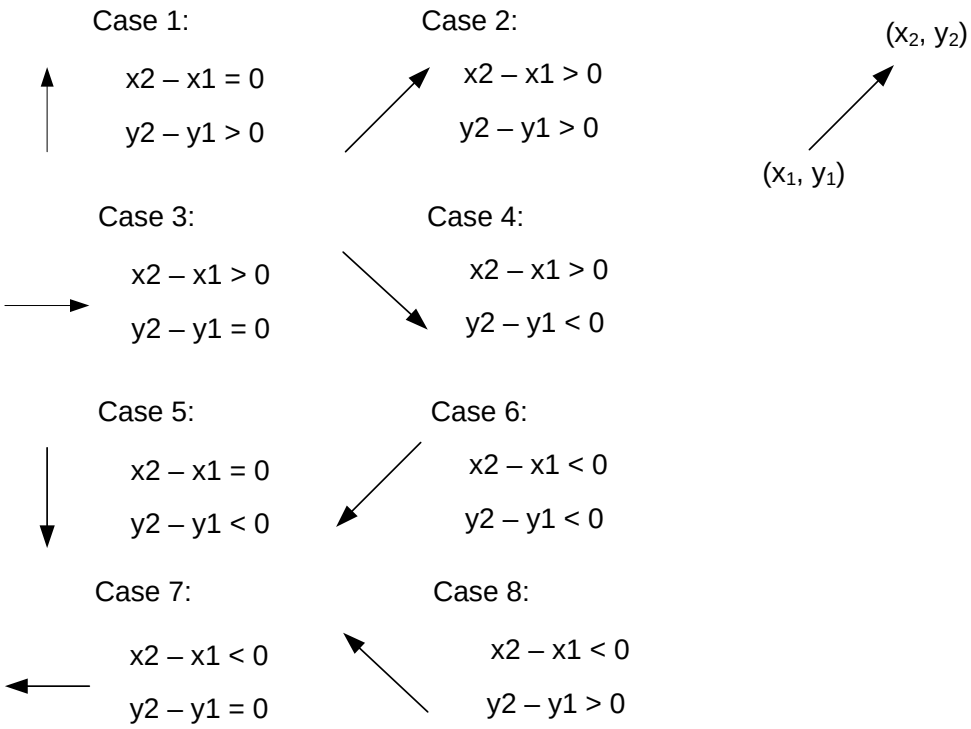


Figure 15 Trajectory Algorithm

3.5 Fireball System

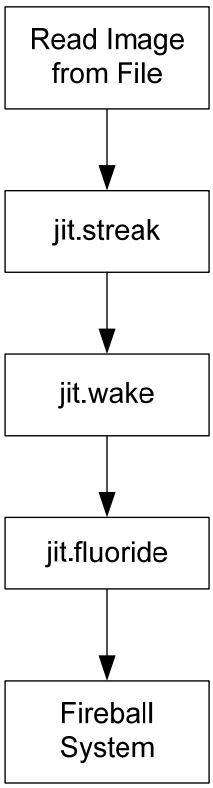


Figure 16 Fireball System Design

The fireball system patch was first created to build the fireball that the user in the live input video would be able to project in different directions of the screen. Using the energylocator patch with the use of color recognition in the user's hand, (see section 1.4 for details) the fireball would appear and be projected leaving a trail to resemble a beam type fireball. Also, every time a fireball was blasted a sound from the cartoon Dragonball Z was made to replicate this very cartoon.

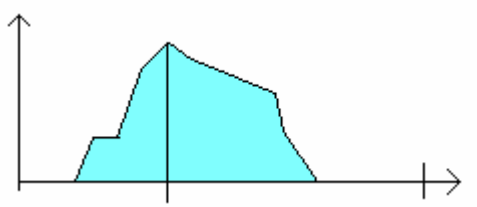
To begin the fireball patch, an image that resembled a fireball was first chosen. With this image, manipulating it using different jit functions allowed us to achieve the projected fireball we wanted.

The jit.streak object uses a specified probability to determine the chance that a given matrix cell's value will be extended to following cells. It was used give the allusion of some feedback the fireball would leave as it was set into motion. The number of pixels the feedback would leave could also be increased or decreased to display a more enjoyable effect. In our case, the increase of pixels made the trail of the fireball look more realistic to the cartoon we wanted to imitate.

Another function we used was jit.wake. The jit.wake object performs video feedback at the convolution stage. We increased the bleed attribute which made the fireball image leave a longer trail as it moved so it then appeared more as a beam firing. The jit.wake object helped offset and scale the image intensities. The mathematical description for image scaling and image intensities uses the algorithm as follows:
Suppose $-(kmax-1) \leq L \leq kmax-1$.
An additive image offset is defined by $G(i, j) = F(i, j) + L$
Then suppose $\lambda > 0$. *Image scaling is defined by* $G(i, j) = \lambda F(i, j)$.

An additional great function we used in creating the perfect fireball was the jit.fluoride object. This object does a great job in giving the image a neon glow. In the cartoon Dragonball Z, the characters fireballs and shooting beams tend to have this glow effect, therefore it was the perfect function to use. Using the attributes of luminosity and tolerance level, the image turned into the perfect glowing fireball that left a great beam trail. Another advantage was being able to change the color of the fireball using the simple color slider. The jit.fluoride object did a great job of brightening the image and the mathematical description for this was using image offsetting. Image offset mathematical algorithm is as follows:
If $\lambda > 0$, *then G is a brightened version of F.*
If $\lambda < 0$, *then G is a dimmed version of F.*
The histogram is shifted by amount L:
$H_G(k) = H_F(k - \lambda)$

Original



Shifted by λ

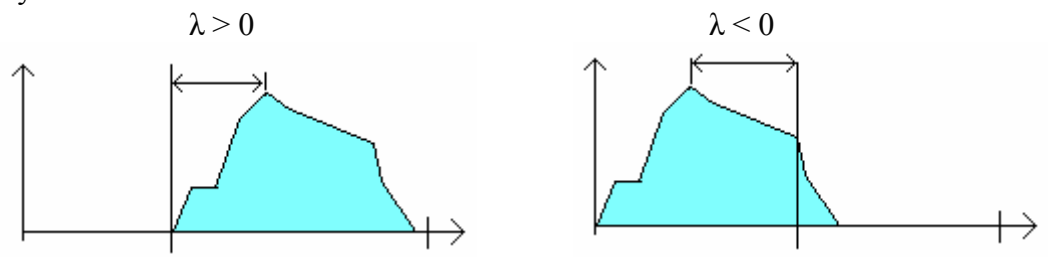


Figure 17 Image Offset Graphs

The implementation of fireball2.pat can be found in Appendix K.

3.6 Sound System

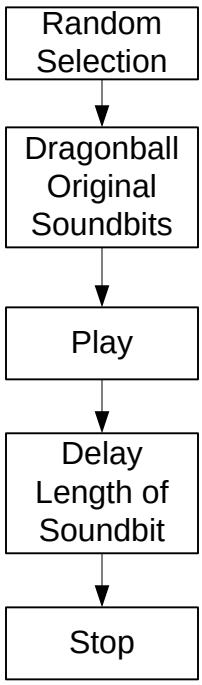


Figure 18 Sound System Design

The sound system (sound.pat) was responsible for randomly playing original soundbits from the Dragonball cartoon, such that when a character launched a fireball, they would

usually scream/yell the name of the attack they would be doing. This system provided that functionality. The implementation of sound.pat can be found in Appendix L.

4 Contribution

4.1 Roles

Member	Roles
Kyungsik Choi	Installation, Background animation
Hanspaul Saund	Concept, Installation, Documentation
Rischa Poncik	MAX/Jitter Programming, Documentation
Terry Ng Wan	Fireball description, Website, References

4.2 Documentation

Member	Contribution
Kyungsik Choi	• Sections 18 • Contributed overall artistic design
Hanspaul Saund	• Sections 1 & 2 • Contributed list of figures
Rischa Poncik	• Sections 3, excluding 3.5 • Contributed appendixes
Terry Ng Wan	• Section 3.5 • Contributed appendixes

5 References

Prof. Sha Xin Wei Course Notes:
http://www.topologicalmedialab.net/xinwei/classes/cs/COMP471_ComputerGraphics_RealtimeVideo/syllabus.htm

Computer Vision for Jitter:
http://www.iamas.ac.jp/~jovan02/cv/objects.html

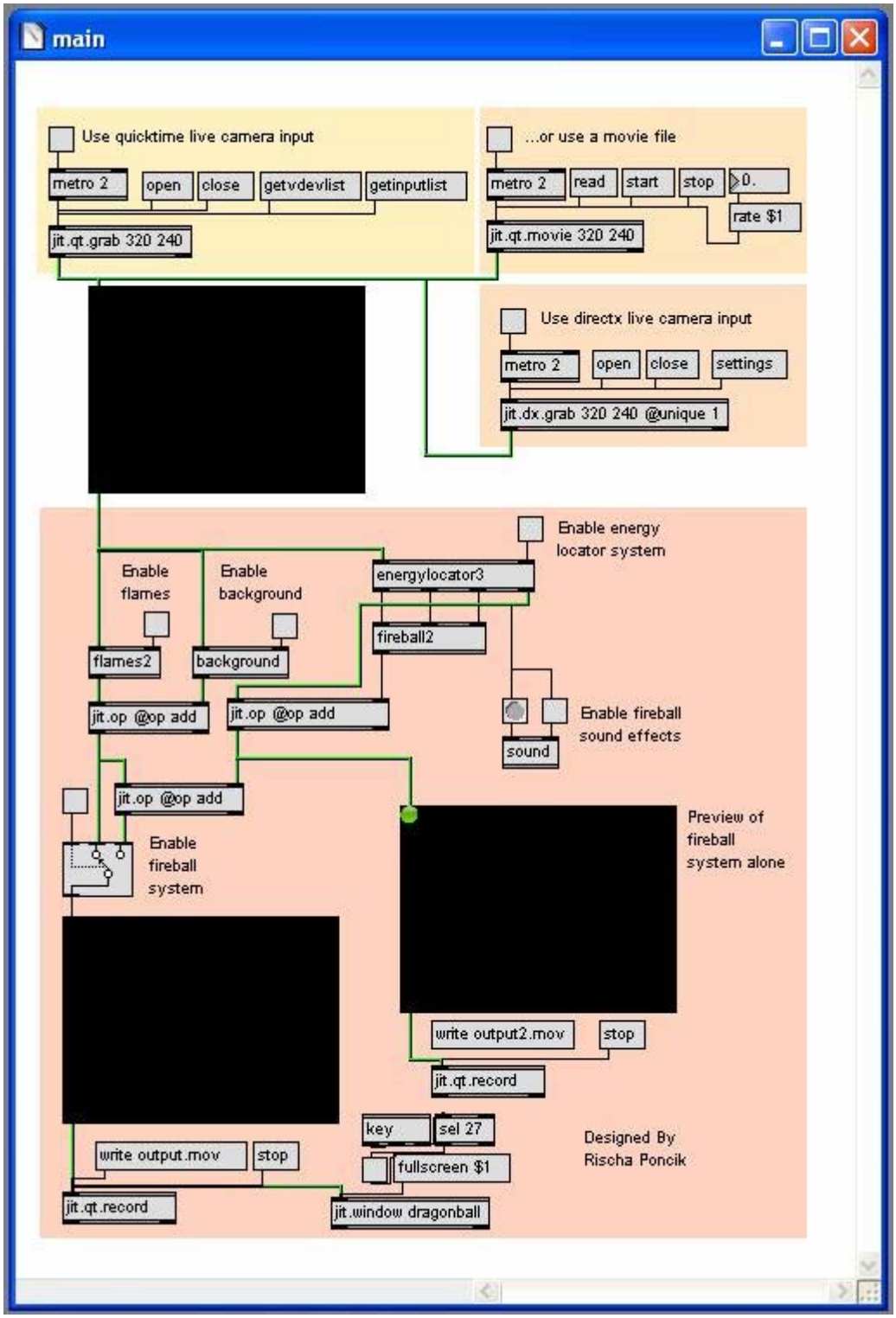
Cycling 74 Max/MSP Jitter documentation:
http://www.cycling74.com/twiki/bin/view/ProductDocumentation
http://www.cycling74.com/documentation/index

Dragonball Sounds
http://www.blackgoku.com/main.php?page=wavs

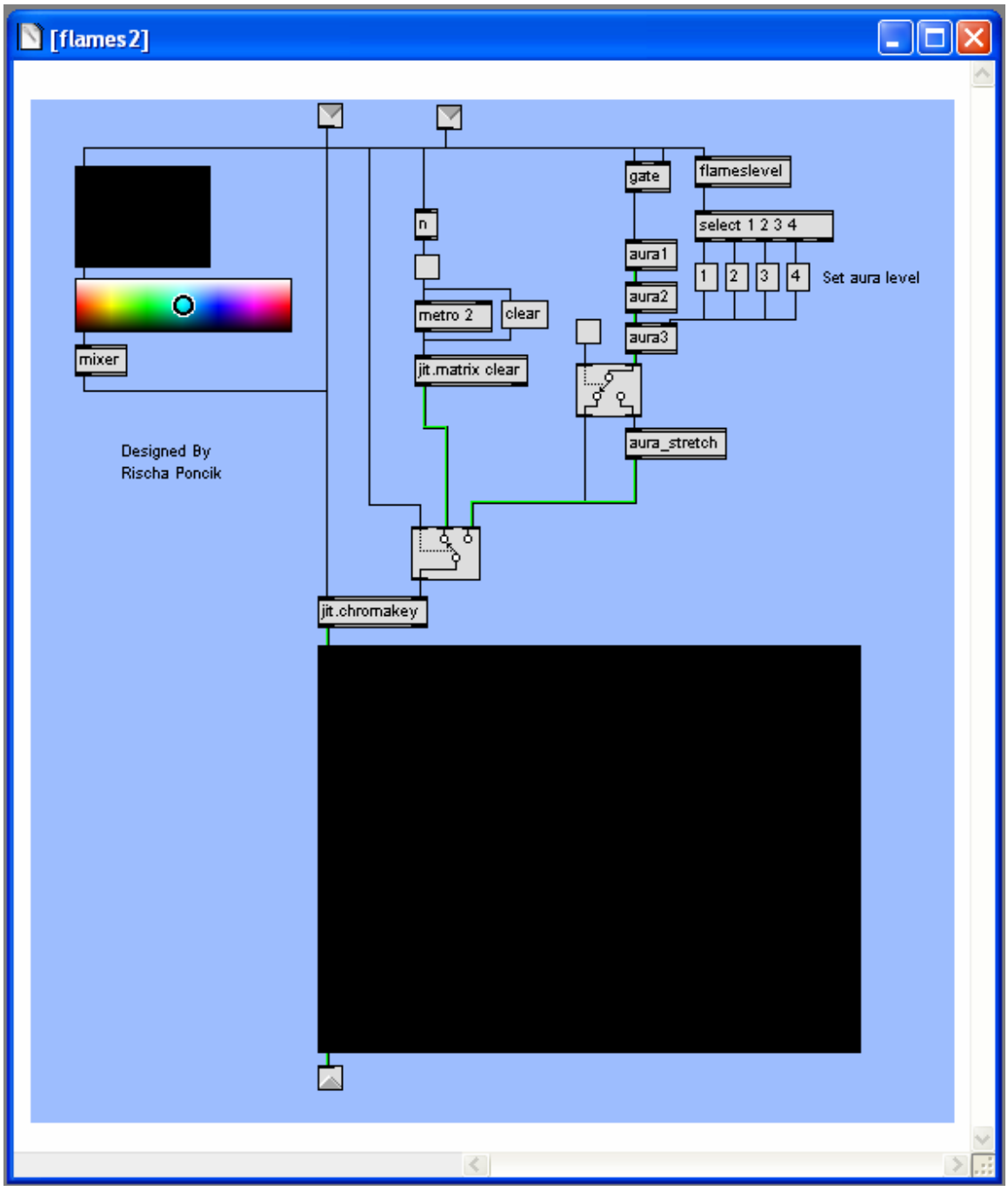
Dragonball Background
Dragonball GT Universal Allies(DVD)

Fireball Image
http://www.tutorialfx.com/forums/index.php?showtopic=39

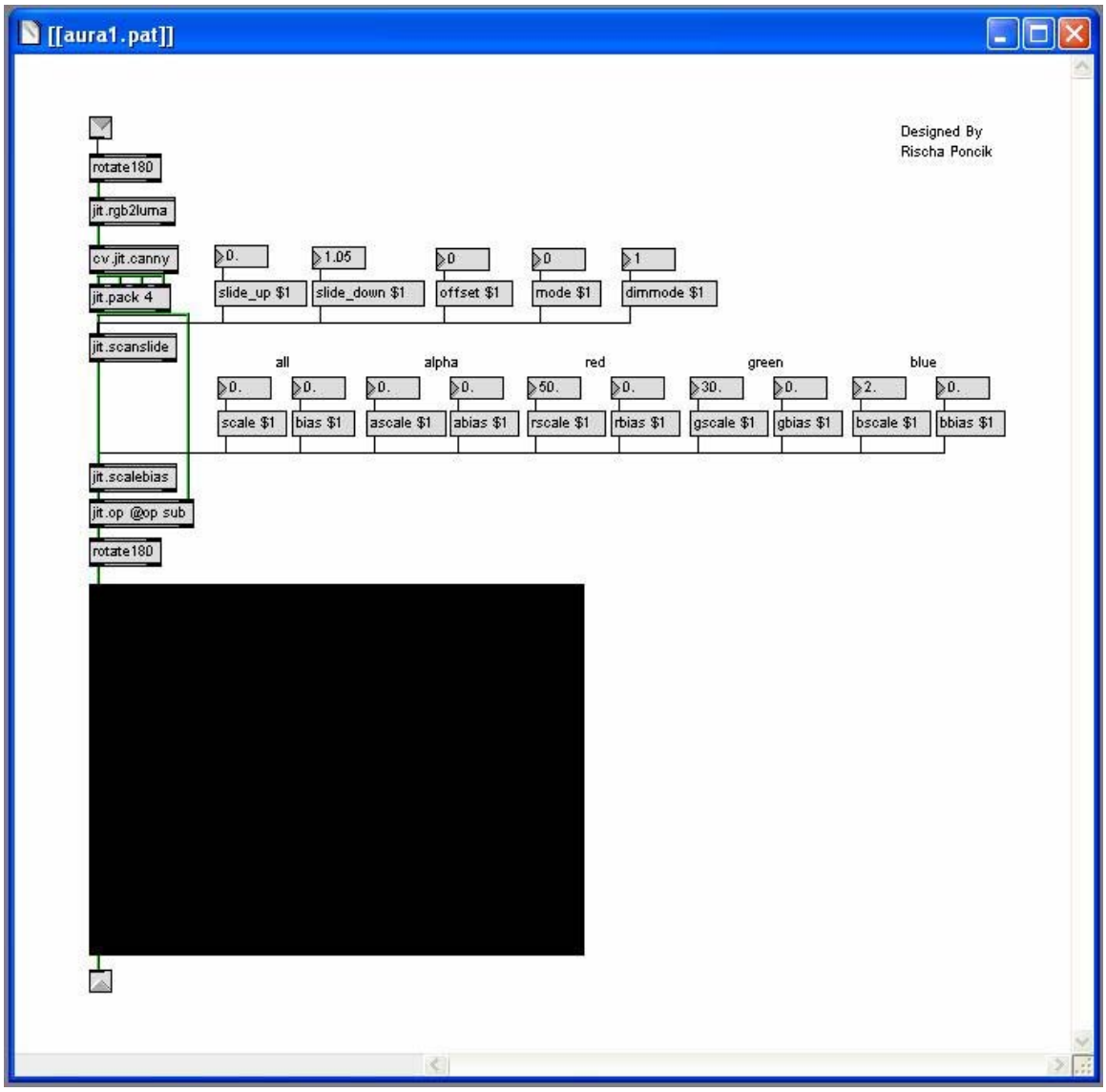
6 Appendix A: Main.pat



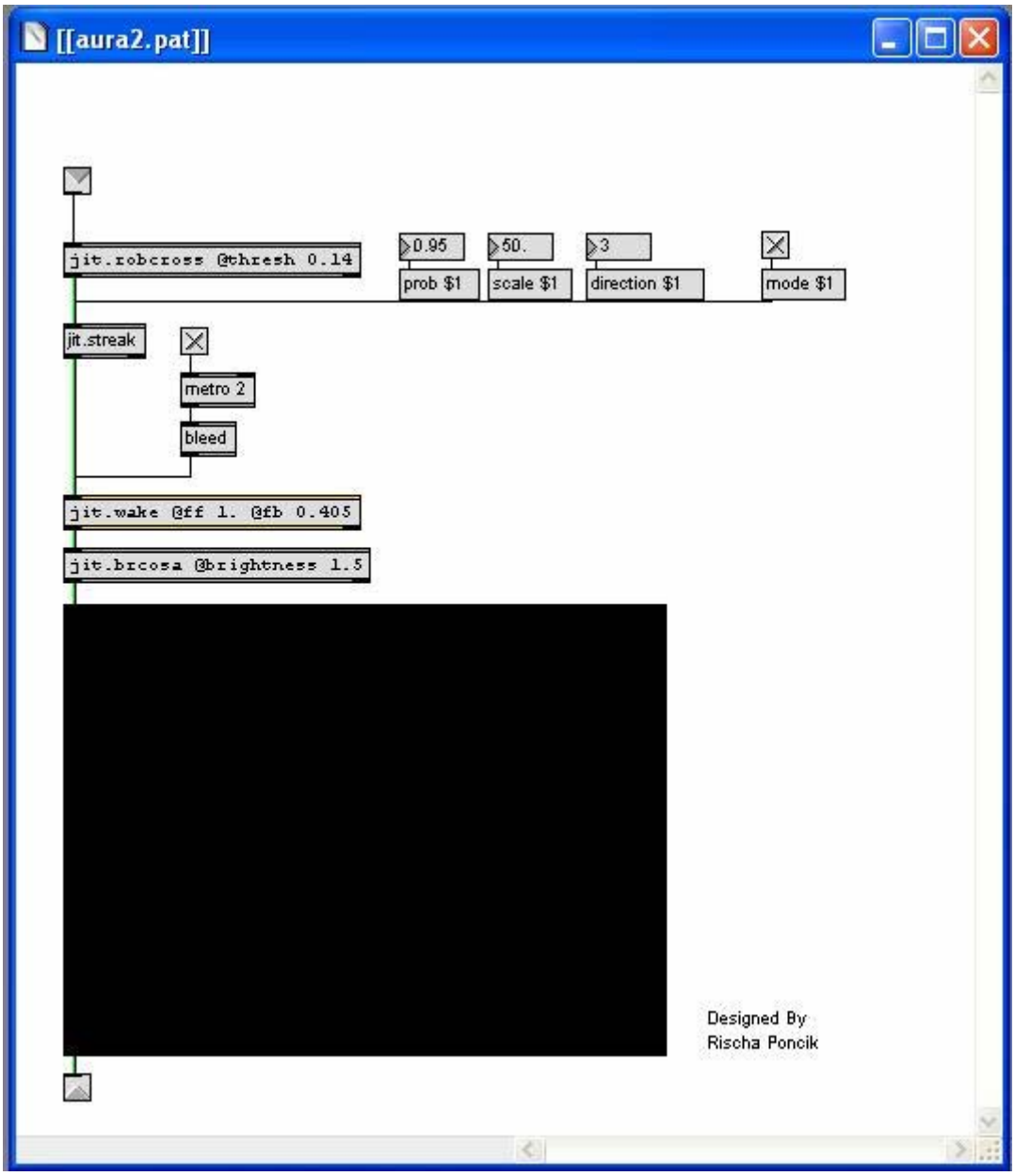
7 Appendix B: flames2.pat



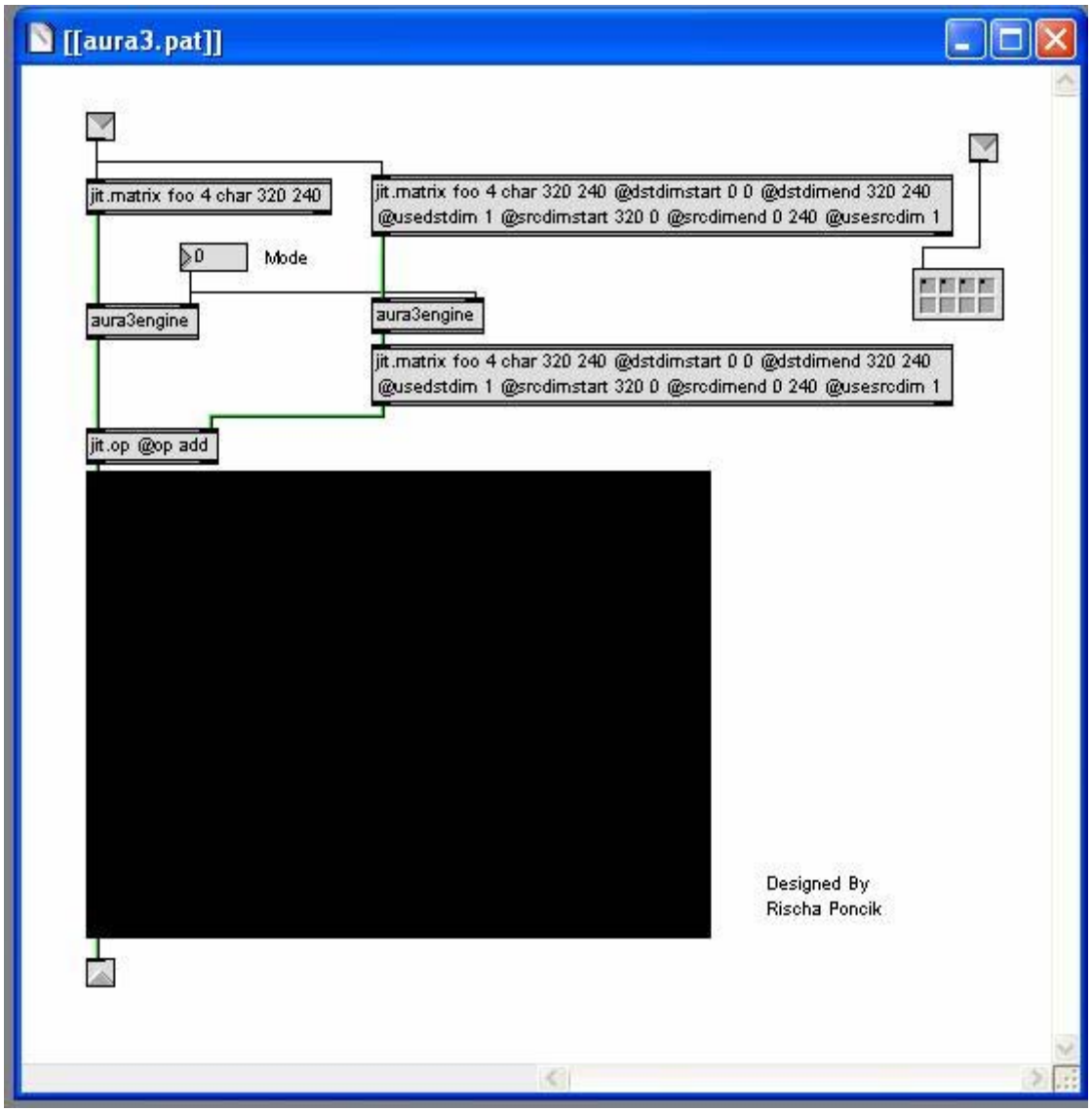
8 Appendix C: aura1.pat



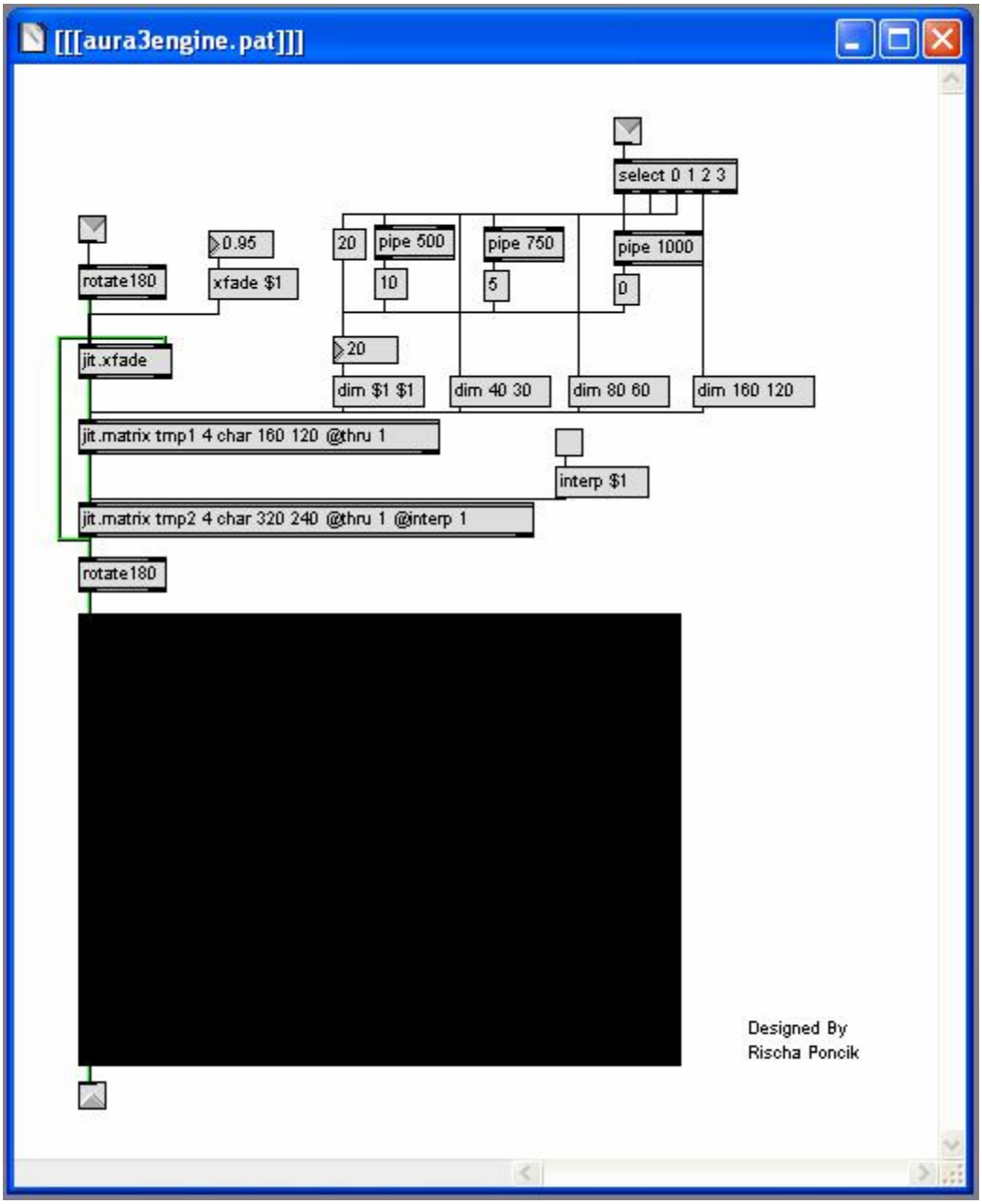
9 Appendix D: aura2.pat



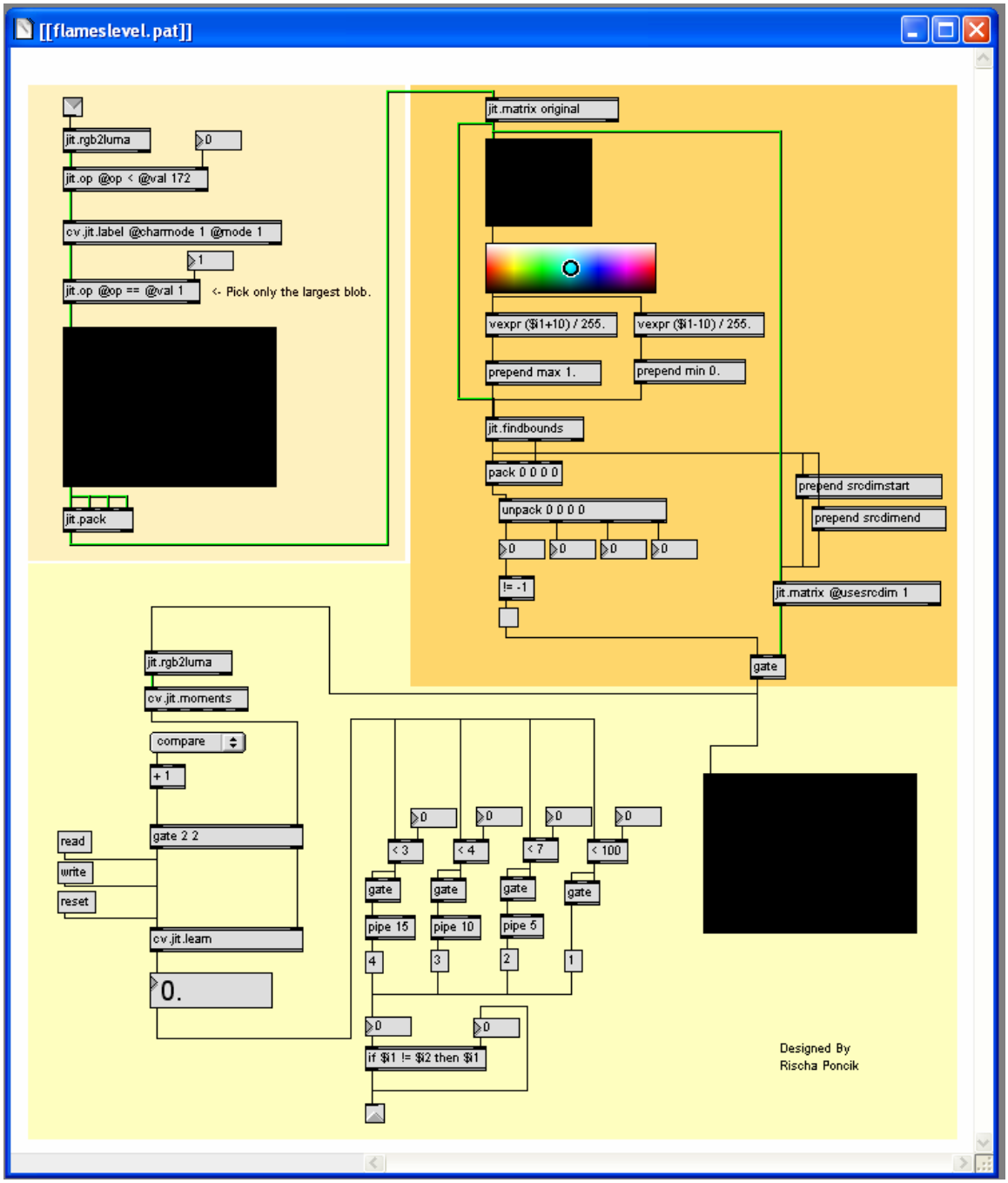
10 Appendix E: aura3.pat



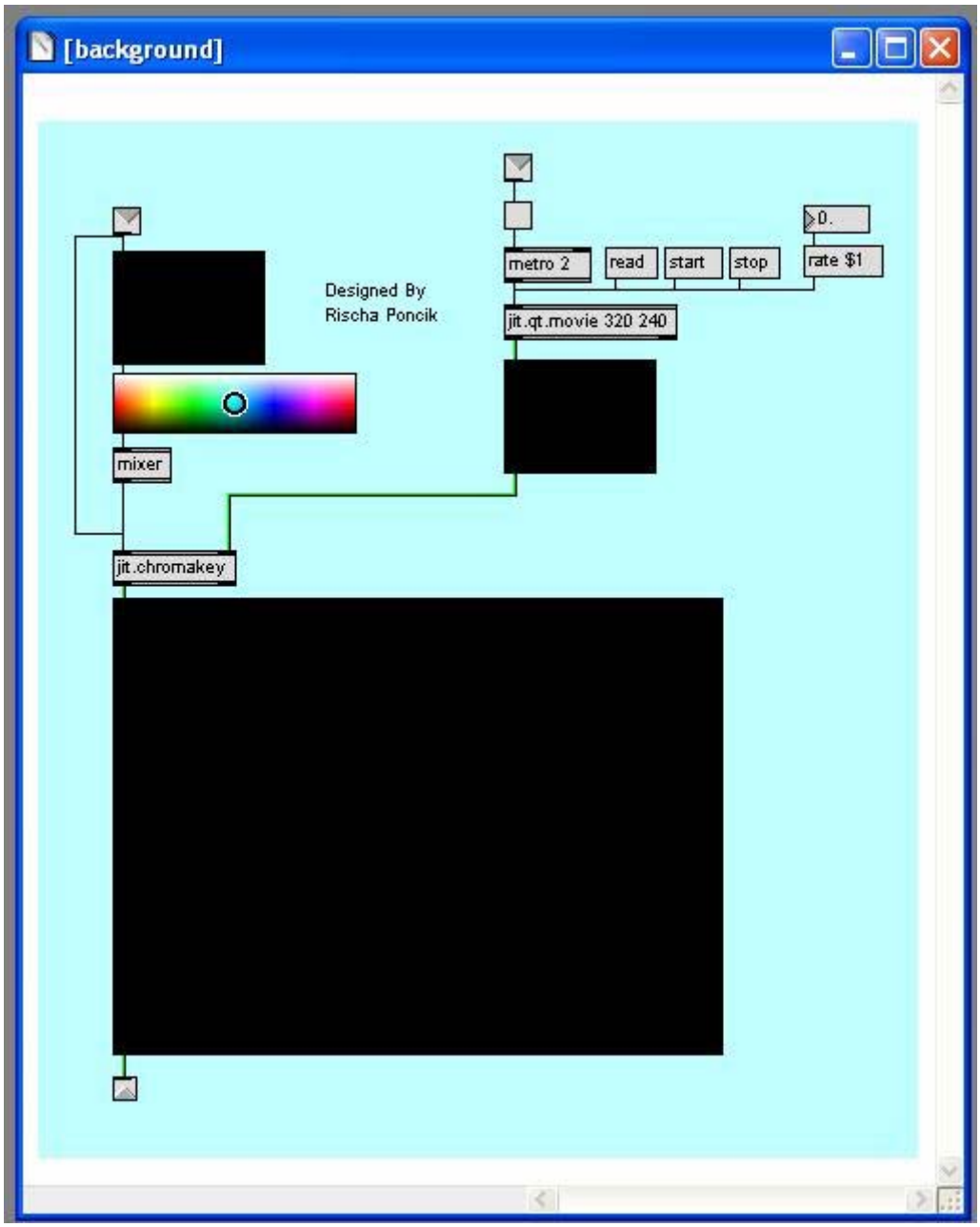
11 Appendix F: aura3engine.pat



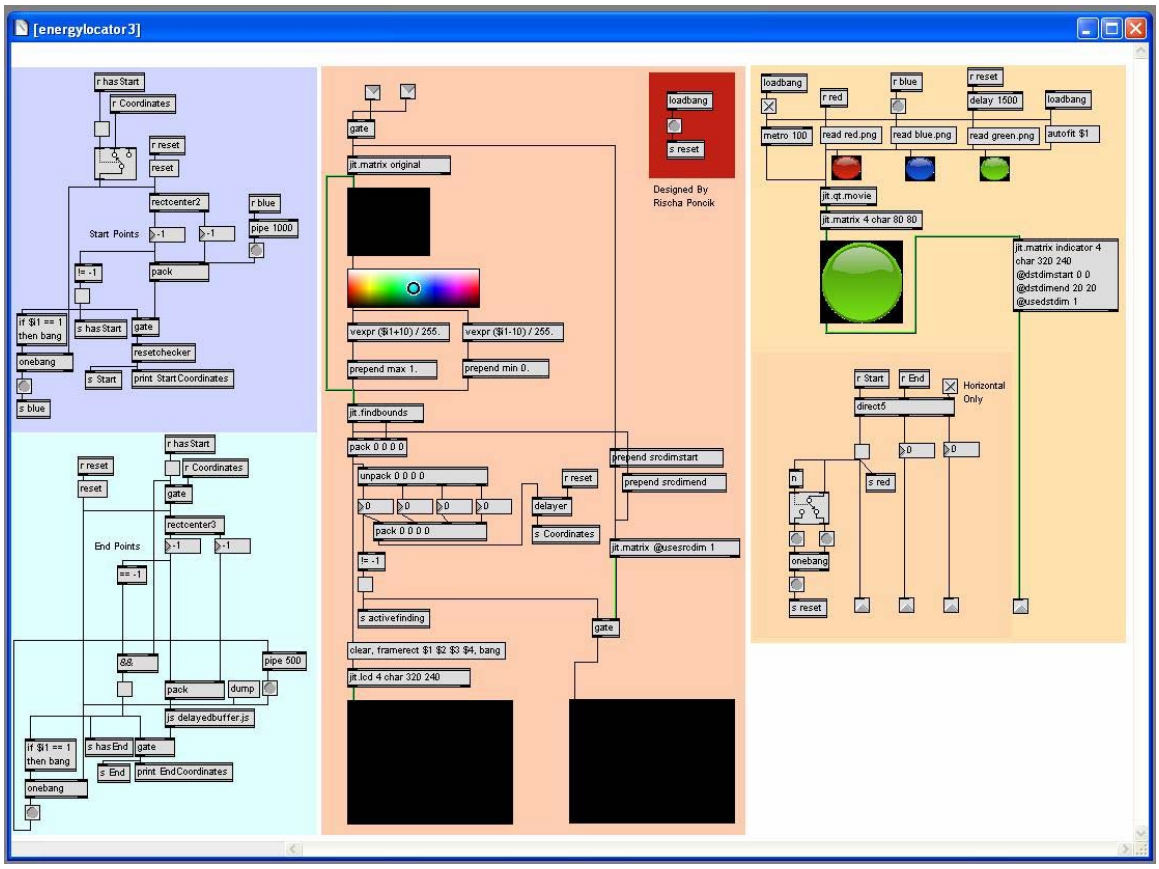
12 Appendix G: flameslevel.pat



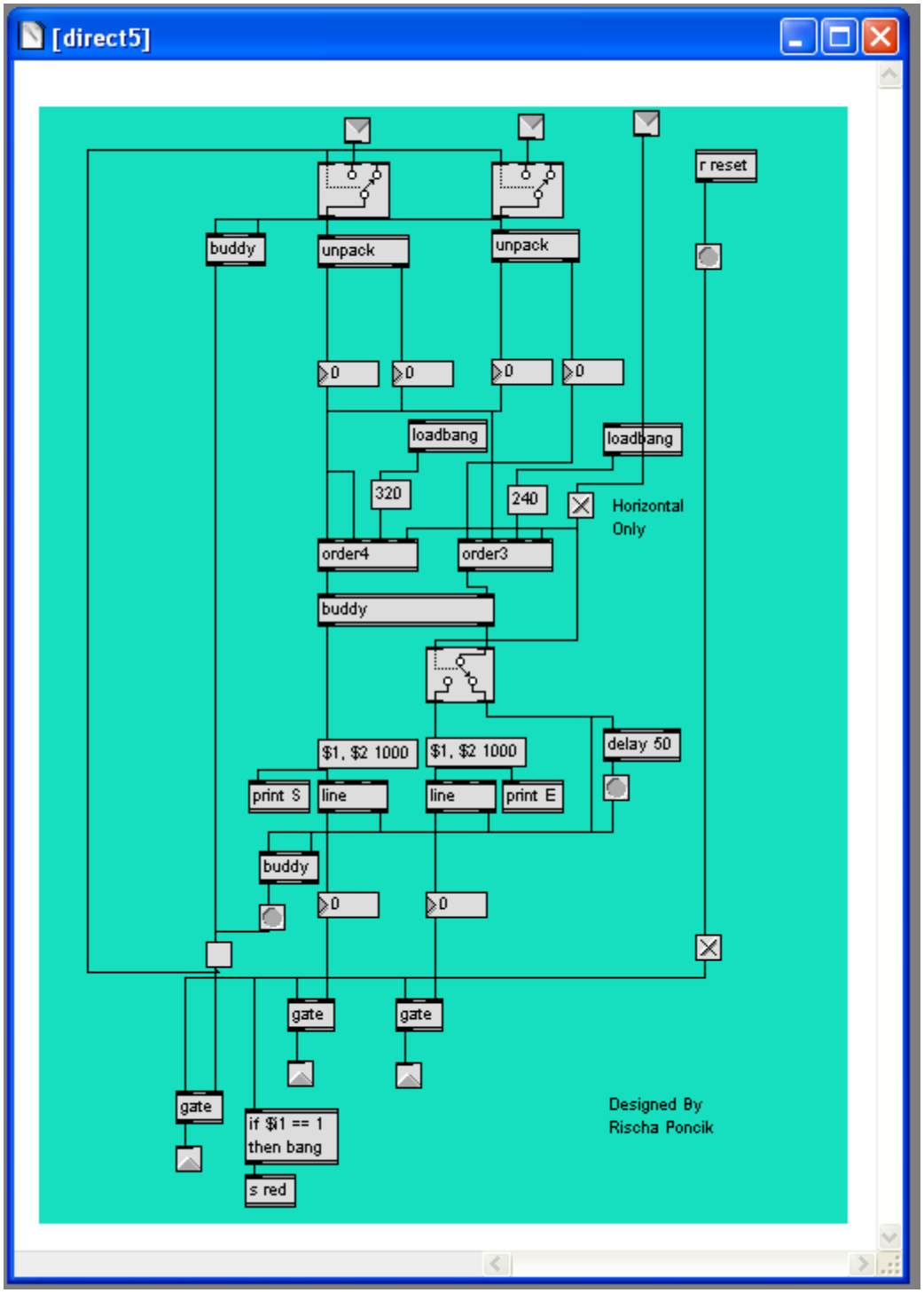
13 Appendix H: background.pat



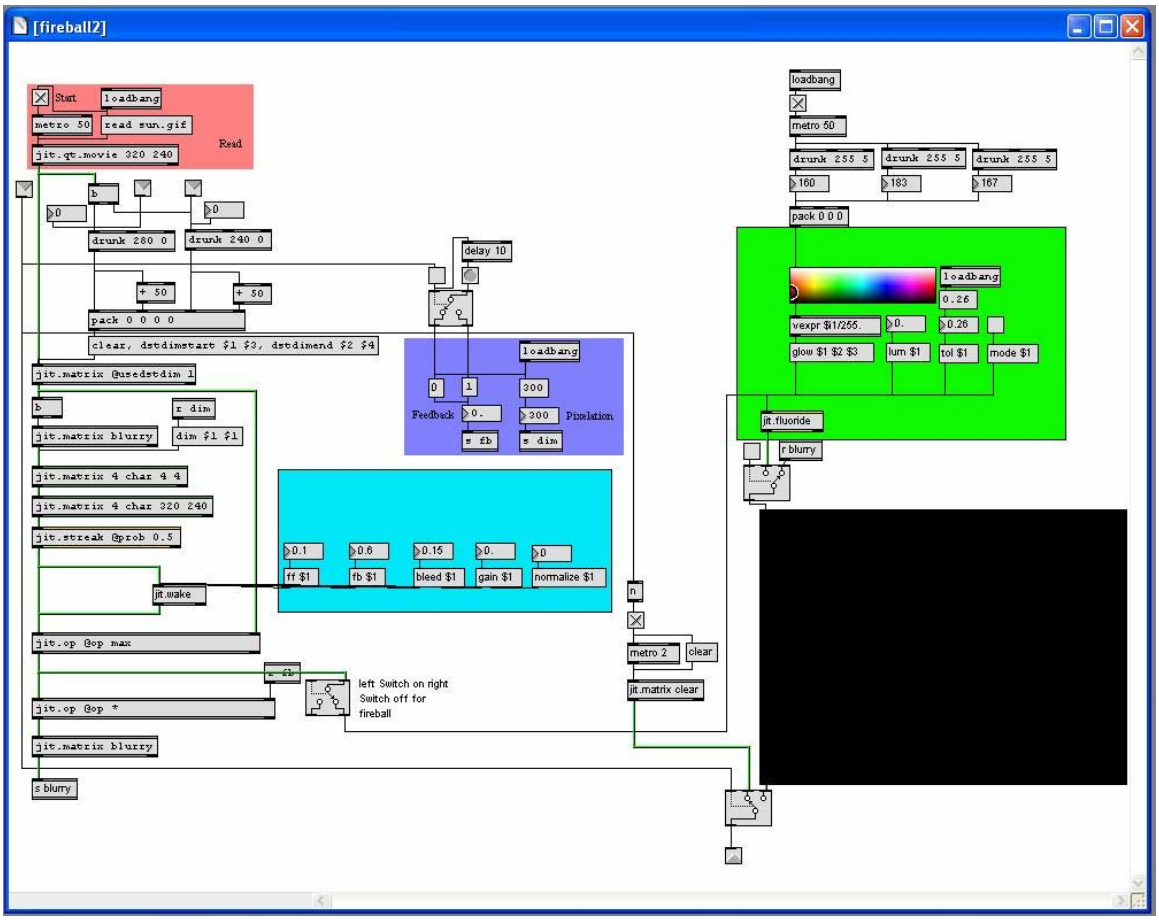
14 Appendix I: energylocator3.pat



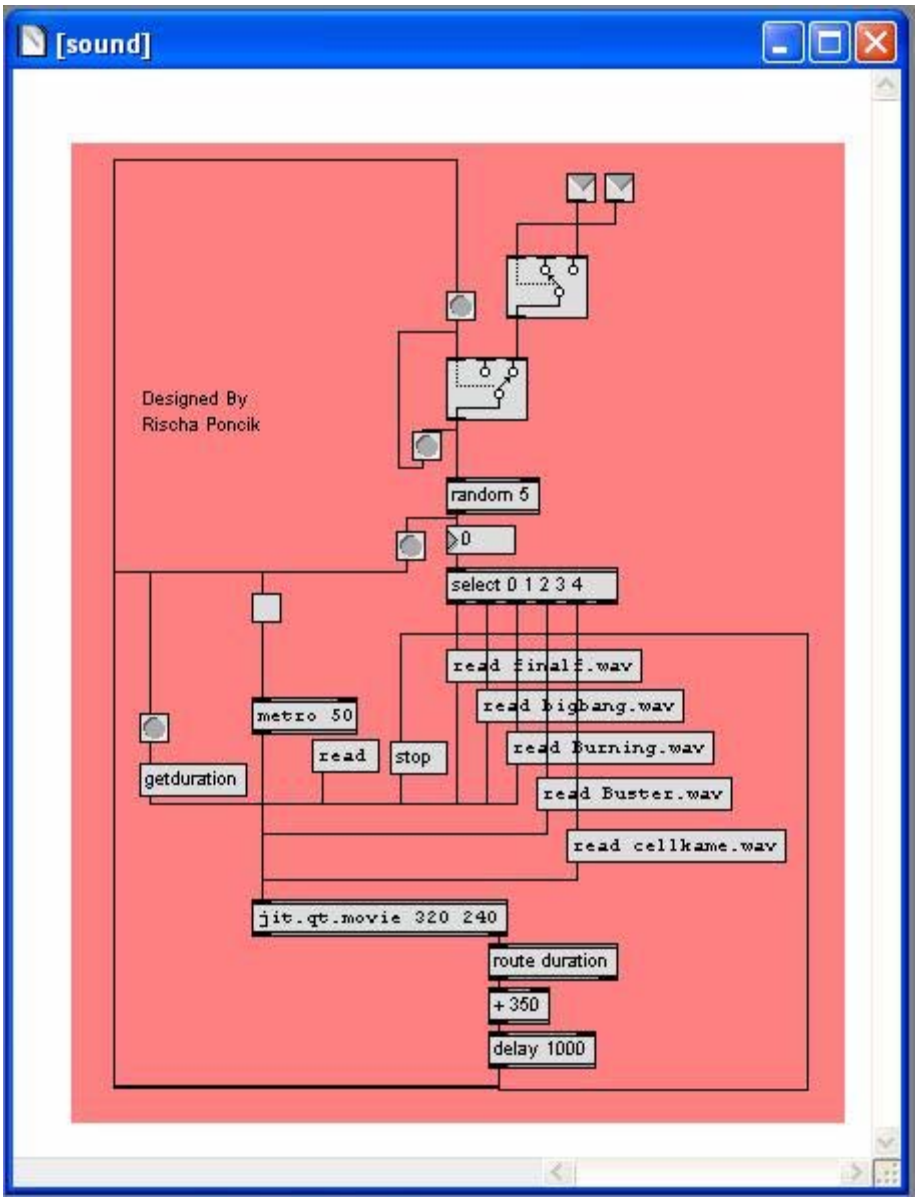
15 Appendix J: direct5.pat



16 Appendix K: fireball2.pat



17 Appendix L: sound.pat



18 Appendix M: User Manual

How to Use:

Environment Setup:

- Train the pose for a user by using *cv.jit,learn*.
- Set up the color recognition for the user.

1. Flame

When a user posses a certain position, flame glows around the user.
When a user posses a certain position, flame will disappear.
(Using *cv.jit.learn* administers can train a certain pose that can trigger flame whether it is on, or off.)

2. Fireball

There is a light indicator on the upper left corner of the screen (user's point of view) that indicates the current state of the system.
When green light shows, the system is ready to accept input from a user.
Then user can show
After a short amount of time, it changes to blue means the system is tracking user's movement.
When a user stop at certain point, the light indicator changes to red, then the fire ball execute.
Then, the system will go back to green light.

19 Appendix N: Individual Project Report (Kyungsik)

NAME :	Kyungsik CHOI
STUDENT ID :	5033330
PROJECT:	Going Super Saiyan

Team-mates

Terry Ng Wan	
Hanspaul Saund	
Rischa Poncik	

I. Description of Major Individual Contributions

Describe here **your own** major contributions to the completion of the project, what skills were involved in these activities, and what you learned while doing these activities.

Contribution 1:

Contribution: Installation
Skills involved: Bring two spot lights and reserve all equipment needed. Setting up all equipment before the test.
What I learned: Everything has to be ready before the test that it will minimize the wasting time.

Contribution 2:

Contribution: Background animation and Fire flame Patch
Skills involved: iMovie and MAX/Jitter programming
What I learned: How to use the software and library.

II. Major Negative Aspects

Describe in detail two of the major problems that you encountered in your project. Identify the root cause of this problem, and propose a solution that you could apply to prevent such a problem to happen in your future projects.

Negative Aspect 1:

Problem: Software update in CDA. CV library was not updated in portable station.
Root cause: Old version of software
Solution: One of our team members has to bring his laptop.

Negative Aspect 2:

Problem:
Root cause:
Solution:

III. Major Positive Aspects

Describe in detail two of the major decisions, practices, or technologies that turned out to be very profitable to your project. Describe in what sense it was profitable.

Positive Aspect 1:

Positive aspect: CV library
Why it was profitable: It is hard to implement the pattern recognition (HMM). CV library has already available pattern recognition features.

Positive Aspect 2:

Positive aspect: Test time.
Why it was profitable: We have tested four times with different environments before the exhibition.

IV. Peer Evaluation

List below **all** your teammates and evaluate their contribution to the completion of your project according to the listed criteria (1 being worst and 5 being best).

Name	Effort	leadership	ability	assiduity
Terry Ng Wan	5	4	5	5
Rischa Poncik	5	5	5	4
Hanspaul Saund	5	5	4	5

If you think that some member of your team (other than yourself) deserves a special mention for his/her great contribution to your project, mention it below, clearly explaining why this person deserves such a special mention. Answering this question is not mandatory.

Name:	Rischa Poncik
Reason: He put extra effort to finish the project regard to MAX/Jitter programming	

20 Appendix O: Individual Project Report (Rischa)

NAME :	Rischa Poncik
STUDENT ID :	5168643
PROJECT:	Going Super Sayan

Team-mates

Kyungsik Choi	
Hanspaul Saund	
Terry Ng Wan	

I. Description of Major Individual Contributions

Describe here **your own** major contributions to the completion of the project, what skills were involved in these activities, and what you learned while doing these activities.

Contribution 1:

Contribution: Implemented the flames system, which included the flames level system.
Skills involved: In dept understanding of the feature set available to the user of the Max/MSP environment.
What I learned: How images can be mapped uniquely through shape descriptors, in order to achieve pattern recognition. The ability to improve image quality through convolution techniques and so much more.

Contribution 2:

Contribution: Energylocator system
Skills involved: In dept understanding of the available feature set available in Max/MSP environment.
What I learned: Originally, the energylocator system used color/motion detection and pattern recognition. However, as my knowledge increased, I realized that by only using the color detection technique, I could accomplish the overall design that I needed. Basically, what I learned was that with an increase understanding of exactly how Max/MSP patches worked, the complexity of designs can be reduces, thus reducing CPU load and resulting in quicker response times.

II. Major Negative Aspects

Describe in detail two of the major problems that you encountered in your project. Identify the root cause of this problem, and propose a solution that you could apply to prevent such a problem to happen in your future projects.

Negative Aspect 1:

Problem: The last few days of reserving or attempting to get equipment proved troublesome
Root cause: Nick would reserve all the equipment, but would never be present to handout or provide others with the equipment he reserved.
Solution: Reserve or bring our own equipment.

Negative Aspect 2:

Problem: The MAC computers seemed quite difficult to use.
Root cause: Inexperience and dislike for the MAC computers.
Solution: Installed the Max/MSP environment on Microsoft Windows.

III. Major Positive Aspects

Describe in detail two of the major decisions, practices, or technologies that turned out to be very profitable to your project. Describe in what sense it was profitable.

Positive Aspect 1:

Positive aspect: Experienced a new technology related to real-time video processing.
Why it was profitable: Increased my skill set and gained confidence in the area of real-time video processing. I personally liked the pattern recognition feature our team used to control the fire level.

Positive Aspect 2:

Positive aspect: Team worked real well together.
Why it was profitable: Helped produced a better end product, since there was never any conflicts of interest.

IV. Peer Evaluation

List below **all** your teammates and evaluate their contribution to the completion of your project according to the listed criteria (1 being worst and 5 being best).

name	effort	leadership	ability	assiduity
Kyungsik Choi	5	4	5	4
Hanspaul Saund	5	4	5	4
Terry Ng Wan	5	4	5	4

If you think that some member of your team (other than yourself) deserves a special mention for his/her great contribution to your project, mention it below, clearly explaining why this person deserves such a special mention. Answering this question is not mandatory.

Name:
Reason:

21 Appendix P: Individual Project Report (Terry)

NAME :	**Terry Ng Wan**
STUDENT ID :	**5192617**
PROJECT:	**Going Super Saiyan**

Team-mates

Kyungsik (Andrew) Choi	
Rischa Poncik	
Hanspaul Saund	

I. Description of Major Individual Contributions

Describe here **your own** major contributions to the completion of the project, what skills were involved in these activities, and what you learned while doing these activities.

Contribution 1:

Contribution: Fireball patch
Skills involved: Programming in Max/Jitter
What I learned: Through testing and research I learned more about programming with Max/Jitter and the many functions and tools it contains which make it such a powerful software.

Contribution 2:

Contribution: Lead ideas to make the project entertaining and closely resemble the cartoon Dragonball Z.
Skills involved: Thinking of what we can implement in our project. Like adding an animated background, sounds for the fireball and music, etc. Have to decide which ideas that are feasible and which are not.
What I learned: The more ideas presented the better, as not all we'll be successful and not all will have time to be implemented.

II. Major Negative Aspects

Describe in detail two of the major problems that you encountered in your project. Identify the root cause of this problem, and propose a solution that you could apply to prevent such a problem to happen in your future projects.

Negative Aspect 1:

Problem: Ran out of time to make the project even more special and interactive.
Root cause: Semester is too short
Solution: A possible solution would be to create and follow a timeline. Time management is always difficult in any project but must be dealt with. Organizing and completing tasks at a scheduled date could help a projects implementation to complete all desired tasks.

Negative Aspect 2:

Problem: Hard to get equipment. To find perfect lighting for camera.
Root cause: Many groups need the same equipment. EV building lighting conditions are difficult to work with.
Solution: We brought our own equipment to better the environment for our project.

III. Major Positive Aspects

Describe in detail two of the major decisions, practices, or technologies that turned out to be very profitable to your project. Describe in what sense it was profitable.

Positive Aspect 1:

Positive aspect: Using Max/Jitter software was something new but very interesting and different. The programming was definitely more exciting using live video.
Why it was profitable: I believe it was profitable because it let us use our imagination to create many different things. Any idea could have been tried to be implemented using Max/Jitter and I believe this is what makes it such a great software.

Positive Aspect 2:

Positive aspect: Working in a group of individuals whom were all interested in the project.
Why it was profitable: We were all on the same page and enjoyed working on the project as it was a project and idea we all enjoyed. Although the entire project was a lot of work, it was appealing for all of us which I believe made us work better together.

IV. Peer Evaluation

List below **all** your teammates and evaluate their contribution to the completion of your project according to the listed criteria (1 being worst and 5 being best).

name	effort	leadership	ability	assiduity
Kyungsik (Andrew) Choi	5	4	5	4
Rischa Poncik	5	4	5	4
Hanspaul Saund	5	4	5	4

If you think that some member of your team (other than yourself) deserves a special mention for his/her great contribution to your project, mention it below, clearly explaining why this person deserves such a special mention. Answering this question is not mandatory.

Name: Rischa Poncik
Reason: Did a great job with the Max/Jitter programming

22 Appendix Q: Individual Project Report (Hanspaul)

NAME :	Hanspaul Saund
STUDENT ID :	4693949
PROJECT:	Going Super Saiyan

Team-mates

Andrew Choi	
Rischa Poncik	
Terry Ng Wan	

I. Description of Major Individual Contributions

Describe here **your own** major contributions to the completion of the project, what skills were involved in these activities, and what you learned while doing these activities.

Contribution 1:

Contribution: Testing of patches in Max/Jitter programming to verify flames and animated background.
Skills involved: Using different patches to help create different effects for the creation of the fire.
What I learned: With the help of the tutorials and notes I was able to learn a great deal of how the max/jitter program works.

Contribution 2:

Contribution: Select song for video, incorporate sound to the patch and help with the layout and documentation of the website using html.
Skills involved: Learning the max/jitter tutorials to incorporate sound.
What I learned: Building the site using html and incorporating sound.

II. Major Negative Aspects

Describe in detail two of the major problems that you encountered in your project. Identify the root cause of this problem, and propose a solution that you could apply to prevent such a problem to happen in your future projects.

Negative Aspect 1:

Problem: One problem was that we had trouble getting access to certain equipment needed to implement our video. The logistics were not entirely reliable in our time of need.
Root cause: Lack of responsibility from the people in charge of the logistics.
Solution: Luckily we had reserved additional equipment in case there might be a problem. However, we still had to wait some time.

Negative Aspect 2:

Problem: I experienced some problems with the website creation because we were not familiar with using html.
Root cause: My lack of knowledge in this department of building a site.
Solution: Studying tutorials online that is instrumental in building a website.

III. Major Positive Aspects

Describe in detail two of the major decisions, practices, or technologies that turned out to be very profitable to your project. Describe in what sense it was profitable.

Positive Aspect 1:

Positive aspect: The fact that I registered for this course and learned how to use max/jitter software.
Why it was profitable: I did not have much experience with mac computers before this course but I am definitely better at using the mac labs with the addition of max/jitter software. I used the max/jitter software for the first time and after some practice I was becoming more comfortable with programming in that language for then videos.

Positive Aspect 2:

Positive aspect: The team co-operation level was great and we did not run into any issues that would be negative to our project. We all worked together to attain the same goal.
Why it was profitable: Having this type of environment was definitely profitable for us because we were able to help each other and work well with each other.

IV. Peer Evaluation

List below **all** your teammates and evaluate their contribution to the completion of your project according to the listed criteria (1 being worst and 5 being best).

name	effort	leadership	ability	assiduity
Andrew Choi	**5**	**5**	**5**	**5**
Rischa Poncik	**5**	**5**	**5**	**5**
Terry Ng Wan	**5**	**5**	**5**	**5**

If you think that some member of your team (other than yourself) deserves a special mention for his/her great contribution to your project, mention it below, clearly explaining why this person deserves such a special mention. Answering this question is not mandatory.

Name: We all worked hard on this project so we all deserve a special mention!
Reason: