SOCIALASER

PROJECT OVERVIEW AND PROBLEM

Physical computing is often used to bridge the gap between technology enthusiasts and those just looking to engage in an interactive experience. The SociaLaser project is aimed at bringing together the social element of human interaction along with the digital dimensions of computing.

The SociaLaser team proposes to develop an immersive environment synchronizing laser light mechanics with physical user input and music. Our end goal is to have users interact not only with each other, but with the technology at their hands. Users will be able to control streams of laser light through the use of a multi-touch interface, as if they were producing their very own light show. Some effects that the user will be able to create include producing solid lines of light, point particles, and various shapes. When the projector is not in use, it will serve as an installation with pre-loaded laser effects put in place.

The multi-touch interface itself will be developed through ActionScript 3.0, and will communicate with Processing to control the laser projector. Other mechanical elements of the project include mirrors, fog, and additional strobe-type lighting setups. The project will target visitors of Imagine RIT 2010 to become inspired with physical computing technologies.

PROJECT OBJECTIVES

- Give users direct control over concert technology
- Utilize intuitive physical motions
- Integrate music as either a medium or context
- Allow for the possibility of more then one user
- Small group collaboration
- Fulfillment through creation

MEASURES OF SUCCESS

- Ten users per hour using the table
- Users deliberately trying to sync the lasers with the music
- One third of visiting patrons using the table
- Multiple people working together to produce a show
- Twenty “likes” on vimeo in a month after the projects debute
- Frequency and duration of audible audience reaction (aka number of WHOAs)

TARGET AUDIENCE

The SociaLaser project is aimed at men and women seeking a concert experience through unconventional means. Also, they are individuals with an interest in technology and its use as a form of creative expression. Each user ranges in age from five to fifty-five and come from a variety of backgrounds.

TEAM BREAKDOWN

Each team member has a variety of roles in the production of the project and will fulfill those roles while following the schedule as closely as possible.

KEVIN WHITFIELD
Hardware Technician

RICH VUONG
Multi Touch Developer

ANNA STEGLINSKI
Laser Control Developer

JASON CARYL
Designer / Document Manager

NICK TASSONE
Designer / Publicist / Marketing

TREVOR CRANDALL
Designer / Photographer / Blogger / Videographer

EQUIPMENT

Socialaser will use both a multi-touch interface and a single color laser projector for the primary equipment deliverables. Secondary equipment deliverables include an audio system, and bounce mirrors. The multi-touch table will be the one used by the RIT sociable group last year. Significant repairs and improvements will be made from parts acquired by team member and affiliates. The critical elements are already present, but improvements need to be made to the illumination system, optical alignment system, and many smaller sub-systems. When the project is finished, the table will remain at RIT and any equipment on loan from team member or affiliates will be returned, the rest will stay with the table.

The Laser projector is a project being carried out between the SociaLaser team and WindWorks design. This projector will be a single color 5-20mW laser projector with a single X/Y scanner module and mechanical blanking shutter. This device will interface through the parallel port of the computer. Parts will be supplied through WindWorks Design on loan for educational use. Once the project is over the projector will return to WindWorks Design and any parts on loan from team member or affiliates will be returned.

Secondary equipment will be used to help create an environment that enhances the users experience. These would include a sound system, laser bounce mirrors, red carpet, haze machine, velvet ropes, “fog airlock”, and rope lights. Equipment will be acquired by team member and affiliates, or through third parties. When the project is finished, any equipment on loan will be returned to its owner.

The team will use their own personal computers and/or RIT’s computer labs to create material including designs and code. Equipment will be stored at team member’s residences or, preferbly, at RIT in a secure location such as an unused, lockable room.

USER TESTING

SociaLaser will randomly select fellow students and professors to ask for feedback and input from direct interaction with the project in its prototype and final stages. Specifically, we will be looking to see if the interface on the touch table is intuitive and user friendly and the user’s reactions to the pre-programmed effects. SociaLaser will then use the feedback to improve the overall design and function of the project to accomplish an extraordinaryuser adventure.

USER SCENARIO

Todd is a well mannered man in his mid-fifties. Growing up through the sixties and seventies has left him with a strong creative yearning. Throughout his adult life he has taken great pleasure in attending many rock concerts, operas, and plays. Todd believes the atmosphere to any show is not solely driven by the performances on stage, but greatly influenced by both stage props and lighting. As such, he is particularly drawn to ImagineRIT by talk of a laser show project, something common among the concerts he frequents.

He arrives at the SociaLaser installation with more than a little curiosity. Todd parts the heavy curtains framing the doorway and steps into a dark, semi-hazy room. People are scattered about, some relaxing among rows of chairs, their eyes pointed at the ceiling, while others crowd around a large table at the end of the room. There is a hushed excitement emanating from the group around the table. The individuals range from children to young adults, all of which are busy plastering their hands on the table's surface. A bright green laser explodes overhead in a pattern of lines and dots, shimmering and shifting at the whim of the users.

Todd takes a seat in one of the nearby chairs, preferring to observe at first. Todd notices the musical accompaniment drifting through the room for the first time. It seems to mesh well with the whole atmosphere andputs him at ease. He recognizes that the tempo seems to be linked to the erratic playof the fingers over the table, but they are not quite synced. Todd observes for a handful of minutes as participants filter in and out of the saturated room. He decides it is past time for him to get a close look at this curious machine. He approaches the table, serenaded by the intricate dance of lights over his head. As he nears, he is greeted by a SociaLaser team member who introduces themselves, welcome him to the installation, and give him a brief overview on how the table works. Todd thanks the team member, and steps forward to try his hand at conducting a laser.

At first he shyly applies pressure with only a few fingers, watching as dots appear in the air before him. Pleased, he proceeds to doodle and sweep his fingers over the table's surface for a few minutes. Todd works his way through some random effects, asking a nearby team member to explain laser scan speed in the process. He is excited with how his laser show is being displayed and changed, his curiosity piquing as he arrives at a pre-rendered effect. With a flick of his finger, his show ends in a spectacular finale of particle explosions, something he was not expecting. He thanks the SociaLaser team for the unique experience, and exit's the installation with a feeling of accomplishment.

MULTI TOUCH SURFACE

MATERIALS USED:

- Sheet Of Transparent Acrylic
- Chain Of Infrared Leds
- Camera With Infrared Filter
- Projector
- Supplies For Table/Housing

The main goal of setting up a multi-touch is to aim infrared LEDs directly inside the sheet of transparent acrylic to create an effect called frustrated total internal reflection (FTIR). That is, all the infrared light will be dispersed within the acrylic surface reflecting on the boundaries, rather than going out. (See Figure 1 for an example of FTIR)

When a finger is pressed down on the surface, more light will reflect downwards (creating an evanescent wave) which is detected by the camera. (See Figure 2 and 3)

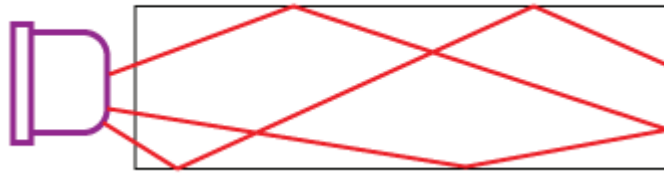


FIGURE I

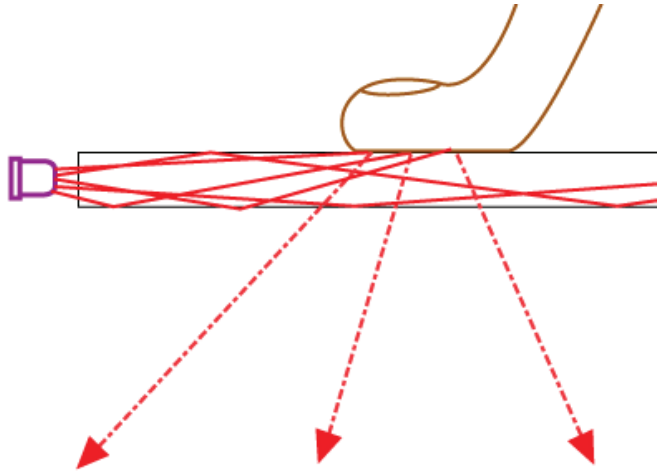


FIGURE 2

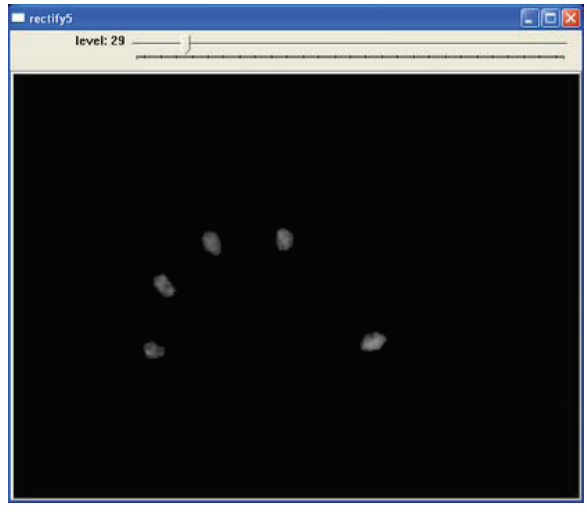


FIGURE 3

MULTI TOUCH SURFACE (CONT'D)

An array of infrared LEDs are soldered together in order to provide constant power and create the FTIR effect. These would be arranged around the edge of the multi-touch surface. (See Figures 4 and 5)

Since an acrylic surface (or plain glass) would just let the light from the projector pass right through, a material such as vellum can be applied to make sure the interface is actually "viewable." (See Figure 6)

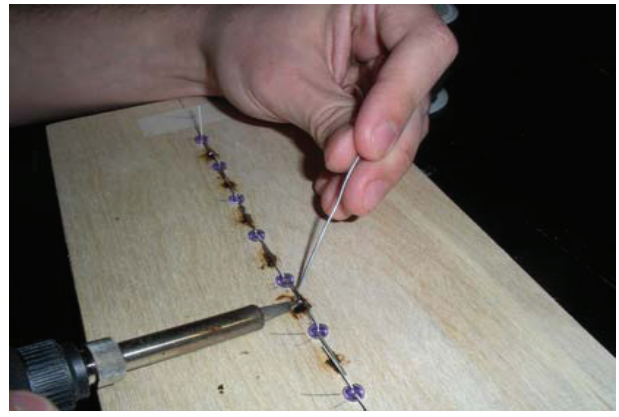


FIGURE 4

FIGURE 5

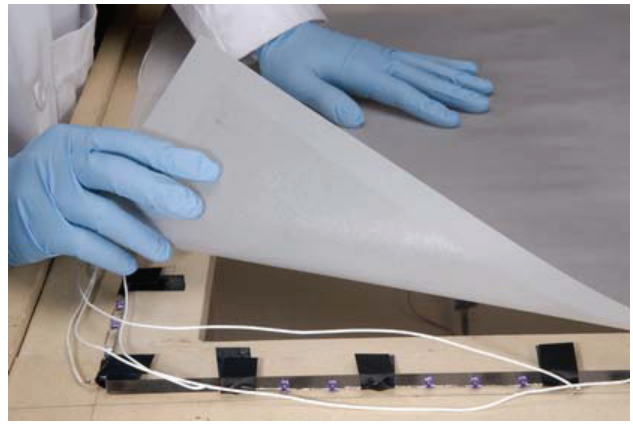


FIGURE 6

MULTI TOUCH SURFACE

The final components of setting up a multi-touch surface include using a camera with an infrared filter (Figure 7) to capture the physical input, as well as hooking up the computer with software to process everything (Figure 8).

Some final assembly and software development will create the finished product!

FIGURE 7

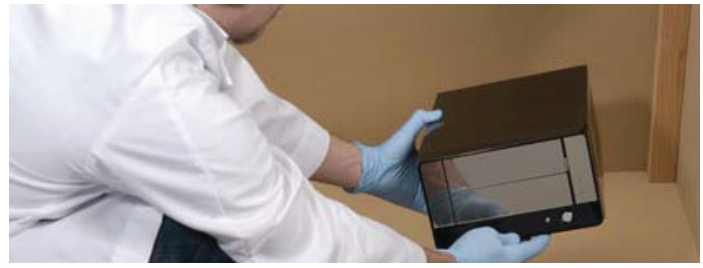


FIGURE 8

FIGURE 9

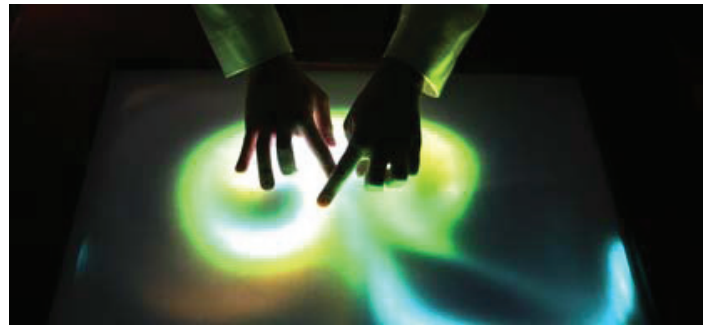
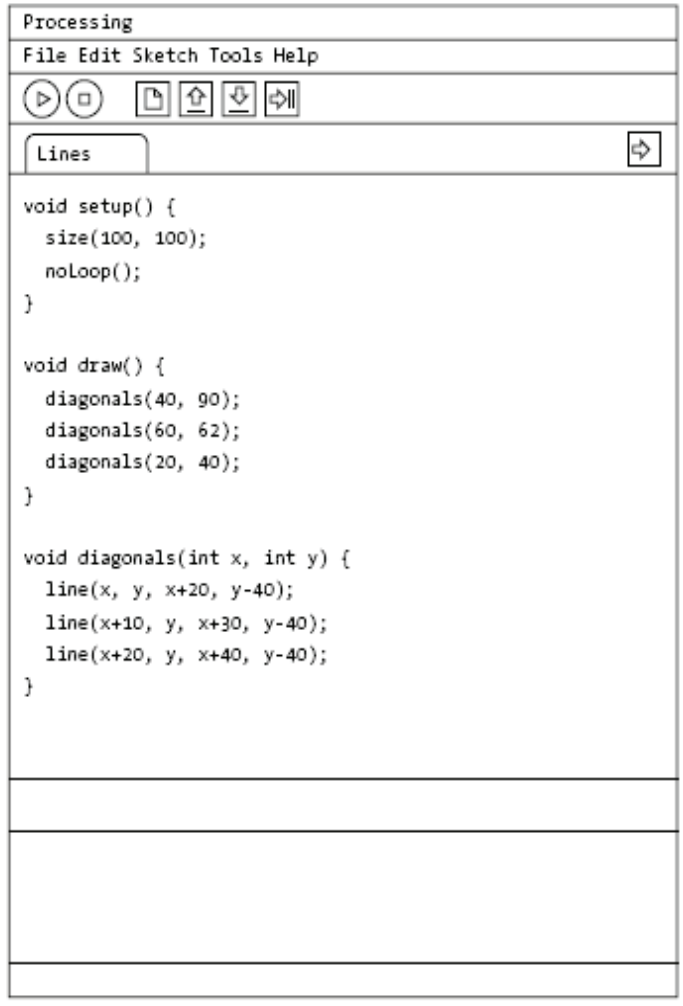


FIGURE 10

PROCESSING
(SOFTWARE & PROGRAMMING LANGUAGE)

Processing is an open source programming language (and software) intended to allow for the development and design of visual projects. The language builds upon the graphical components of Java, as well as allowing for interaction with other physical hardware (similar to Arduino). Processing will be used extensively in the SociaLaser project due to its ability to communicate with the laser projector, as well as providing an interface for the multi-touch surface. While the syntax is similar to many other languages (Java, C++), Processing does aim to simplify some functionality for the visual designer. Two main functions found in every Processing project are the setup() and draw() methods. The setup() function acts as a constructor for instantiating variables and initializing the project. The draw() fucntion is used like a “for loop” which is very useful when something like constant feedback (think multi-touch input) and animations.See below for an example of the Processing interface and a sinple program which draws three sets of diagonal lines.



PROCESSING TO WEB (VIA ACTION SCRIPT 3.0)

Once Processing has successfully captured the input from the multi-touch screen you can then port it to the web and/or a database using Flash and Actionscript 3.0. The easiest way I can see is to use Processing to create a virtual server on a specific port and write out the information to be stored using the serverObject.write() function. In this function you will pass the information you want to store using a delimiter such as a comma to seperate values: serverObject.write(data1 + “, ” + data2 + “,” +...).

Processing

```
import processing.net.*;

int port = 9001;
Server myServer;
                        //variables for storing and sending information to flash
byte zero = 0;
int total = 1;
int total2 = 2;

void setup(){
    size(200, 200);
    myServer = new Server(this,port);
}

void draw(){
    myServer.write(total+","+total2);
    myServer.write(zero);
                        //the “zero” is a transmission termination value. Flash detects this and ends the
transmission
}
```

Flash (Actionscript 3.0)

```
                        //establish connection to get data


serialServer.onConnect = function(success){


serialServer.onClose = function(){



 function gotSomething(datar){

                        //The data is then broken into an array using the comma as a delimiter.
                        //Here we would begin the transmission to the database using PHP.
```

FLASH TO A DATABASE (VIA PHP)

http://tush.wordpress.com/2007/07/20/actionscript-3-using-urlloader-to-send-and- load-server-variables/

Flash can use PHP to store information to the database. By creating a URLVariable object we can store the data and pass it to our PHP file using a URLRequest and URLLoader.

Flash (Actionscript 3.0)

```
private function sendAndLoad():void  {
        var url:String = "http://[your server]/login.php";          //name of the PHP file to send data to
        var variables:URLVariables = new URLVariables();
        variables.UserName = "tushar";                              //data to send to store in the database
        variables.Password = "my_password";
        this.sendData(url, variables);
}

public function sendData(url:String, _vars:URLVariables):void {
        var request:URLRequest = new URLRequest(url);
        var loader:URLLoader = new URLLoader();
        loader.dataFormat = URLLoaderDataFormat.VARIABLES;
        request.data = _vars;
        request.method = URLRequestMethod.POST;
        loader.addEventListener(Event.COMPLETE, handleComplete);
        loader.addEventListener(IOErrorEvent.IO_ERROR, onIOError);
        loader.load(request);
}
```

PHP

```
<?
$clientUserName=$_POST['UserName'];                 //data coming from Flash
$clientPassword=$_POST['Password'];

private function getMysqli()                    /       /use mySQLi for a more secure transport
{                                                       //connect to the database
        $mysqli = new mysqli("localhost", "USERNAME", "PASSWORD", "DATABASE");
        if(!$mysqli)
        {
                printf("can't connect.Errorcode: %s\n", mysqli_connect_error());
                exit;
        }
        return $mysqli;
}
public function PostToDatabase($clientUserName,$clientPassword)
{
        $mysqli = getMysqli(); //setup db connection
        $stmt = $mysqli->prepare("UPDATE table SET password = ?  WHERE username = ?");
        $stmt->bind_param("ss",$clientPassword,$clientUserName);
        $stmt->execute(); //execute the statement
}A
```

SCHEDULE

WEEK 1 (MARCH 8-13)
Buffer time.
Review prototype and make a list of changes.

WEEK 2 (MARCH 14-20)
Start making changes

WEEK 3 (MARCH 21-27)
Finish making changes, prepare for next weeks test

WEEK 4 (MARCH 28-3)
Working final setup
Test on location with ALL elements

WEEK 5 (APRIL 4-10)
Make adjustments based on test

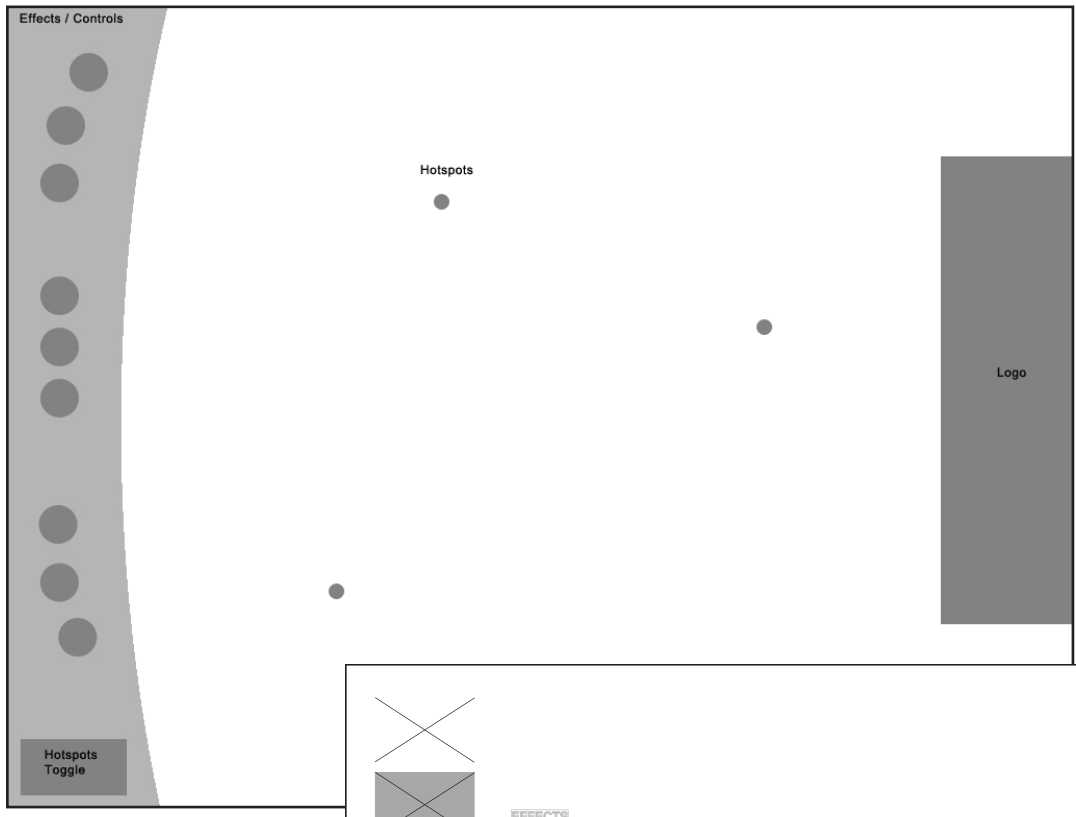
WEEK 6 (APRIL 11-17)
Buffer time

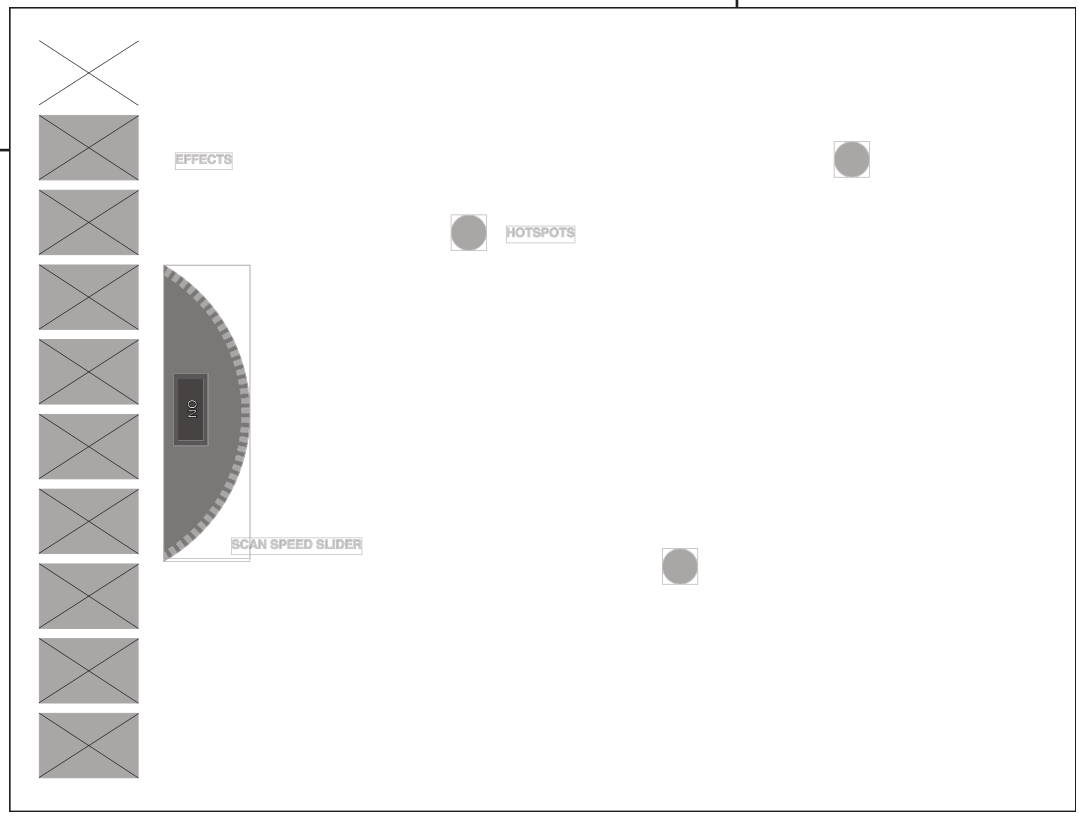
WEEK 7 (APRIL 18-24)
Buffer time

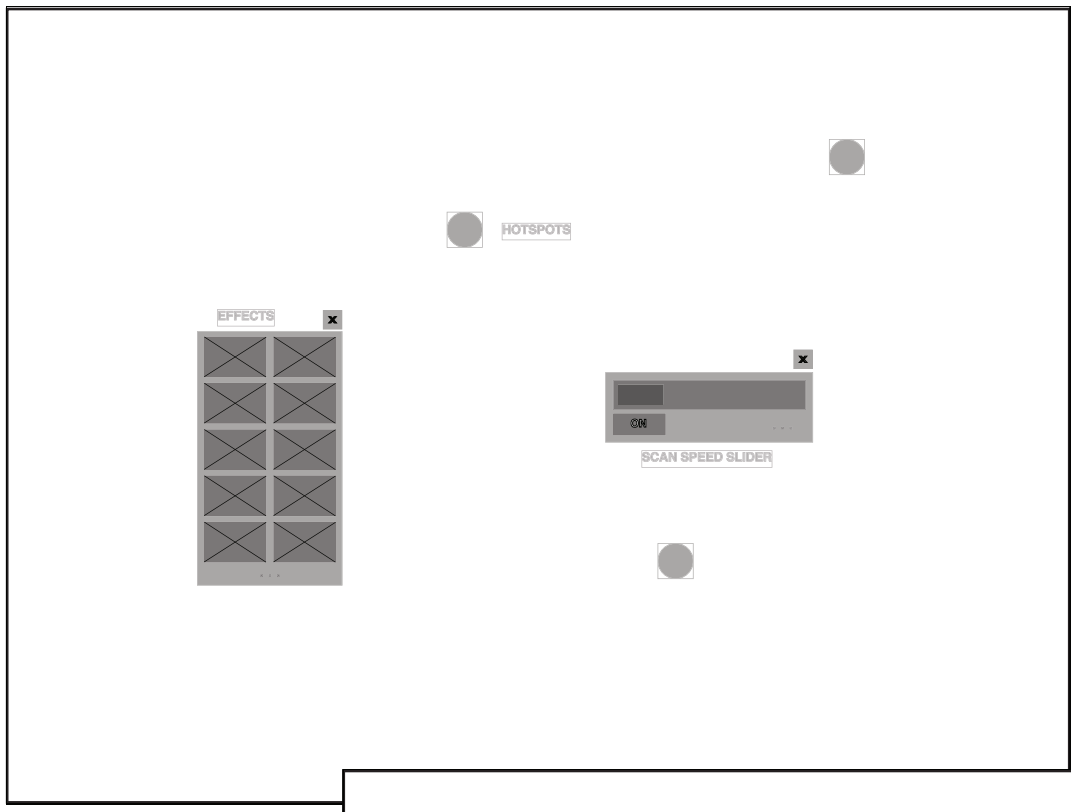
WEEK 8 (MAY 25-1)
FINISHED on 26th

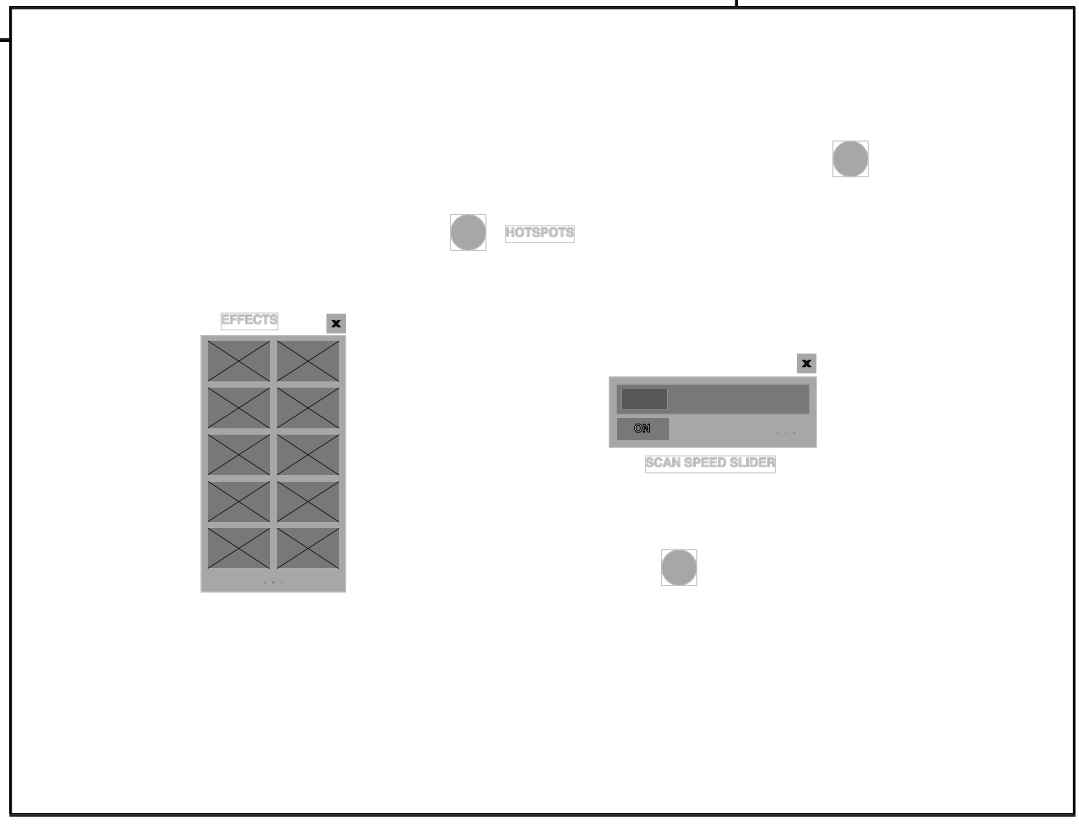
IMAGINE RIT IST, SATURDAY

WIREFRAMES

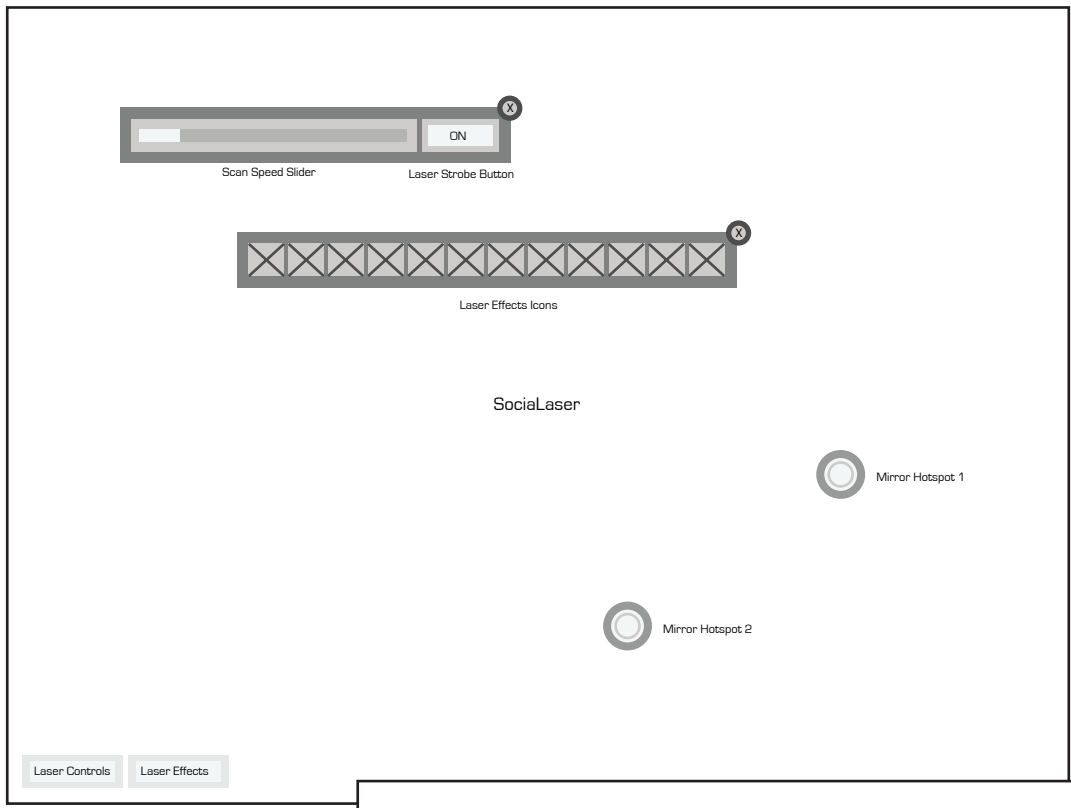

Effects / Controls
Hotspots
Logo
Hotspots
Toggle

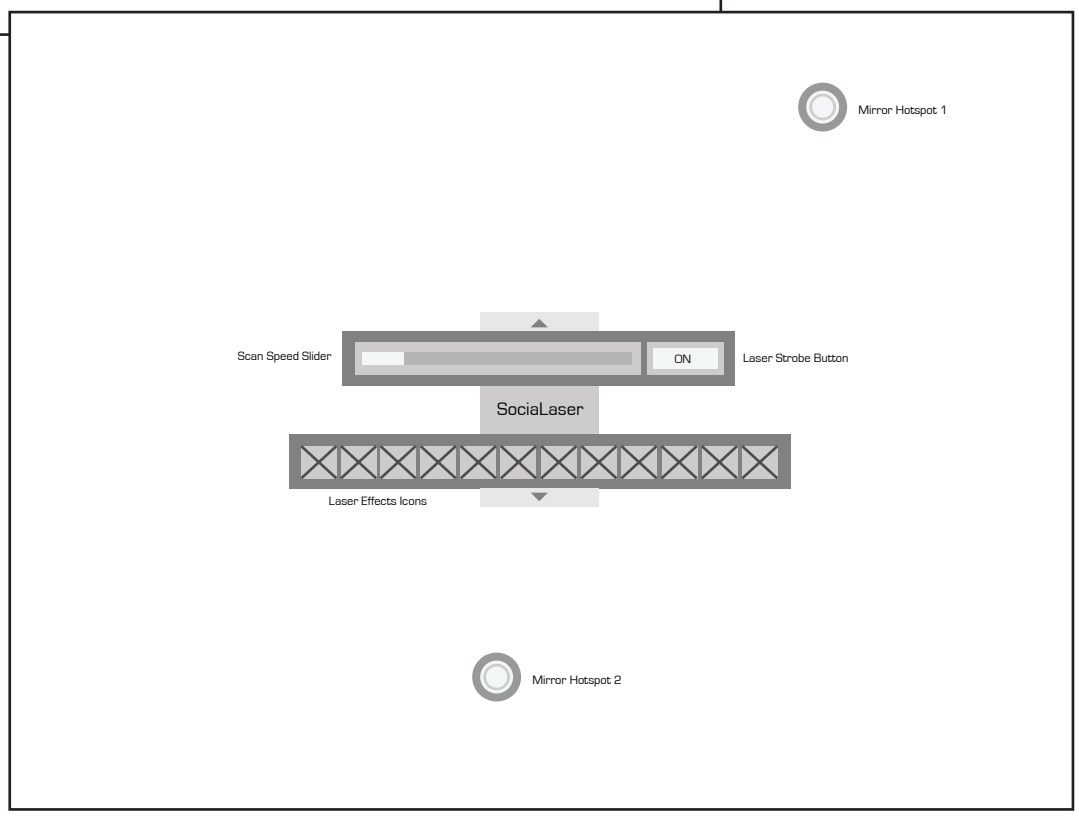

EFFECTS
HOTSPOTS
ON
SCAN SPEED SLIDER


HOTSPOTS
EFFECTS
ON
SCAN SPEED SLIDER

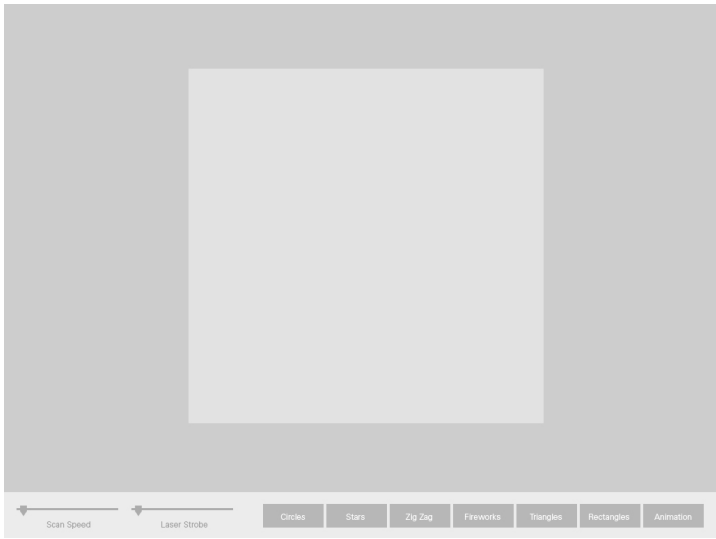

HOTSPOTS
EFFECTS
ON
SCAN SPEED SLIDER

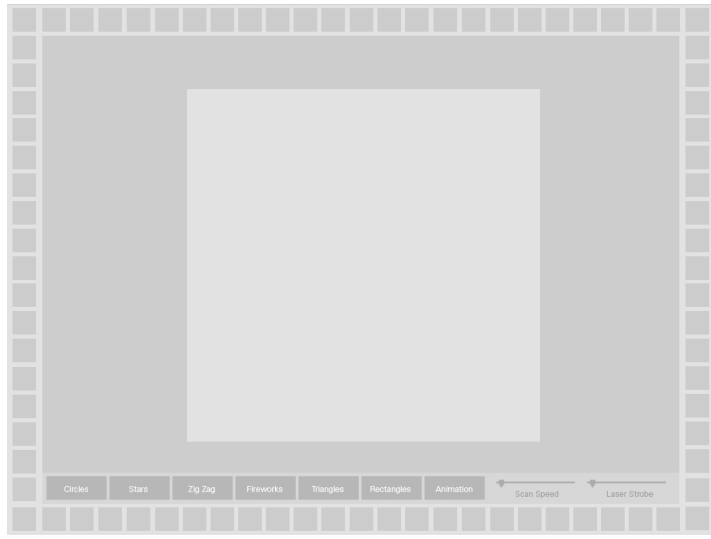
SOCIALASER


ON
Scan Speed Slider
Laser Strobe Button
Laser Effects Icons
SociaLaser
Mirror Hotspot 1
Mirror Hotspot 2
Laser Controls
Laser Effects

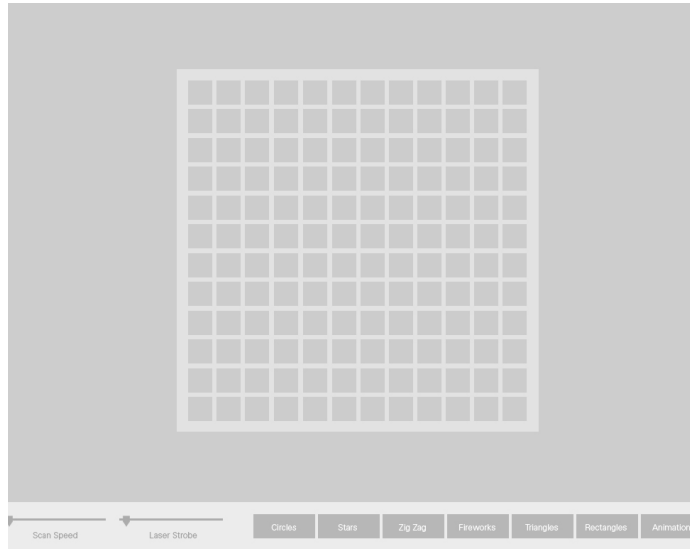

Mirror Hotspot 1
Scan Speed Slider
ON
Laser Strobe Button
SociaLaser
Laser Effects Icons
Mirror Hotspot 2

SOCIALASER


Scan Speed
Laser Strobe
Circles
Stars
Zig Zag
Fireworks
Triangles
Rectangles
Animation

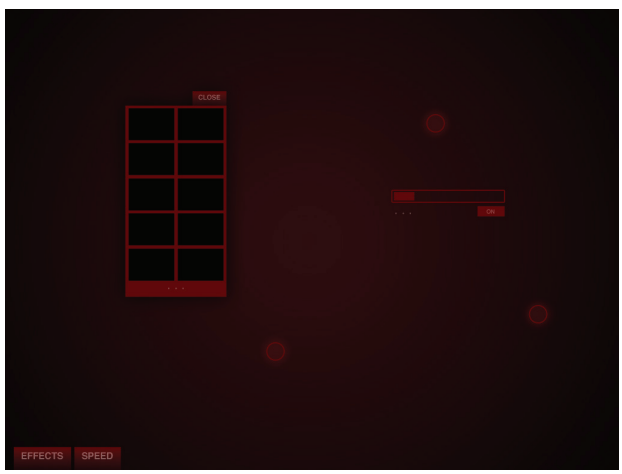

Circles
Stars
Zig Zag
Fireworks
Triangles
Rectangles
Animation
Scan Speed
Laser Strobe

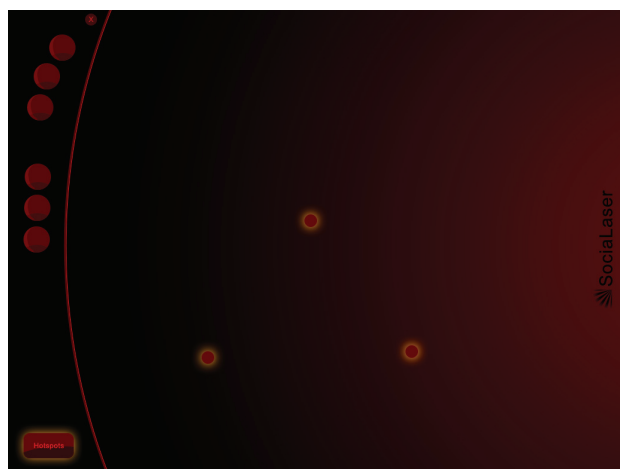

Drag and drop effects icons into the outlined area.
Animation
Rectangle
Triangle
Fireworks
Zig Zag
Stars
Circles
Random
Scan Speed
Laser Strobe

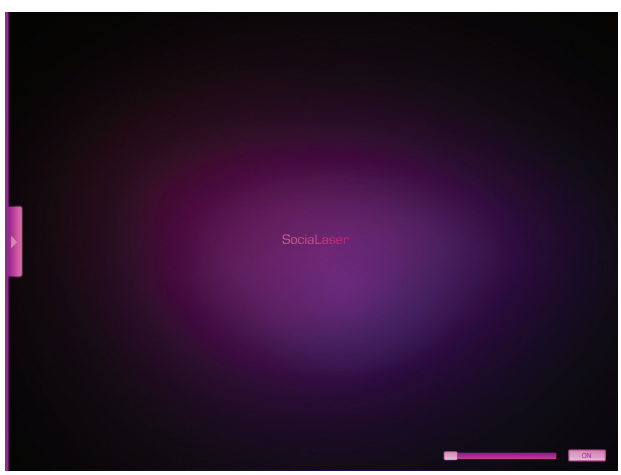

Scan Speed
Laser Strobe
Circles
Stars
Zig Zag
Fireworks
Triangles
Rectangles
Animation

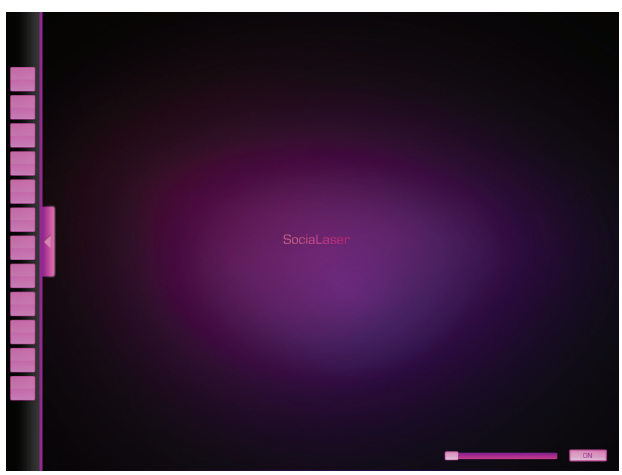
SOCIALASER

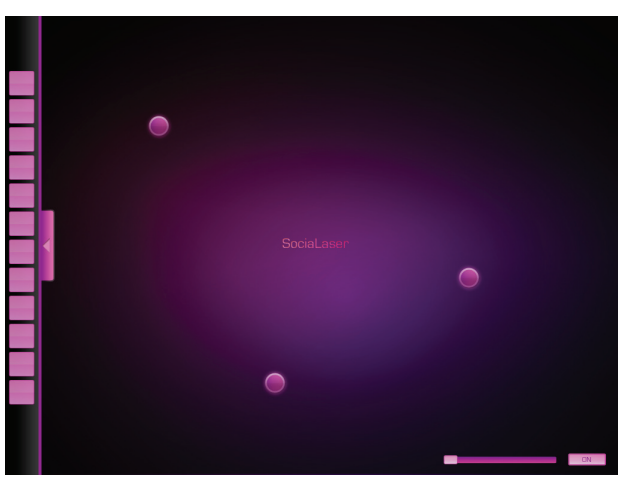
COMPS











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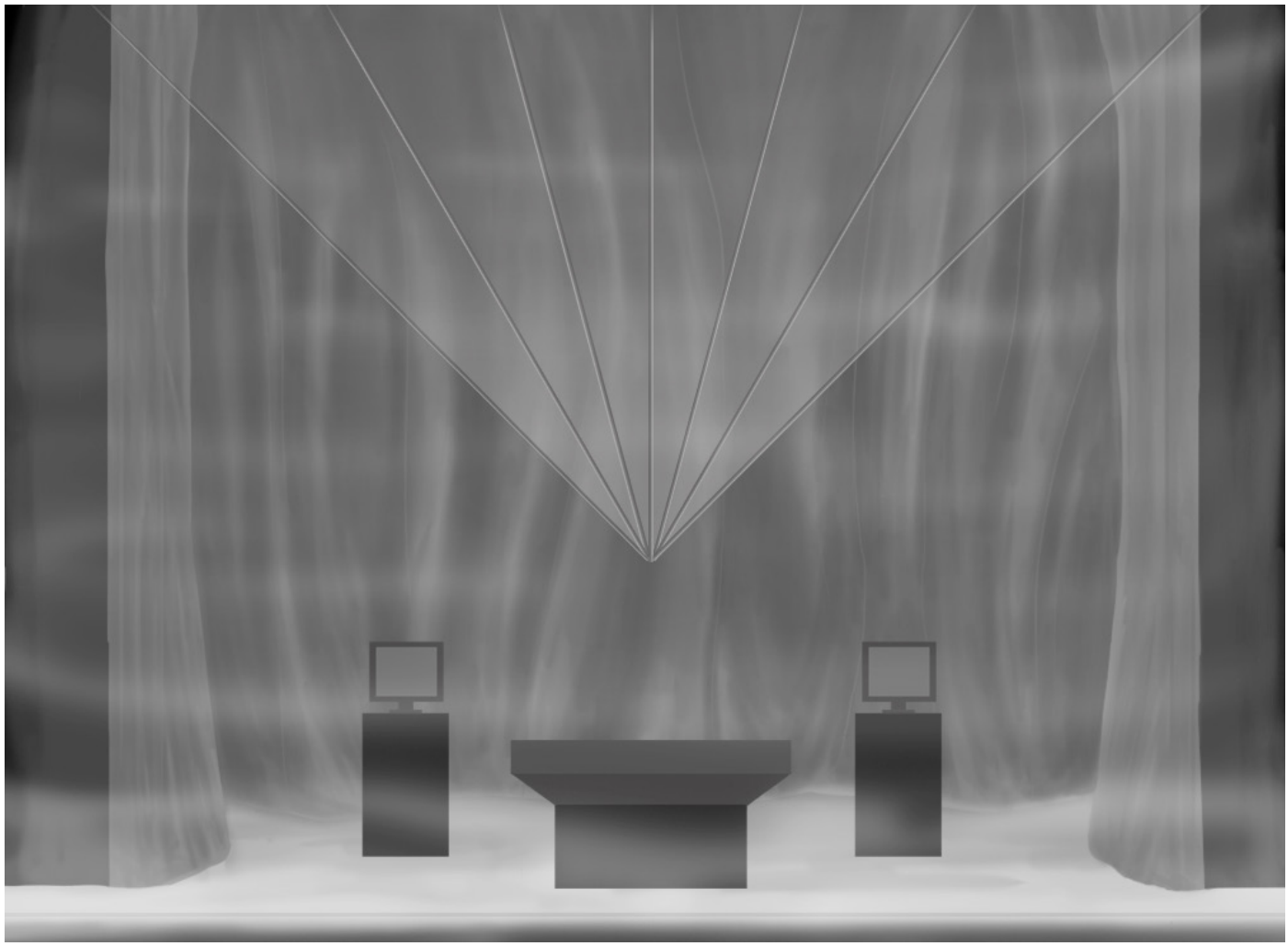

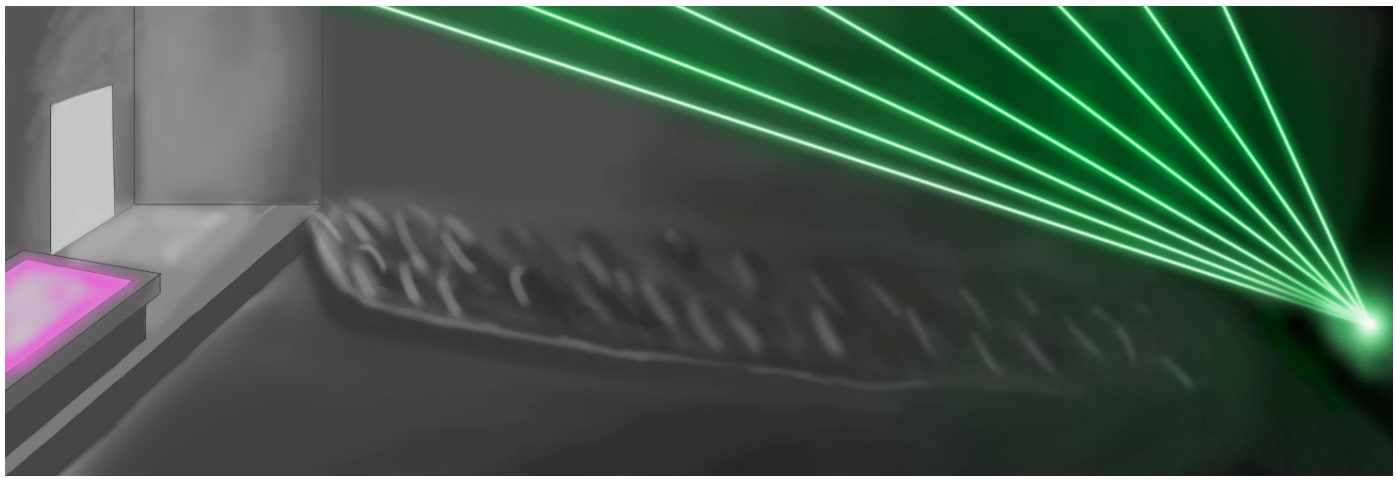


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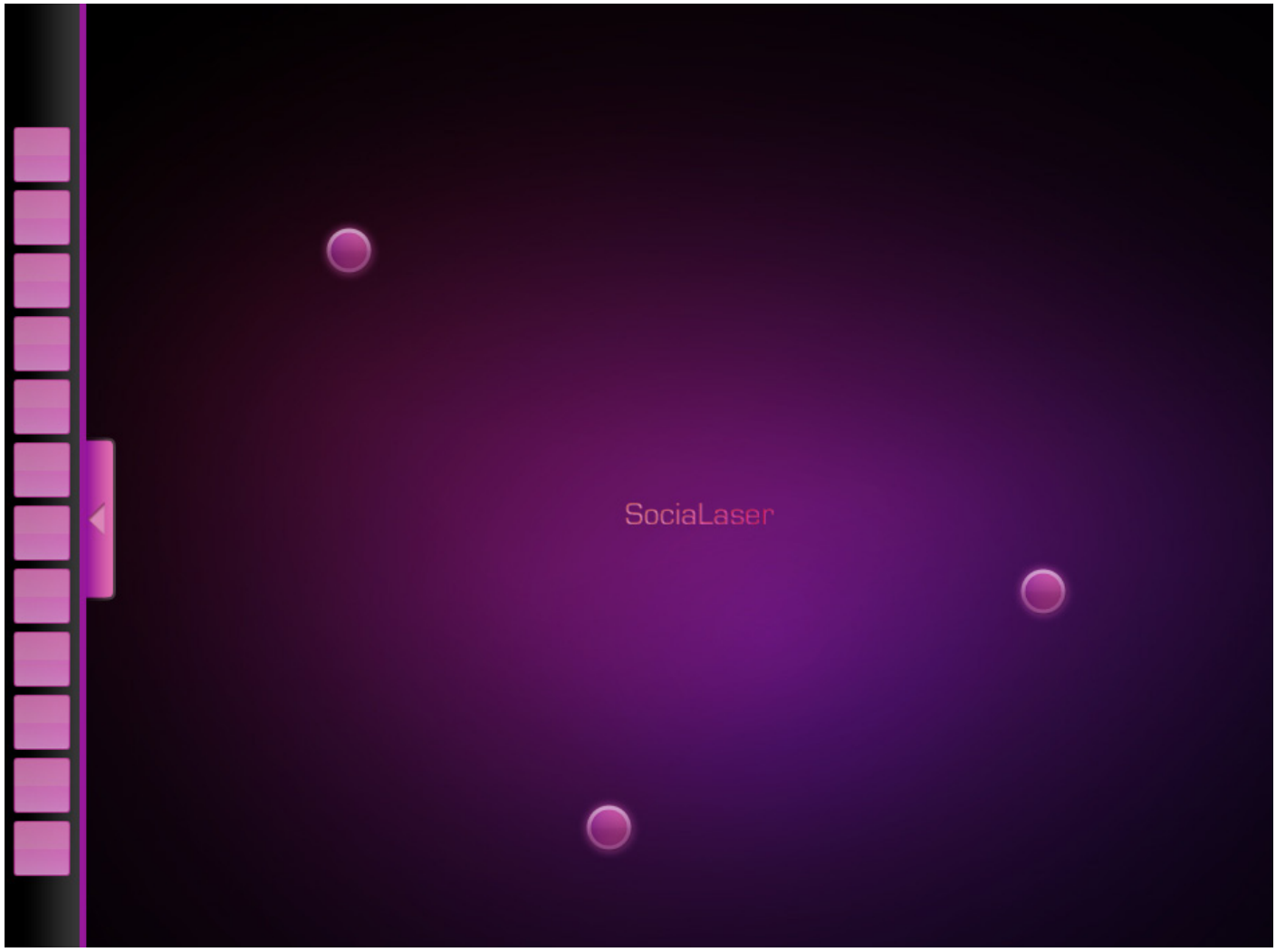
SociaLaser


SociaLaser

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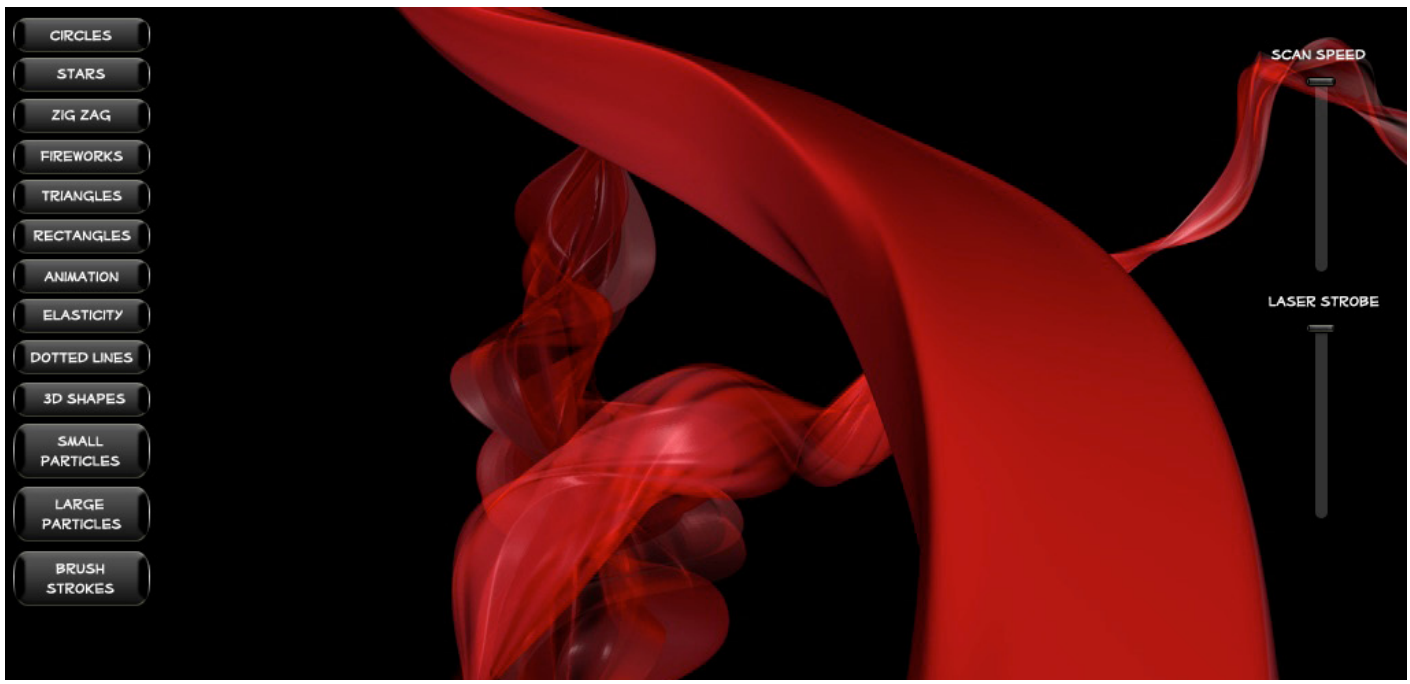
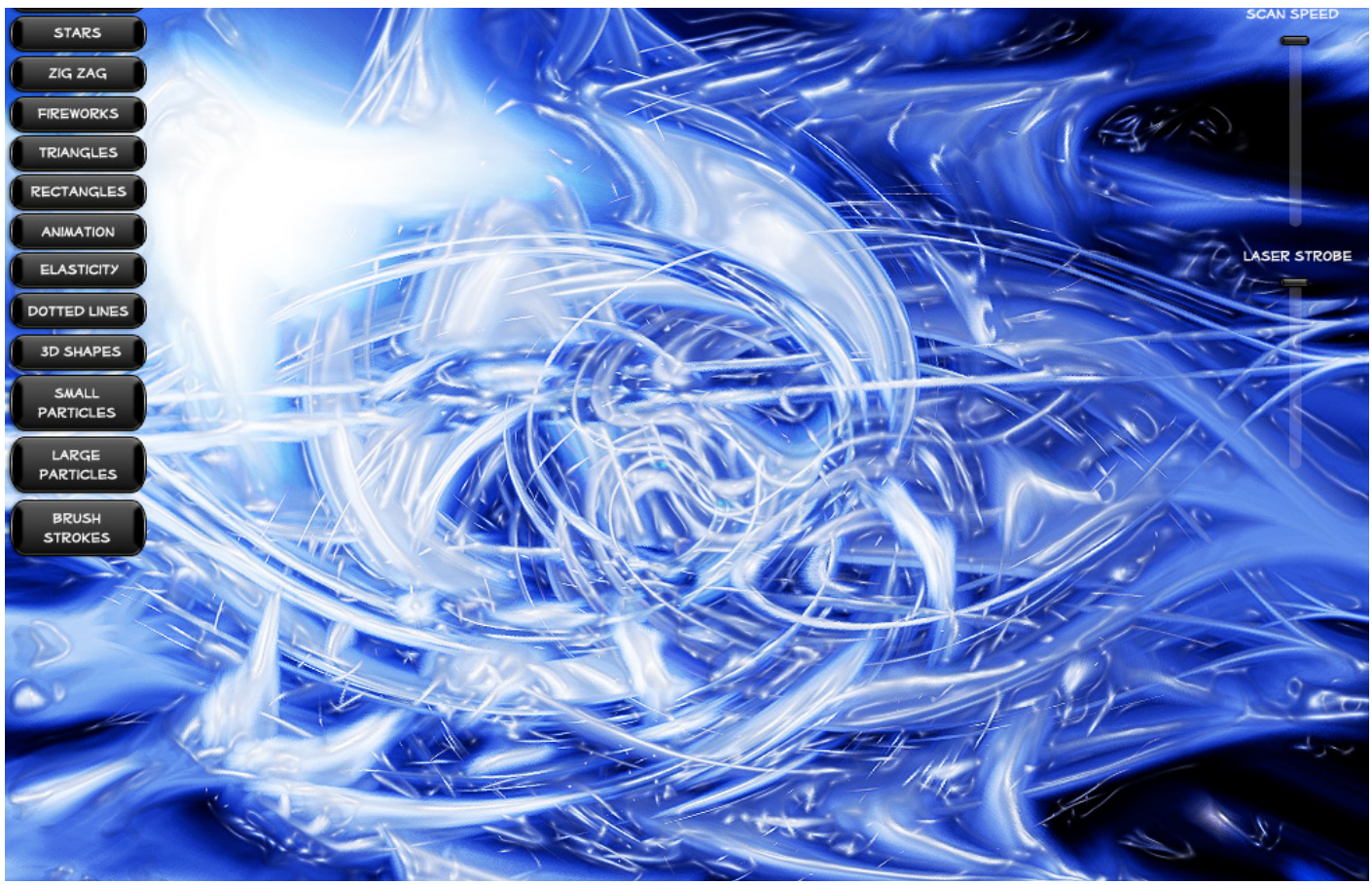

CIRCLES
STARS
ZIG ZAG
FIREWORKS
TRIANGLES
RECTANGLES
ANIMATION
ELASTICITY
DOTTED LINES
3D SHAPES
SMALL PARTICLES
LARGE PARTICLES
BRUSH STROKES
SCAN SPEED
LASER STROBE


STARS
ZIG ZAG
FIREWORKS
TRIANGLES
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LASER STROBE

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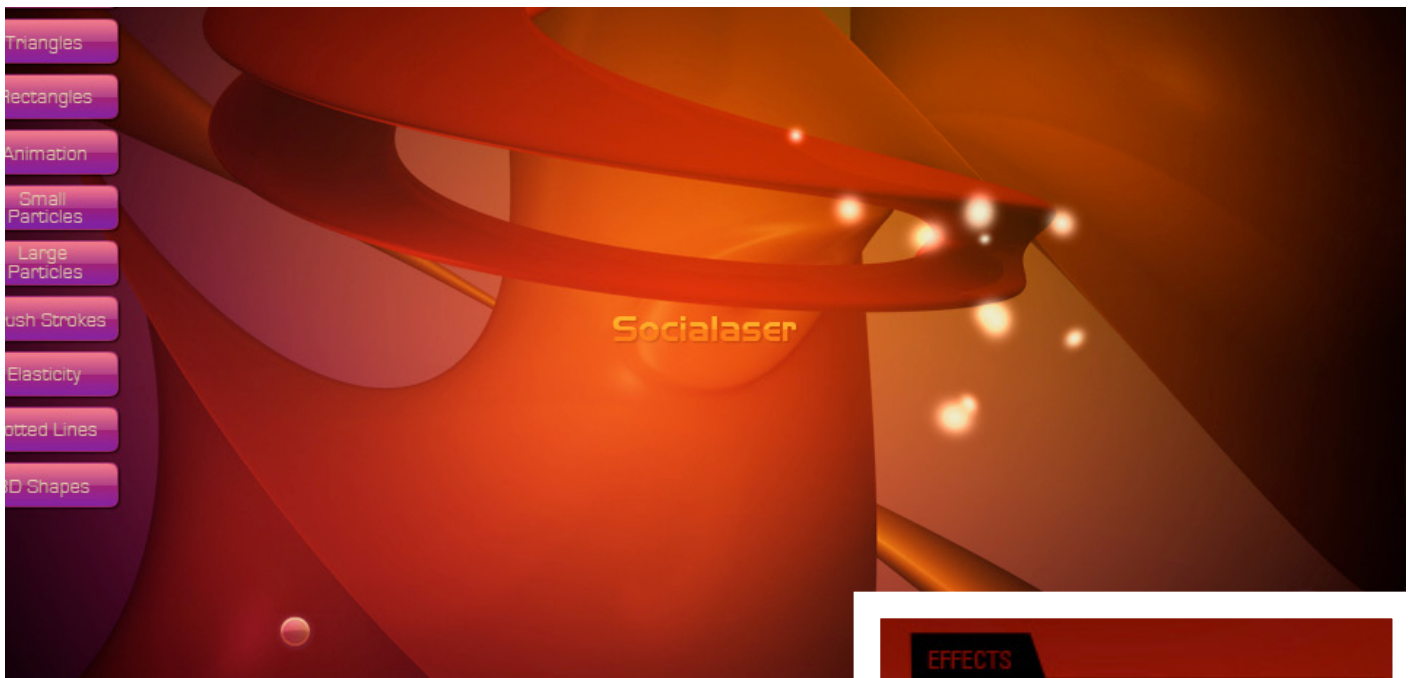
Triangles
Rectangles
Animation
Small Particles
Large Particles
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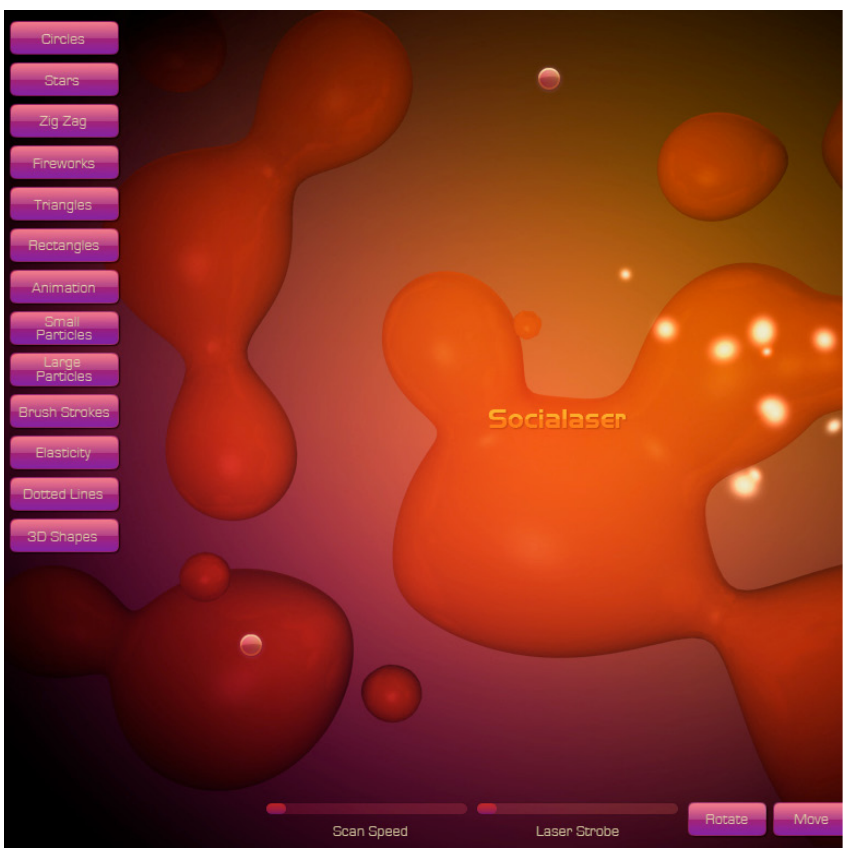
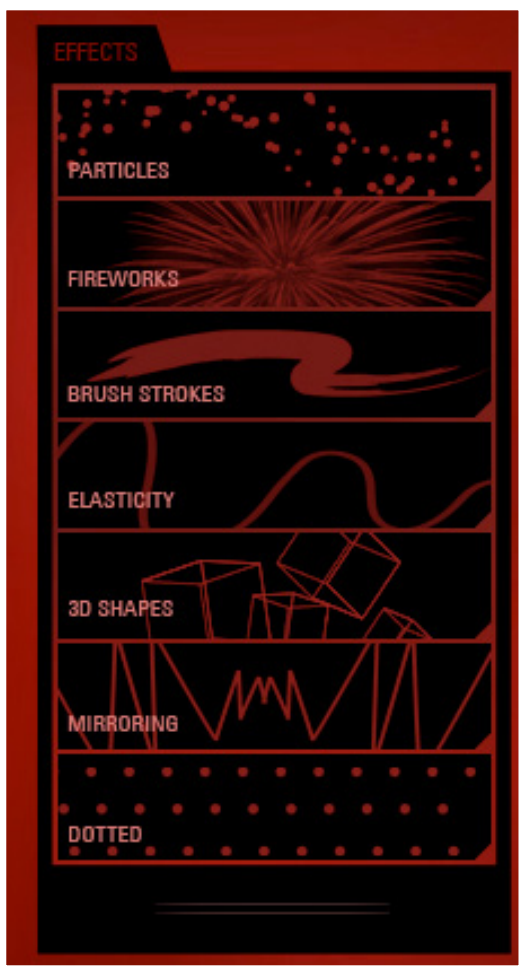
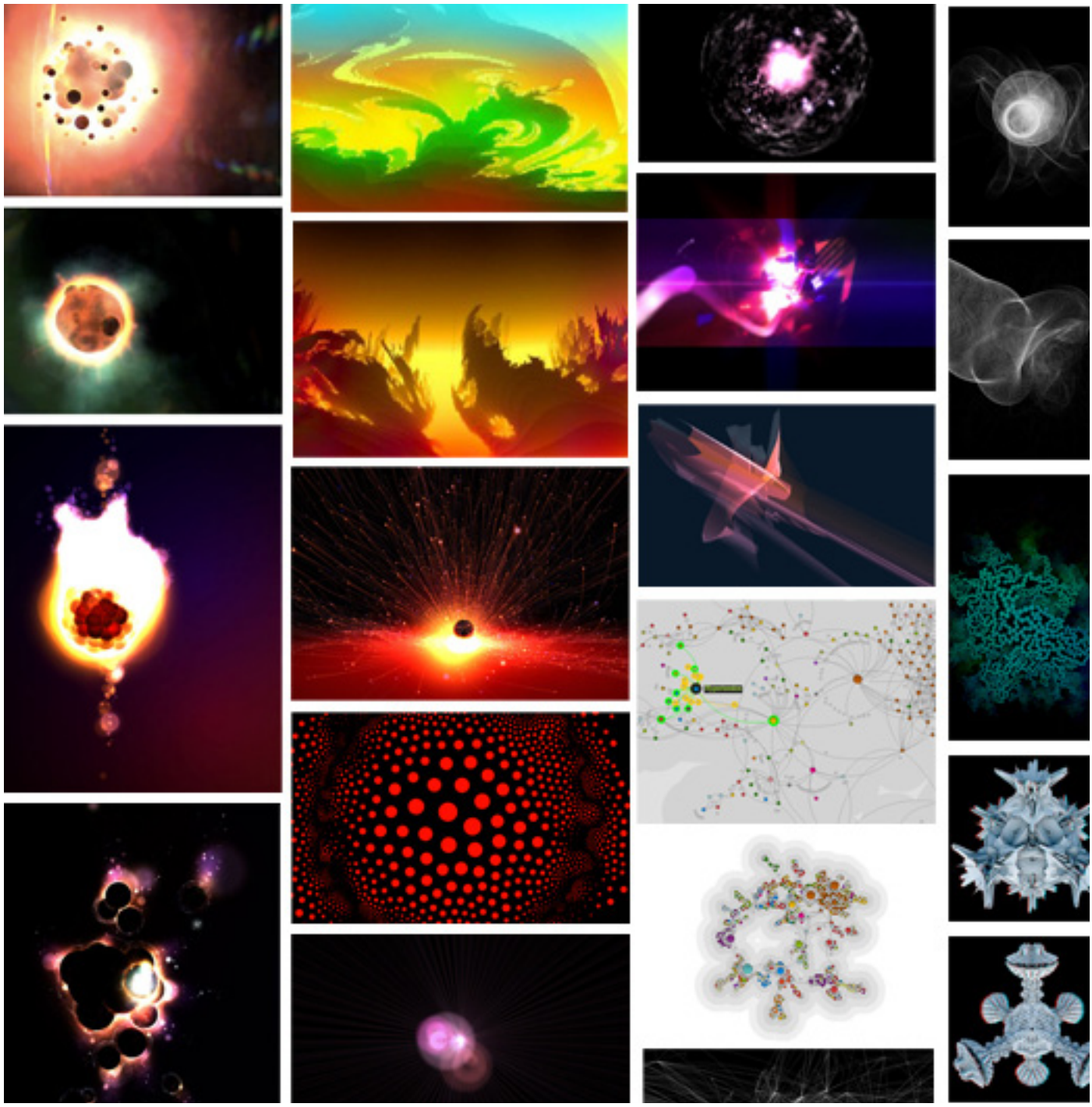
Elasticity
otted Lines
D Shapes
Socialaser


Circles
Stars
Zig Zag
Fireworks
Triangles
Rectangles
Animation
Small Particles
Large Particles
Brush Strokes
Elasticity
Dotted Lines
3D Shapes
Socialaser
Scan Speed
Laser Strobe
Rotate
Move

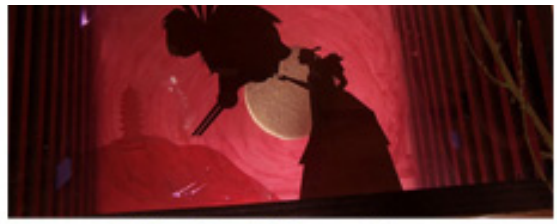

EFFECTS
PARTICLES
FIREWORKS
BRUSH STROKES
ELASTICITY
3D SHAPES
MIRRORING
DOTTED

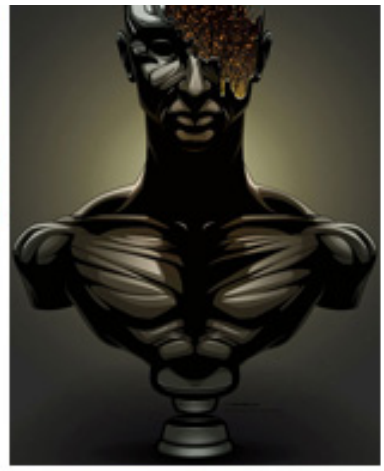
CREATIVE RESEARCH

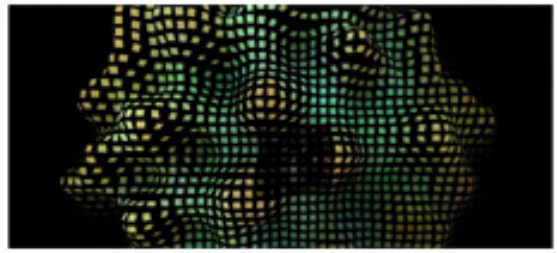


SOCIALASER


openbox








WE ARE PIRATA
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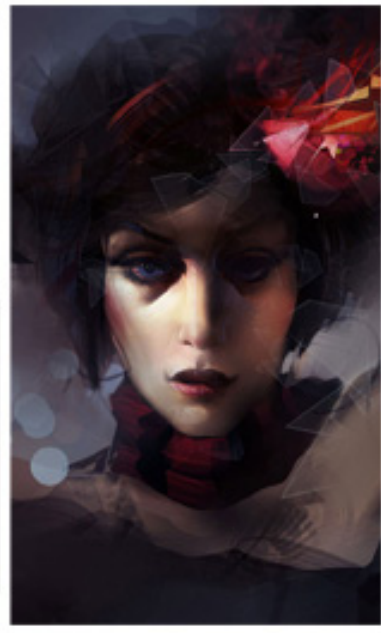
PIRATA
TEAM
WORK
CONTACT

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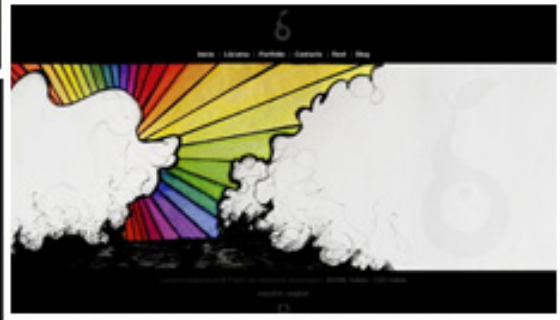

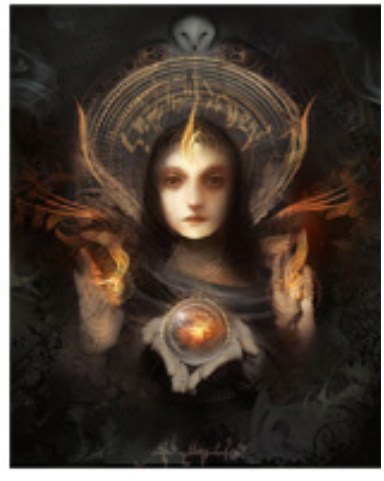


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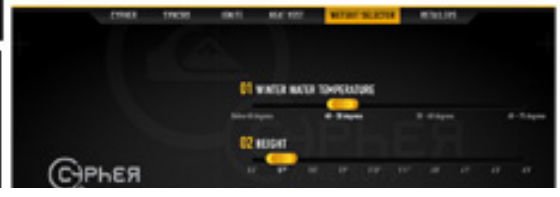
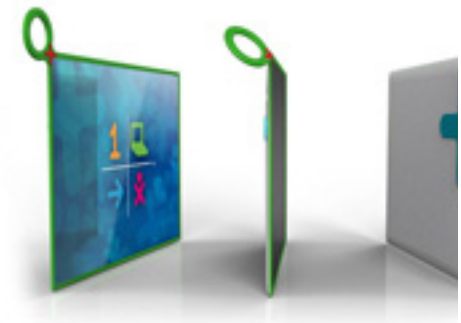
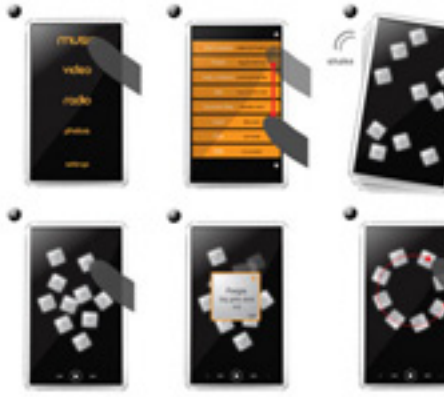

01 WINTER WATER TEMPERATURE
02 HEIGHT
CYPHER

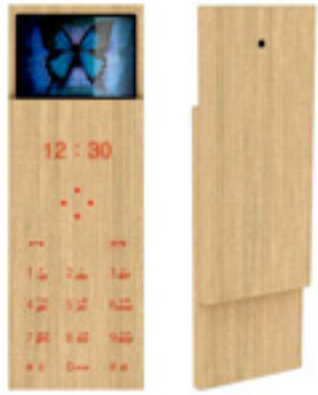
SOCIALASER



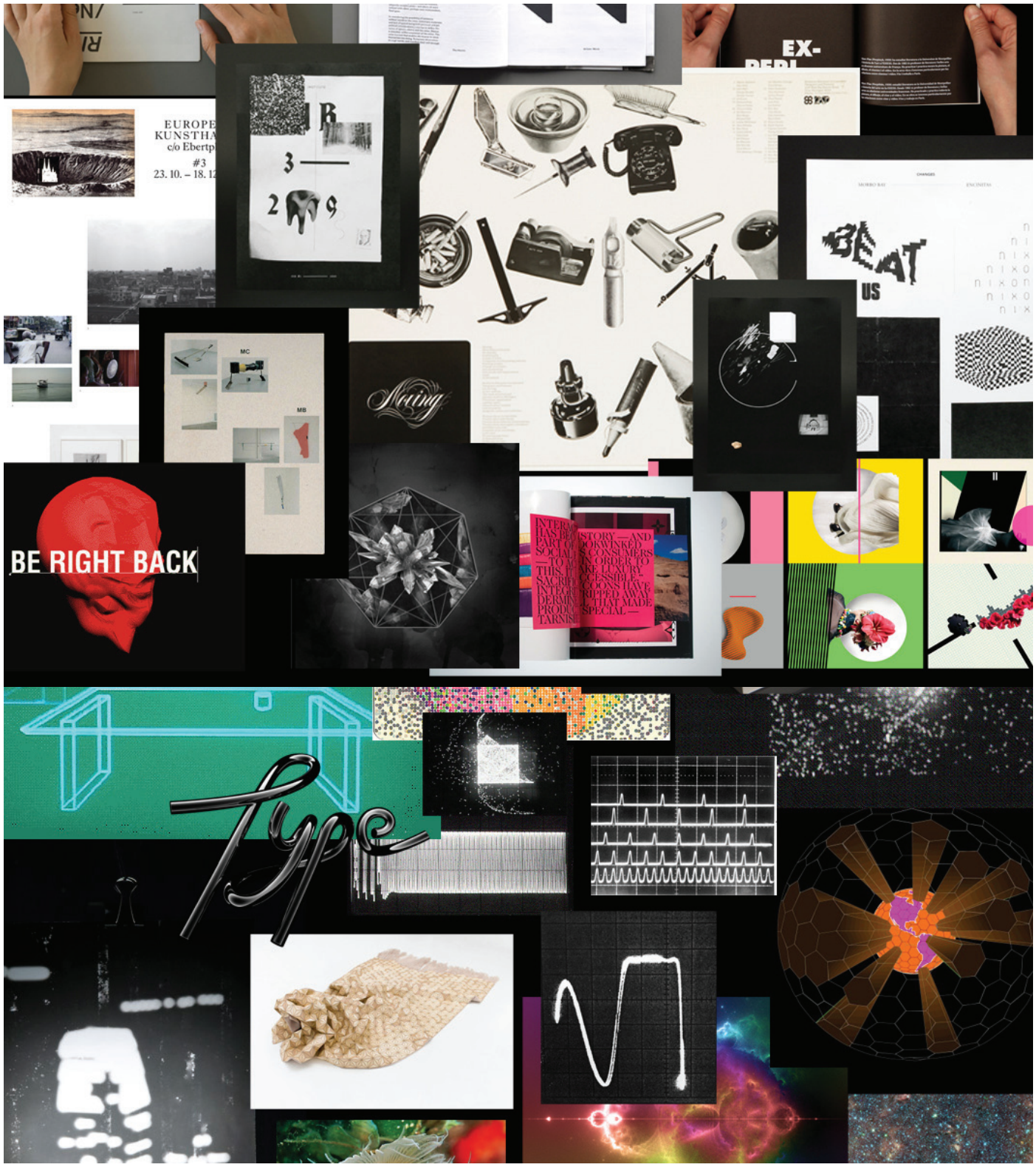







SOCIALASER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CRITICAL SUCCESS FACTORS

- 100% commitment to the group and the project
- Work together as a team to solve problems and meet deadlines
- Open communication and critiquing among members
- Attendance of all lectures and group meetings
- Equal division of design, development, and research among members
- Extensive documentation of project so that anyone can comprehend it
- Revisions and improvements wherever and whenever possible
- Providing enough time in the schedule to have goals completed
- Ensuring that weekly tasks and long term milestones are actually completed

MONITORING

Team SociaLaser will regularly meet twice a week throughout the duration of the project. The first weekly meeting occurs at a scheduled lab time of 2pm in 70-2550 where the group can collaborate with Professor Harris to go over the project plan, design document, design comps, prototypes, and general progress of the project. The second weekly meeting time is flexible with the team's schedules, but generally takes place on Fridays at 2pm. This meeting's location may take place at on-campus lab, a classroom, or just a recreational setting (e.g. a coffee shop) depending on what the major tasks for the week are.

Continuous communication within the group is aided by the use of Basecamp, email, and phone. Open communication within the team will be critical to keeping with the original vision of the project and its undeniable success. Project deadlines, tasks, and file management will be handled through Basecamp and SociaLaser's CIAS account. Additionally, the team will make regular publicity updates using social media outlets such as a live blog, Facebook, Twitter, Vimeo, and Flickr.

CONTROL

Our team will adhere to the schedule that we have created to the best of our ability. We have created weekly milestones that we will stick to understanding that the milestone should be completed unless there is a legitimate reason for it not to be, such as the incorrect estimation of the time a task will take. If tasks are not being completed on time a group meeting will be held to review the situation and decide on an appropriate course of action. We will communicate with the Professors regarding setbacks and progress when appropriate.

EVALUATION

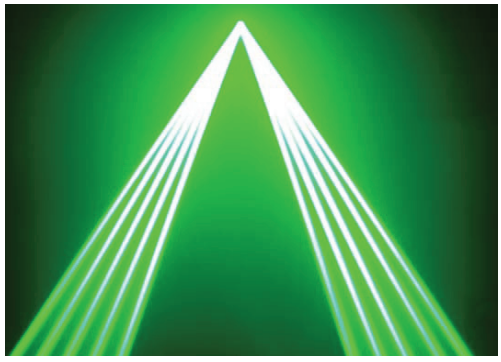
In the beginning and middle of the project we will evaluate our success based on the timely completion of our tasks according to the deadlines we have set. As we continue developing our project we may need to adjust dates of our milestones knowing that concepts can take longer in reality to complete than we estimate. In the event of needing to adjust a deadline we will still view this as a mark of success for our project as it means the team member is working hard towards completing the goal he or she has been given at the level of quality expected.

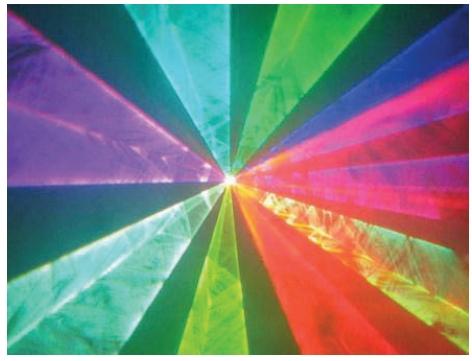
In the final stage of our project we will view it as a success if we meet all of the goals we have set for the group. Additionally, if all our team members have enjoyed working on the project and seeing the final product we will consider the project completed successfully.

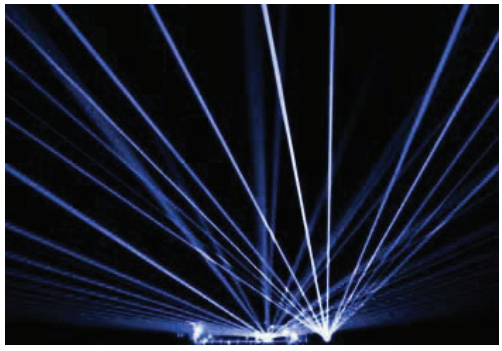
SUMMARY AND DELIVERABLES

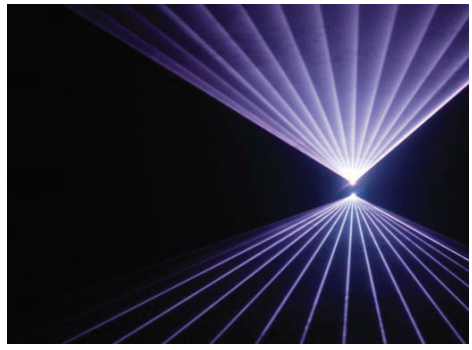
By May 1 team SociaLaser will develop and complete a laser projection display with user control through a multi-touch table. The table will have a few advanced features such as possible patterns, shapes, and hot spots. We will complete a working prototype by the end of winter quarter to begin testing and creating additional features as time allows. As the quarter progresses we will hold weekly meetings to discuss the designs, view the progress of the developers, assist in the construction of the multi-touch table, and address issues as needed.

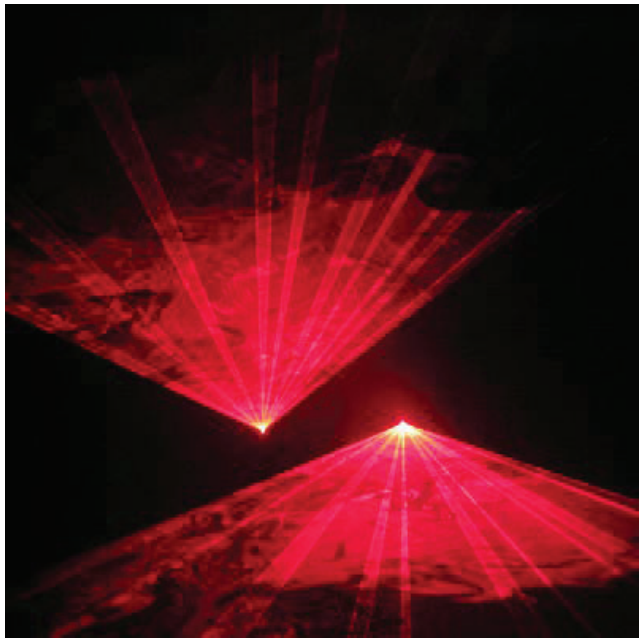
LASER INSPIRATION







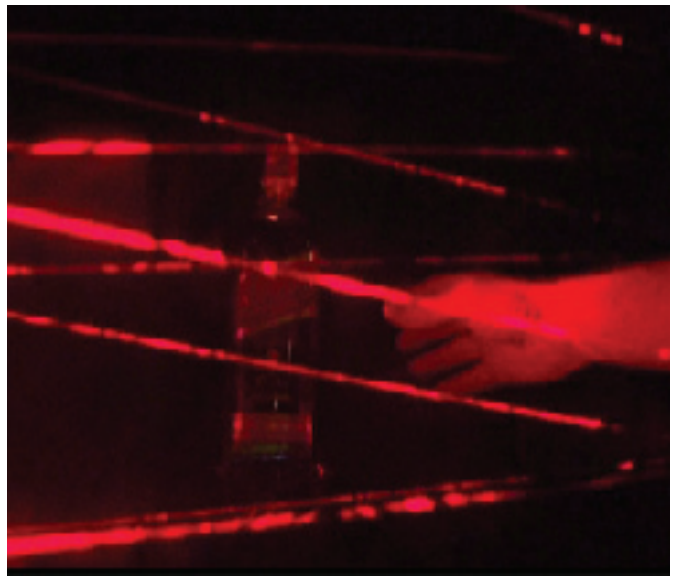




LASER “GAME”

One additional concept considered for the project was a way to engage the audience using the project by appointing them specific tasks. In this case, a game-like setting could be considered. LaserDesign built and operated a laser system that included lasers, sensors, and a digital timer with a LED bar control system into an interactive game for Johnie Walker Red Label. The game consisted of placing a bottle of Johnie Walker Red Label behind a field of red lasers and then asking the audience to retrieve the bottle without breaking any of the beams in the allotted time.

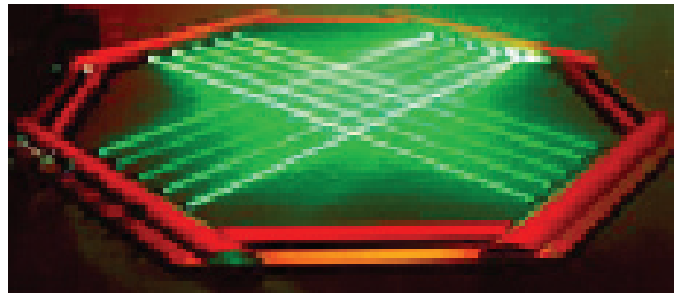
http://www.laserdesign.gr/laser-show.php?id=4&lang=en&artid=45



LASER HARP

An advanced feature of the project would be the inclusion of the same touch screen input being used to then create unique real time music. One solution to this is the Laser Harp. Beams of laser light are pointedat separate sensors to create a playable instrument. The sensors detect whether the beam is on or off. If it is off (meaning something has broken the beam), the sensor triggers a midi note to be sent to a musicalsynthesizer, which plays the corresponding note.

http://www.laserspectacles.com/pages/harp.htm



VIDEO OF HARP

http://www.youtube.com/watch?v=gq9plb7-mby&feature=player_embedded

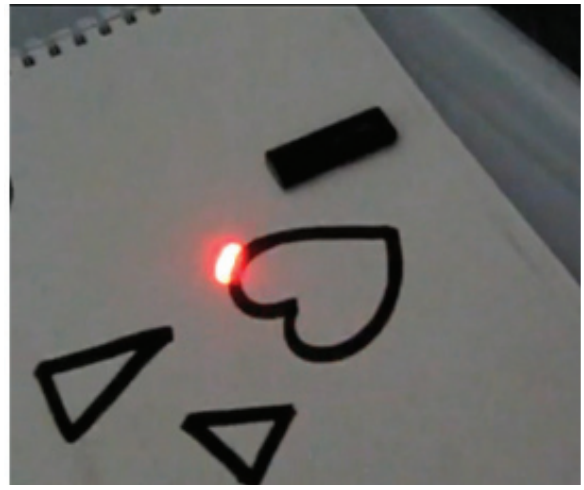
Harp concept being used for “Harp Hero”

http://hacknmod.com/hack/making-music-with-the-virtual-laser-harp/

INTERACTIVE LASER

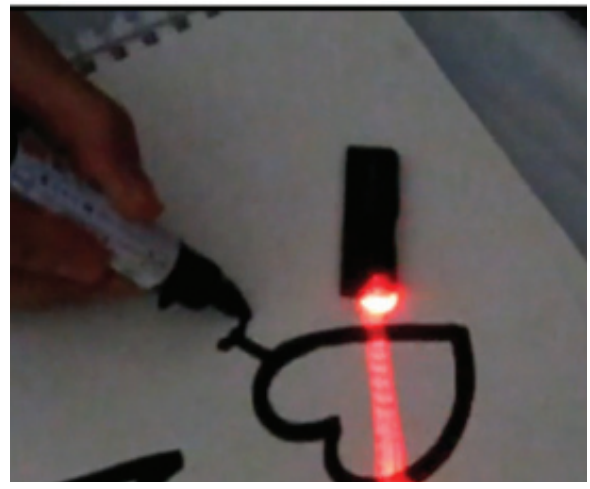
http://blog.makezine.com/archive/2009/08/interactive_laser_demo_is_quite_awe.html

There isn't much info on this project, however it was a very interesting blend of lasers and interactivity. The developed laser was able to sense all sorts of input, from real time drawing, to printed mazes, and even human hands. It would then react to those stimuli and use them as boundaries for its travel.



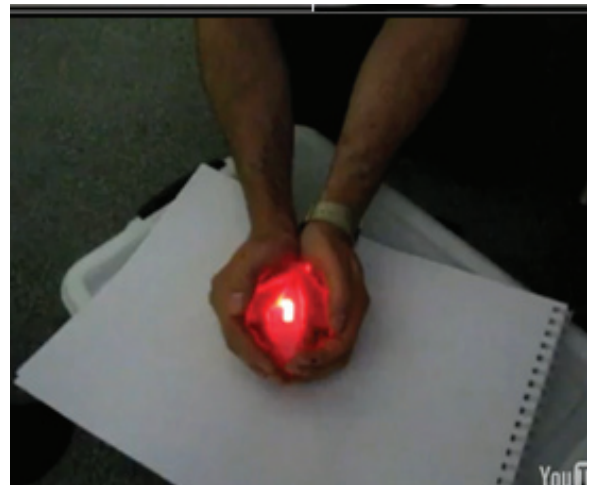
HOMEMADE AUDIO VISUALIZER USING A CD, LASER POINTER, AND SPEAKER.

http://www.instructables.com/id/music-driven-laser-pointer-lightshow/step7/what-youll-see/

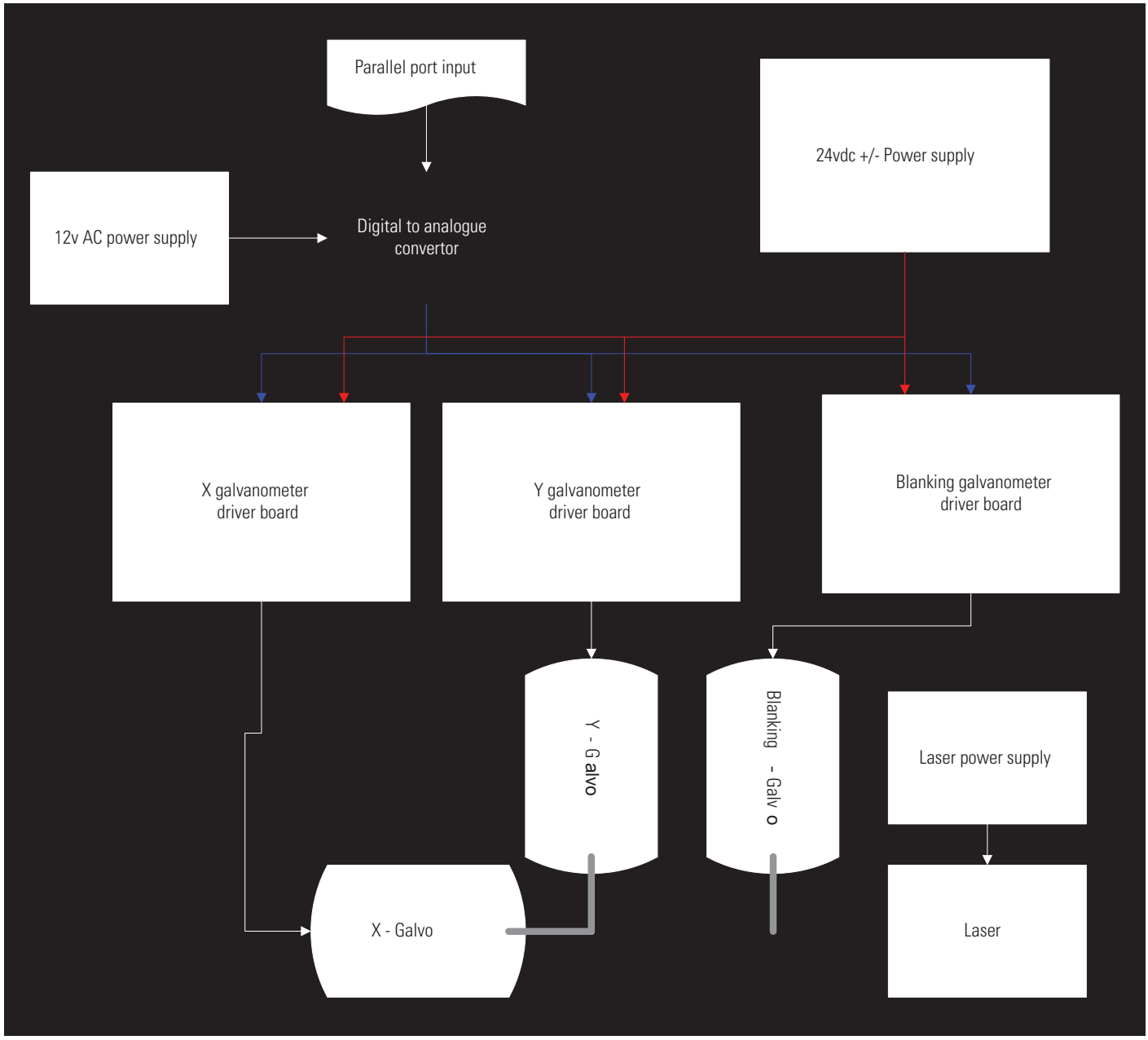


LASER MOD SITE

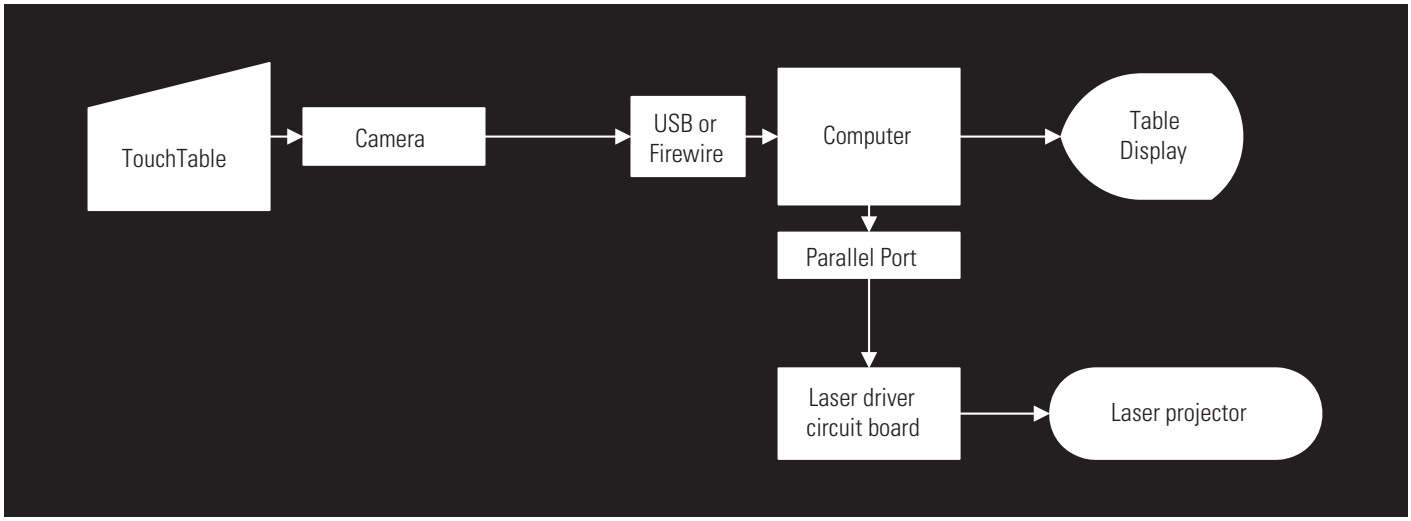
http://hacknmod.com/topics/lasers/



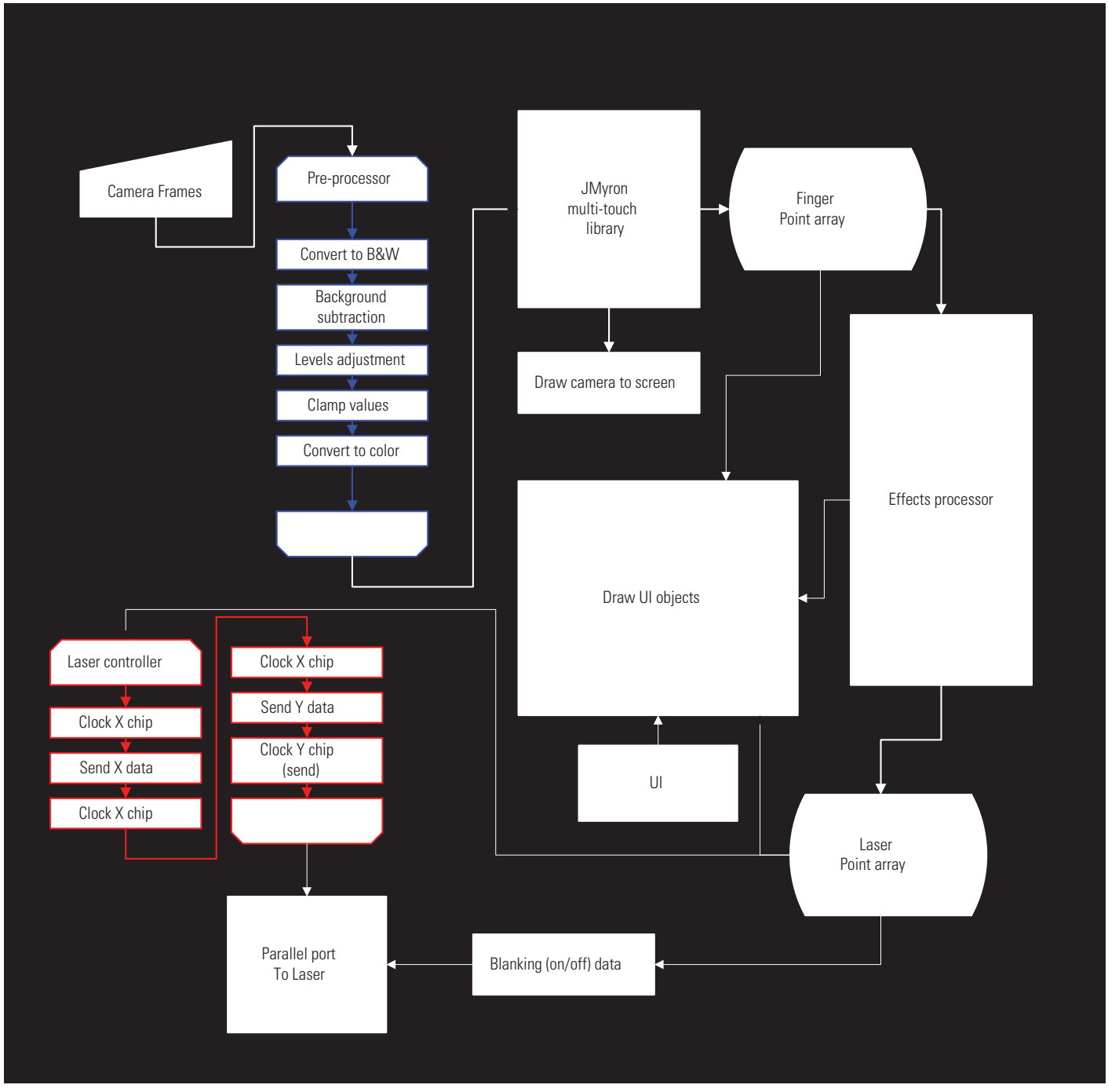
LASER PROJECTOR



OVERALL LAYOUT



PROCESSING


Camera Frames
Pre-processor
Convert to B&W
Background subtraction
Levels adjustment
Clamp values
Convert to color
JMyron multi-touch library
Finger Point array
Draw camera to screen
Effects processor
Draw UI objects
UI
Laser controller
Clock X chip
Send X data
Clock X chip
Clock X chip
Send Y data
Clock Y chip (send)
Laser Point array
Parallel port To Laser
Blanking (on/off) data

SIGNATURES

By signing the following you are agreeing to the project plan that is placed in front of you. Also, you are agreeing to contribute to the project as much as you are capable. Please sign below if you agree with everything that has been stated.

TEAM MEMBERS

JASON CARYL DATE

TREVOR CRANDALL DATE

ANNA STEGLINKSI DATE

NICK TASSONE DATE

RICH VUONG DATE

KEVIN WHITFIELD DATE

FACULTY ADVISOR

MICHELLE HARRIS DATE