

The Human Controller

by Paul Craven

The image shows a screenshot of a software interface, likely a video editing or animation application. A central figure, a white silhouette of a person with arms raised, is overlaid on a dark background. Two green, semi-transparent panels are positioned on either side of the figure, highlighting specific parts of the interface. The top of the screen features a control bar with buttons labeled 'A', 'AV', 'V', 'T', 'A', 'B', 'Alph', and 'B'. Below this, there are several tabs or menu items: 'CalculatingInfin...', 'DCVS21 Beat Mas...', 'DCVS21 Tech Ove...', 'Enter_13', 'CalculatingInfinity_MOV_PAL', 'FutureTech_MOV_PAL', 'PeriodicElements_MOV_640x480', and 'VJSurvivalk'. The main interface is divided into several sections. On the left, there is a 'Composition' section with a 'Layer' dropdown showing 'layer 1'. Below this are sections for 'Dashboard', 'Auto Pilot', 'Audio', and 'Transform'. The 'Audio' section includes 'Volume' (0.00) and 'Pan' (0.00). The 'Transform' section includes 'Blend Mode' (Add), 'Opacity' (0.00), 'Width' (Disabled), 'Height' (Disabled), 'Scale' (100.00%), 'Position X' (0), and 'Position Y' (0). On the right, there is a 'Clip' section with a dropdown showing 'DCVS21 Beat Mask 05 equ...'. Below this are sections for 'Dashboard', 'Transport', 'Cue Points', and 'Video: DCVS21 Beat Mask 05 equ...'. The 'Video' section includes a thumbnail and metadata: 'Photo - JPEG', '640x480', and '30 FPS, 00:00:01.93'. Below the video section is another 'Transform' section with 'Opacity' (1.00), 'Width' (640.00), 'Height' (480.00), 'Scale' (100.00%), 'Position X' (0), and 'Position Y' (0).

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1. The Brief

1.1 Description

The aim of this module brief is to create two deliverables, a prototype and a design document. I am required to create (or finalise) my prototype into a completed project and to write a document critically justifying my approach and methodology taken.

It may be a continuation of the work done in Personal Project 1 or start a new project.

The exact subject material for the project is self-determined but the module content will embrace; visual and verbal preparation of design proposals, research and investigation; assessment of goals, audience, content and design requirements; prototype development and evaluation.

1. The Brief

1.2 My Aim

Aim:

My aim is to create an interactive audio visual art installation. Which can be used in a nightclub to display live visuals but can also be used by the audience to for some interactive crowd participation

Scope:

My project will be aimed at anyone interested in interactive art or audio Visuals or people who just want to have fun waving their arms around to control the visuals at their local nightclub.

Innovation:

Fogscreens are relatively new to market but they cost 10s of thousands of pounds to buy and around £1000 per day to rent. I will build my own smaller portable version to use in public areas of nightclubs. I will seek out new softwares to do the interaction processes.

Problem:

The problem I have is to come up with an interesting and new way to display and interact with live visuals..

Tech:

I will use a variety of different tools to create generative art. From processing to quartz composer. I am teaching myself processing and will build myself a fog screen to project onto. I will use an ultrasonic mister to make the fog and I will use Arduino or Raspberry Pi and maybe an Xbox Kinect sensor to interact with the art.

Value:

my project will be able to be hired out by venues from nightclubs to corporate team building exercises. It will allow me to display some of my own visuals for a club night that I am setting up with my friends in the summer.

2. Research

2.1 Displays

As I have been progressing in my final year, I have developed a keen interest in audio visual art, the generation of digital art and how it would be best displayed. I did a lot of research into various different display methods some of which I will show here.

OLED is an emerging display technology that enables beautiful and efficient displays and lighting panels. Thin OLEDs are already being used in many mobile devices and TVs, and the next generation of these panels will be flexible and bendable.

Short for organic light-emitting diode, one of the main ways OLED displays differ from LED-lit LCD displays is that they don't need a backlight to brighten up your living room. Simply applying electrical current lights up each OLED pixel individually, which not only allows the displays to offer unparalleled black levels, rich colours, and vivid contrast, but also allows OLED displays to be remarkably thin; LG's EC9700 4K OLED TV, for instance, is about as thick as an iPad.



LG's super-thin OLED screen sticks to your wall using magnets



The design gets even thinner when you remove the brains of the TV from the equation, as LG Display has done with its fascinating wallpaper display prototype. Dubbed a "future display" by the company, the panel is a remarkable .97mm thick, and weighs just under 2Kg, allowing it to be placed virtually anywhere with ease. Such a display probably won't be used in a TV anytime in the near term; it's more likely to end up in wearable technology, automobile manufacturing, and commercial applications.

GRAPHIC WATER SCREEN CURTAIN



The Water is pumped through a series of nozzles which creates a screen, at periods the water is stopped and started in certain nozzles at high speed effectively chopping the water stream into falling sections, the speed of chopping results in the creation of water based pixels, text and logos can be created and the screen can also be used with simultaneous laser, video and light projections.

Water Projections



For over 10 years, water has acted as a projection surface in a variety of situations. Originally, water projections were most seen as theatrical effects, at special sound & light shows, and also movie premieres. They relied on custom rigs dropping sheets of water to create a waterfall-like-curtain. As technology improved, techniques evolved and the 'sprinkler' shaped screen of mist now provides the most common solution for optimum quality, colour, clarity and effect.

The 3D illusion is created from light beaming through an imperfect wall of water. Best results are obtained with rear projection using much brighter bulbs than usual, where the light is deflected by a mist of tiny water droplets. Most clarity is achieved by projecting a contrasting image so video filters and alpha channels need to be considered when making the content.

Fogscreen

The FogScreen is a novel projection system that uses a thin layer of fog as a transparent projection screen, displaying images that appear to float on air. Futuristic and captivating, the FogScreen makes a dramatic central feature for a range of events and venues. It works by pushing fog or haze through a series of tubes which creates a thin display screen onto which you can rear project images or video. It is especially effective at creating an illusion of 3D.



Heliodisplay

The Heliodisplay is an air-based display using principally air that is already present in the operating environment (room or space). The system developed by IO2 Technology in 2001 uses a projection unit focused onto multiple layers of air and dry micron-size atomized particles in mid-air, resulting in a two-dimensional display that appears to float (3d when using 3d content). This is similar in principle to the cinematic technique of rear projection and can appear three-dimensional when using appropriate content. As dark areas of the image may appear invisible, the image may be more realistic than on a projection screen, although it is still not volumetric. However the system does allow for multiple viewing and dual viewing (back and front) when combined with two light sources.



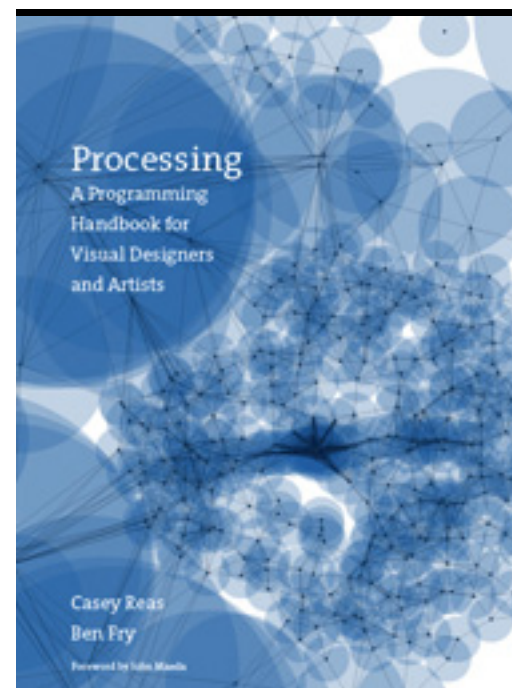
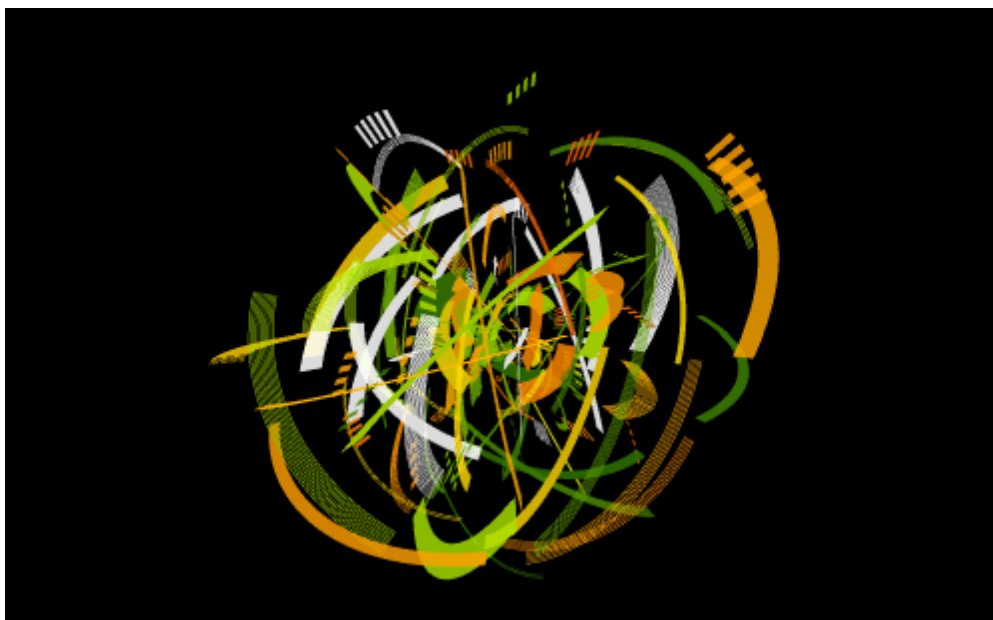
2. Research

2.2 Generative Art

Processing

Processing is one of many free development tools intended for artists. Pure Data and VVVV are both so called visual patching tools, popular for video and sound manipulation. Node Box and Scriptographer are specialised for graphic programming and systems like Structure Synth and Context Free are based on recursive shape grammars.

Processing is a programming language, development environment, and online community. Since 2001, Processing has promoted software literacy within the visual arts and visual literacy within technology. Initially created to serve as a software sketchbook and to teach computer programming fundamentals within a visual context, Processing evolved into a development tool for professionals. Today, there are tens of thousands of students, artists, designers, researchers, and hobbyists who use Processing for learning, prototyping, and production. Processing was written by artists for artists, originally intended as a teaching tool. Processing is a simplified language built on top of Java focusing on real time graphics and interactive systems. There are a great many books that have been written on the subject of creating generative art with processing,



2. Research

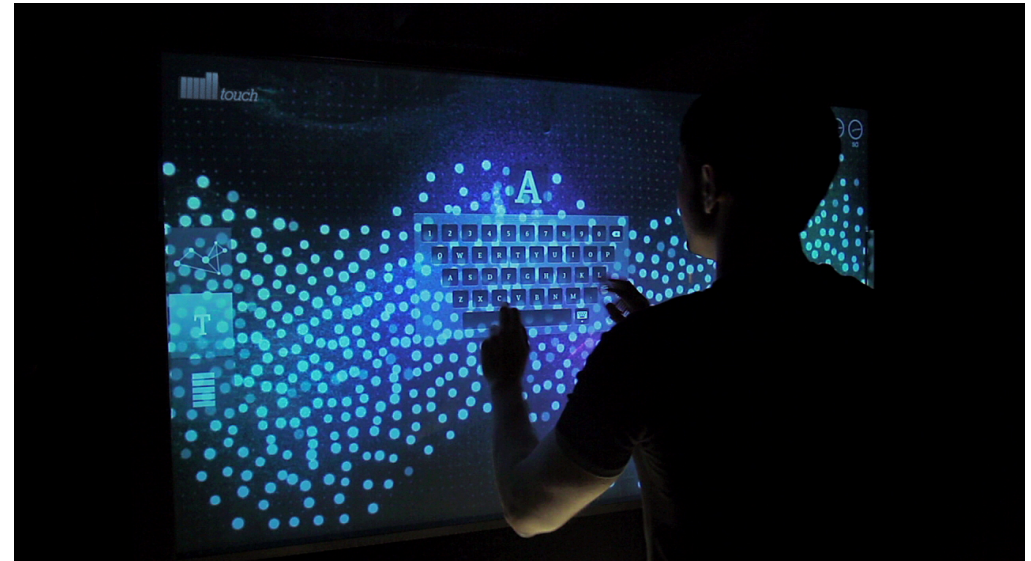
2.3 Interaction

Interaction

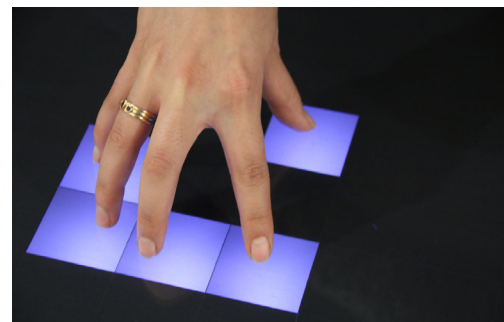
The main aim of my project is to create an interactive display. This could be done by trying to make it a multi touch display, or by using an interactive controller like Xbox Kinect or Wii controller. I have researched a few controll methods:



Remember the giant, interactive touch screen that detective John Anderton used to fight pre-crime in the movie, *Minority Report*? How crazy and far-fetched did that concept seem at the time? And that was only 2002! Fast forward to present-day, and you will find the new Mill Touch at the center at The Mill New York office. Executed from concept to launch in-house by their NY Digital team, it is a rear projected, 5' x 3' interactive touch screen panel made entirely of switchable glass.



Amanda Ghassaei has built her own multitouch midi controller based on the [Monome](#) open source controller. She built this using the 'Laser Light Plane' technique or LLP. Most IR-sensing multitouch screens use a camera to track the position of "blobs" (points where your fingers make contact with the surface of the screen), but these systems require that the camera be positioned far from the screen so that it can "see" the entire surface. Her system uses an array of IR phototransistors positioned directly under the screen to minimize the amount of depth needed.



Xbox Kinect

I have had a look at multi-touch systems but think it might cost a bit more to setup. I have found some tutorials on hacking the Kinect and think that I will investigate this route further as it may be the cheaper option.

The Kinect can be hacked to access the various devices contained inside it for example the infra red camera or the depth sensor. This involves installing some drivers and various open source libraries, this is also quite complicated and I covered it in Personal Project Part One.

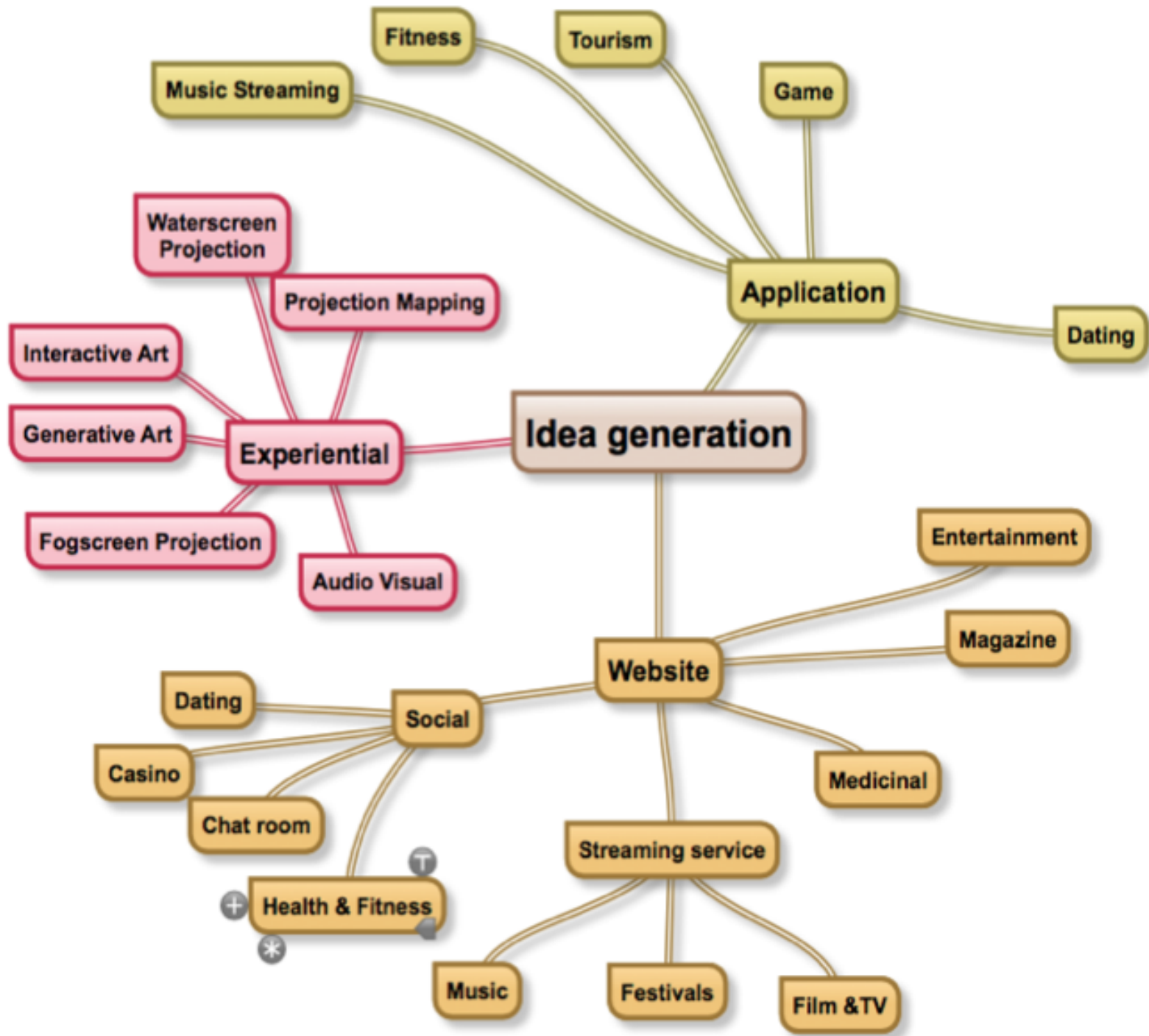


Wii-Remote

The wiimote has been out for a bit longer than the kinect sensor. Software libraries for connecting to a Wii remote, parsing the input report data, and configuring the controller are available for nearly every major development platform on Windows, Mac OS, and Linux. The open development community has created these libraries, and you can download them for free.



3. Idea Generation

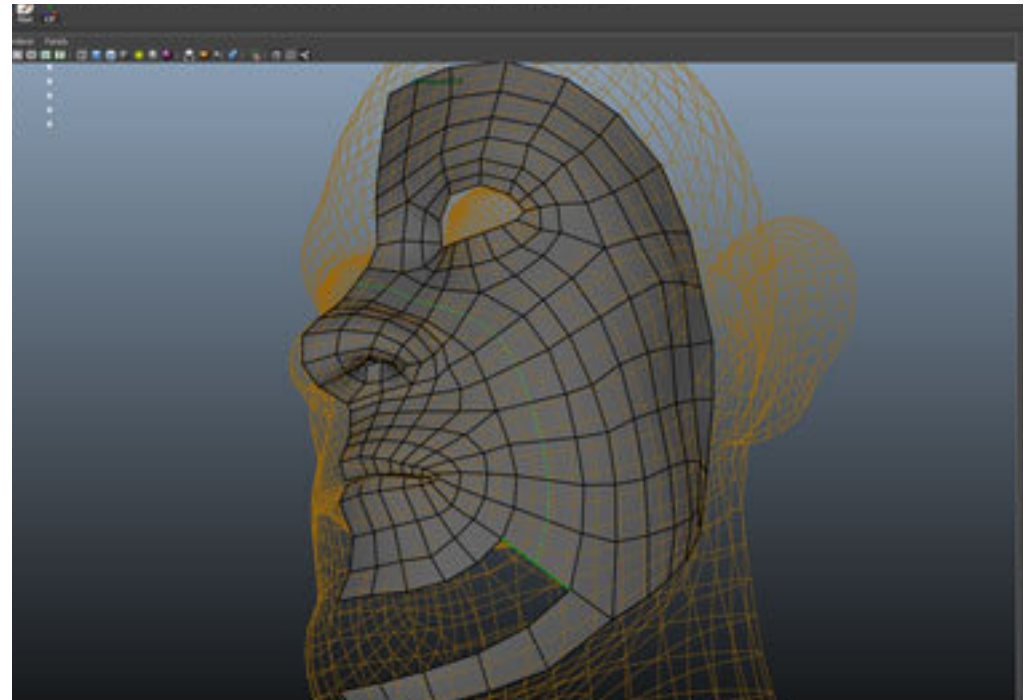
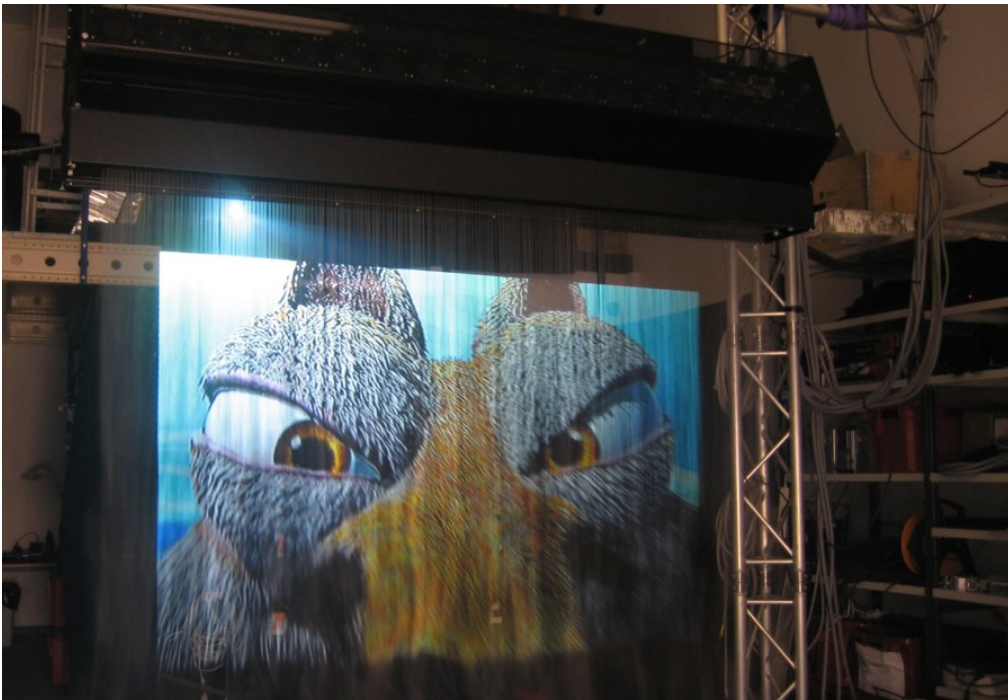


4. Concept Development

Concept 1

As commercial fogscreens are heavy and expensive there is a need for an interactive portable fogscreen that can be taken out to venues around Newcastle and display visual art in real time from the VJ in a new and exciting way. This is something that I haven't seen in a small venue and I feel that this would be a new way to attract people to nightclubbing in Newcastle. It could be interactive using Xbox Kinect technology to track people and generating new real time art.

I would also like to try my hand at animating a real time character to appear on the screen which would allow kids to have a play with it and it could possibly be hired out to parties or it could be used in team building exercises at corporate days. To do this I would need to learn how to animate a character with a 3d animation software like Maya from Autodesk or Maxon cinema 4D. I will also need to find the required hacks to enable the depth sensor and the skeleton tracker within the Kinect. There are various open source plugins which can be used with music programs and some graphic programming softwares too like 'Processing' or Quartz composer.



Concept 2

If like me when you go to a nightclub there is no chance that you get a glimpse of the DJ and you spend more time looking at the visuals whilst dancing, plus the fact that nights out are expensive. You might grudge paying £20 to see a DJ that you haven't seen before when you might not even like them on hearing them. Or maybe you are a student and would like to have the DJ in your flat party....Then a streaming service is what is needed.

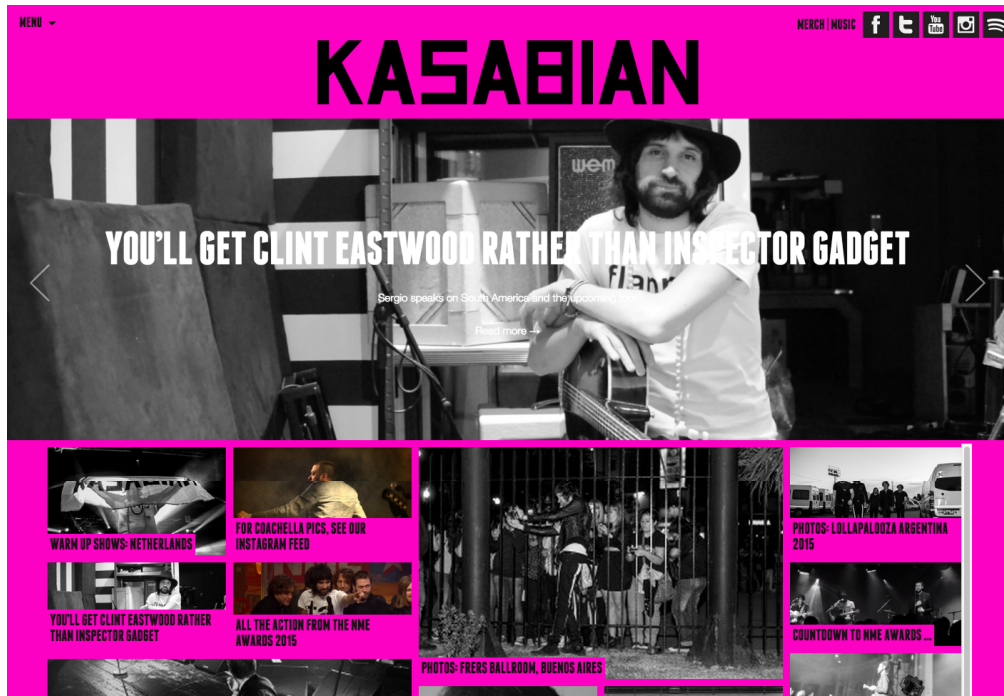
There are a couple of dedicated dance event streaming teams, one that I use often myself is called Boiler Room TV, but they only do big name events.

I aim to change that by streaming local events in Newcastle upon Tyne. I will focus on delivering a new brand with a reliable service that will be free for people to stream to their home computers or hand held devices. It will focus on the audio visual art and music scene in the North East.



Concept 3

Travel application based on music taste. The application would be able to suggest places to visit based on your musical tastes. It takes a look at your spotify or itunes lists and based on what you listen to it will suggest gigs or places of interest to visit. If for instance you listen to Kasabian the app would intuitively notify you about the latest tour dates and where you can buy tickets from, it would also supply information on where they are from and where they played their first gigs etc. Places that a Kasabian superfan might want to visit?



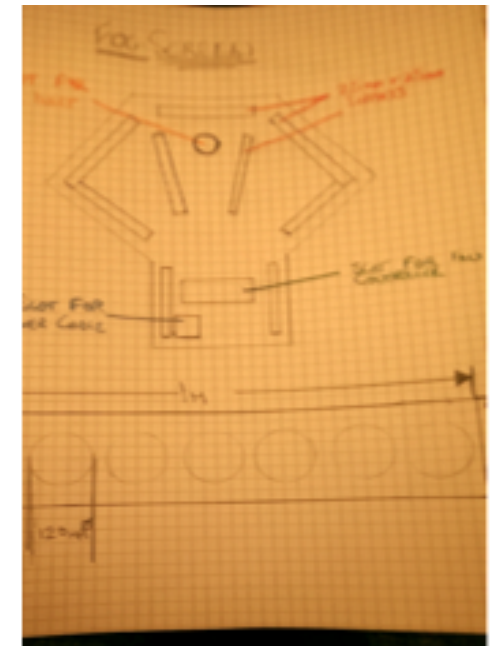
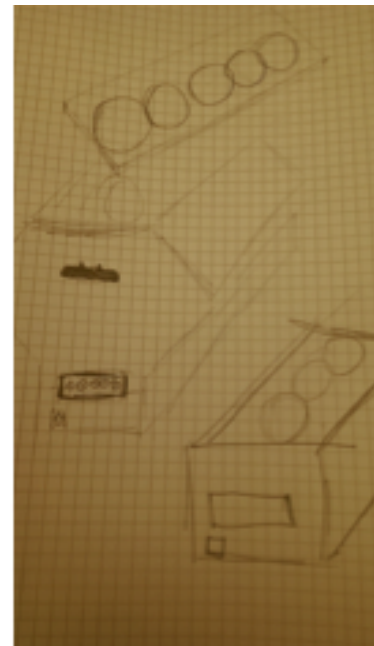
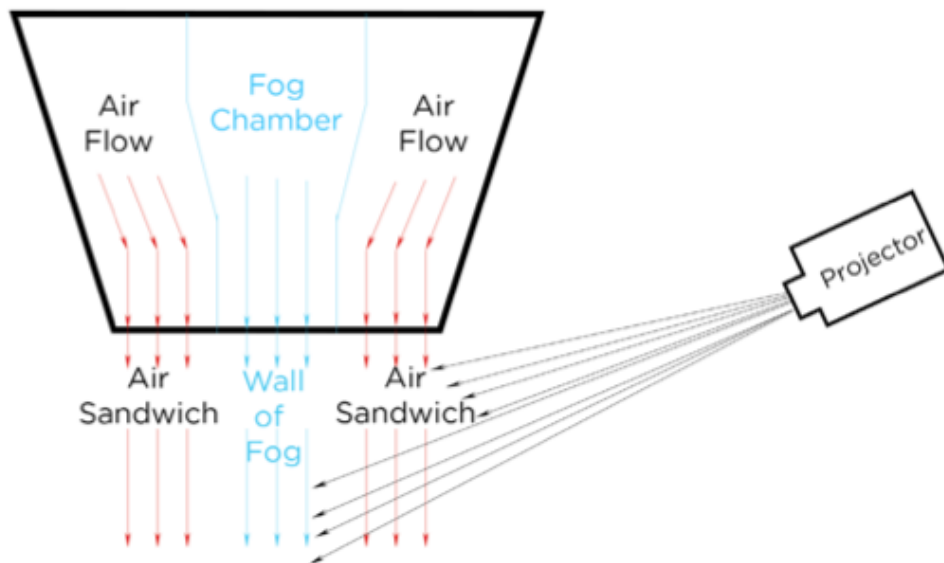
5. Final Idea

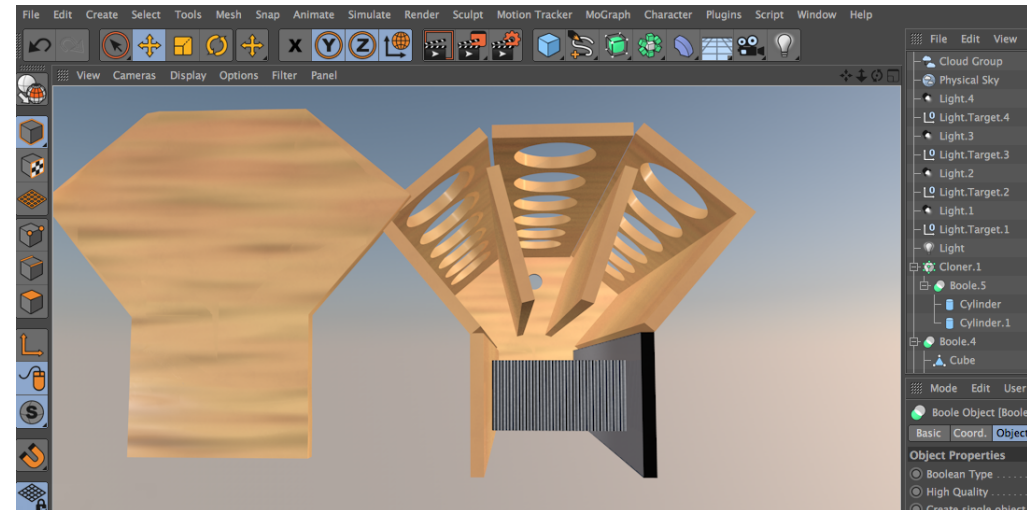
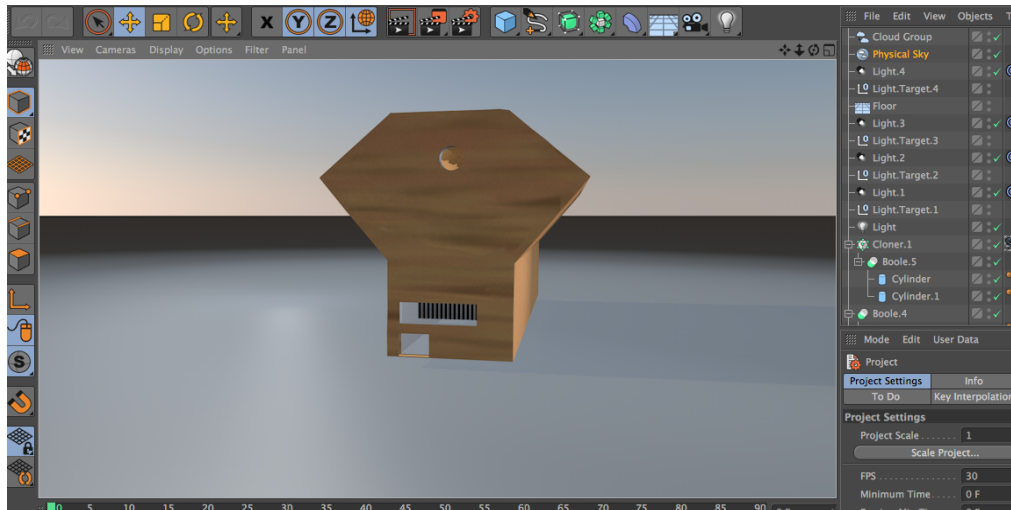
5.1 The build

Interactive Fogscreen: The Build

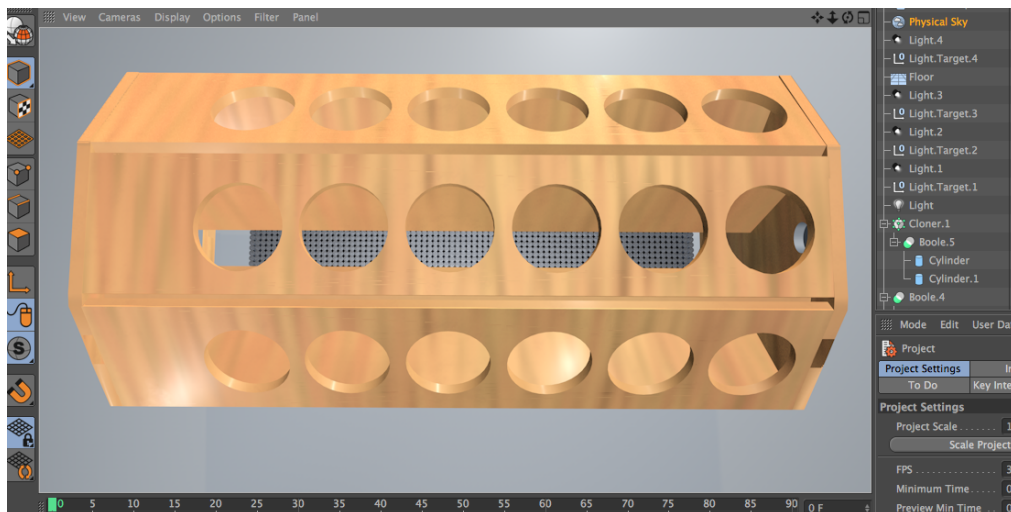
I have decided to build the interactive fog screen, I will use The Kinect sensor to control the visuals as I have found some software that has already isolated the various sensors and can access them through this software with some plugins which attach directly to some great animation softwares and also midi and osc control too. I described the build of the fog Screen in Part one of my design doc so I will include a brief outline of what I had to do here.

The FogScreen is a high-tech version of the technology in a cool air humidifier. Tap water is pumped into the fog tank where it is blasted with ultrasound, turning it instantly into a thick fog made of tiny water particles 2-3 microns in diameter. The tank's internal design plus 3 sets of fans work together to create a very thin wall of mist about half of an inch thick. One set of fans blows the fog downwards while the other two sandwiches the fog between air curtains so that it becomes a smooth projection screen. First I sketched out a rough outline of the basic shape for my Fogscreen.

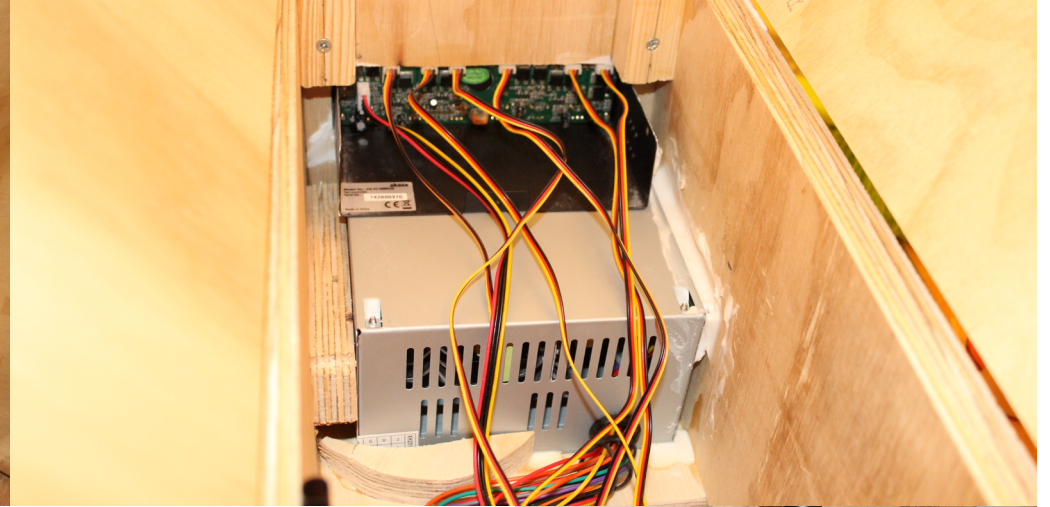




After my initial outline I created a 3D Model Using Maxon C4D, I used this 3D model To complete my final design of the Fogscreen unit.



I used the boole tool to create the 18 fan holes in the top of the model (bottom left) and I used the cloner tool to create the Straws in the model(top right). Fans will be attached to the inside of the Unit which will draw air into it. The fog will travel through a pipe into the chamber through the hole in the end of the unit (bottom left). The fans will push the air and the smoke out through the straws a the bottom giving a smooth screen of fog cushioned either side by layers of air to project onto.



Built from 18mm 2.4m x 1.2m Plywood I cut it into 9 x 1m boards for the fan holes and the outside boards and also the two inside boards. I then cut the last bit of plywood in half and used a template that I had created in C4D to cut out the shapes for my 2 end boards. It contains inside it a 400w computer power supply which powers 18 x 120mm case fans through a variable speed six channel fan controller and a bunch of splitter cables which I soldered together. The fog is pushed through the 1.2m x 40mm pipe from container by an ultrasonic mist maker. I also put handles on it for portability



Once I had completed the construction of the unit. I filled any gaps with wood filler and then sanded it and painted it with a black paint. I then bought a lighting rig that I could use to hang it up.

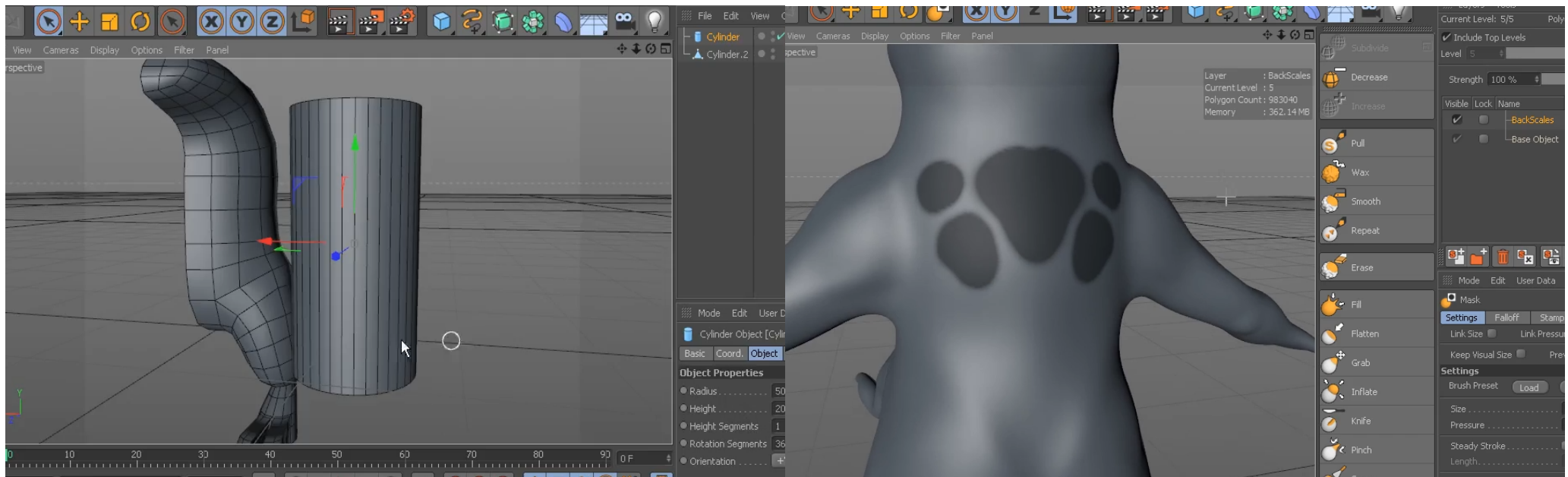
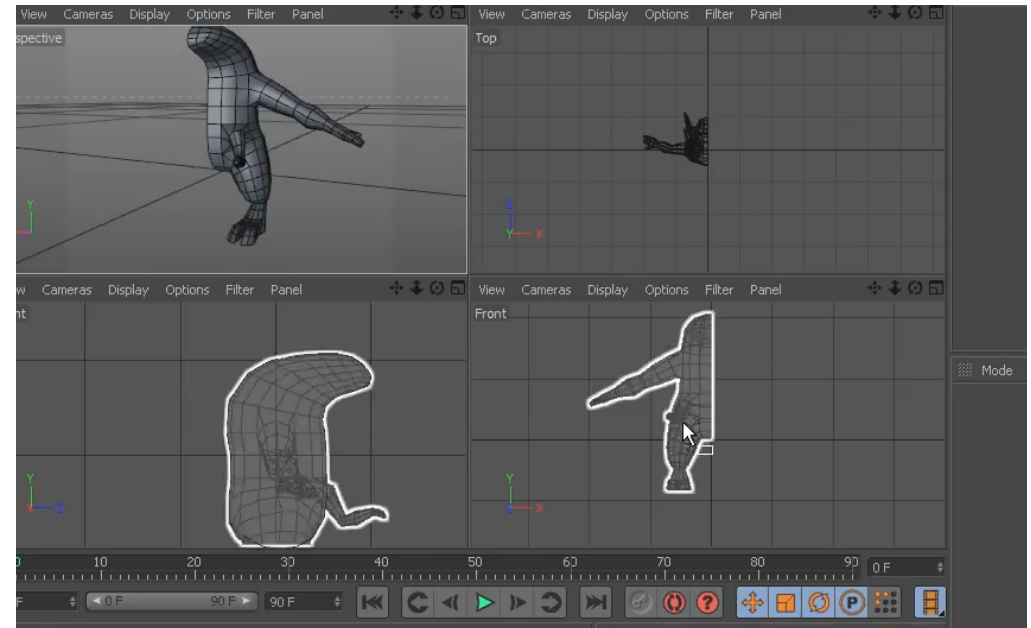


My intention was to use an ultrasonic mist generator to create the smoke but after spending a small fortune, I found out that it was not strong enough to create enough fog to make the screen to project onto properly. Instead I had to use a cheap DJ smoke machine. Th

Maxon C4D

3D Character Animation.

Part of my plan was to design and rig an animated character that would be real time generated and controlled by the skeleton tracking software in the kinect. in order to do this I would need to learn how. I bought the digital tutors creature creation in C4D tutorial set and started to build my 3D creature. However this was taking a lot longer than I anticipated and I had to put it away and stop working on it as it was a lot longer process than I had anticipate, and was putting me behind in my project. it is not as though I am new to C4D. I was however new to character animation. I considered this to be (excuse the pun) character building and gave me some more C4D skills that I did not have before.



5. Final Idea

5.2 Testing

NI Mate and C4D

NI Mate is a real time motion capture software that utilises the hardware within the Kinect sensor to create real time animation. It has plugins for all of the main animation software providers and it also allows you to control audio and visual softwares through the midi (Musical Instrument Digital Interface) control or through osc (Open Sound Control) these allow other midi or osc controlled programs or hardware to speak to each other.

<http://www.ni-mate.com/>

While I was learning to character animate in C4D, I bought 'NI Mate' with a view to using the plugin to from it to animate my C4D character however when i was trying to get the plugin to work I found that it was a bit glitchy with C4D and it wouldn't allow me to animate the character properly, According to the online tutorial it was as simple as starting the plugin and then start it receiving the body skeleton information, it would create a null of the various body parts from your skeleton, and then all I need to do was attach the null body parts to the parts of my model. I joined an online 3D modelling community called 'Mixamo', Here you can buy 3D models already rigged to use in a 3D engine. They give you a free one to start off with so I used it to try out the plugin. I was able to attach the body parts to models that I had created myself but not of any that I imported from other places. I'm not sure if the free model was not rigged properly or if the plugin was not working but after days and days of trying it I decide to knock the whole character animation part out of my project and just use for evaluation of the project over all.

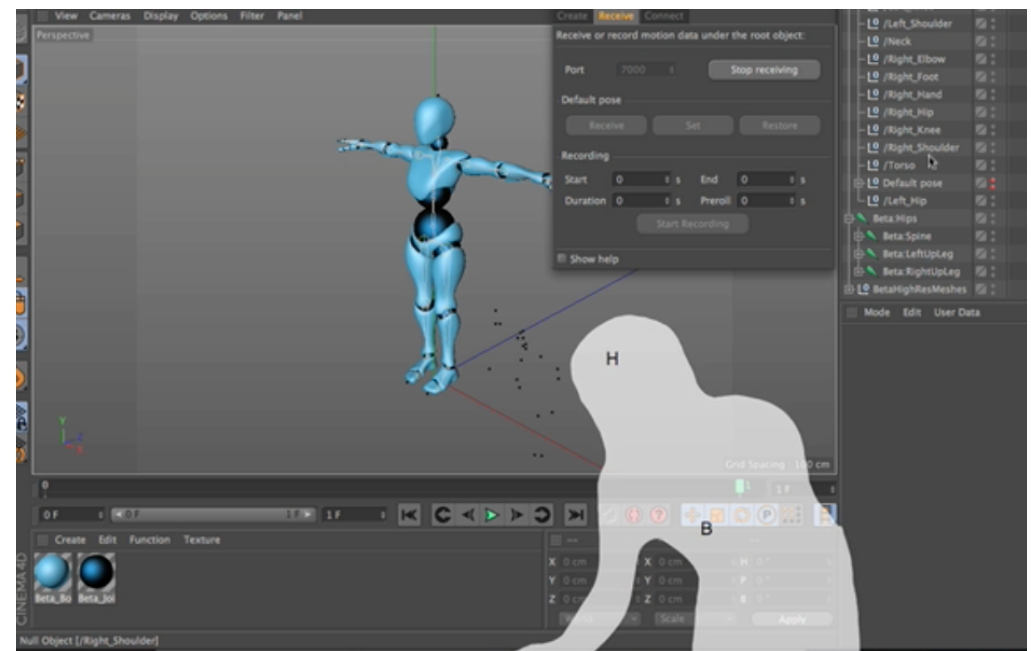
The banner features a blue header with navigation links: NI MATE, READ THE NEWS, FREE DOWNLOAD, USER FORUMS, OFFICIAL PLUGINS, and FREQUENTLY ASKED QUESTIONS. The main content area is dark with white text announcing the V2.0 update. A 'DOWNLOAD' button is visible at the bottom right.

NI MATE | READ THE NEWS | FREE DOWNLOAD | USER FORUMS | OFFICIAL PLUGINS | FREQUENTLY ASKED QUESTIONS

NI MATE V2.0 ANNOUNCEMENT + ...

IT'S BEEN NEARLY A YEAR SINCE WE LAST PUT OUT AN OFFICIAL UPDATE TO NI MATE. THIS DOESN'T MEAN THAT WE'VE STOPPED WORKING ON THE SOFTWARE - ON THE CONTRARY. WE'RE HAPPY TO NOW ANNOUNCE ON THE BLOG THAT FOR ... [CONTINUE READING](#) →

THE REAL TIME MOTION CAPTURE TOOL **DOWNLOAD**



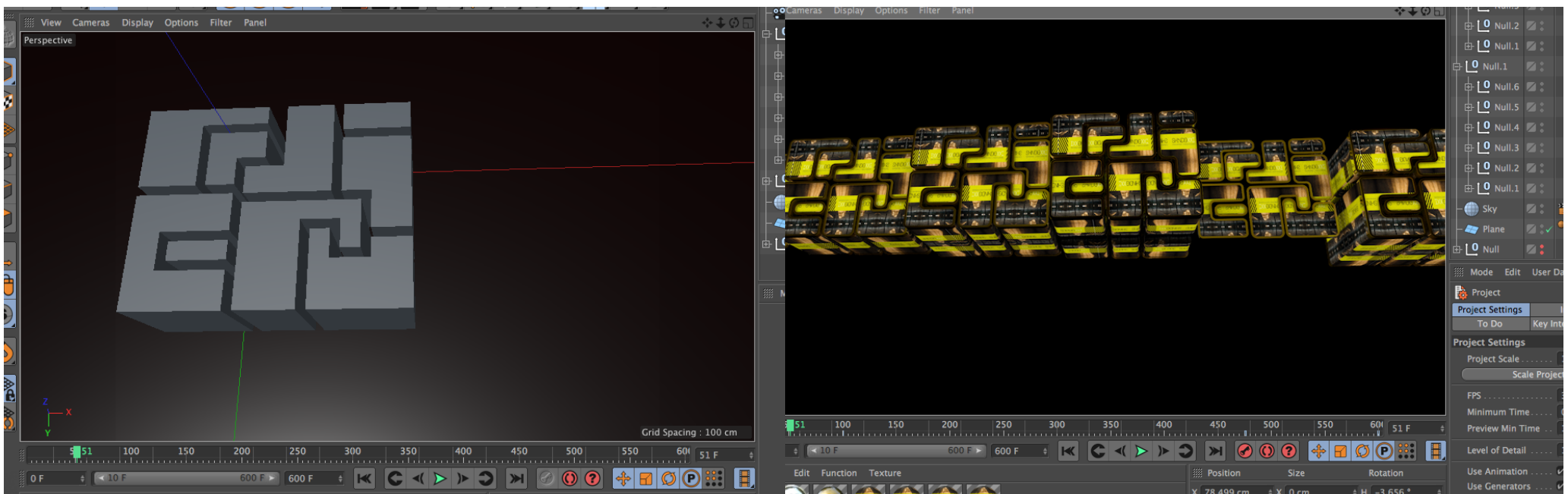
5. Final Idea

5.3 Content Creation

C4D Animation For Resolume

Since I had to stop the work i was doing on the character animation I decide to create some original visuals to use with Resolume. I used Cinema 4D to do this as I had already used it before and was getting a grasp of it a bit better. I have a friend who VJ's for Shindig which is a nightclub event in Newcastle, so I created a short video animation for him to use at their 23rd anniversary event.

I Started by creating some a flat geometric shapes that fit together like tetris blocks. I then curved the corners and extruded them to become 3D blocks that fit together in a 3D jigsaw style. I then animated them so that they travelled a cross the screen and I used an online flyer to create the texture map on the cubes, this also was animated to travel across the 3d models independently of the entire animation motion across the screen.



Here are a couple of screen shots from the final animation that was used at the Shindig 23rd anniversary birthday bash. I only animated a single cube and a camera zoom and pan as it was taking too long to render out the final video with more cubes in it. This was only 7 seconds long and took 14 hrs to render effectively decommissioning my laptop for the duration of the render. This was played on and off through the entire night of the warehouse party I have included the 7 second animation as a separate video file of this animation as Indesign would not attach it to my interactive pdf properly.



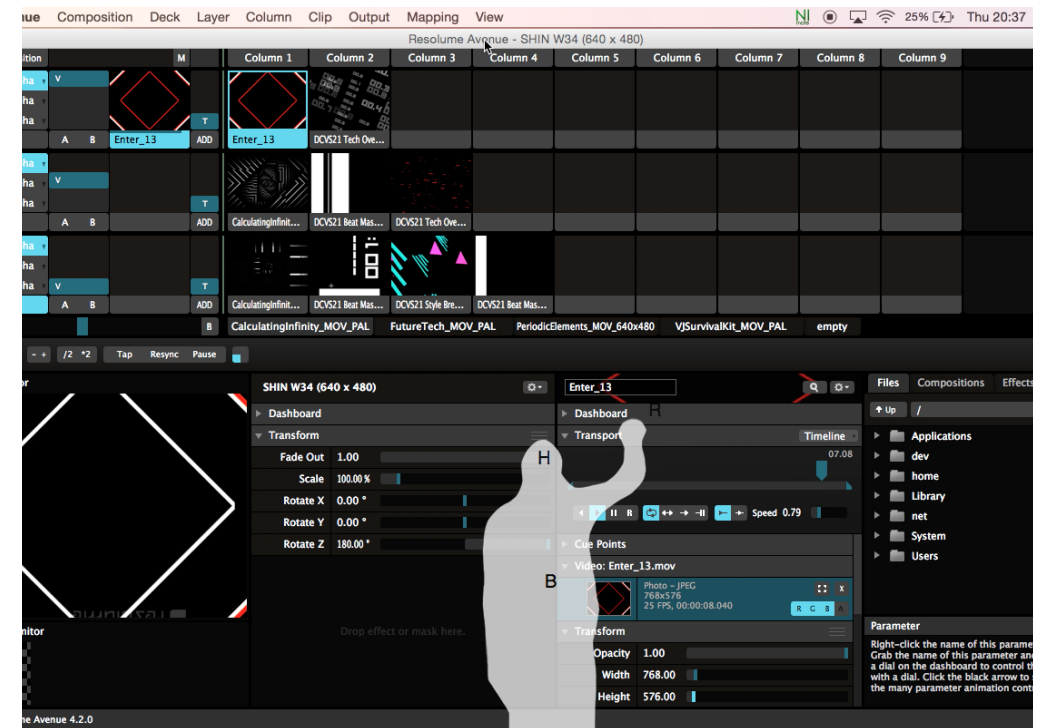
5. Final Idea

5.4 Software

NI Mate and Resolume

NI Mate can be used to capture the skeleton of the user and then attach the body parts to various different controls of music production softwares like 'Ableton Live' or VJ softwares such as 'Resolume' or 'Modul8' with the midi or osc controls. It can also enable virtual midi trigger buttons around the user which can be assigned to midi controls in these softwares also. This was fairly straight forward but again i'm not sure if it was the processing power of my laptop but when I mapped the virtual buttons it worked great but when I added the osc Skeleton control as well there was a bit of lag.

for example I had mapped 6 triggers around my head to turn on different visuals in 'Resolume', this worked fine on it's own. I also attached the up and down movement of my left arm to the z rotation for the output image from 'Resolume', and the right arm to the opacity of the video selected, again this worked fine on it's own but when I started using midi and osc together there was a noticeable lag between the user and the software output. 'Delicode' the makers of 'NI Mate' have just released their own VJ software called 'Zvector' that is specifically designed to go with the Kinect and that might be something to investigate further.



6. Evaluation

Evaluation.

I am very disappointed with the fact that I had to leave the character animation out of the final project. I bit off a bit more than I could chew when I undertook a mammoth task of trying to learn how to character animate in just a matter of weeks, this came to the detriment of my final design document and video and had I not wasted so much of my time on that and trying to figure out the realtime character animation plugin I would have probably been able to figure out what was causing the lag between "Resolume" and 'NI Mate' also that is if it wasn't the softwares using up all of my processor power.

Overall I thought that I had a good idea and that it would have been great if I would have had a more powerful computer at my disposal.

My fogscreen works very well with a good fog machine connected to it and is great fun controlling the visuals with your body via the Kinect sensor. There is a small problem in smaller enclosed areas as the excess fog that is blowing out of the machine interferes with the infra red sensor from the Kinect when it fills up the room, but in bigger areas it works really well. It also looks great when just showing images on there as it gives a really great 3d effect.

My VJ friend tested it for me and was very impressed with the effect and is going to use it at future events throughout the summer.

