TouchDesigner Workshop
realtime visuals for performance
beginner's level: 9-10 february 2019

Note: this document and the work file provided are for a 3 day course.
We will choose what materia to focus on for second day.

10.00 - 18.00
Focus on sound reactive visuals and case studies of my work.
TouchDesigner interface basics:
https://www.derivative.ca/Education/BestWorkshopVideos088/

Day1 (beginners) morning
OVERVIEW
Explanation of interface - node types
help-> Operator snippets (examples of nodes)
projector output - interface design - example of multi patch/multi interface setup for show
Case study
"Inferometer" music by Nikolay Popov
https://vimeo.com/199131963

Animating an image with audio
d1_ex1: analysing audio peaks - analyse CHOP - lag CHOP - moviein TOP - composite TOP
        compare pre and post lag values - trail CHOP - switch CHOP
        noise function to animate - noise CHOP - time slice
d1_ex2: distort an image with audio reactive noise - noise TOP - displace TOP - speed CHOP
d1_ex3: audio animated ripple - ramp TOP - opacity TOP - speed CHOP - collapsing nodes into a patch
Converting audio to image
d1_ex4: 2 methods for converting audio to image - chopto TOP - audiospectrum CHOP - displace TOP

Day1 (beginners) afternoon
component COMP - Panels
in nodes - interface design - perform mode
optimization
Perform CHOP - FPS - GPU usage
Performance monitor
3d rendering - Noisy sphere in a box - light projections
d1_ex5: sphere SOP - noise SOP - facet SOP - normals
        lights - shadows
        Phong MAT - color - rim lighting
        texture mapping - texture SOP
Converting audio to geometry
d1_ex6: chopto SOP - wireframe MAT
        -render as tube - limit SOP -render as surface - skin SOP - texture SOP
Movies - mixing and layering
d1_ex7: ways of controlling a quicktime movie - scrub
        mixing - switch TOP

Day2 (beginners) morning

Case study

"Gore - Russian song" music by Nikolay Popov

https://vimeo.com/109052990

converting image to geometry

d2_ex1: using an image to displace points on a grid - grid SOP - topto CHOP - sopto CHOP - chopto SOP
       point groups - CHOPs

d2_ex2: particles - collision - force

Python scripting and DATs

d2_ex3: changing keyframe values in a DAT using chop execute DAT
       CHOPexecture DAT

d2_ex4: countCOP - text TOP - convert DAT - selecting lines from a text file for output

Day2 (beginners) afternoon

pen tool

d2_ex5: track mouse movements to create pen tool - panel CHOP

geo instancing

d2_ex6: record mouse movements and instance geometry - trail CHOP - geometry component:instancing
       add attenuated noise - noise CHOP - pattern CHOP
       GPU vs. CPU - geo instance vs. copy SOP

d2_ex7: geo vortex sacred geometry
       use animated noise to control rotation, ramp to control opacity and colour
        noise CHOP - speed CHOP - ramp TOP - topto CHOP
       GPU transparency in TouchDesigner

d2_ex8: depth of field - rendering depth pass and plug into luma blur TOP
       Explanation of camera clipping planes.

importing 3d models

d2_ex9: demonstration of 3d rigging in houdini - export fbx to TouchDesigner
The new ablembic SOP - inputs geometry FAST

interaction design 1 - Kinect

Demo of 2d/3d mode - skeleton tracking - rgb point cloud - use of depth and infra red cams.

VR (oculus)

Introduction to VR - stereo render - vive CHOP - what is a camera matrix

LED - dmx

DMXout CHOP - convert image to rgb channels and send to LEDs via artnet dmx controller.

case study

"ANF-93" music by Nikolay Popov

https://vimeo.com/109052990

Particles - layering CHOPs

d2_ex1: combining noise CHOP and wave CHOP with audiospectrum CHOP
      -lookup CHOP - pattern CHOP - explanation of samplerate.

interaction design 2 - kinect2

d3_ex1: Paint tool with kinect - skeleton viz patch

case study

"playing with fire" - interactive installation - particle attractor and kinect

https://vimeo.com/70735873

d3_ex2: particle attractors tracked to hands - kinect world space/screen space - point SOP-particle SOP

d3_ex3: GLSL shaders – rendering kinect rgb point cloud input

Audio landscape

d3_ex4: audio trail in TOPs – convert to CHOPs then to SOPs as a grid

d3_ex5: same process in CHOPs (more precise) - 'audio history' – trail CHOP-shuffle CHOP, chopto SOP
      line SOP, skin SOP

GLSL shaders 1

importing shadertoy GLSL shaders to TouchDesigner

https://www.shadertoy.com

GLSL shaders 2

Displacement mapping - creating normals

GLSL shaders 3

Geometry shaders

d3_ex6: we use the audio spectrum as vertical emission velocity for particles - particle SOP

Advanced rendering - PBR (physically based rendering)

d3_ex7: environment light, metallic surfaces, soft reflections - substance shader: shader builder

d3:ex8: drag and drop a movie file into a component: container-drag tab

Geometry (SOP) and rendering tricks

d4_ex1: tiled wall - fake normals - environment maps-point SOP-primitive SOP

d4_ex2: explode geometry - primitive SOP

D2_ex5: ray SOP - creep SOP - animating a light over complex geometry

D2_ex6: creep SOP - sweep SOP - fitting particles to a path

REFERENCES

python scripting

https://www.derivative.ca/wiki088/index.php?title=Working_with_OPs_in_Python

TUTORIALS

http://matthewragan.com/category/how-to/touchdesigner/

http://matthewragan.com/2014/03/05/touchdesigner-these-are-the-dats-youve-been-looking-for/

http://matthewragan.com/2014/03/06/touchdesigner-replicators-and-buttons-and-tables-oh-my/