

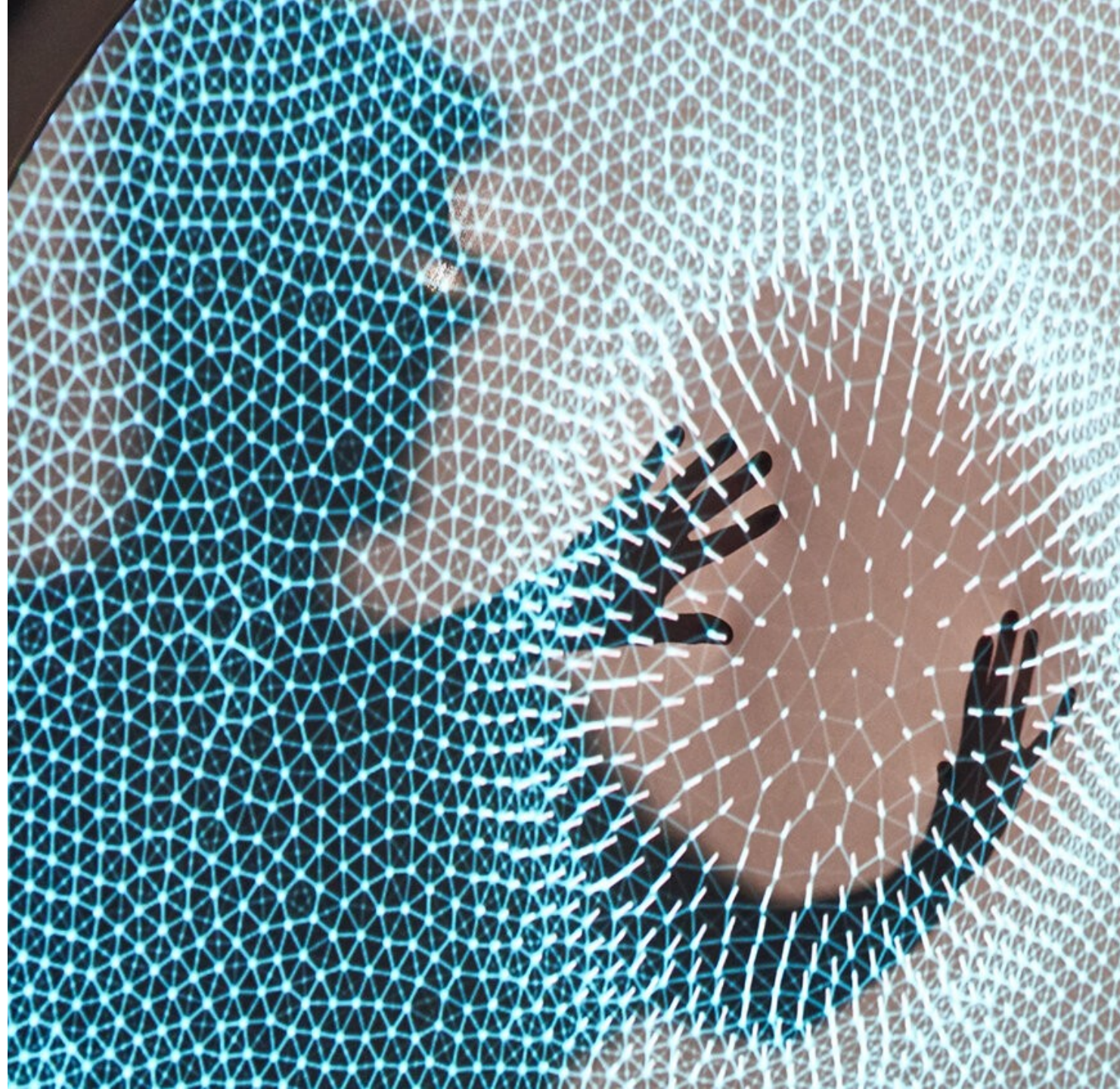
# AAA Security Introduction

# AAASeed

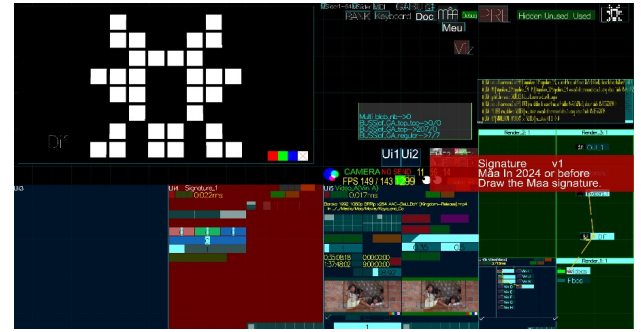
Introduction

Part 1: **Starting**  
with ugly Slides  
(function over Form)

- **What is AAASeed**
- **GaBuZoMeu**
- **Setup AAASeed on your computer**
- **Folder structure**
- **Configuration**
- **First step**

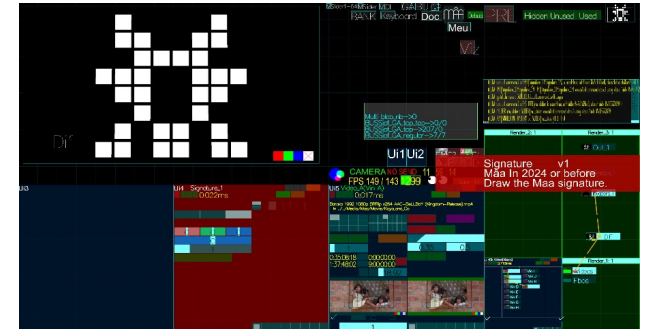


# What is AAASeed ?



- A **generic toolkit** to build **realtime** processes
- oriented mainly in 3 contexts
  - **Video Jockey**
  - **Open data**
  - **Interactive Art** installation
- Soon **OpenSource** (MIT license) and **free**
- Brainchild of **Mâa**
  - Used and refined in **production for 25 years**
- Cleaned and stabilized with the European Project ending September 2025
  - <https://ArtCast4d.eu>
  - Early Adopters Program**
- AAASeed intend to live Longer
  - <https://AAASeed.org>

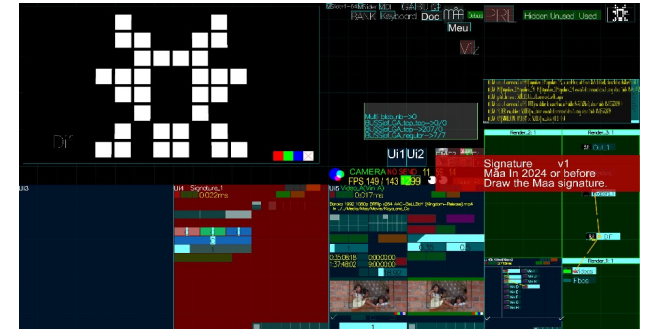
# For whom is **AAASeed** ? **Artist**



- A place where to **assemble** and **compose** blocks on the **fly**
- most of these block deal with **graphics processes**
- some of the blocks
  - deal with **inputs** (cameras, captors )
  - analyse **images**
  - **connect elements**
- produce **live graphic** and or **interactive processes**
- **MultiScreen / MultiMachine**

# For whom is AAASeed ?

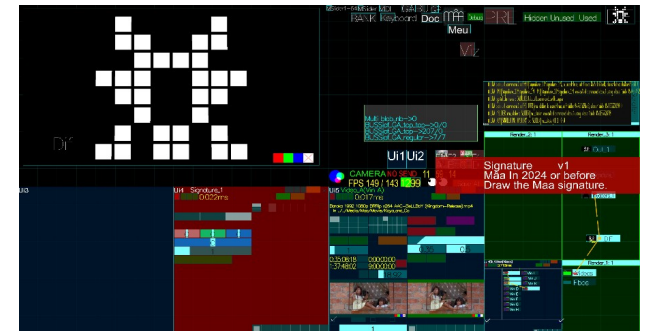
## Developer



- On the base of an old school **robust C++ rendering graph** using the **very fast and flexible Lua scripting language** you can access the low level fonctionnality:  
**Window system, custom C object, OpenGL, C++ objects, GL Shaders, OpenCl, OpenCV, Nvidia Flex, dlib, bullet, ...**
- A rich **lua virtual machine provide** an **interface** to edit and customize realtime processes most of it happen **live** while processes are running **extend and edit on the fly the interface**

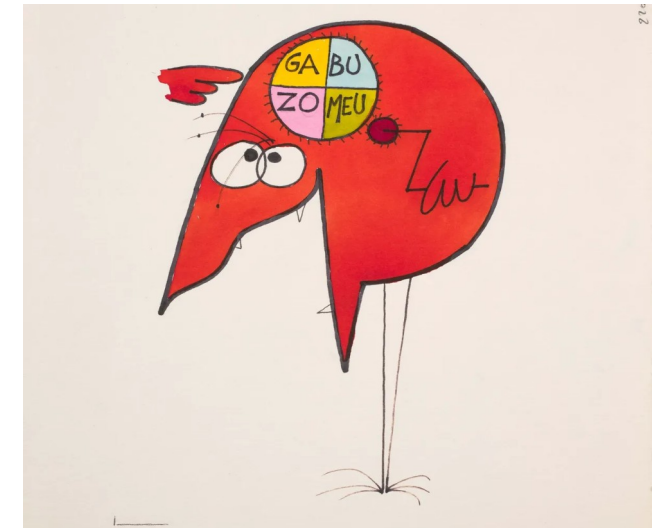
# User point of view

- This a **PC windows** application for now  
**AAASeed\_Metal.exe**
- tested under **windows 10 and 11**  
should also work on Windows 8,7 even XP.
- It can **run on low end machines**  
even an executable for non Avx2 Processor (AAASeed\_Wood.exe)
- But it likes fast machines and **use the Gpu a lot**  
**Graphic Processor Unit**  
Love **NVidia** but function on integrated Intel  
support **Amd** most of the time (getting better on this every month)



# Shadoks point of view

- talking with the **GA**  
Global Action: the top level
- using **BU**  
Box User: element of interface  
BU regrouped in **BUS**  
**BUS** contain **BU** which can contain one  
**BUS** which can contain **BU**s which can contain one
  - **BUS** which can contain **BU**s which can contain one
- you manipulate a bunch of **MEU**  
Module Editable Unit: fonctionnal editable blocks  
sometime represented in their short form the **MU**: Module Unit
- We lost the **ZO** but we will find it, promised («On a perdu les Zos»)
- More on this: search shadoks on YouTube
  - <https://www.youtube.com/watch?v=Sla57Zw-FN4>
- Thanks to **aaa**production



# Install 1/3 Other softwares

- **Klite Codecs**

handle decompression of video (AAASeed use it through DirectShow till 2025 September at least)

[https://www.codecguide.com/download\\_kl.htm](https://www.codecguide.com/download_kl.htm)

klite Mega

default options all the way

- **7z**

handle compression and decompression of 7z files

<https://www.7-zip.org/>

Windows 64-bit x64 version

7z ... -x64.exe : execute to install

- **Visual Studio Code**

text / code editor used by AAASeed by default

<https://code.visualstudio.com/>

Download for windows

- **XnView**

Image browser with batch and conversion capabilities

<https://www.xnview.com/en/>

MP or Classic



# Install 2/3 AAASeed

- Get files from <https://AAASeed.org/files/>
- Use the latest Installer

Install with AAASeed\_Setup.1.3.1.exe (2025 April)

**Need a Reboot the first Time**

**Download and add libcurl.dll and cpr.dll to AAADll Folder**

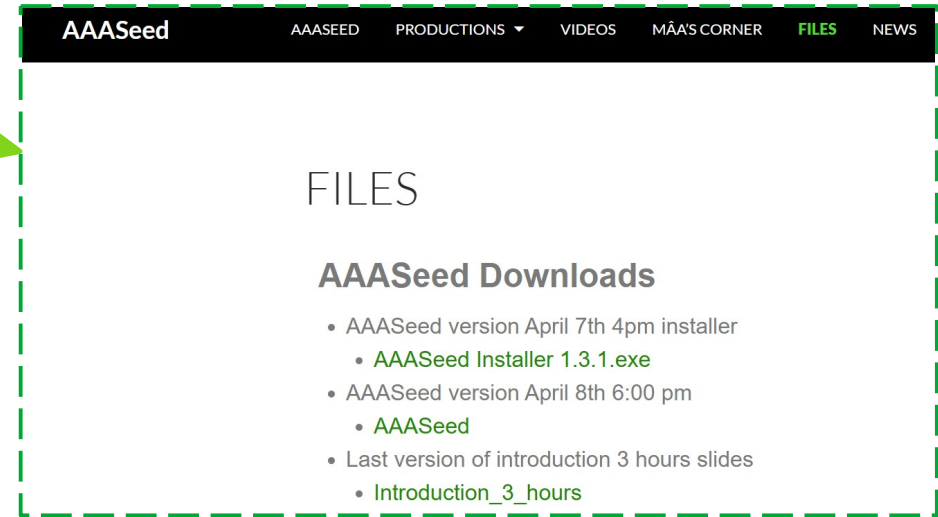
No updater for now

**Update with the latest AAASeed.7z**  
**replace previous AAASeed folder**  
**You can rename AAASeed folder**

- **Folders**

-AAAFoundation:	AAASeed stuff and your work are stored
-AAADll	Dlls associated (the installer define a system path to it)
-AAASeed	What we Maintain, executables are there
-AAAUser	Where yours preferences are stored
-APPs_Guest	Where you should save yor APPs
-Media	Where you put content (videos, images, sounds...) with sub folder by projects
-Install	Associated installers, drivers...

- It is possible to install from a local drive / USB Key with no Network.  
A manual install is possible too



# Install 3/3 Multiscreen

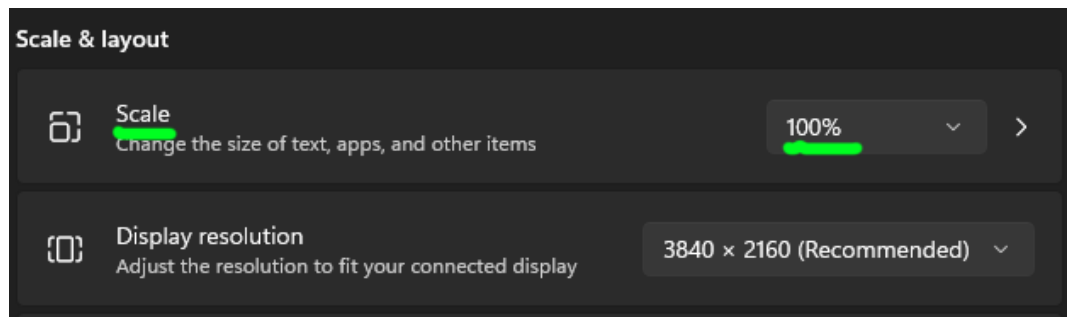
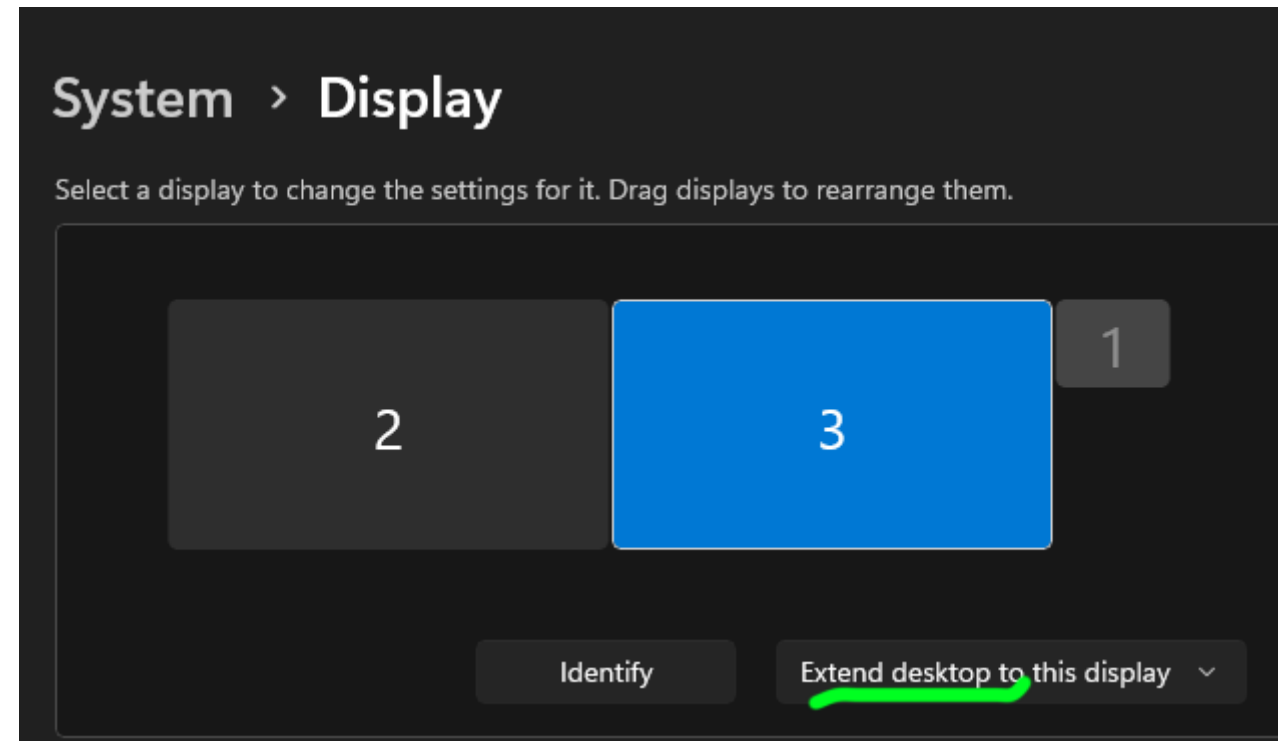
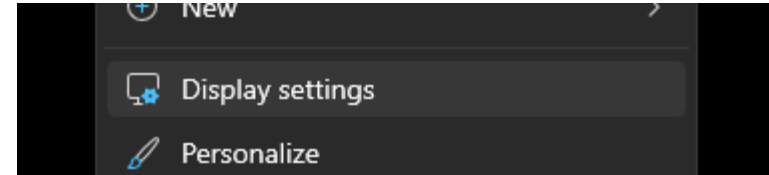
On desktop

right click menu

Display Settings item

Dialog

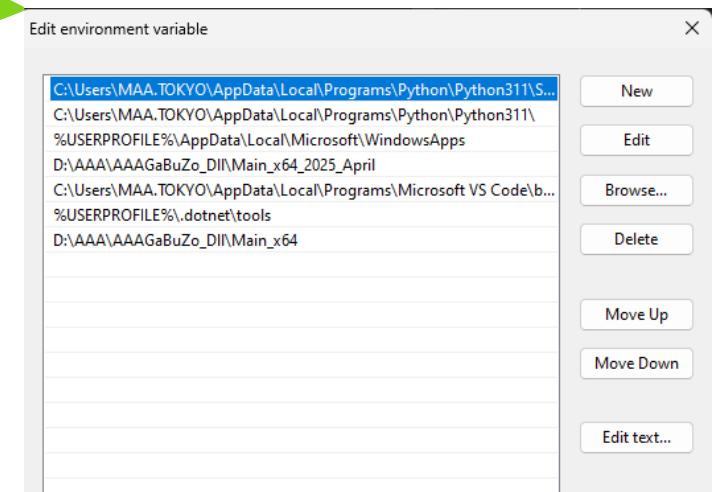
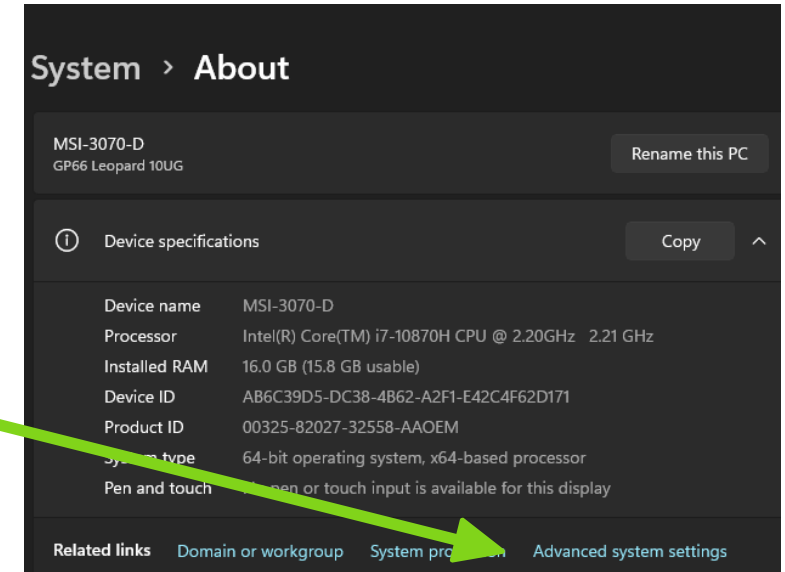
- Set **Extend desktop** mode
- Be careful with the **screen alignment**
  - **Horizontal and Vertical**
- Choose the **right resolution**
- Be sure **Scale at 100 % for all**



Up to 6 screens

# Install TroubleShoot (Archive)

- If AAASeed complain about missing dll other that VC ... .dll
  - Copy the Dll path from the folder where they are
  - Go to PC / Properties / Advanced system settings
  - Environment Variables
  - Then User variable / Path (User or System) / Edit...
  - New
  - Paste path and eventually change order
  - Validate : Ok then Ok then Ok
  - Launch AAASeed\_Metal.exe
- If it complain about some missing VC ... .dll
  - Execute VC\_redist\_2015\_2022 ... .exe
- If it still complain about missing VCOMP120.dll
  - Execute vcredist\_2013\_x64.exe



# AAASeed Sources

- AAASeed.org FILES section

- Developer access

git

-AAASeed Folder

-Lua

-APPs

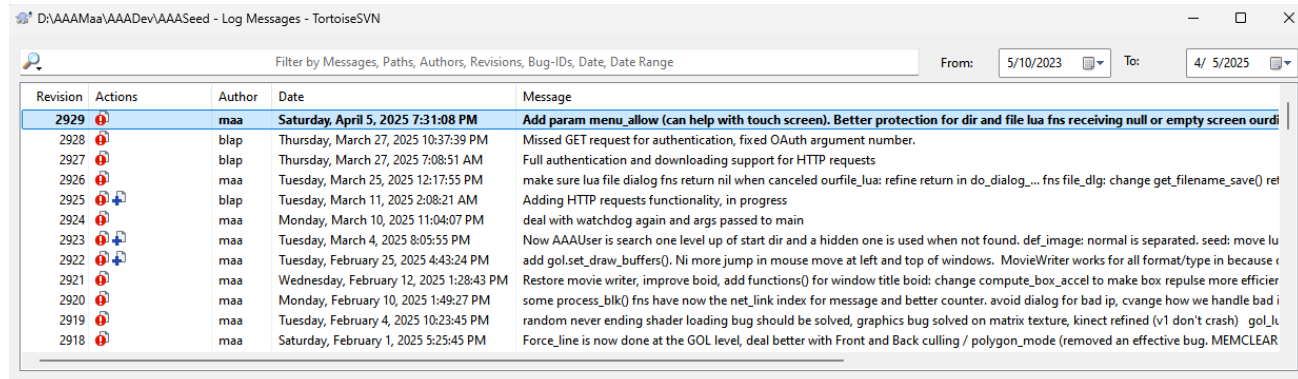
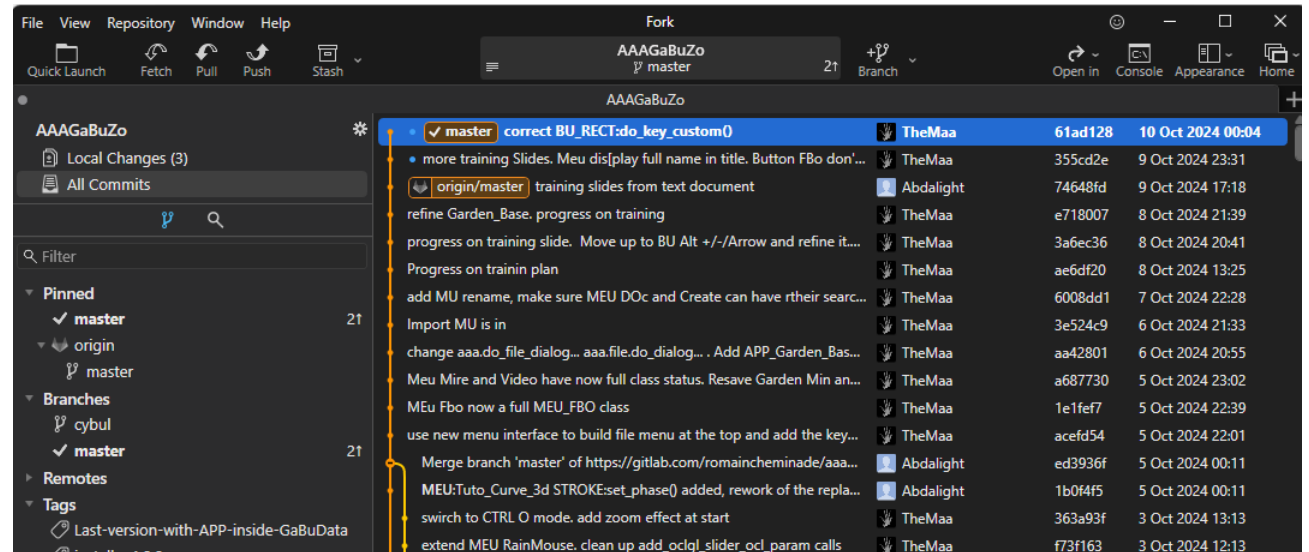
Svn

-AAASeed.exe and dll

-C++

-will move to git

request Maa if you want it



# AAASeed folders: Inside

- **AAASeed folder name can be changed**
  - Users use this to keep different versions
- We call it the **start folder**
  - in lua `aaa.dir.get_dir_start()`
- This is what we maintain and update
  - **As User/Guest don't store your stuff here**
  - For **developer** this is the **Git repository**
- **2 executables**
  - **AAASeed\_Metal.exe**
  - **AAASeed\_Wood.exe** for machine with **no AVX2 Extensions**
- **3 files**
  - **README.md**
    - Detail the install and tree structure
    - Document the **start sequence**
    - Preview in VSCode
  - **ReleaseNotes.md**
    - Document the evolution from version to version
  - **Version.txt**
    - Correspond to the current version of the **installer**

# AAASeed folders: Inside more

- **AAAAPPs Folder**
  - **APP** is like a document
    - Each one a **folder**
    - Examples, Tutorials...
    - **No way to save an APP for the moment: DUPLICATE !!!**
  - **APPS maintained by the core team**
- **AAADoc Folder**
  - Far from finished (state in 2025 April)
  - **Lua API**
    - lua\_aaaseed\_draw.lua**
    - lua\_aaaseed\_interface.lua**
  - **Training Folder**
    - Slide and Pdf used in training
- **AAAKernel Folder**
  - **Developer space**
    - Some resources: lua code, shader, OpenCl, Fonts, Textures...
  - in lua **aaa.dir.get\_dir\_kernel()**

# AAASeed folders: going Up

- AAASeed the Startup folder
- AAAUser folder
  - **AAAWho.txt** made of 3 lines:
    - **UserName**
      - in lua `aaa.dir.get_dir_start()`
      - Where global stuff are saved (pref, master, binds...)
    - **NetName**
      - in lua `aaa.dir.get_dir_net()`
      - Where net stuff is saved
        - Yes it is separated
    - **UserApplicationPath**
      - Used to build relative path
    - **UserName** folders
    - **NetName** folders
  - **APPs\_User** folder
    - **APPs\_Guest** by default
      - Your APPs, MEU protos, data, shaders.....
  - **Media** folder
    - images, videos, fonts, 3d objects...
    - **Big** files are there

# AAASeed First steps

- keyboard first step

- w like (w)indow  
switch between window and full screen Module

- Tab

switch Flatland On and Off ←

Ctrl e like (e)dit flip edit mode (more later on this)

see feedback at the top left of Flatland

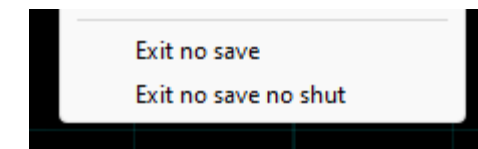
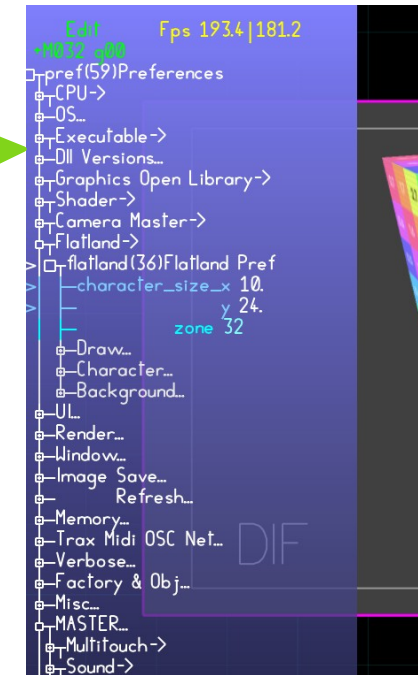
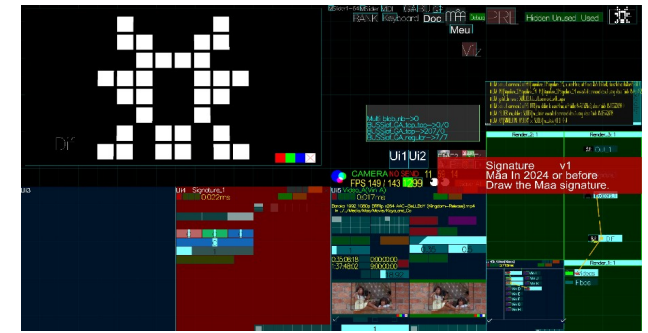
**Red LOCK** vs **Green Edit**

leave it as Edit

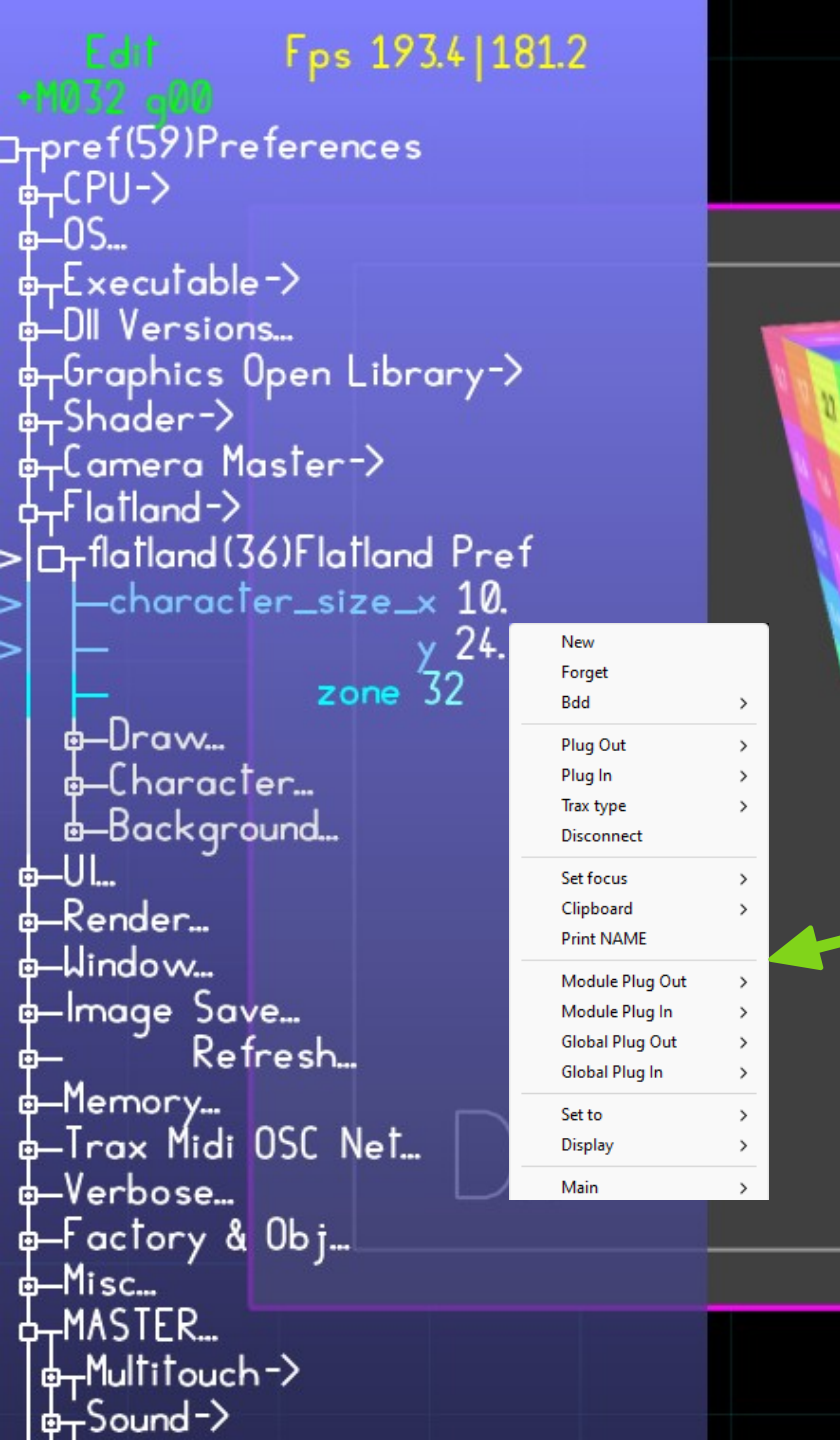
- Double Esc to Quit saving global stuff

- Alt F4 to Quit with a dialog

- Mouse Right Button / Menu / Exit no save

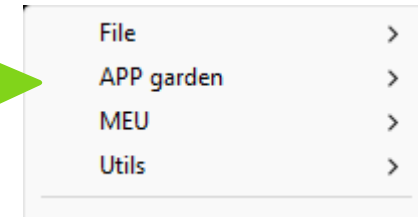






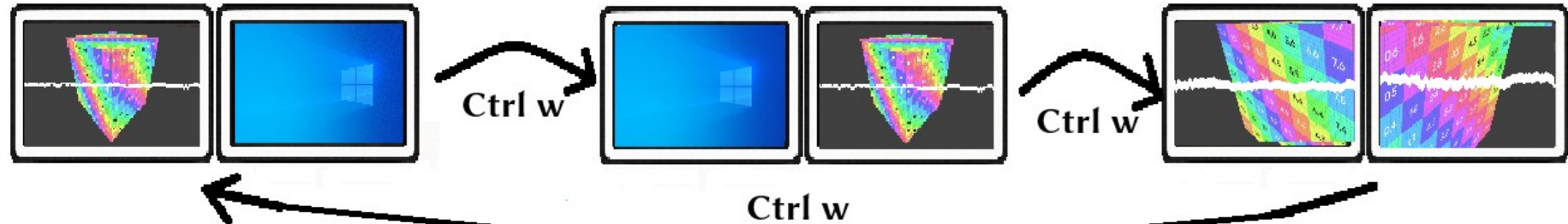
# Flatland

- **Tab**
- **Original AAASeed interface (2000)**
  - where the **C++ can be seen and used**  
a whole world we will explore later  
made of **c\_obj\_ui** and **param**
  - **F10** → **Preferences**
    - example: change values in Flatland
  - **Ctrl F10** → **Preferences at start**
- **Right Mouse Button** → **Menus**
  - in Flatland** → **param menu**
  - out Flatland** → **main menu**
- **GaBuZoMeu**
  - Start of Main Menu
- **Flatland have precedence for event / keyboard**
  - Need to be off to use keys with GaBuZoMeu
  - So leave it off for now → **Tab**

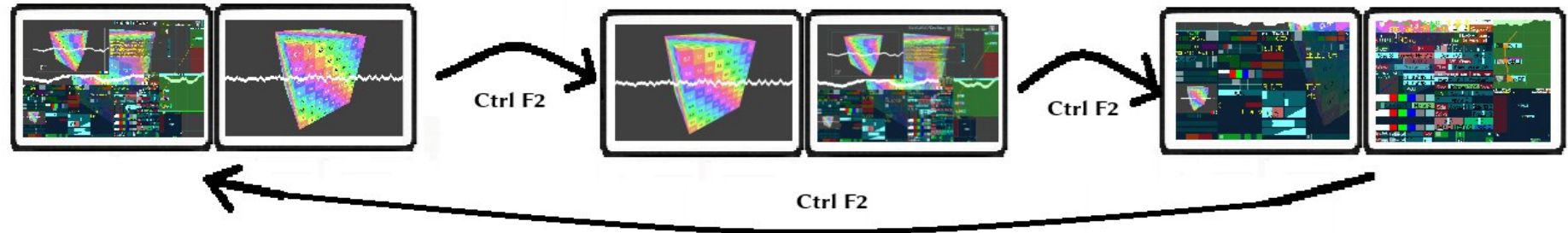


# AAASeed Multiscreen

- **w** like (w)indow  
switch between **window** and **full screen** Mode
- **Ctrl w** circle through all the possible **full screen configurations**  
**Shift Ctrl w** go the reverse way



- **Ctrl F2** change UI position on screens  
**Shift Ctrl F2** go the reverse way



Same principles with more screens (up to 6)

# AAASeed Multiscreen and Flatland

- Flatland by default on left of AAASeed Window which can traverse several screen
- If it is a problem switch screen position in desktop

See install 3/3 Multiscreen  
or change Flatland position

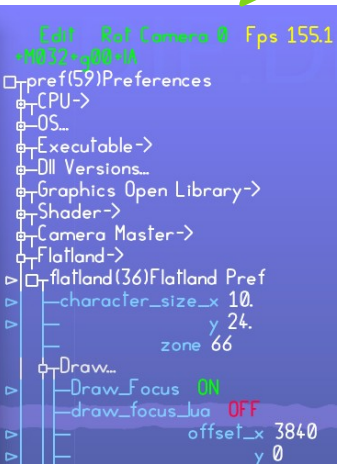
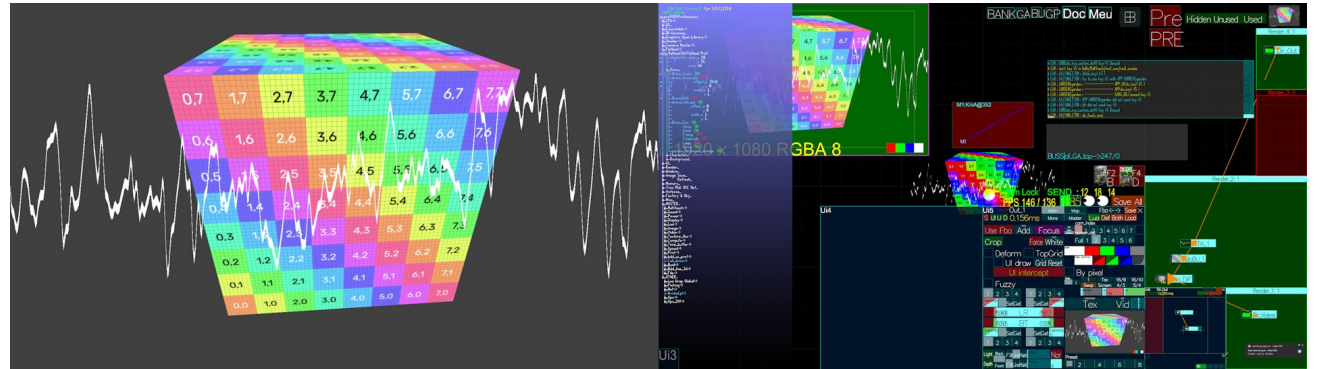
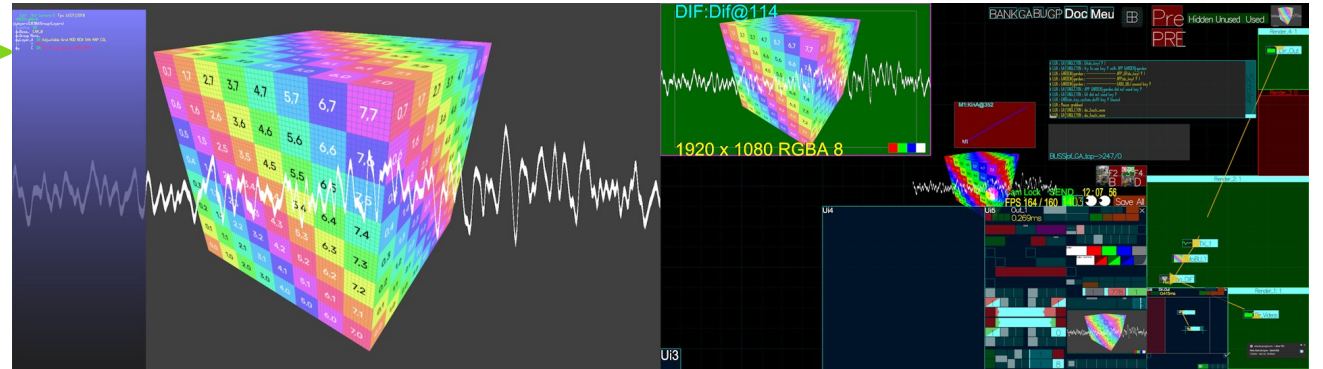
Flatland (Tab)

Preferences (F10)

Flatland/Draw

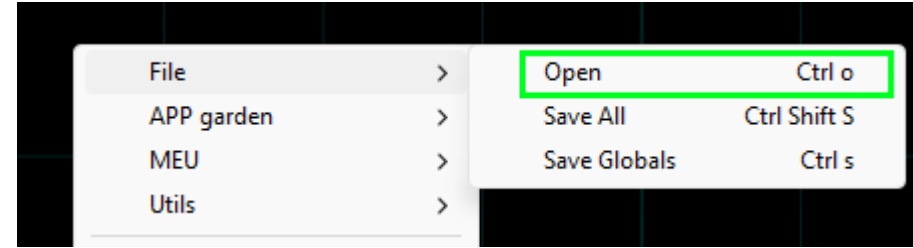
`draw_focus_offset_x/y`

Careful it can make Flatland invisible  
(drawn outside)



# AAASeed APPLICATION

- Open APP/Application Garden\_Base
  - Main Menu File/Open
  - or Ctrl o



- **File Dialog**

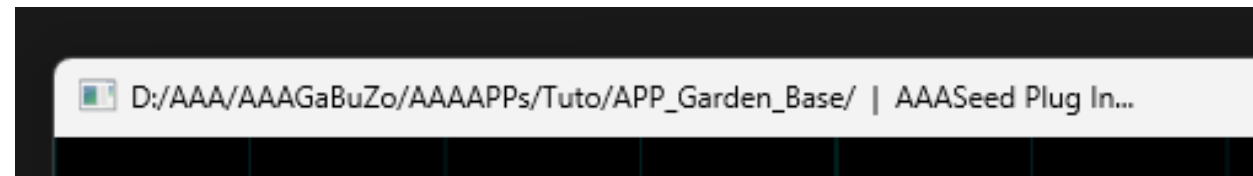
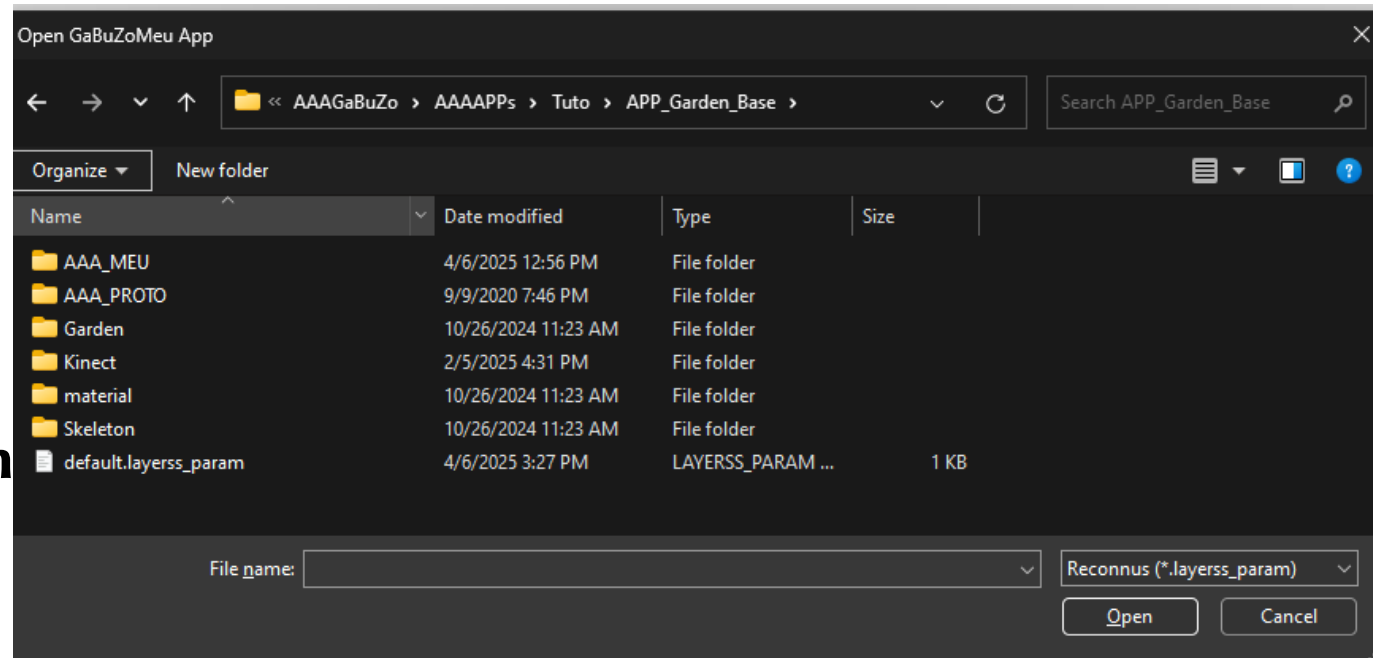
- goto **Start folder**
- then **AAAApps** folder
- then **Tuto** folder
- then **APP\_garden\_base**
- **open default.layerss\_param**

The APP is the folder

The folder is the APP

- Bug sometimes need to redo it

- **Name in the window bar**



# AAASeed Basic

- Don't be scared  
    need to get used but efficient

- Careful with **shift lock**  
    **Dangerous** → avoid

- **Ctrl F2**  
    Force the **GaBuZoMeu UI On** and move it from screen to screen

- **F2**  
    Only **flip** the **GaBuZoMeu UI On/Off**

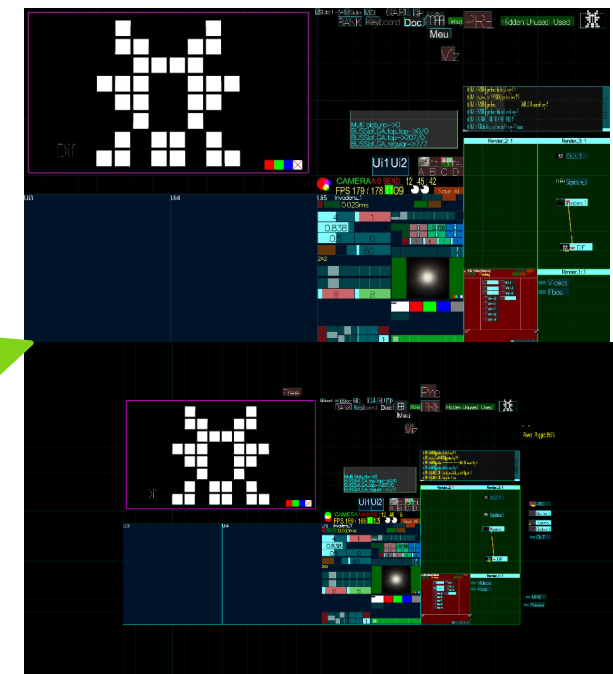
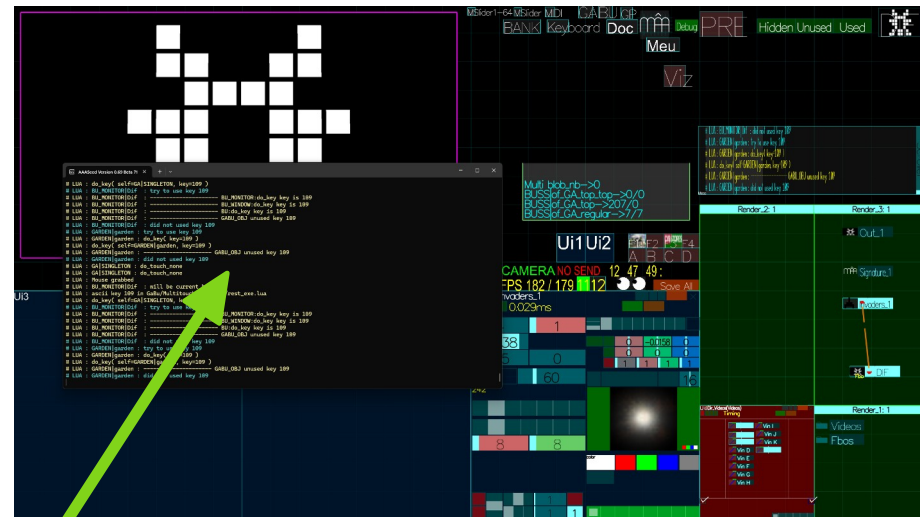
- **F3**  
    Switch the **rendering process On/Off**  
    **BU\_Alive**



- **F1** or **Ctrl h** like **(h)elp**  
    switch the **help** system

- **m** like **(m)essage**  
    pop the **terminal window**

- **Ctrl Tab**  
    flip the **UI Scale** (between 2 values)



# AAASeed

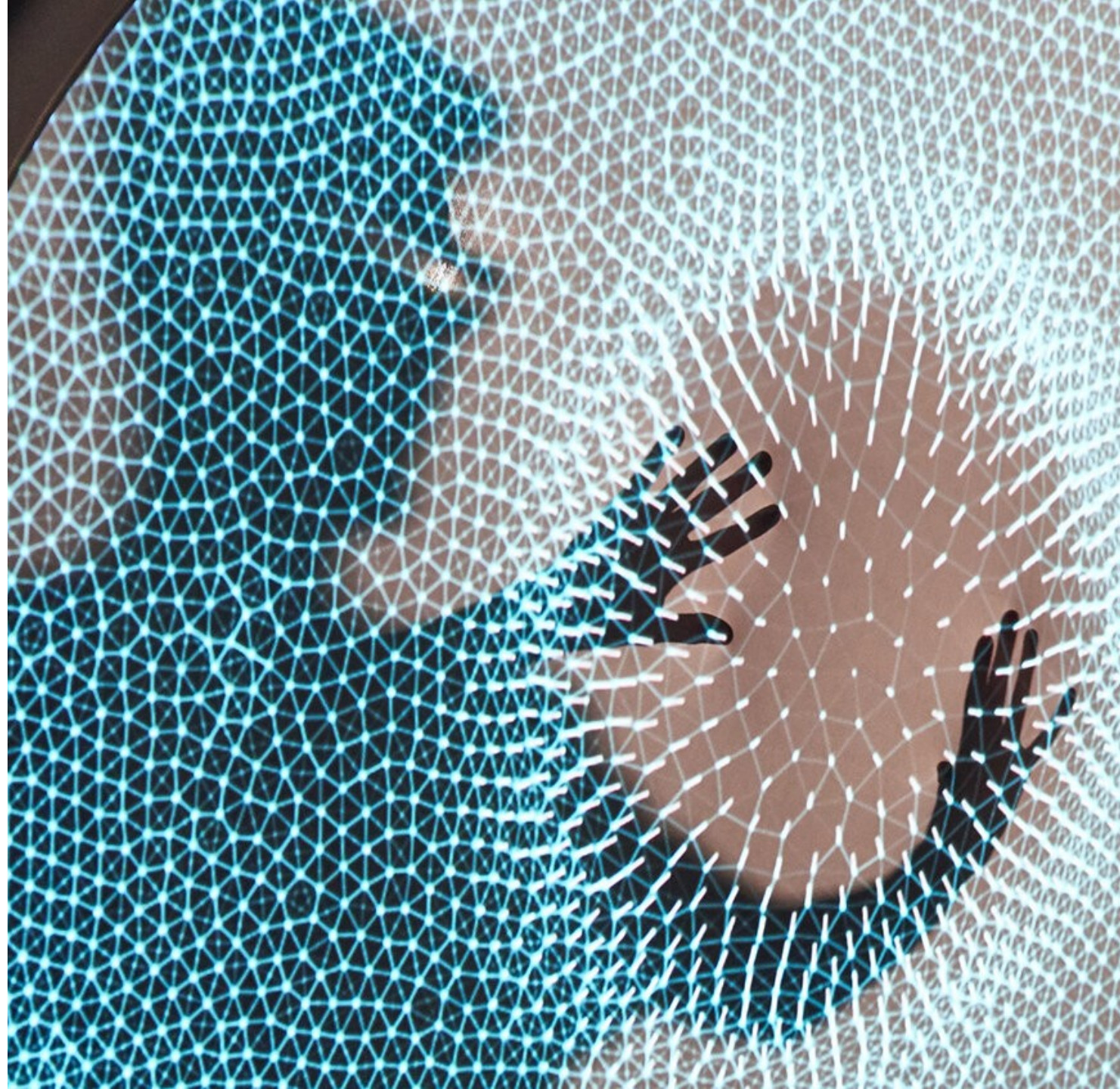
Introduction

Part 2: UI

with ugly Slides

(function over Form)

- **BU**
- **BU\_MONITOR**
- **BUTTON**
- **SLIDER**
- **SLIDER\_TWO**
- **SELECTOR**
- **BU\_TEXT**
- **BU\_VIZs**
- **BU\_MESS**
- **BU\_SHOW**



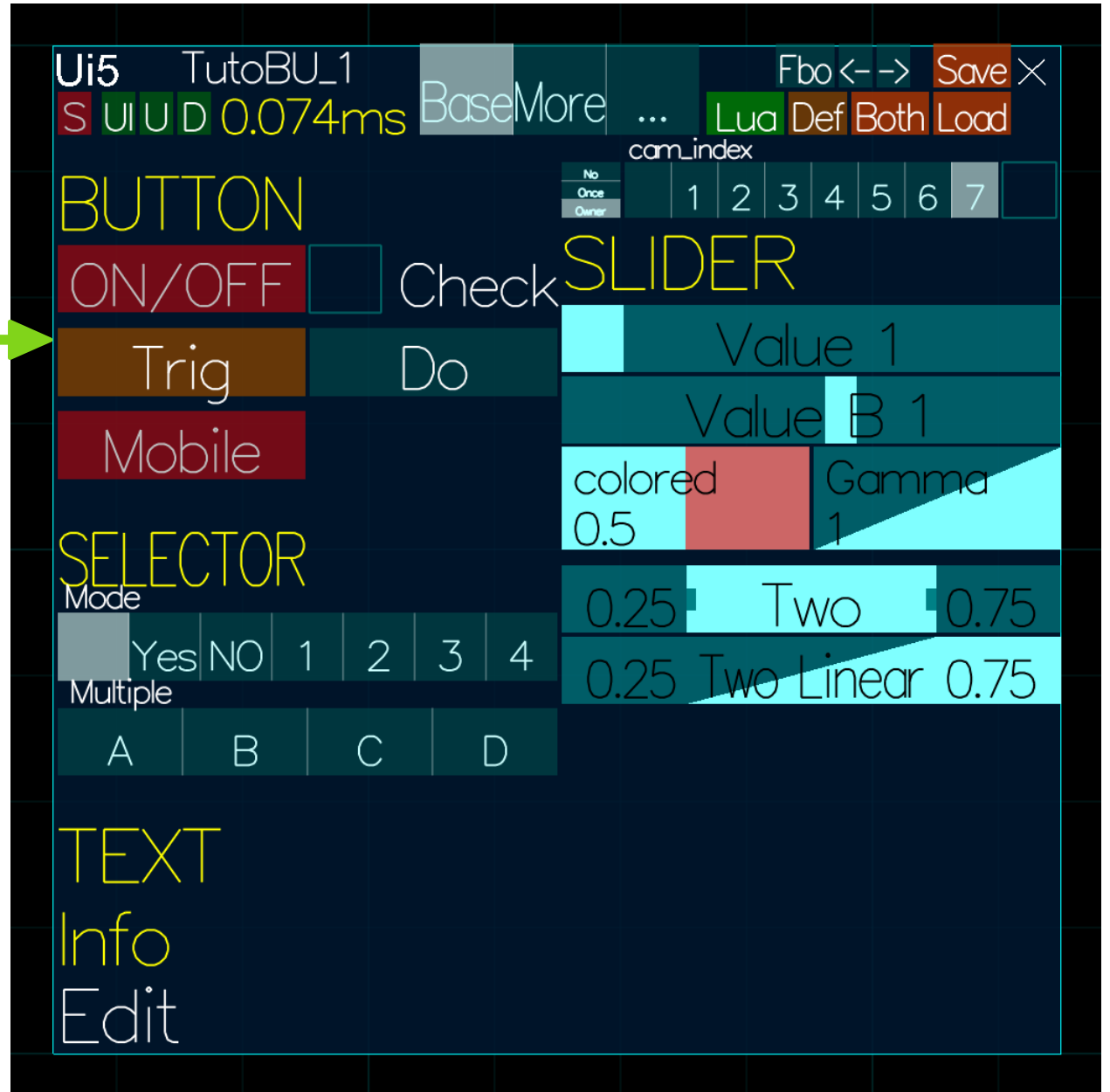
# BU Box User

- Every UI element is a **BU**  
    **BU** can contain **BUS**  
    **BU / BUS / BU / BUS ...**

- To see this ←
  - Click on the TutoBU\_1 Icon



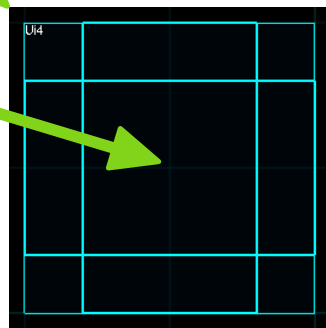
- **Click**
  - Done with **left button**
  - **4 types**
    - Simple**
    - Double**
    - Triple**
    - Long** (stay fix button down)



The screenshot displays a complex UI with various elements and their labels. At the top, there's a header with 'Ui5 TutoBU\_1' and a 'Save X' button. Below it, a status bar shows 'S UIUD 0.074ms' and 'BaseMore'. A 'cam\_index' section contains a row of buttons labeled 1 through 7. The main area features several UI components: a 'BUTTON' labeled 'ON/OFF' with a 'Check' box; a 'SLIDER' with 'Value 1' and 'Value B 1' labels; a 'SELECTION' section with 'Mode' (Yes NO) and 'Multiple' (A B C D) options; and a 'TEXT' section with 'Info' and 'Edit' labels. A green arrow from the text 'Click on the TutoBU\_1 Icon' points to a small icon in the top left of the screenshot.

# BU Resize Move

- Maintain Alt
- Transparency
  - See under
- Blue Flashing Frame
- Click with Alt
  - Move
  - Central zone
  - Resize
  - 8 external zones





# BU StarMenu, Dialog

- Click on TutoBU\_1 slider



- StarMenu

Also UIF for UI Fast

Proximity UI

Context Menu

- Zones
- Button

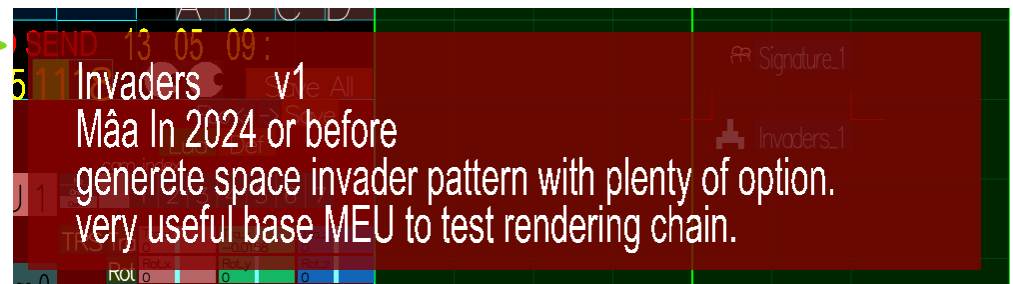
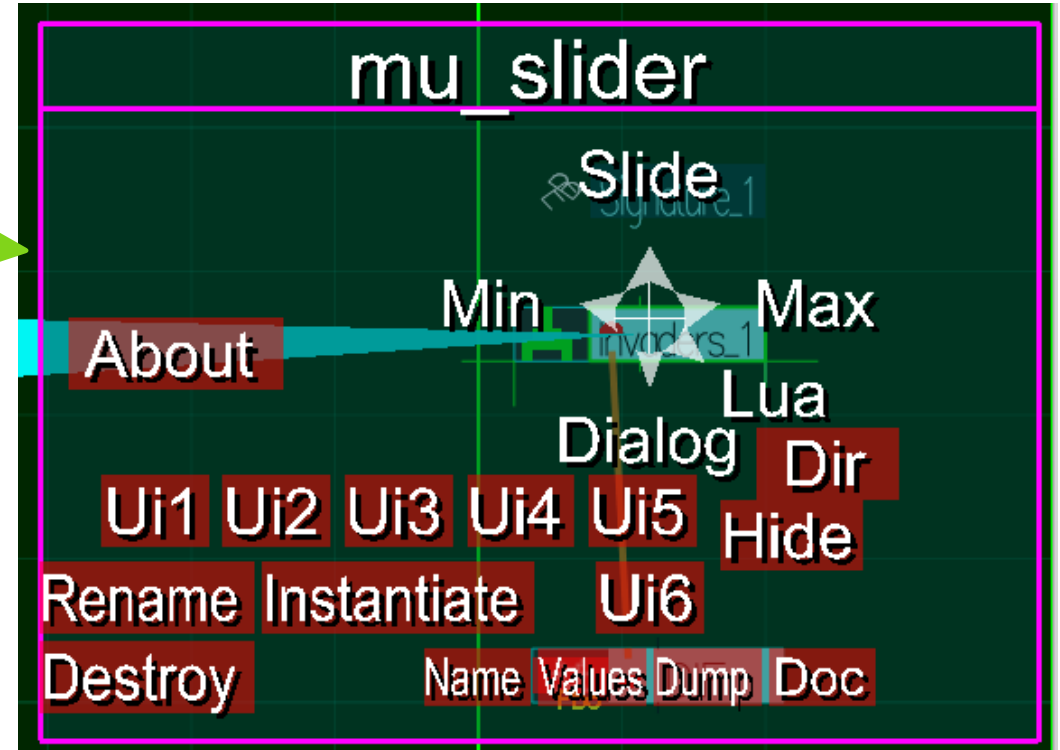
- Example: use **About** button

- Dialog

Flashing Red for attention

Move / Resize using Alt as Always

Click to remove



# BU more on Resize

- **Alt click** move resize

**Alt Arrows**      **Move**

**Alt + - \* /**      **Size**

- 3 states: **Normal** / **Full** / **Mini**

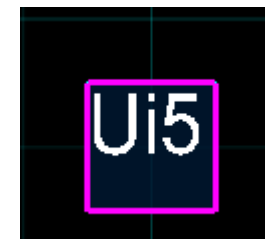
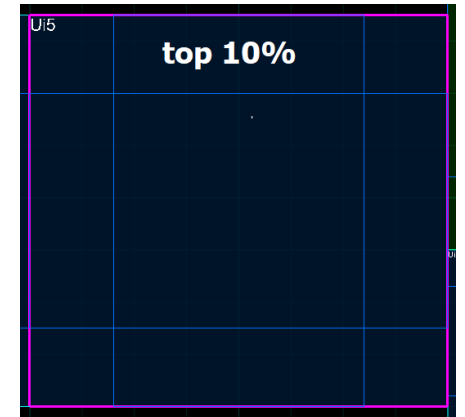
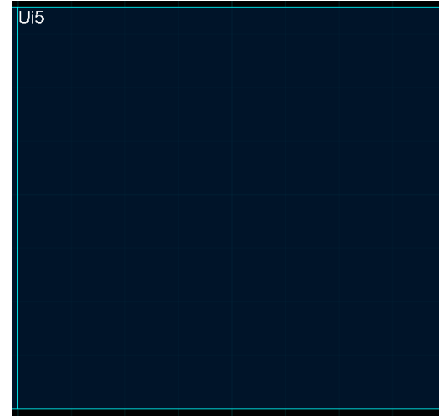
**Double click**      **Normal ↔ Full**

**Double click in top 10%** → **Mini**

- keyboard

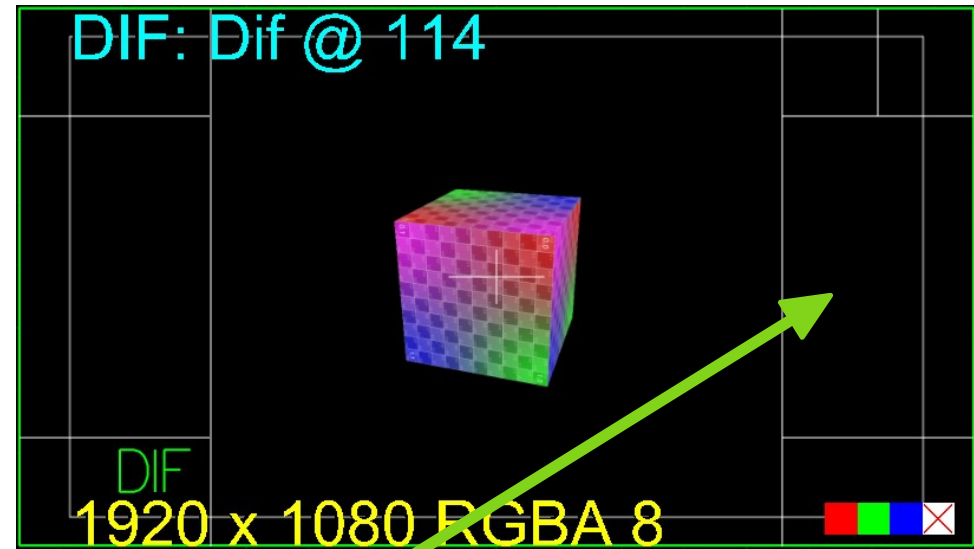
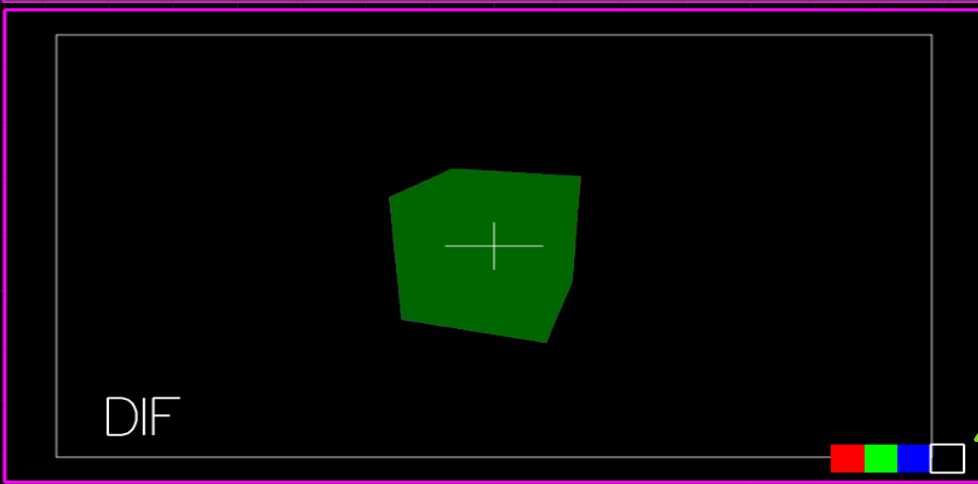
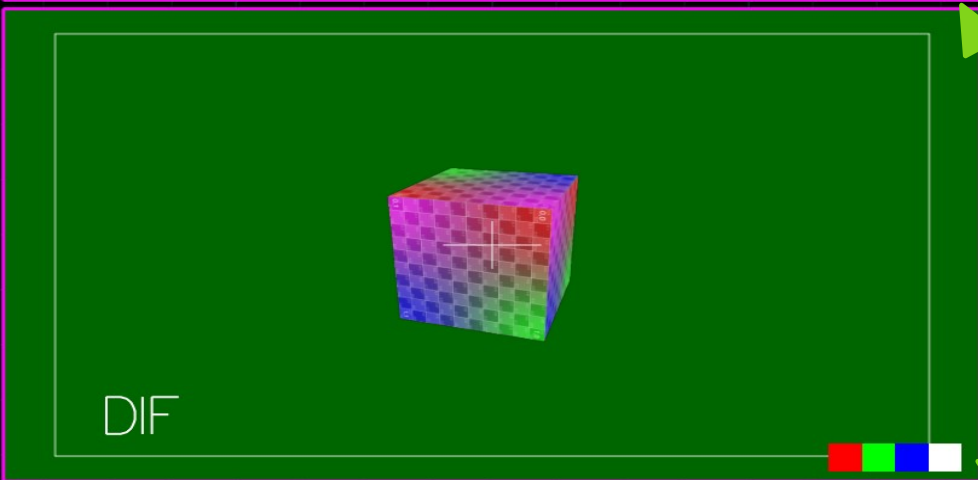
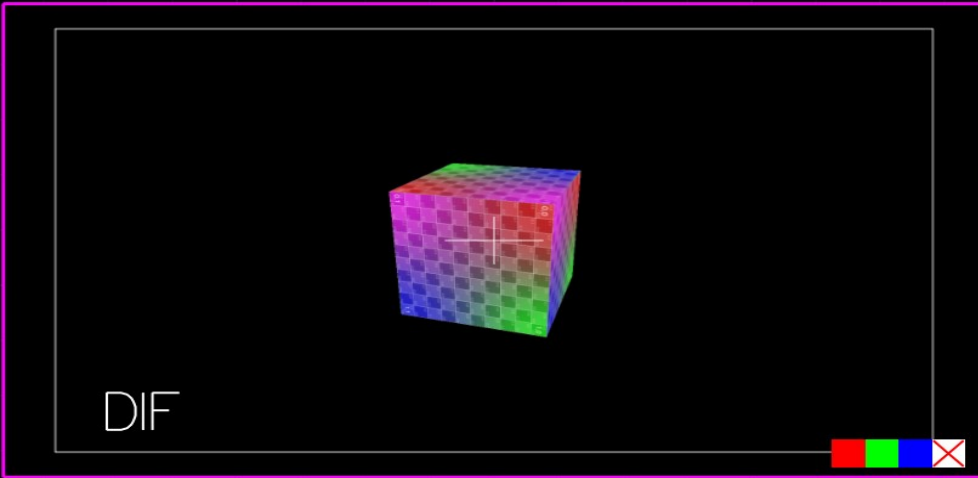
**Space**      **Normal ↔ Full**

**Ctrl Space**      **Normal ↔ Mini**



# BU\_MONITOR

- Click zones



- Click Right Middle  
change how  
**alpha is displayed**  
same as **Key + / -**

# BU\_MONITOR Click Zones

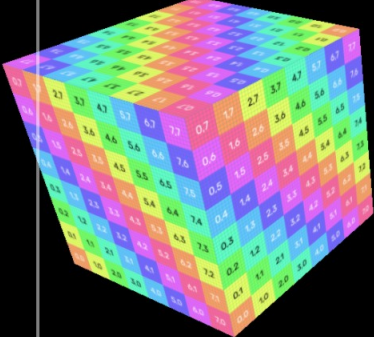
Flip Bank/Bind information

DIF:Dif@114

Flip Window More

Flip Window Draw Top

Flip both information



alpha No -

how Hsv

RGB	Gr	Alpha
R	G	B

Invert Abs

Direct White Spectrum

LT RT

LB RB

More

Draw Top

Draw Top

top alpha 0.455

Grid

grid.u 2

grid.v 2

Center

Frame

frame size 0.894

Flip Alpha Mode or Key + -

Flip Texture information: resolution and format

DIF  
1920 x 1080 RGBA 8



Flip channel display

# BU\_MONITOR Channels

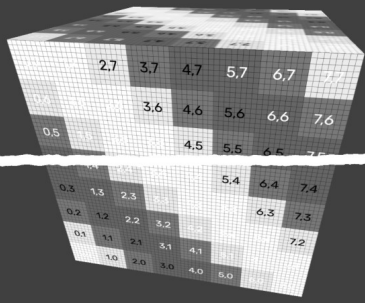
- In fact it shows textures
- Textures have a number of channels

1 or R for Red  
displayed as grey

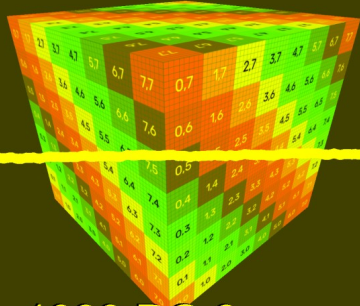
2 or RG for Red Green  
displayed as yellow  
no Blue

3 or RGB for Red Green Blue  
full color

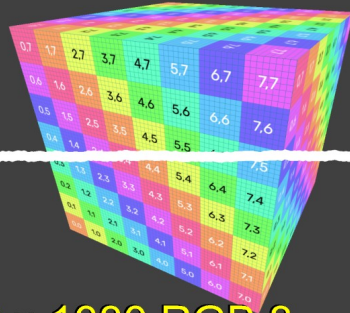
4 or RGBA for Red Green Blue Alpha  
like RGB but with transparency/Opacity  
0 mean transparent, 1 Opaque  
different method to display Alpha  
Regular / Inverse / No  
See before



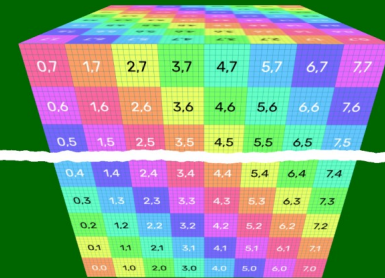
1920 x 1080 Red 8



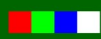
1920 x 1080 RG 8



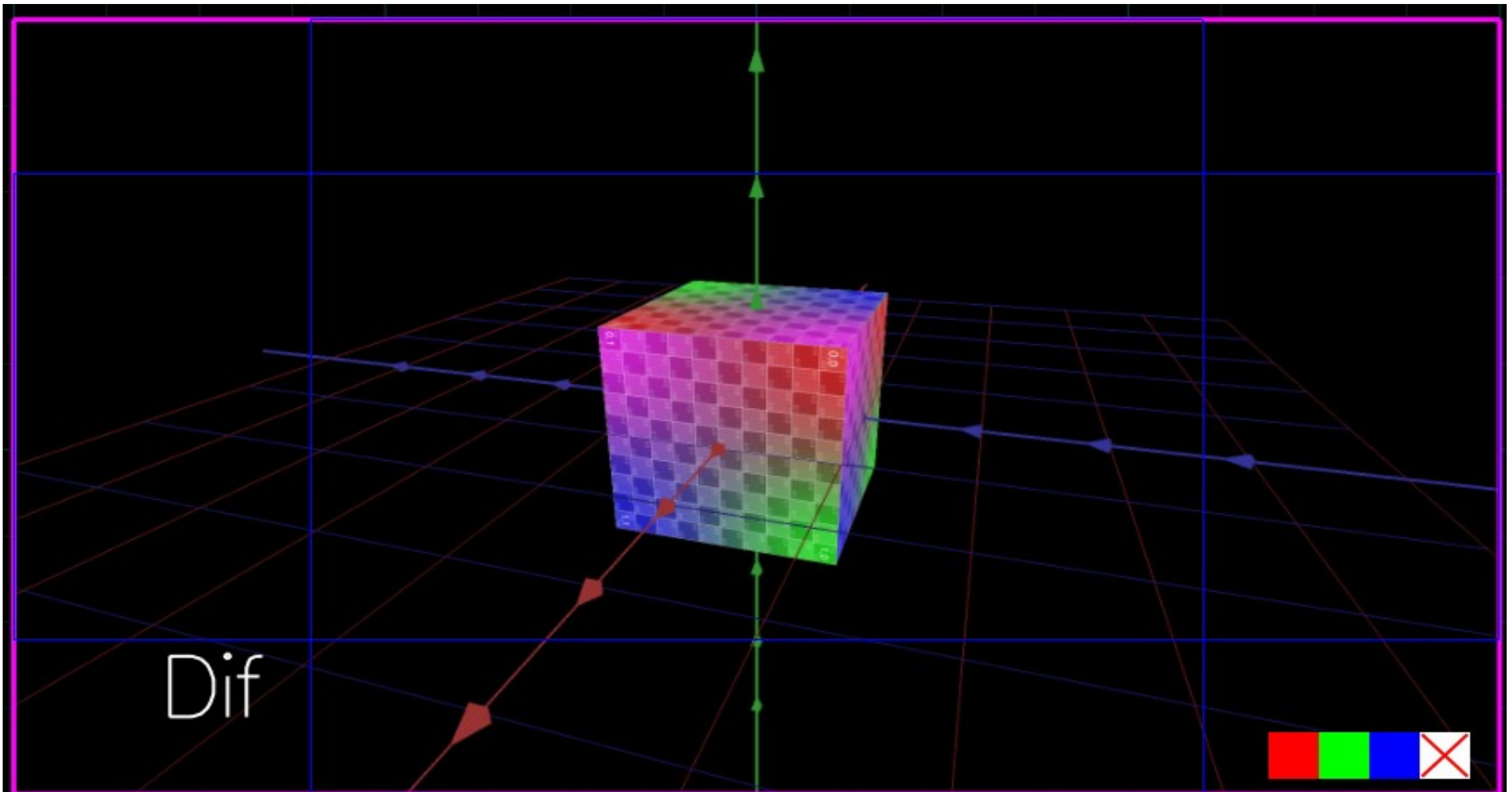
1920 x 1080 RGB 8



DF  
1920 x 1080 RGBA 8

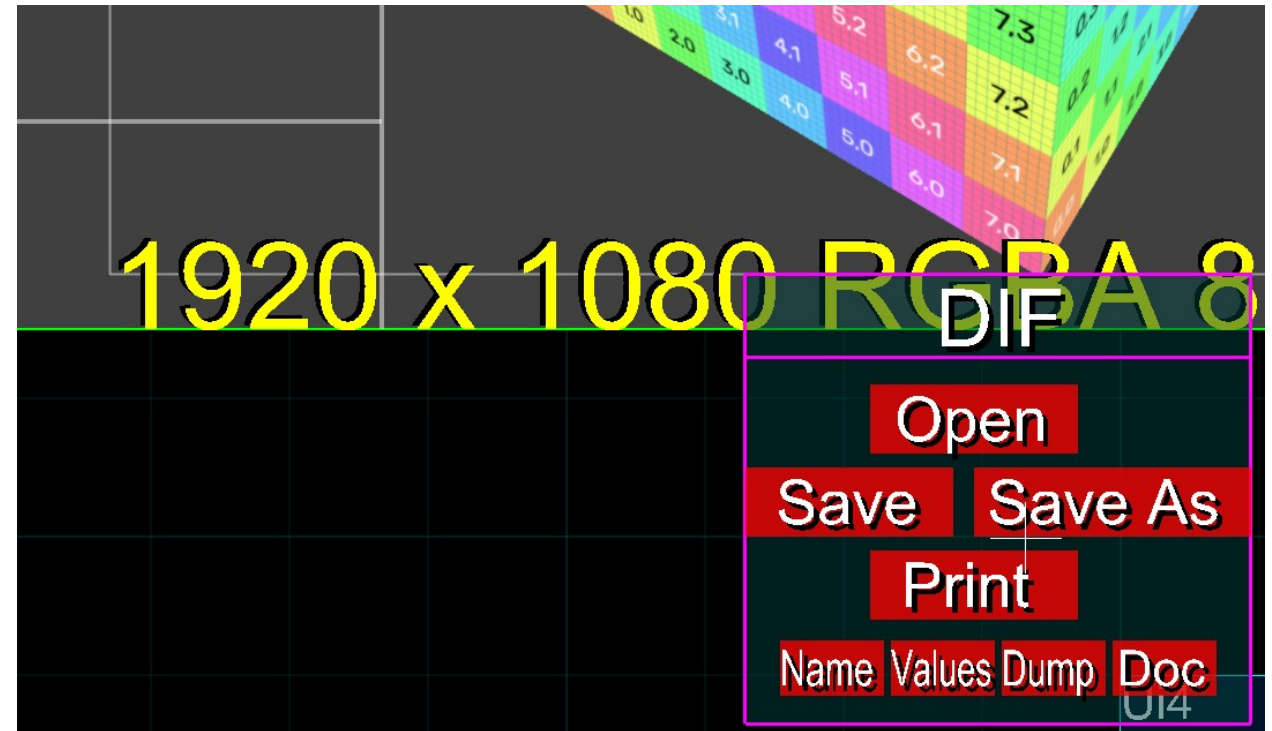


# BU\_MONITOR Alt to Move/resize as usual



# BU\_MONITOR StarMenu

- **Click and drag out quickly**  
like any BU
- **Open**  
Load an image with a file dialog  
can choose severals
- **Save**  
Save the Image  
In Media/AAASnapshots  
How  
in Flatland/Prefs/Image Save
- **Save As**  
idem but with a file dialog
- **Print**  
Print  
How  
in Flatland/Prefs/MASTER/Print

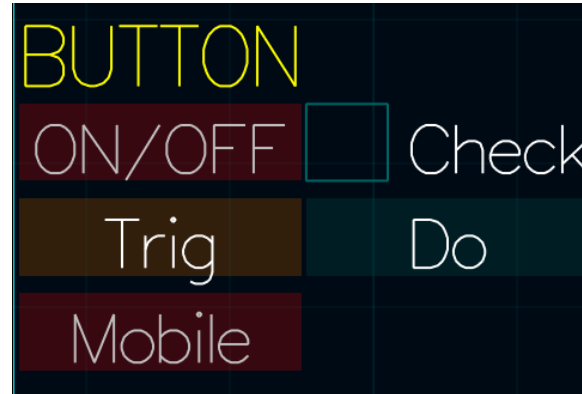


# Basic BU: for bottom to top

- Click on Train\_BU icon

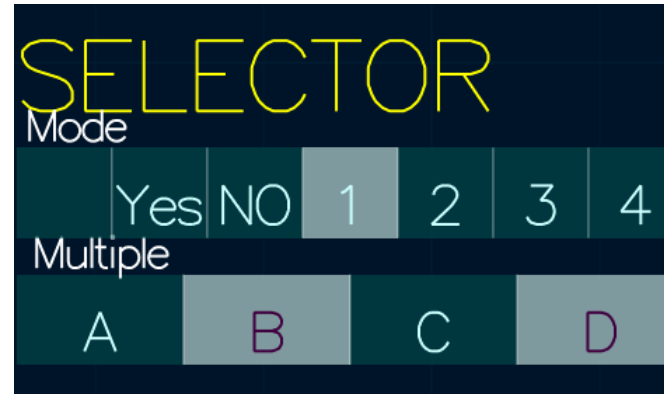


- **BUTTON**



- **SLIDER**

- **SELECTOR**



- **BU\_TEXT**

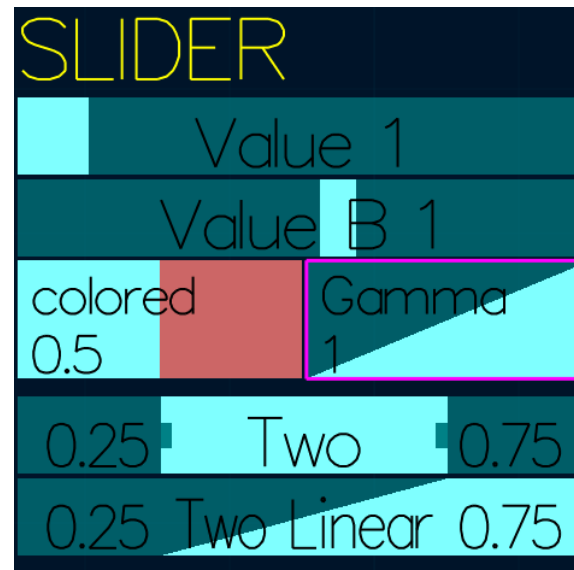


- current **BU**

receive keyboard

**violet rectangle**

**change it with arrows**





# BUTTON

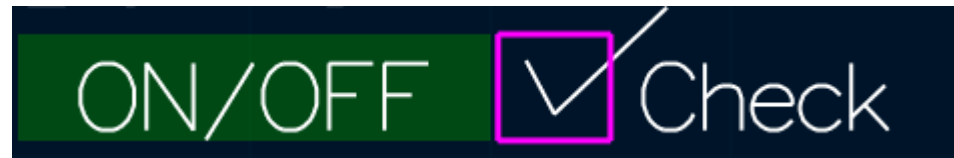
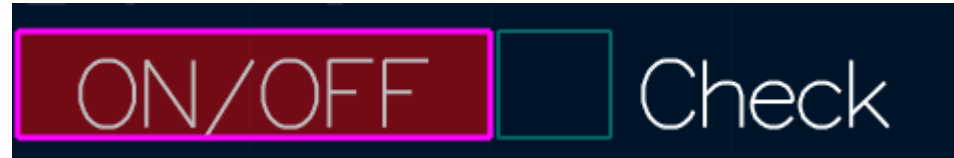
- **On/Off**

2 versions

**green / Red**  
**checkbox**

Developer note :

- boolean or integer



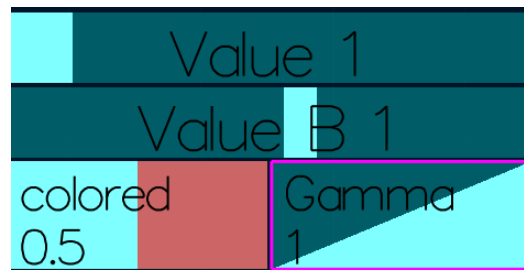
- **Trig**

Confirmation **BUTTON**

- Could be moveable too (**Alt**)
- Access to **StarMenu**
  - **Go out quick**



# SLIDER



- Slide

Go up

then angle

Shift lock on values

Ctrl Alt → sensibility

- Min / Max

- Edit

Double Click or Dialog

- keys

+ - \* / → change

Enter → inverse

. → floor integer

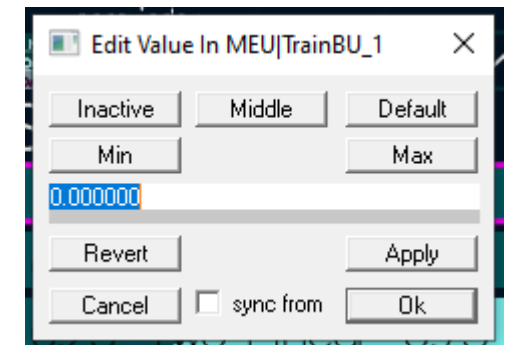
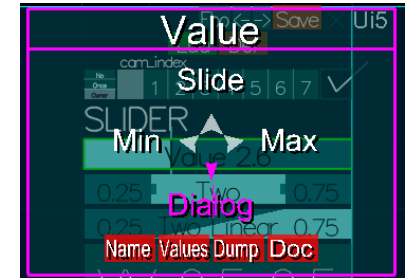
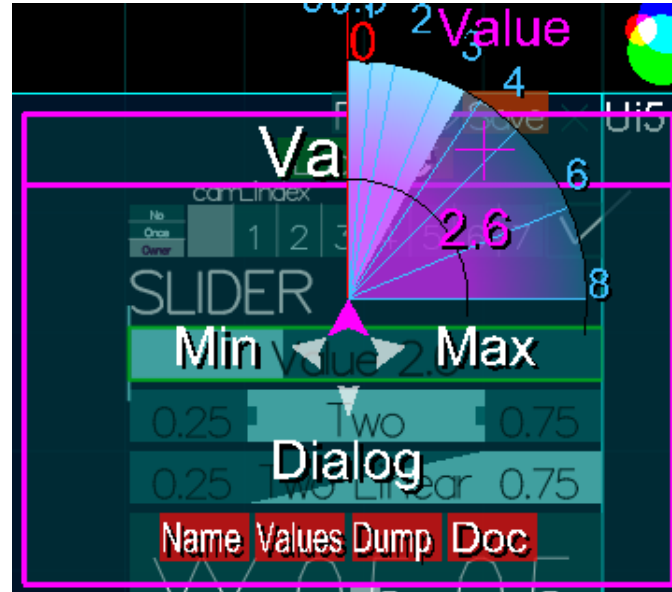
Home → Default

End → Inactive

PageUp → Maximum

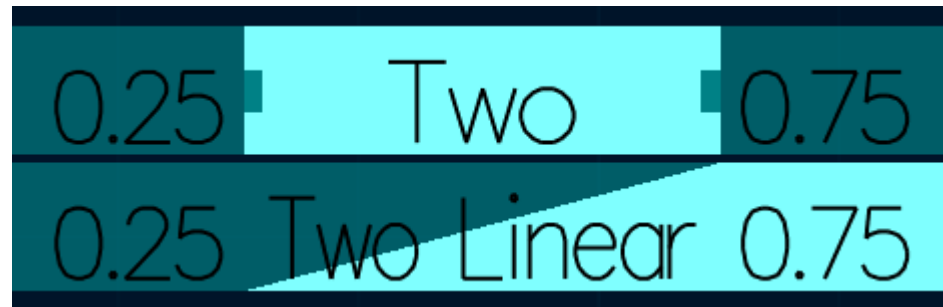
PageDown → Minimum

- Floating point or integer

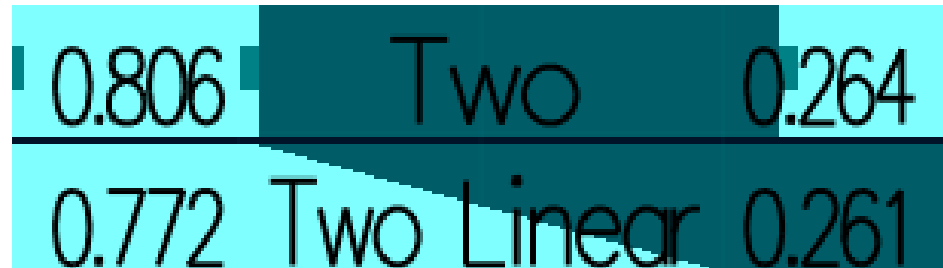


# SLIDER\_TWO

- Same but **2 values**
- Range / Linear
- Depend **where you click first**
  - Closest value is selected
- Keys change last value used



- Can be **Flipped**
  - Left bigger than right



# SELECTOR

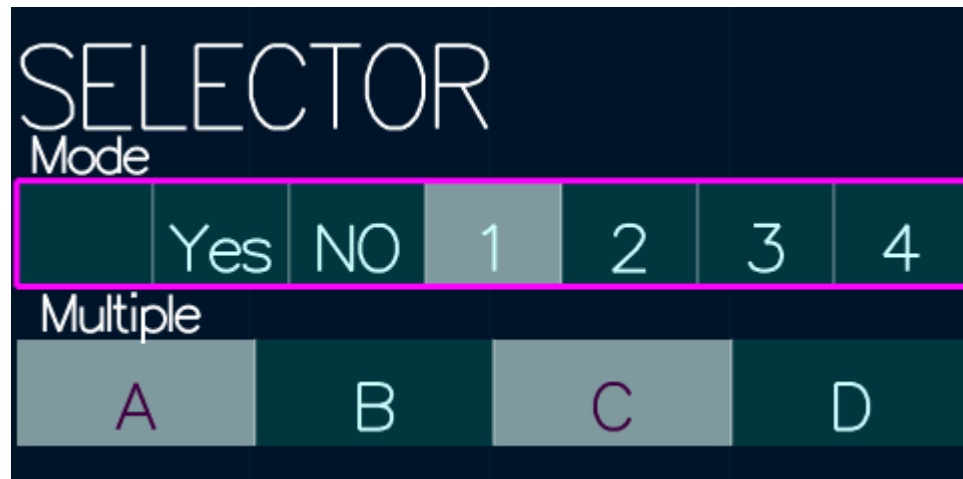
- Click
- Keep mouse down

Change with mouse

- Access to **StarMenu**  
like **BUTTON**: go out quick

- Use **keyboard** as for a **SLIDER**  
+ and - mainly

- **Mutiple selection** an option



# Back to Slide

- Slide for selector too

**Go up**

then angle

**Shift** lock on values

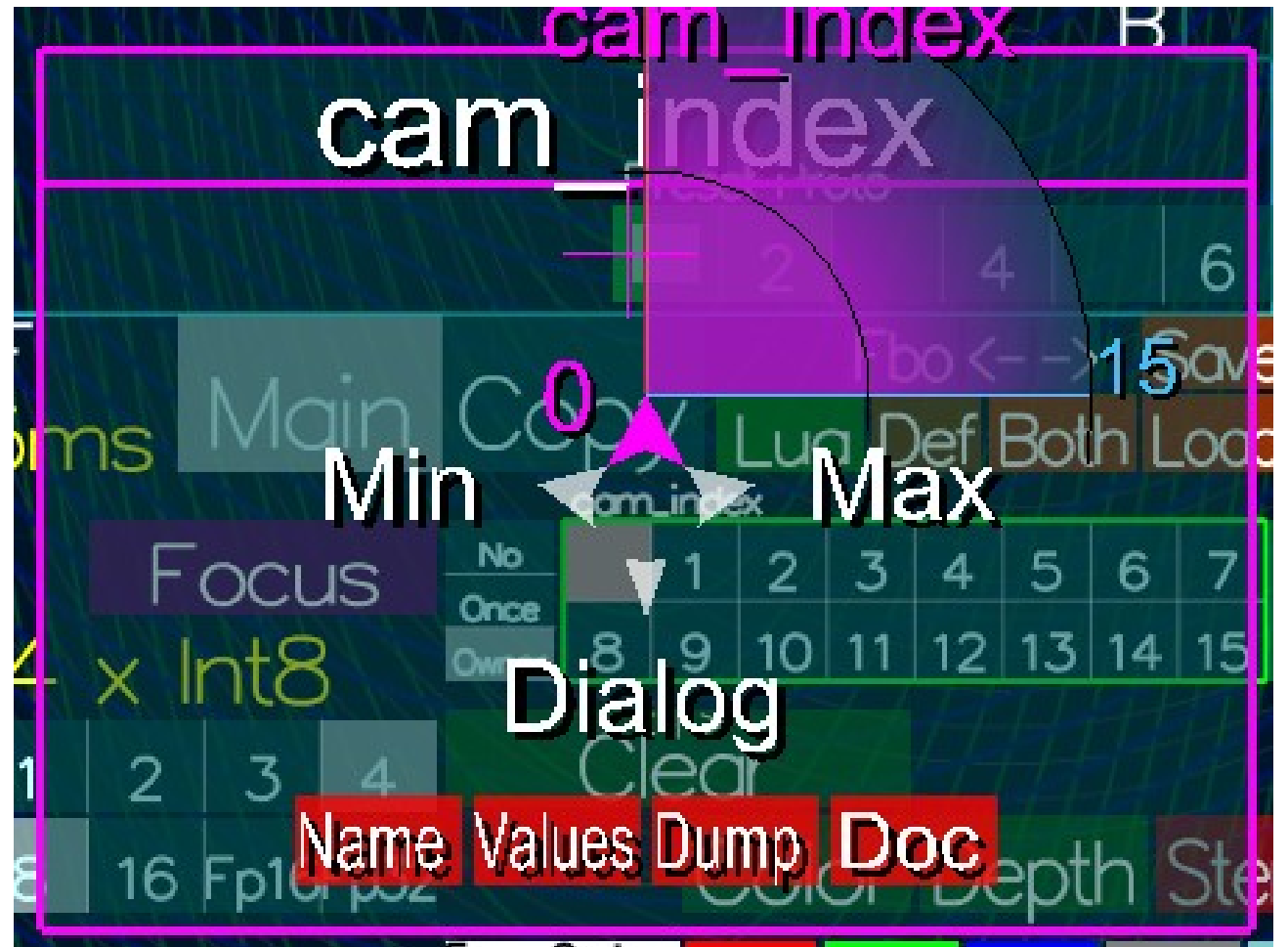
**Ctrl Alt** → sensibility

- keys

+ - \* / → change

**Enter** → inverse

. → floor integer



# BU\_TEXT

- **Editable or not**
  - **Double Click**
- **BU\_TEXT INFO**
  - **Yellow** in general display info
- Access to Star Menu
  - like **BUTTON** and **SELECTOR**
  - go out quick
- Will Evolve
- Dialog Will Evolve
- Virtual keyboard exist but not functional at the moment (2025 April)



# Other SLIDERS

- Select More in top Selector



- SLIDER\_XY

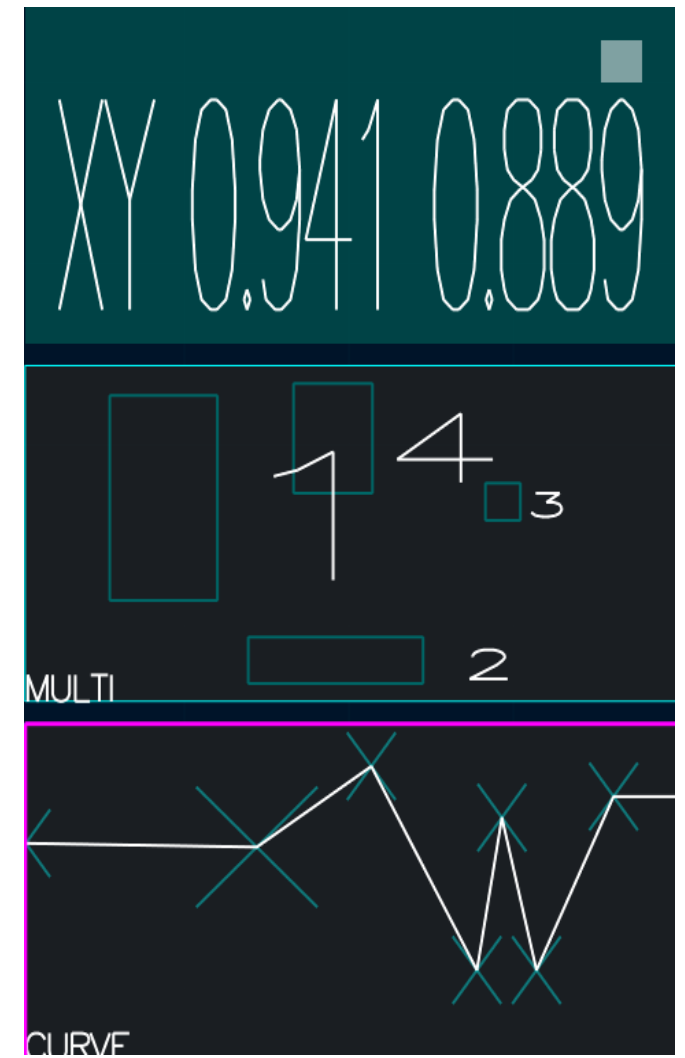
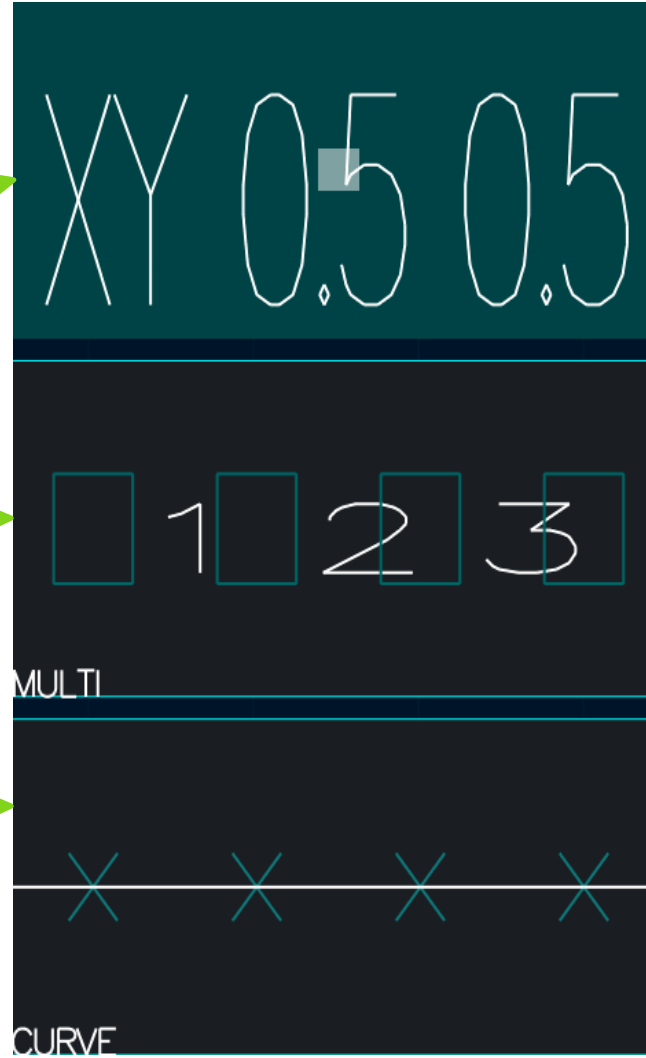
2 values x y

- SLIDER\_MULTI

several x y size\_x size\_y  
use Alt to Resize

- SLIDER\_CURVE

linear curve for now  
Key insert → Add point  
Key delete → remove point



# Composite BU

- BU multiple



Use a hidden SELECTOR

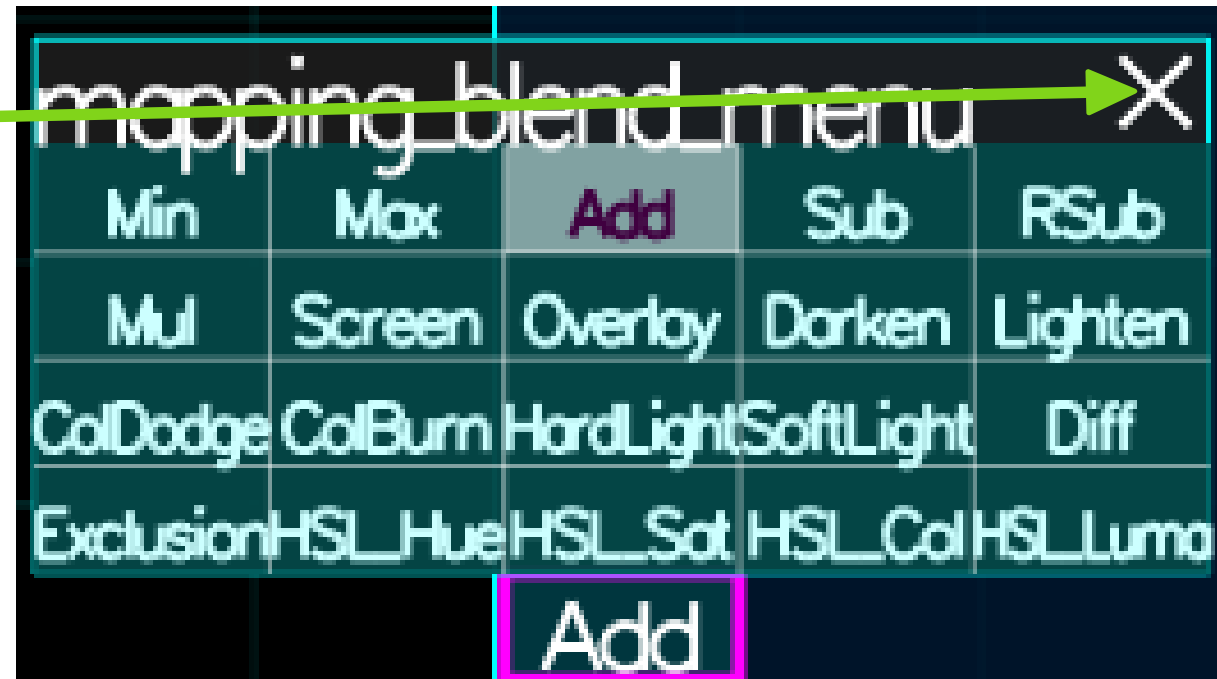
Click left or right to change

- BU menu

use a **selector** in an optional **window**

**Move window to keep it open**

**Close BU at top right**





# **Copy / Paste**

- **Ctrl c / Ctrl v**
- **Act on selected BU**

## **Undo / Redo**

- **Ctrl z / Ctrl y**
- **Function on BU values**
- **Also size and position**
- **Unlimited**
- One more reason not to be afraid  
try things then cancel

# Some BU\_VIZ widget/wizard

• BU\_ALIVE show/control rendering F3



• BU\_FPS Frame Per Second

FPS 153 / 145

Flatland Too

• BU\_TIME show time

23 : 26 58

• BU\_EYE show mouse direction



• BU\_CAM control edition of camera

CAM Locked

• BU\_SEND control synchronisation between machines

NO SEND

• BU\_MEM show memory used

1165

problem if it increase continuously

• BU\_POWER show power and plug status

Power : Plugged 92%

• BU\_BLOB show number of contact

-1-

# BU\_MESS

```
# LUA : BU_CAM | viz_CAM : ----- GABU_OBJ unused key 9
# LUA : BU_CAM | viz_CAM : did not used key 9
# LUA : GARDEN | garden : try to use key 9
# LUA : GARDEN | garden : do_key( key=9 )
# LUA : do_key( self=GARDEN | garden, key=9 )
# LUA : GARDEN | garden : ----- GABU_OBJ unused key 9
# LUA : GARDEN | garden : did not used key 9
# LUA : GA | SINGLETON : KEY NOT USED 9
# LUA : GABU.do_key_custom_def() key 9 Unused
```

Mess

Scroller

**Try Double Click**

**Key m** for (m)essage window / Terminal

**Scroller** is a **Slider**

**Red** Message are **error**

**Violet** are **tracker**

**Cyan** are **debug**

**Yellow** are **Info**

# BU\_SHOW

```
Multi blob_nb->0  
BUSSof_GA_top_top->0/0  
BUSSof_GA_top->220/0  
BUSSof_GA_regular->7/7
```

Good tool for debug

More and more **Red** Message for **error** there

# AAASeed

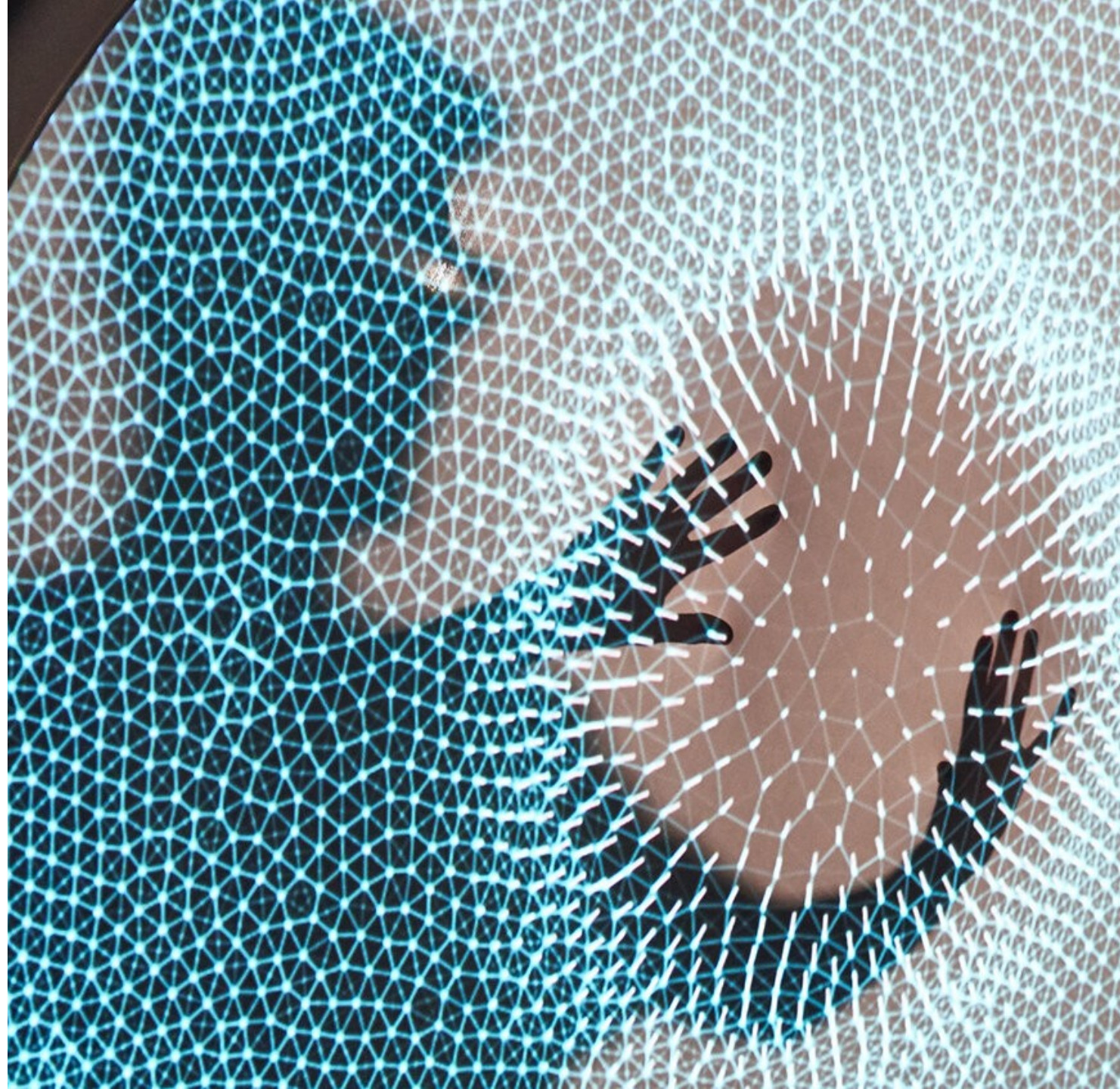
Introduction

Part 3: MEU

with ugly Slides

(function over Form)

- MU / MEU
- MEU and UixRendering Chain and BU\_RECT
- MEU Bar
- Preset
- Rendering Chain and BU\_RECT
- MU Slider / Alpha
- BU\_RECT
- MEU Seen MEU search
- MEU\_DIR
- Cameras
- Axes
- Flatland



# MU Module Unit

## MEU Module Editable Unit

- MEU base to encapsulate and manipulate functionality
- MU compact part of the MEU



- slider value is the alpha of the MU / MEU

**Click** on slider → StarMenu Slider but also MU

**Click** on icon → move

**Alt Click** → move/resize

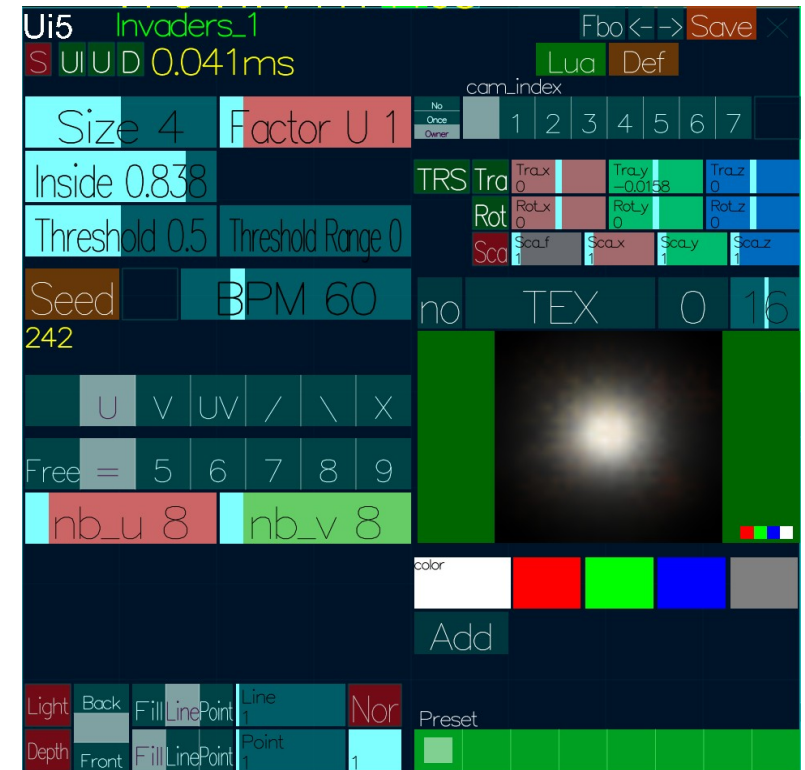
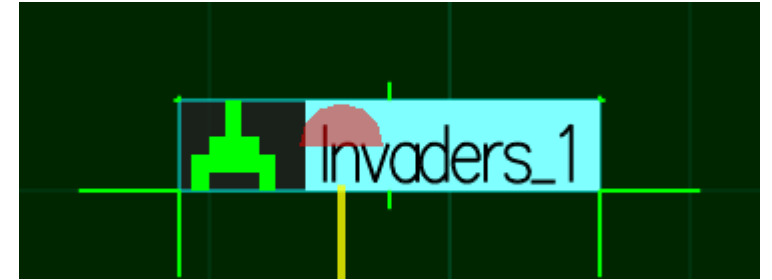
- State and Position of the MU control the rendering order

Slider value more than 0 → On

vertical first: **bottom to top**

then horizontal: **left to right**

**orange line** show the **rendering chain** (more later)



# MEU and UIx

- Click on **MU** icon → **MEU** in UI5
  - UI5** by default
  - UI6** Folder/Directory default
- **Links** show related **MEU / MU**
- **MU StarMenu** to choose UI
- **MEU StarMenu** click on **background**
- Close **BU** at top right
- Red Background ↔ not rendered
- Uix are infact **BU** too: **BU\_MEU**
- Drawing change with distance  
speed optimisation





# More on MEU

- **MEU** is a **module** of functionality,
  - in computer term it is an **object**
  - it **usually render** but can be otherwise
    - receive/send data**
    - analyse image**
    - control a device** (e.g. plotter, projector, Dmx, Arduino...)
    - ...
- **2 main methods** (function) are called every frame by a **render() method**
  - **update ()** prepare so draw() will be as fast as possible
  - **draw ()**
- **1 method** is called when the **MEU UI is visible**
  - **update\_ui ()**

# MEU real nature a peek for now

- It is a **Lua object**

Name is MeuType\_InstanceName

a lua Script for each Type / Class / Prototype

- It use a **C++ AAASeed Object**

a c\_obj\_ui

c\_layers or c\_module

Accessible via **Focus**

- It live in a **directory**

Everything is readable and can be edited

less and less needed

but some like it

# MEU Bar



- **TutoBU\_1** Title (top left in white or green if current)  
MEU\_name made of **type** (left) and **instance** (right):
- **S UI UD** buttons (left bottom)  
**switches to activate/deactivate**  
Send update\_UI Update and Draw
- **0.032ms** Execution time (next right) in millisecond
- **Base More** Tab (middle) ius a SELECTOR  
**switch** between different block of UI
- **X** Close button (top right) close the MEU

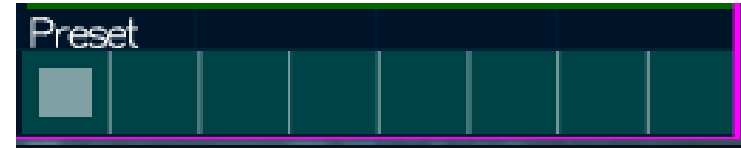
# MEU Bar



- **Lua** Open the **lua** script that the MEU use in an associated text editor
- **Load** Load only the **MEU** state
- **Save** Save only the **MEU** state
- **Def** Trigger a **Definition**, in fact a redefinition of the **MEU** interface
- **Both** Trigger a **Definition** and a **Load**
  
- **Fbo** Open the used **Fbo** (more soon)\  
in the previous **BU\_MEU**
- **<->** let you navigate in the rendering chain (more soon)

# MEU Preset

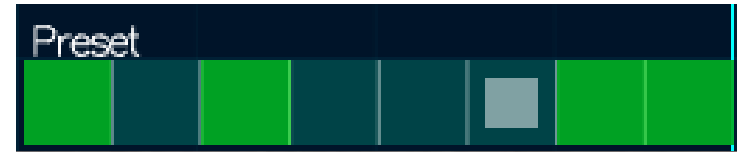
- At the bottom right of the MEU
- **Load/Save the state of a MEU**



in fact load/save the values of included **BUs**

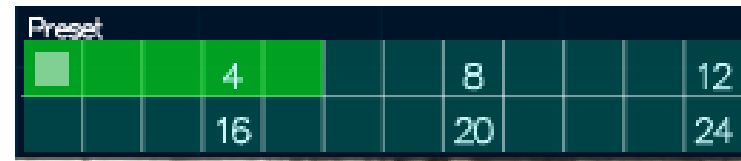
not always all, at the author discretion

- **preset defined** ↔ **green color**
- **Click**                    **Load**
- **Ctrl Click**            **Save**
- **Ctrl Alt Click**      **Delete**



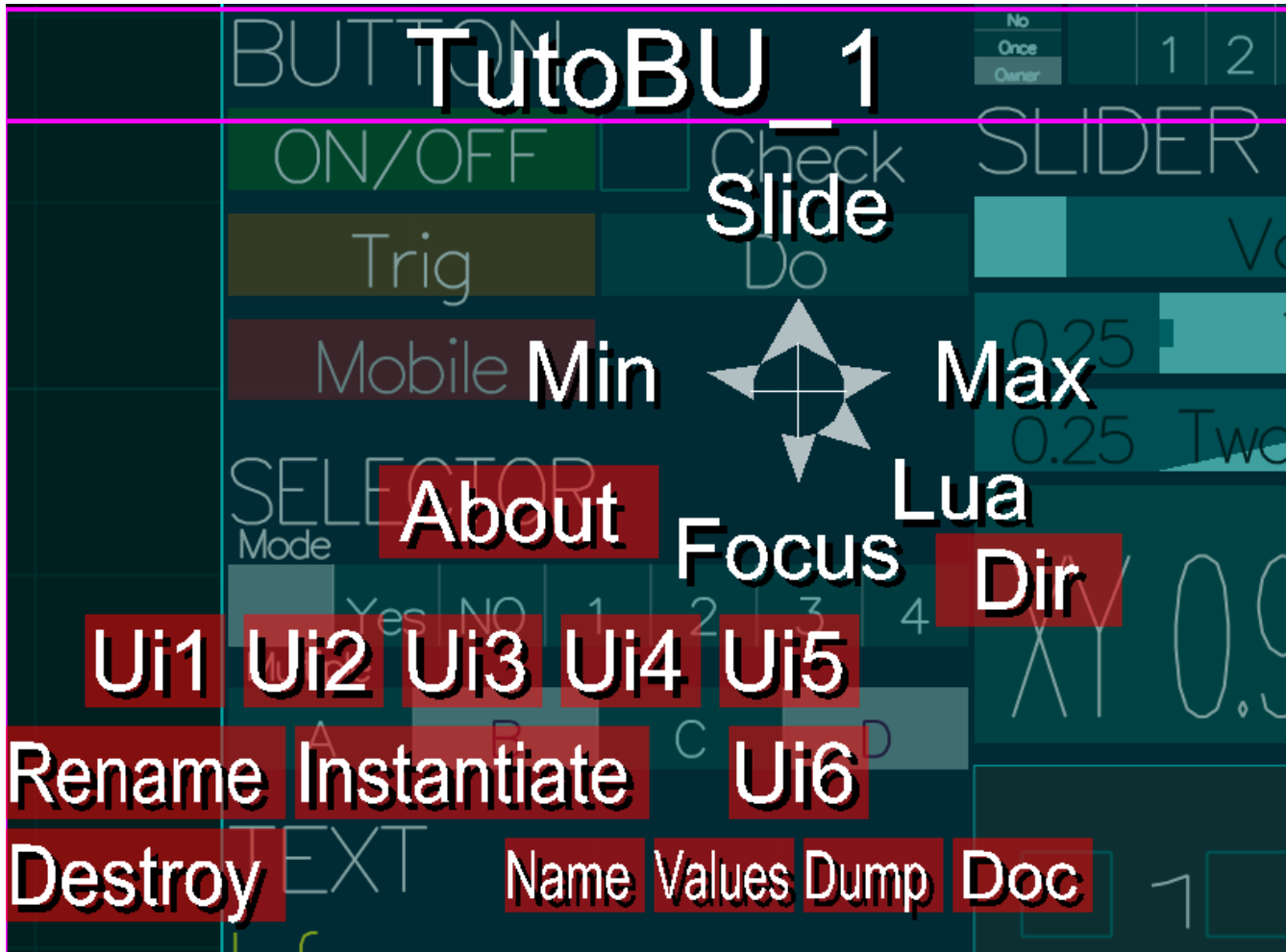
- Fixed number by MEU Type

defined in the code for now (2025 April)



*Developer Note: function meu:get\_preset\_nb() return 24 end*

# MEU StarMenu



## Slide

Same as the **MU Slider**

## Focus

Access to **Flatland**  
**C** part of the MEU

## Lua

Access to the **Lua script**  
Using **default editor**

## Dir

Open the **Instance Folder**

## Uix

Choose **BU\_MEU** for UI

## Rename

**Keep Type Name**

## Destroy

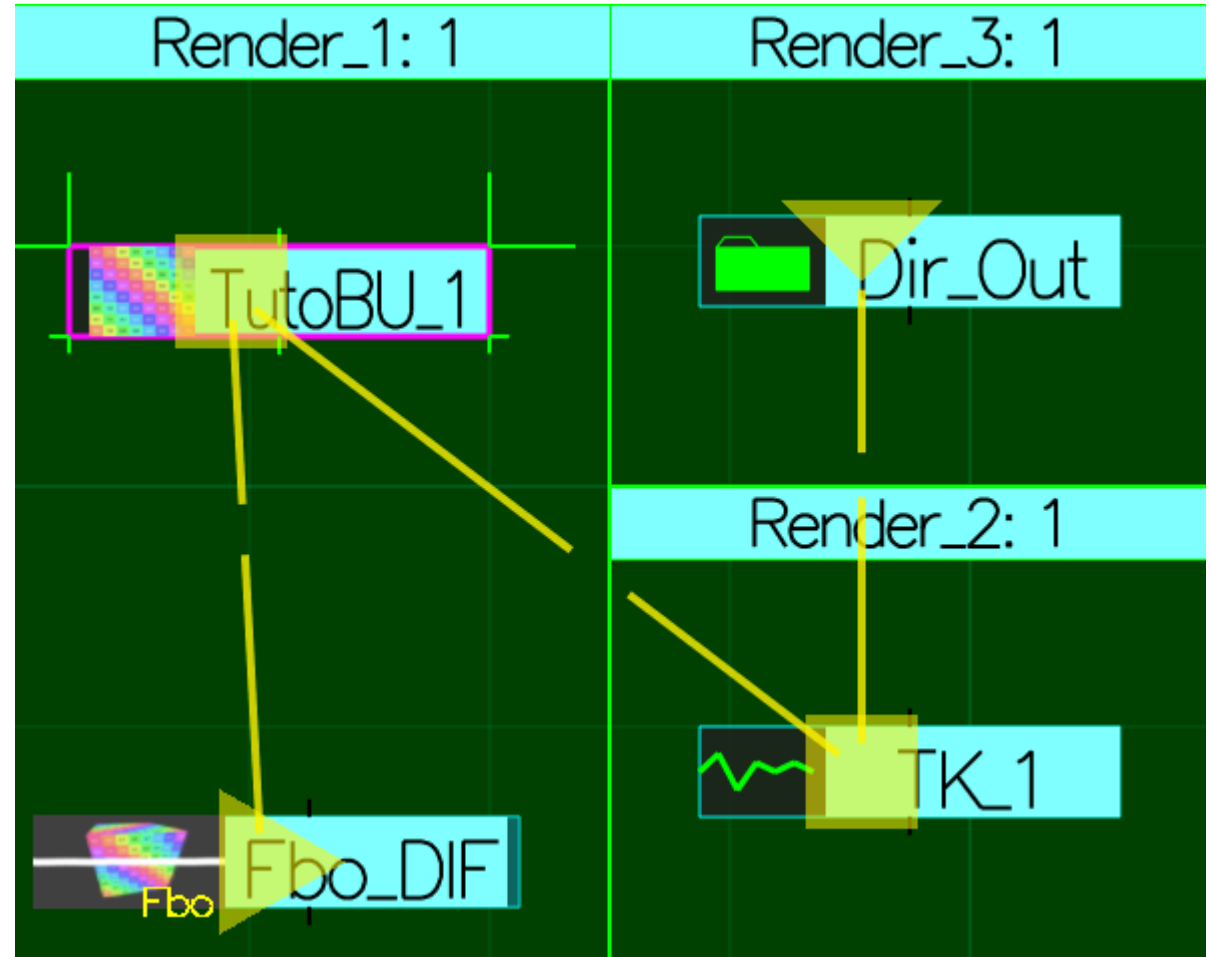
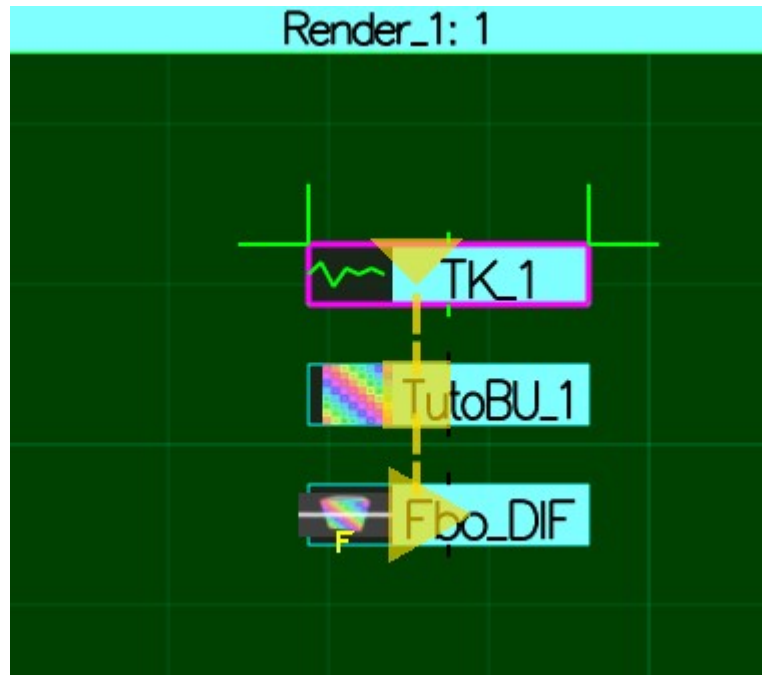
**Confirm**

## Instantiate

**Duplicate**

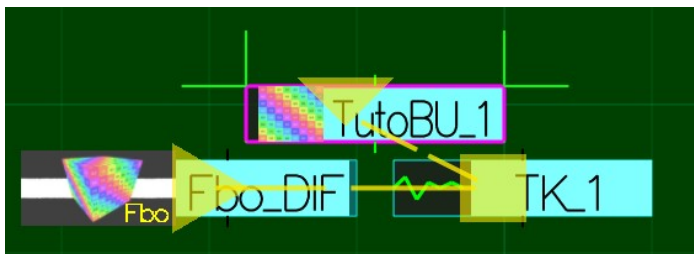
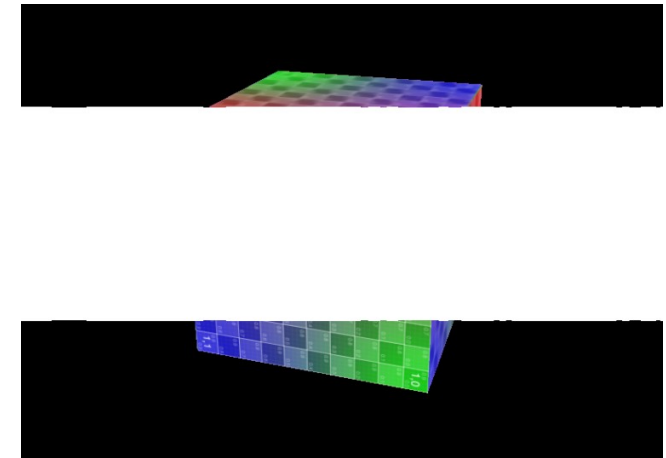
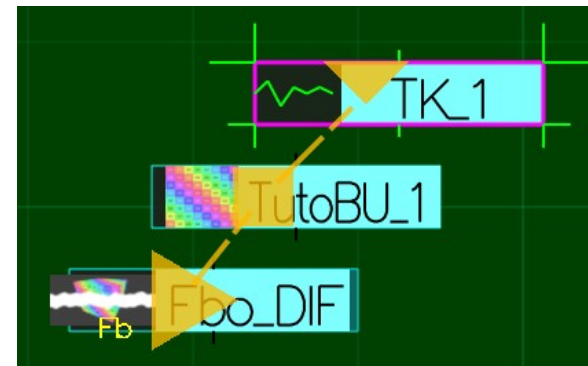
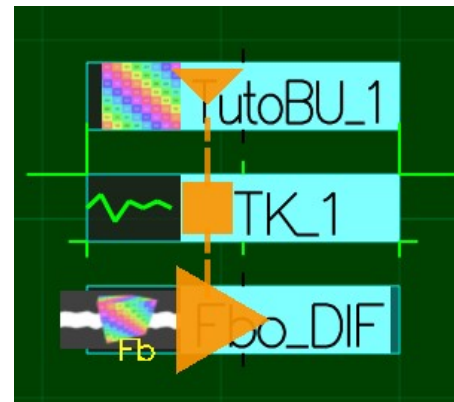
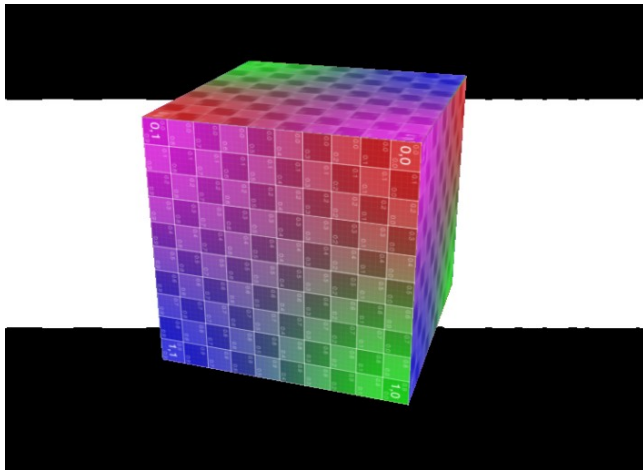
**Keep Type Name**

# Rendering Chain and BU\_RECT



# Rendering chain

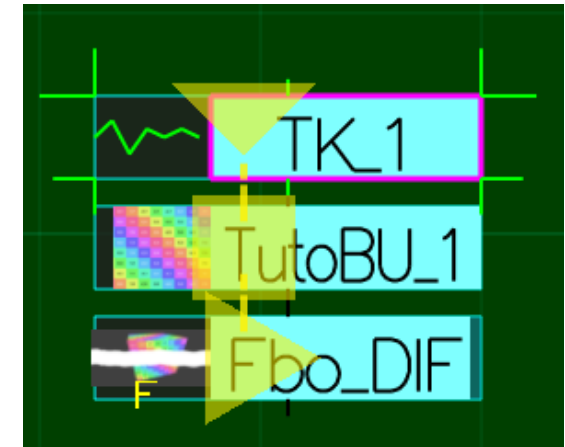
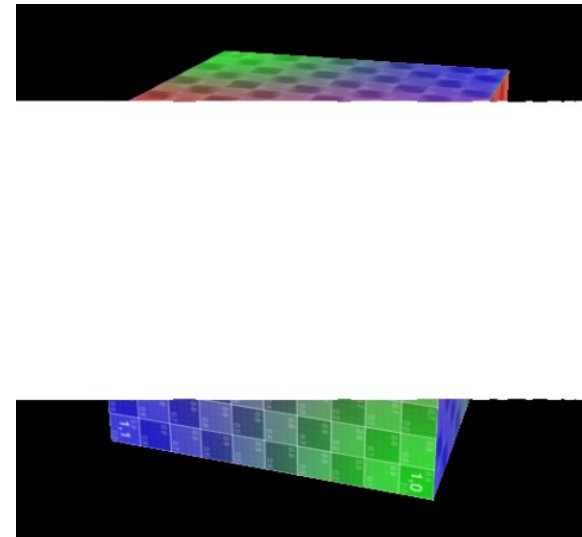
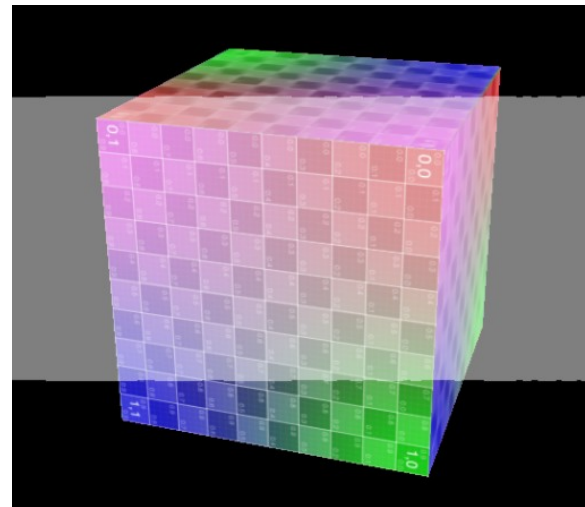
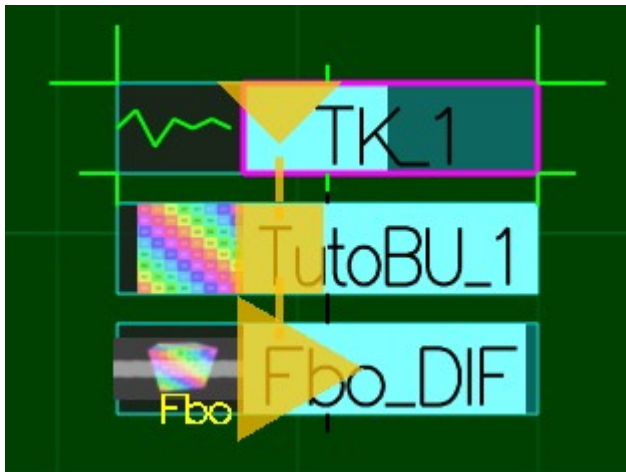
- **State and Position** of the MUs control the **rendering** (execution) **order**  
rendering order when MEU do rendering
- **bottom to top**, then **left to right**
- orange line **not a cable** just a **visualisation** of the rendering chain





# MU Slider for Alpha Opacity/Transparency

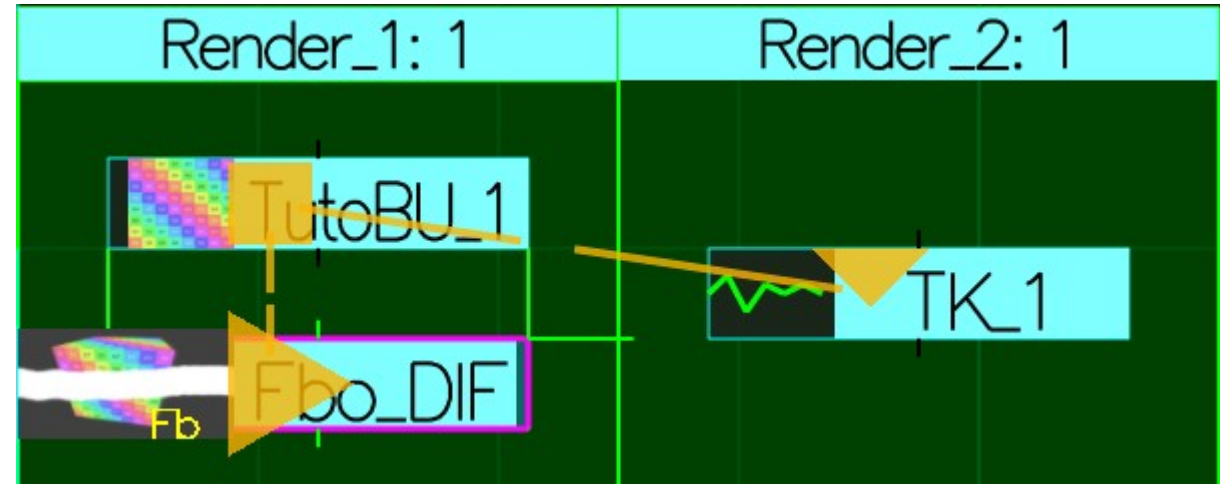
- MEU/MU slider value more than 0 → **On**
- when possible this value is the alpha level of the **MEU** (Opacity)



# Rendering Chain BU\_RECT

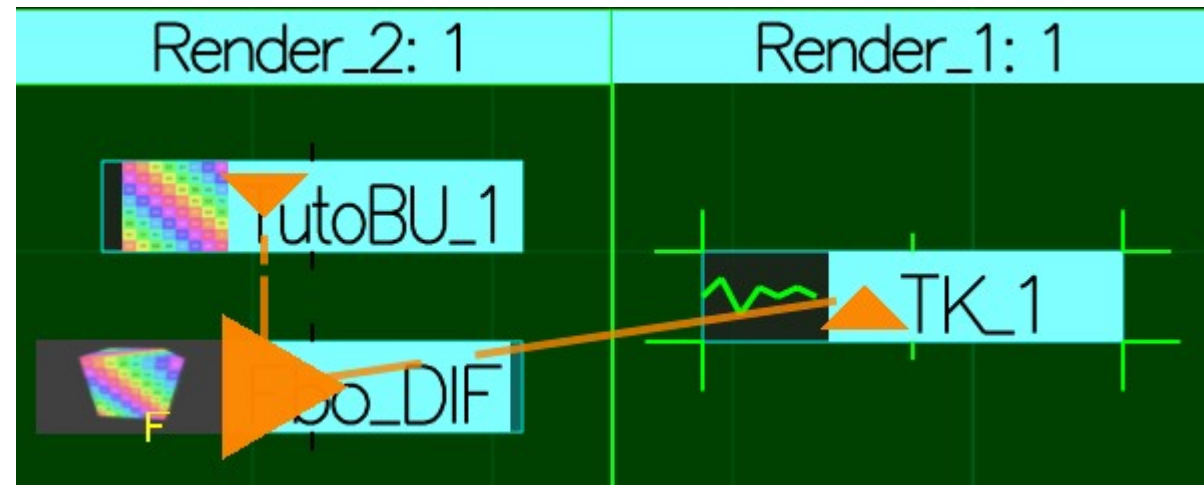
- **First**

- **Order of the BU\_RECTs**
  - **Number in Name**
- **Change**
  - **StarMenu**
  - **Keyboard**
    - **Ctrl Up / Down**



- **Second**

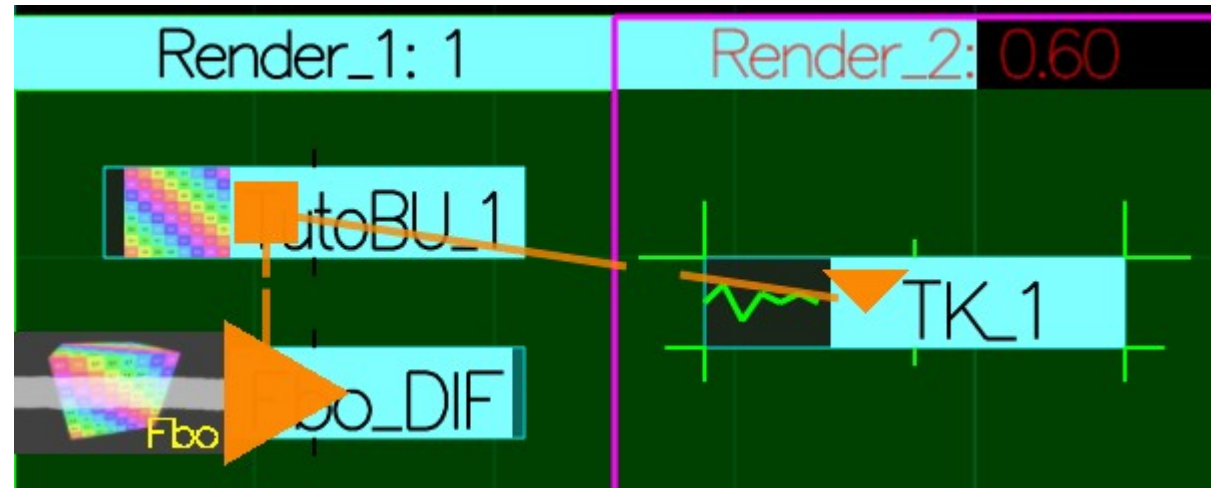
- **Order in the BU\_RECT**
  - **Bottom to top**
  - **Left to Right**



# Rendering Chain BU\_RECT

BU\_RECT value

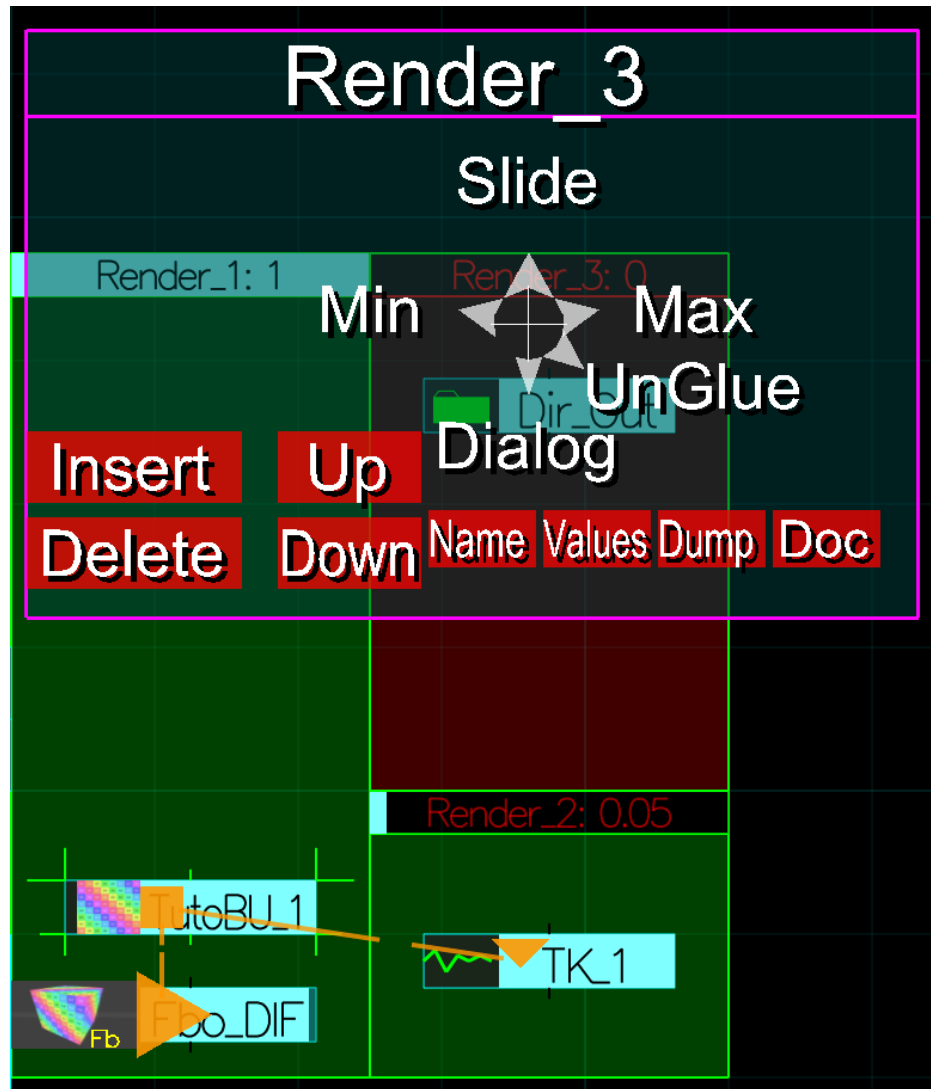
- multiply MU Value



- Inferior or equal zero  
→ Inactive



# BU\_RECT StarMenu



- **Slide** to change value  
**Alpha** for BU\_RECT  
shown like Slider at the BU\_RECT top  
**Red** when not 0 or 1  
**keyboard** like a **slider**
- **Insert / Delete**  
**Ctrl Insert / Del**
- **Up / Down Order**  
**Ctrl Arrow Up / Do**
- **Glue / UnGlue**  
**Affect MUs inside when moved**

# MU Seen MEU Search

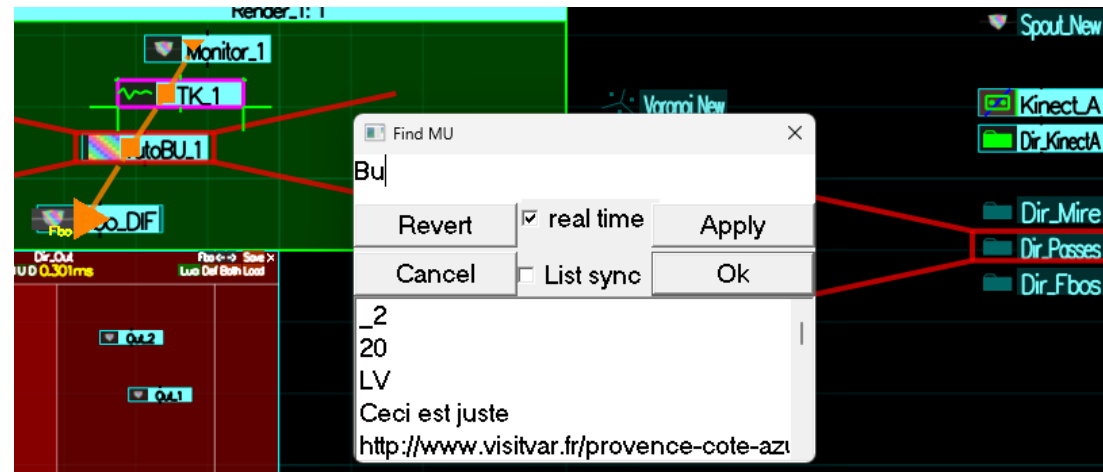
- 3 Buttons to select MUs we see



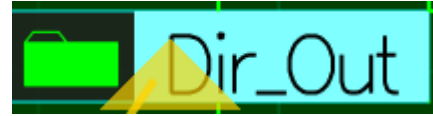
- **Hidden** display in the hide attribute by MU is on
  - **StarMenu** on MU
  - **Shift Ctrl** on Icon
  - **Back color** is red
- **Unused** display the MU having a **slider/alpha** equal 0
- **Used** display the MU having a **slider/alpha** greater than 0
- A way
  - to simplify the display
  - To keep MUs around

- **Find MU/MEU**

- **Ctrl F**
- Show a mark



# MEU\_DIR



- **Encapsulate other MEUs**
  - A way to regroup and control
  - a AAA\_MEU Folder
- **Render Chain** inside
- **Open in UI6** by default
  - More easy to navigate the MU inside
  - to simplify the display
  - While keeping MU around
- No BU\_RECT
  - but **2 optional areas A and B**
- Can **drag MU in and out**
  - **Ctrl Drag** do **Instantiate**



# MEU Cameras



- **No / Once / Owner**

- **No**: use current camera defined in the rendering chain
- **Once**: use camera only for this MEU  
then go back to current rendering chain camera
- **Owner** : Own this camera  
it become the current Camera  
the Meus following in the rendering chain can inherit it

- Camera selector

- Button **Axe show**



- Reminder: StarMenu → name

# Camera Selector

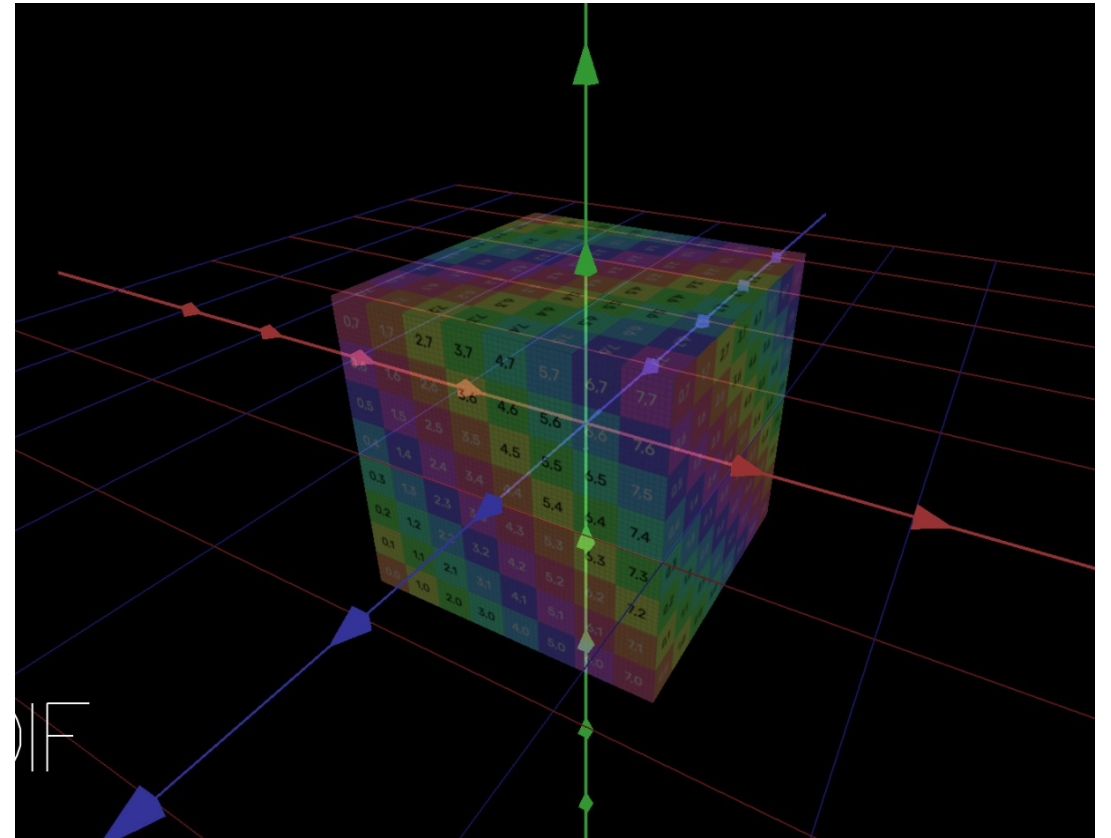


- **Click** **Select**
- **Ctrl Click** **Write to**
- **Ctrl C/Ctrl V** **Copy / Paste**
- **Shift Click** **Lock / Unlock**
- **Double Click** **Edit in flatland**



# Camera Axes Units

- **Right Hand System**  
like OpenGL  
not left hand
- **Z** in your **face**
- **2d** : **XY** facing you
- **X|red**      **left to right**
- **Y|Green**    **bottom to top**    **Vertical**
- **Z|Blue**      **back to front**
- **No unit**: Mathematic not physics
  - Back of the pyramid aligned with unit



# Camera Edit

- **Middle Click → Start Editing**

- BU\_CAM will manifest if locked

- BU\_CAM locked
    - Camera locked

- When editing

- **Wheel**

**Dolly**

- **Mouse**

**Rotate**

- **Middle Click Drag**

**Move**

- **Key o**

**Flip (o)rthogonal vs perspective**

- **Key x|X y|Y z|Z**

**Align front | back**

- **Ctrl Shift F4**

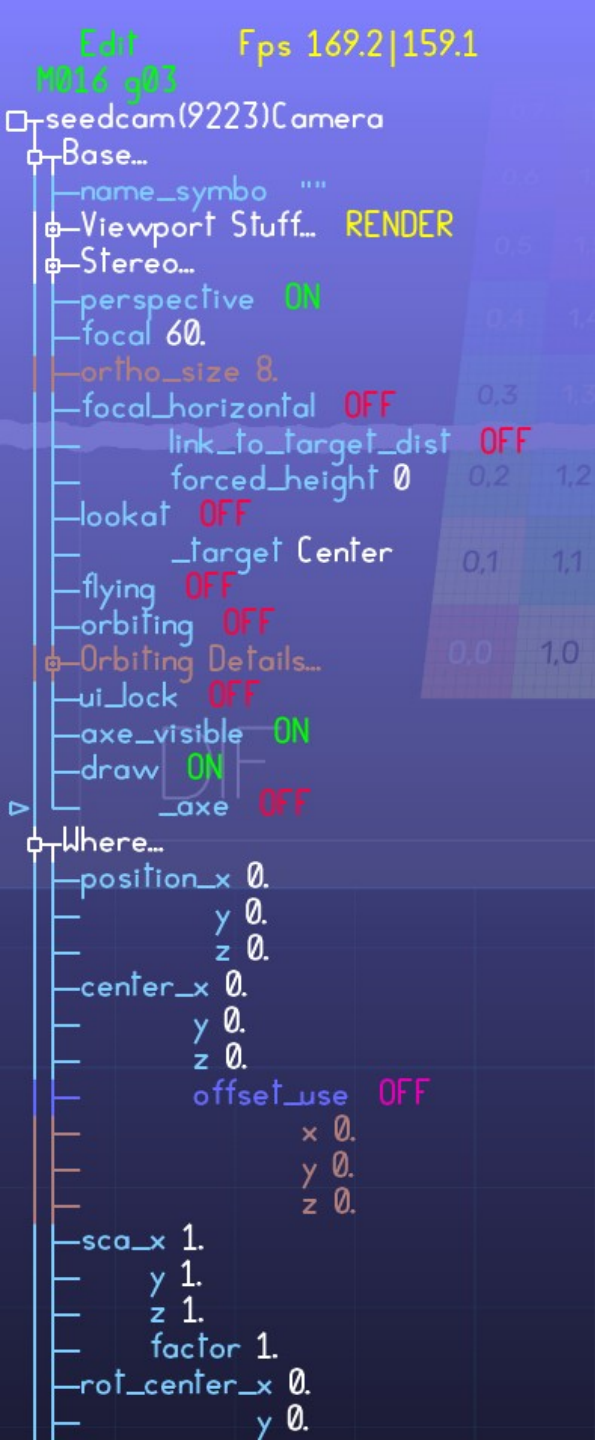
**Reset**

- **F4**

**Focus in Flatland**

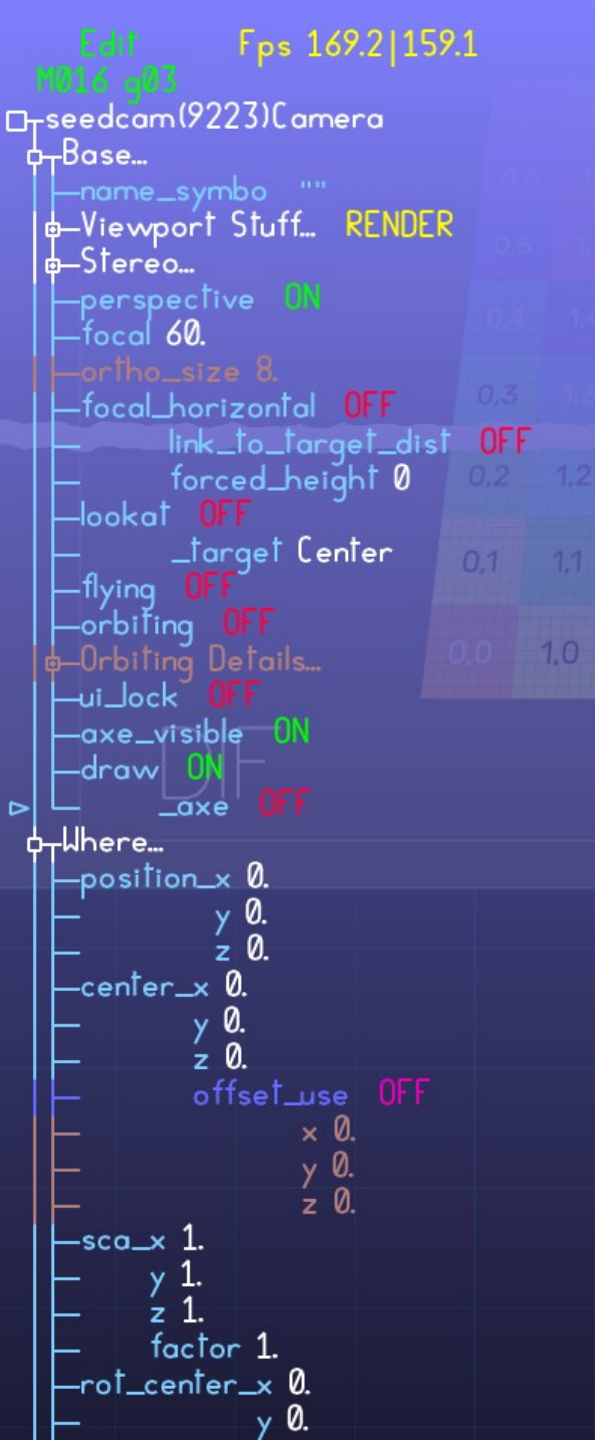
- **Left Click → accept edit**

- **Right Click → cancel edit: go back to start position**



# FlatLand a little deeper

- Tree Made of params ()
- **Tab** **On/Off**
- **Focus**
  - **F10** **Preferences**
  - **Ctrl F10** **Start preferences**
  - **0** **Application**
  - **Triple n** **Network preferences**
- **Key <- ->** **Navigate in past Focus**
- **Wheel** **Scroll**



# FlatLand Params

Short for **parameter**

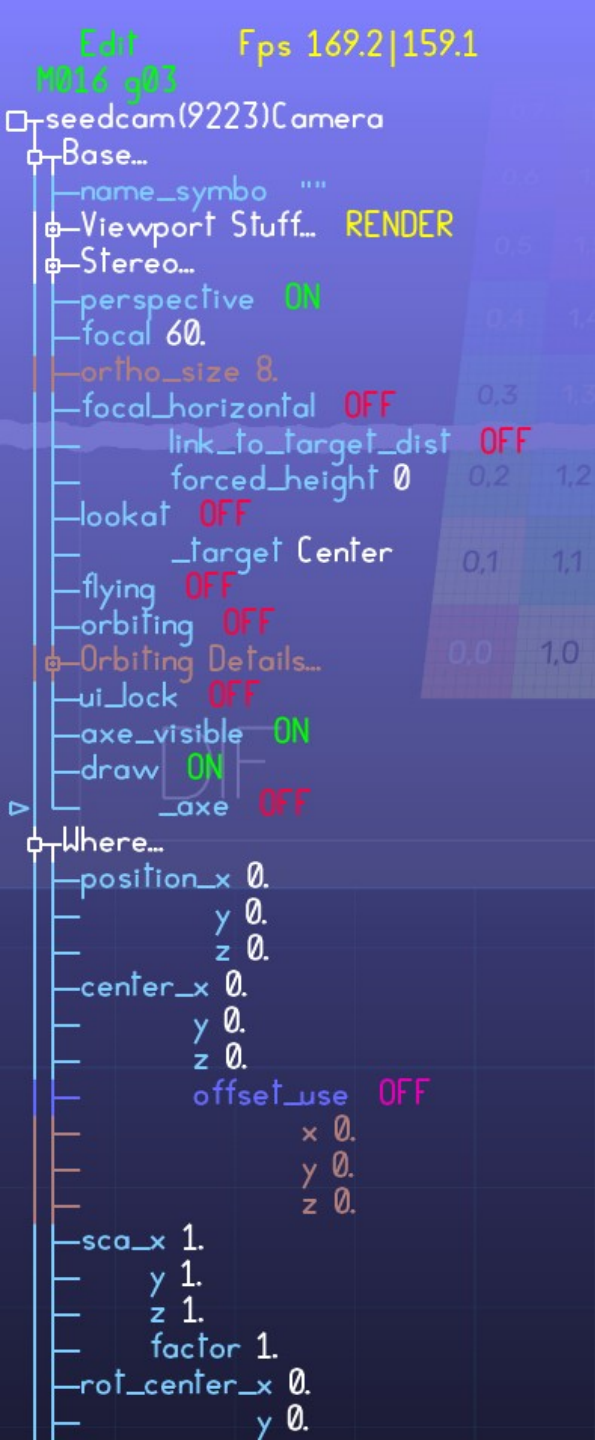
Types for now: **bool, integer, float, text, filename**

Param draw :

- **Box** → something under
- **Big Box** → Object
- **Param name**
- **Pinkish / Red param** → Unused
- **Param value**
  - for bool **OFF ON**
- **Yellow** → Comment / Sum Up

UI

- **Click**
  - Left** Select current param and eventually Open/Close
  - Right** Param menu
- **Space** Open and Close
- **Arrow Up Down** Move selection up and down
- **Right Click** Param menu



# FlatLand Param edit

## Mouse

- Bool
  - param\_trig Drag left and Right
  - Just touch it
- Integer,Float
  - unlimited Click and turn around
  - Sensibility
  - Ctrl Slower
  - Ctrl Tab Even Slower
  - Shift Ctrl Faster
  - Shift Ctrl Tab Even Faster
  - Double Click Edit
- Text, Filename
  - Double Click Dialog

## Keyboard

- Same as BU
  - + - \* / Change
  - Enter Inverse
  - . Floor integer
  - Home Default
  - End Inactive
  - PageUp Maximum
  - PageDown Minimum

# AAASeed

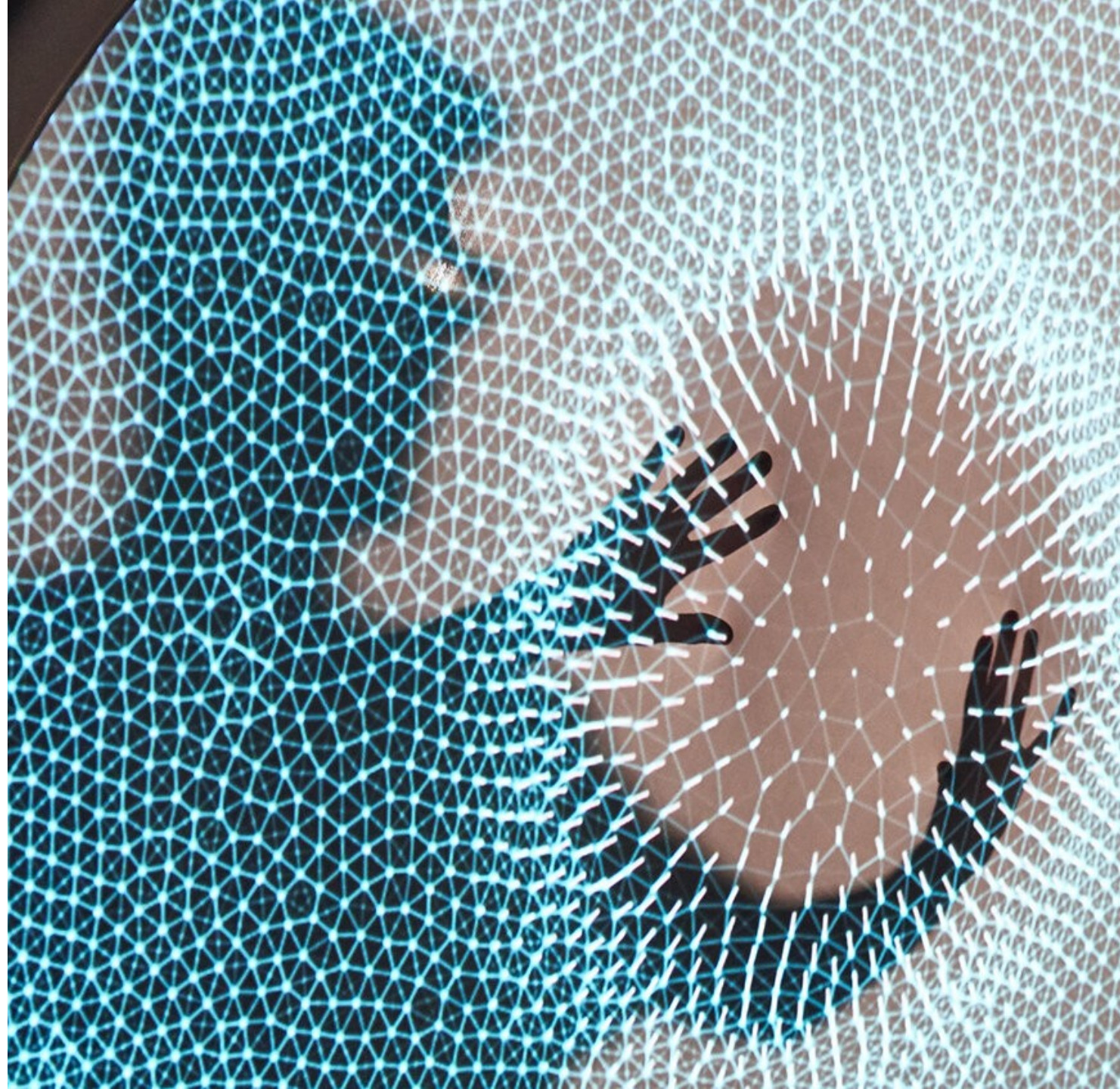
Introduction

Part 4: MEU

with ugly Slides

(function over Form)

- **Update AAASeed**
- **Create New APP**
- **Bank of Binds**
- **BU\_TEXTURE**
- **Frame Buffer Object**
- **MEU Fbo**
- **Meu Monitor**
- **Create MEU**
- **Import MEU**
- **MEU Video**
- **MEU PIP**
- **MEU Out**
- **MEU Trax**



## **Update AAASeed**

- **Get AAASeed.7z**

**AAASeed.org**

**FILES section**

- **Replace existing AAASeed Folder**

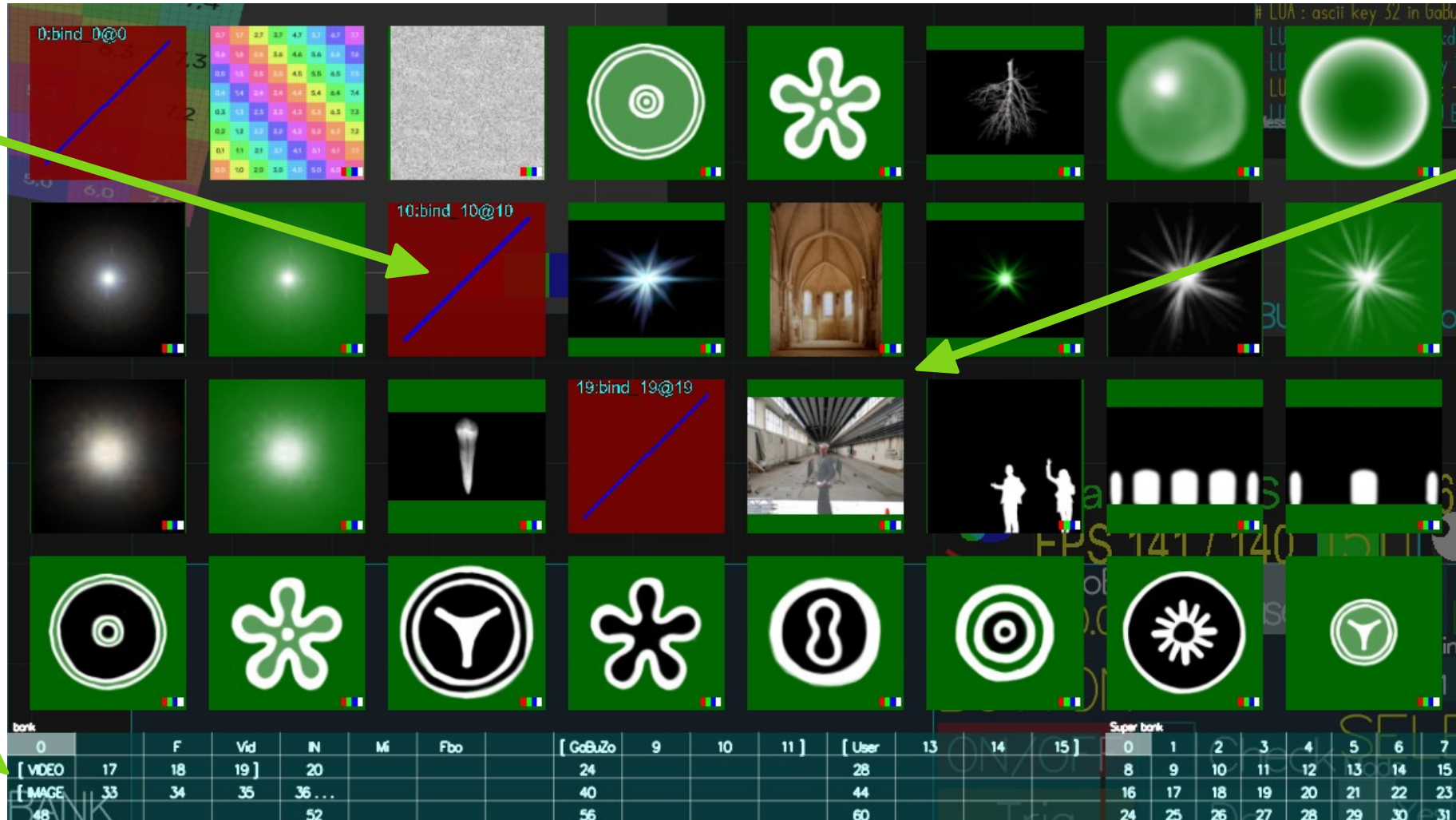
## **APP: Create a new one by folder duplication**

- **Copy** AAAAPPs\Tuto\APP\_Garden\_Base
- Into **APPs\_Guest**
- **Rename** APP\_Garden\_Base
- **Open** AAASeed
- **Open** renamed **APP**



# Bank of Bind: 2048 Banks of 32 Binds → 65 536 Slots

- Bind for no texture
- Slow blinking redish
- Blue diagonal

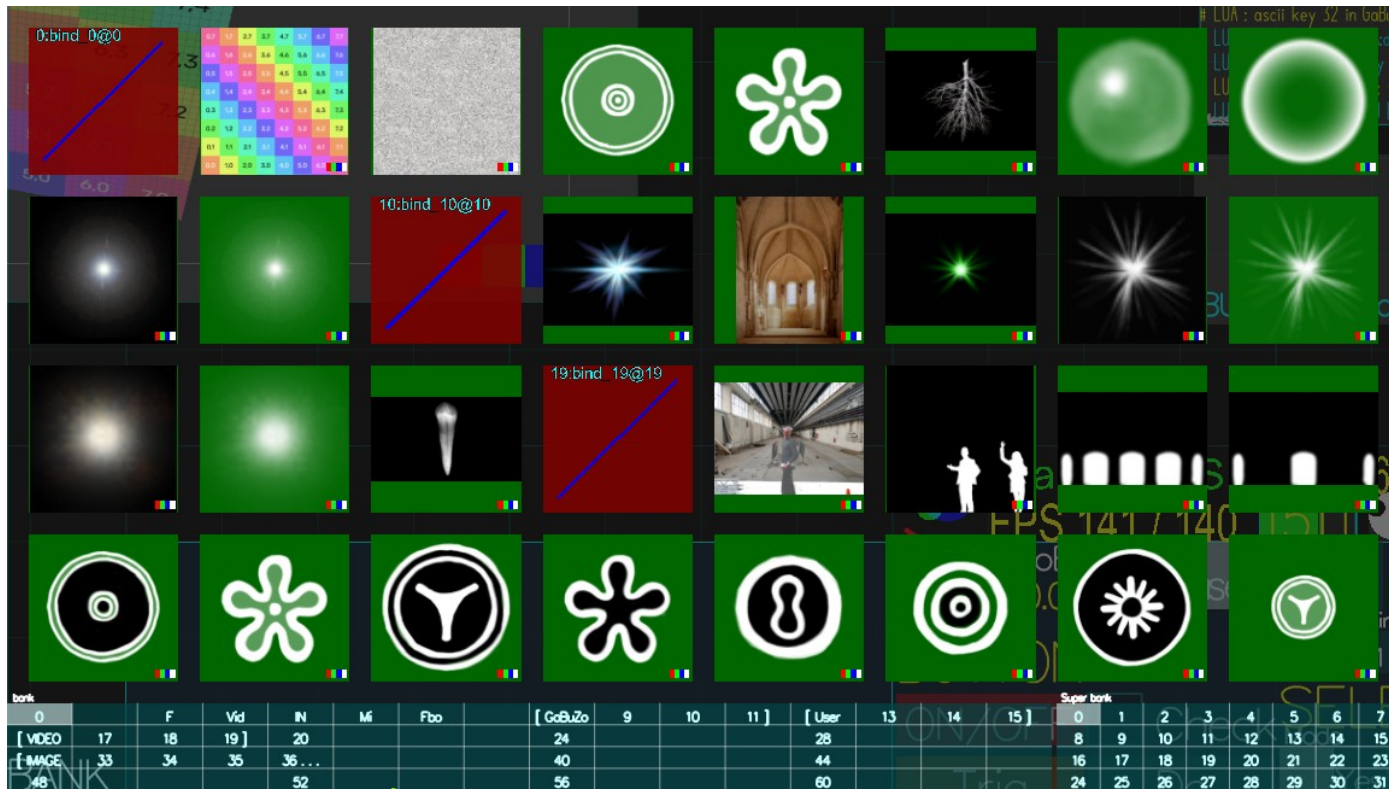


- Binds
- Monitors
- Click Double
- Open monitor

• Banks

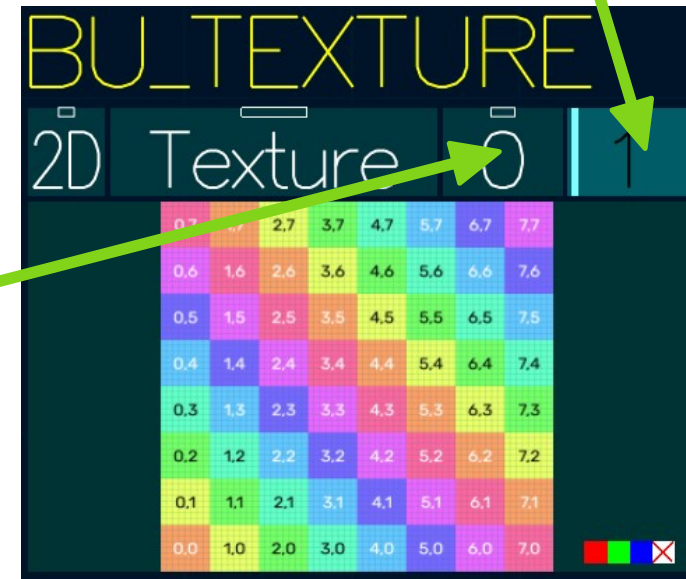
• Super banks  
→ 64 banks

# Bank of Bind: BU\_TEXTURE



Bank

Bind



# BU\_TEXTURE

Texture dim	X
no	1D 2D 3D

Dimension  
Optional

ShortCut

Texture																X
Video				Fbo				Input				Mire				
A	B	C	D	F1	2	3	4	In1	2	3	4	Mi1	2	3	4	
E	F	G	H	F5	6	7	8	In5	6	7	8	Mi5	6	7	8	
I	J	K	L	F9	10	11	12	In9	10	11	12	Mi9	10	11	12	
Dif	PreDif	R Viz	F13	14	15	16	In13	14	15	16	Mi13	14	15	16		
Albe	Nor	Spec	Emis	ZBuf	Light	Custic	Fog	Dof	Transparent	GodRays	ToneMap	Fxaa				

BU_TEXTURE																																																															
2D	Texture	0	1																																																												
0.7	1.7	2.7	3.7	4.7	5.7	6.7	7.7	0.6	1.6	2.6	3.6	4.6	5.6	6.6	7.6	0.5	1.5	2.5	3.5	4.5	5.5	6.5	7.5	0.4	1.4	2.4	3.4	4.4	5.4	6.4	7.4	0.3	1.3	2.3	3.3	4.3	5.3	6.3	7.3	0.2	1.2	2.2	3.2	4.2	5.2	6.2	7.2	0.1	1.1	2.1	3.1	4.1	5.1	6.1	7.1	0.0	1.0	2.0	3.0	4.0	5.0	6.0	7.0

bind

bank

Texture_bind				X
0		4	7	
8		12	15	
16		20	23	
24		28	31	

Click Double To Load

Texture_bank																X	
0	F	Vid	IN	Mi	Fbo	[	GoBuZo	9	10	11	]	[	User	13	14	15	]
VIDEO	17	18	19	20			24					28					31
IMAGE	33	34	35	36	...		40					44					47
48				52			56					60					63

# Fbo / Frame Buffer Object

- Concept from Computer Graphics

LearnOpenGL.com

- see it as a **Canvas**

it is as **where we draw**

it **Regroup textures** (image) of the same size

- **Color attachments, up to 4** in AAASeed
- **Depth** attachment (**zBuffer**)
- **Stencil** attachment, exist but **ignore**

- **Exposed in GaBuZoMeu**

MEU\_Fbo

Special MU display

Fbo flashing

Icon changing size



# Fbo / Frame Buffer Object

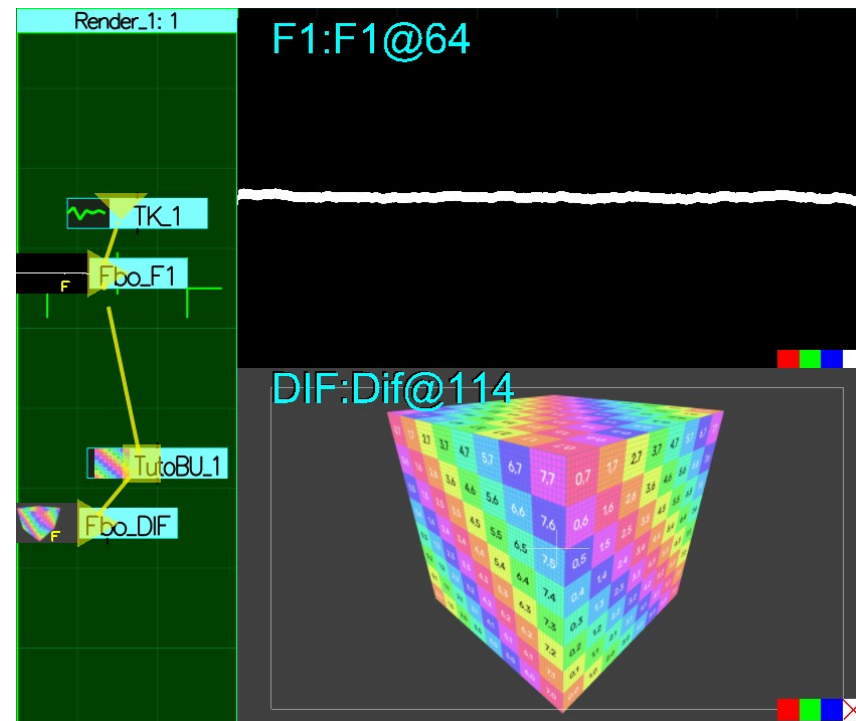
- No Fbo

we draw to the back of the window

- A Fbo

All the successive Meu in the rendering chain use it

Until a new one is executed/rendered



# MEU Fbo

Ui5 Fbo\_DIF Main Copy Fbo<-> Save X

S UIUD 0.066ms

Active 0 Focus

1920 x 1080 4 x Int8

Size X 1920 Size Y 1080 1 2 3 4

Size / \* Swap 8 16 Fp16Fp32

Attachement active

1 2 3 4 Depth

See

1 2 3 4 Depth

Erase Custom

Erase Color

Custom 0 25 50 75 100

R G B Cy Ye Ma

trail 6.046

0

Do Restart

1 from 0

Monitor Center Flip U Flip V

Attachement On Cpu

1 2 3 4 Depth

Attachement to save

1 2 3 4 Depth

Save trig Save

Preset

2 4 6 8

1920 x 1080	
Size X	Size Y
1920	1080
Size /	* Swap

- Size
- Color format
  - Channel number R RG RGB RGBA
  - Chanel Format
    - Integer 8 bits [0,255]
    - Integer 16 bits [0,65535]
    - Floating point 16 bits, called half
    - Floating point 32 bits

4 x Int8			
1	2	3	4
8	16	Fp16	Fp32

- Attachements
  - Selection
  - Cpu : transfert from Gpu to Cpu
  - Monitor
    - Active
    - Click Double
  - Save Trig → One frame
  - Save → Each frame

Attachement active				
1	2	3	4	Depth

- Cameras
- Erase
  - How, What
  - Colors with presets
  - Trail

Clear

Color Depth Stencil

Erase Custom

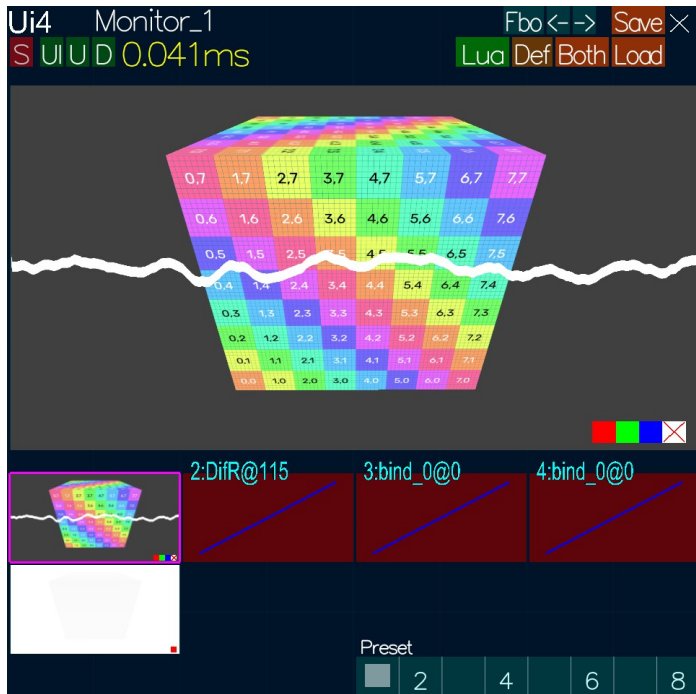
Erase Color

Custom 0 25 50 75 100

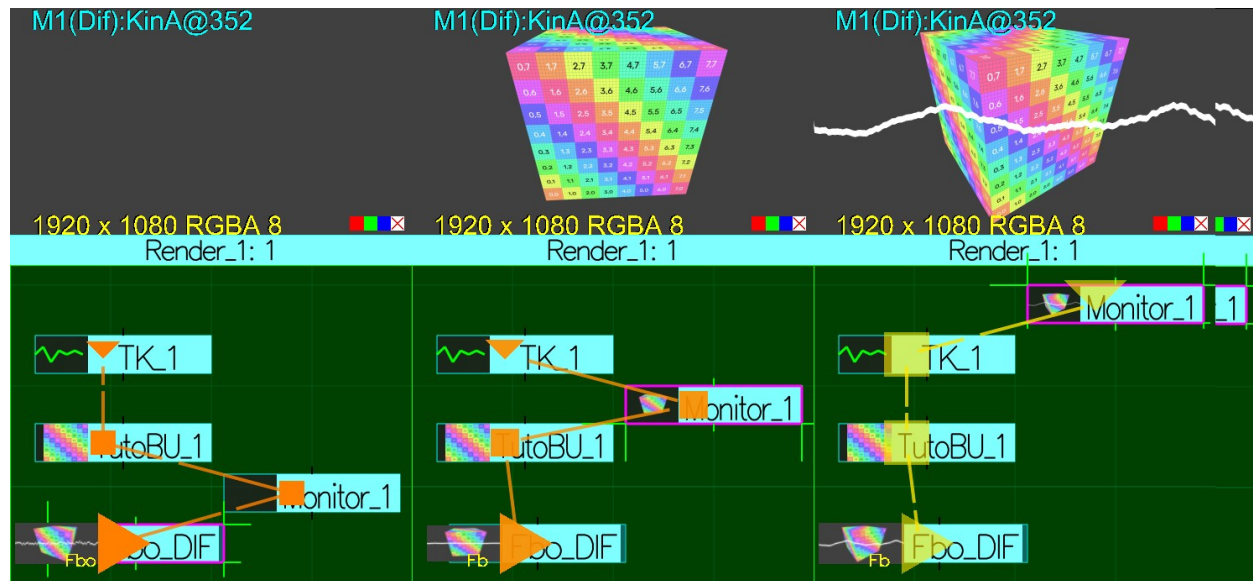
R G B Cy Ye Ma

trail 6.046

# MEU Monitor



- **Copy and Display** current state of current Fbo
- **Monitor** show selected attachment



- **Meu**

**Show all attachments**

**Select monitor attachment**

# Core MEUs

- **Fbo** Frame Buffer Object
  - Canvas where we draw
- **Monitor**
  - Display and copy the current state of the current Fbo
- **Dir**
  - Encapsulate MEUs
- **Video**
  - Decompress video in a texture
- **PIP** Picture In Picture
  - Display a texture
- **Out**
  - Output a Texture
- **TRAX**
  - Plug BU
- Kinect
- Analyse



# Fun MEUs

- **TK**
  - Visualize the Audio
- **Displace**
  - Displacement mapping
- GeoUV
- Obj3d
- Boid
- Deform like class
- Lua Draw
- ShaMosaic

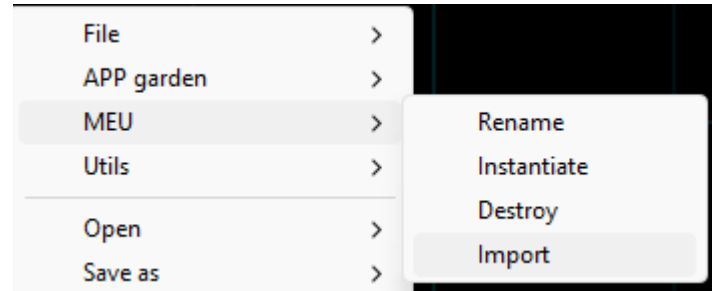
# Meu Window: Create MEU

- Navigate MEU
  - Prototype
- Create New MEU
- Select by Tag
- Select by Name

The screenshot shows the 'Meu' window with the title 'MEU nb 103/121'. On the left is a vertical list of tags, including 'Self', 'All', 'Proto', 'No Tag', 'All', 'Tag', '2d', '3D', 'Art', 'Camera', 'Core', 'CoreGraphic', 'Deprecated', 'Device', 'Draw', 'Experimental', 'Generator', 'Geometry', 'ImageProcessing', 'Input', 'Interoperability', 'Output', 'Point', 'Procedural', 'Proprietary', 'RenderPass', 'Sound', 'Surface', 'Text', 'Texture', 'Tutorial', 'Unfinished', 'Utility', and 'VJ'. A red circle highlights the 'Core' tag. The main area displays a grid of MEU items, each with a name and a small icon. The items are arranged in columns: 2054, AAAUtils, App, BlobDetect; Blur, Boid, Bullet, Cam; CaptureRect, Clear, Clous, CIPool; ColorCurve, DepthPick, Derviche, DigitalProjection; Dir, Displace, DisplaceCV, DisplacePart; DistField, ExShaderGrid, ExShaderInstance, FaceTrak; FaceUV, Fbx, FbxMatte, FieldGene; Flex, FlexVideo, FP, Grab; GridSel, Hexa, HexCraze, imgAnal; ImgSend, Invaders, Kinect, Kinect1; KinFlipper, KinMove, KinMoveAuto, Lidar; LightPassV1, Lights, Marseille, Materials; MeshStatic, Mondrian, Monitor, MuBegin; MuEnd, NdcAddBlur, NdcBloom, NdcBranching. At the bottom, there is a 'Use BU' button and a color palette.

# Meu Window: Import MEU

- Menu File/ Import MEU
- Navigate to an APP
- Navigate to a MEU  
folder AAAMEU
- Open



# MEU Video: Send an Image flux to a texture

The screenshot shows the MEU Video interface with the following elements:

- Top Bar:** "Ui5 Video\_A", "Fbo <- -> Save X", "S UIUD 0.010ms", "Lua Def Both Load".
- File Path:** "Pbs - The Shape Of Life Episode1-.Origins.DivX-MP3.HankE.avi", "In ../Media/Maa/Movie/life".
- Bank/Bind Grid:** A 4x4 grid with "bank" and "bind" labels. Values include 0, 4, 8, 12, 16, 20, 24, 28. A "Oh!" button is present.
- Buttons:** "Capture", "Video", "Play", "Loop", "Restart", "Incrust", "Inv", "Gain 0.35", "Bias 0.5", "Cpu", "Gpu", "Step 18.92".
- Time/Clip:** "0:00:18:09 In 0:00:00:00", "0:53:39:24 Out 9:00:00:00 Clip".
- Preview:** Two side-by-side video frames showing a hand holding a small orange object.
- Bottom Bar:** "Monitor", "Center", "Flip U", "Flip V", "Preset", "volume 1", "2", "4", "6", "8".

- Video Name and folder (Red when a problem)
- Bank / Bind like texture
  - 2 selectors
  - Click double
  - Pick a video for the bind
- Play / Control
  - In / Out / Clip → play a subpart
  - / + → move in time of Step
- Monitor
  - Click double open as separate
- Volume
  - Check button with Slider
  - There is a master Volume Too
- Capture → switch to capture mode
  - more in a separate document
- Video → Flatland (Violet)
- Incrustation
  - Luminance Incrustation
  - Inverse → inverse the curve
  - Levels → min max levels of incrustaion
  - Gain / Bias alter the shape of the transfer curve (more next slide)
- Cpu / Gpu
  - Decompression happens in the CPU Side
  - Where we keep it

bank	bind
0	0
4	8
App	16
	24
	28

This screenshot shows the play controls and volume slider:

- Buttons:** "Play", "Loop", "Restart".
- Speed:** "Speed 1".
- Time/Clip:** "0:00:18:09 In 0:00:00:00", "0:53:39:24 Out 9:00:00:00 Clip".
- Volume:** "volume 1" with a slider and "- + Step 18.92".

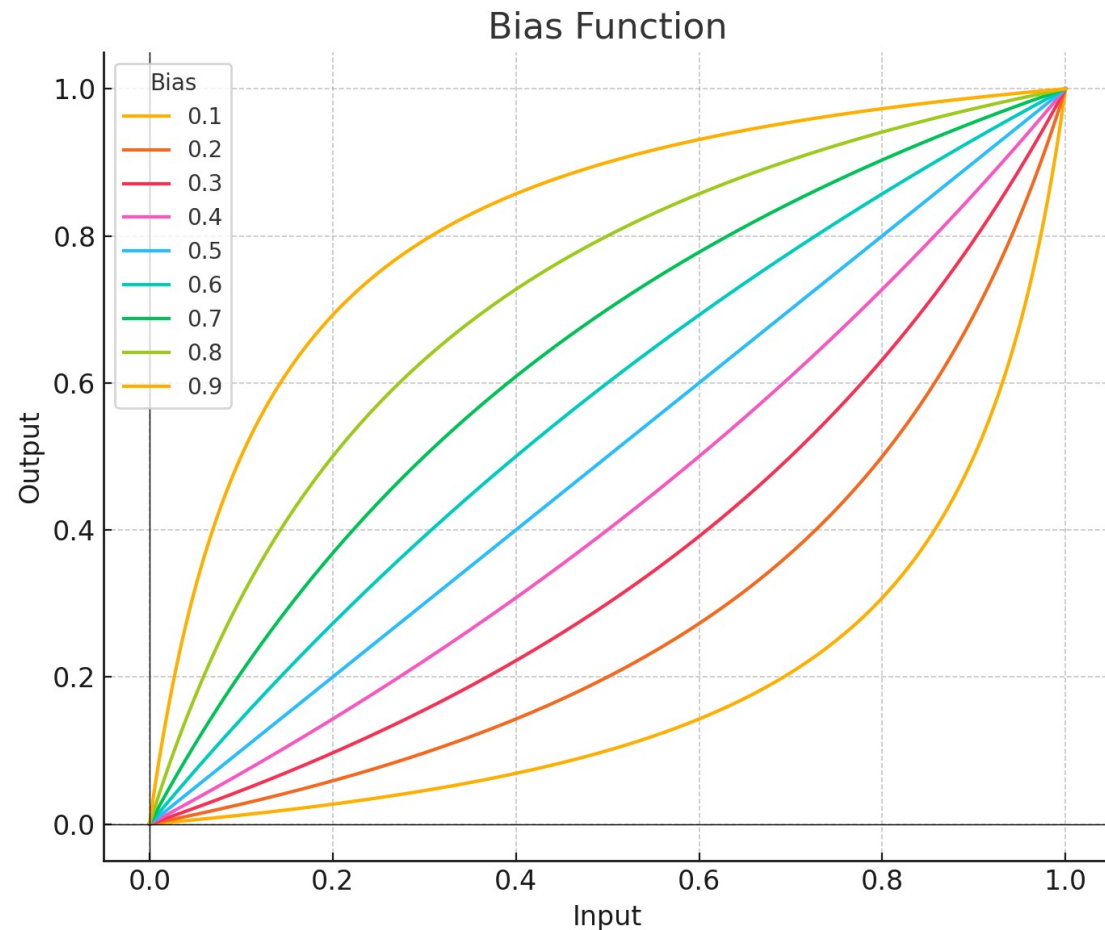
This screenshot shows the incrustation controls:

- Buttons:** "Incrust", "Inv".
- Levels:** "0.117 Levels 0.238".
- Gain/Bias:** "Gain 0.35 Bias 0.5".

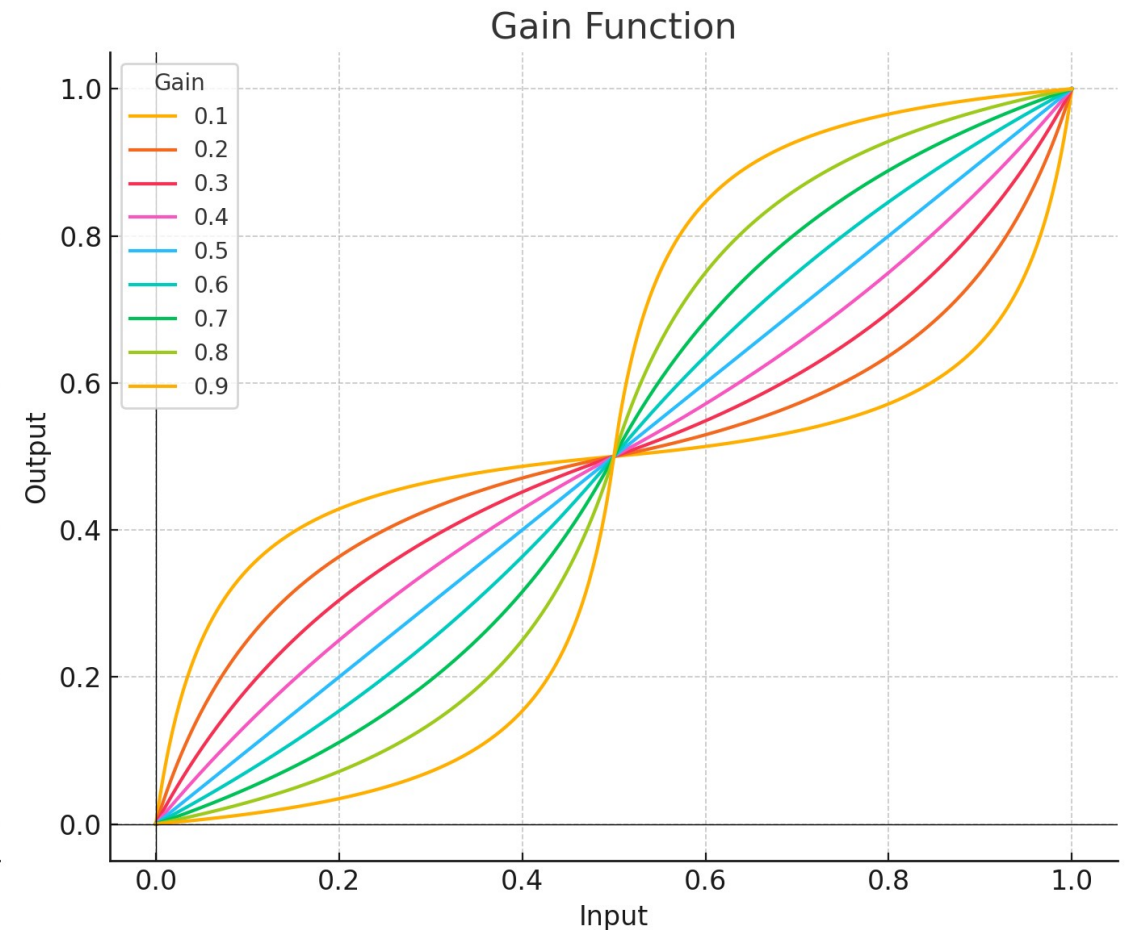
This screenshot shows the CPU/GPU selection controls:

- Buttons:** "Cpu", "Gpu".

# Gain Bias an electronic heritage



- **Input at 0.5 : Bias value**
- **Low Bias** → Push values down
- **High Bias** → Push values up



- **Double Bias curve (symetry in the middle)**
- **Low Gain** → Push value to middle
- **High Gain** → Push values to extreme

# MEU PIP (Picture In Picture): Main



- Display a Texture and handle smooth transition
  - Tex : Next Texture
- Luma (Luminance) Incrustation
- Swap: Exchange texture and Mask
- Mask
  - Remap: like incrustation
  - How Grey map to alpha
  - Flip : Inverse the remap
  - Mul : Multiply luma by the mask
  - See : show only the mask
- Cameras
- Size and Moving setting
- Colors for object, background, offset and Gamma
- Clamp :
- Fuzzy edge / border
- Selector : blending

# Ratio and size

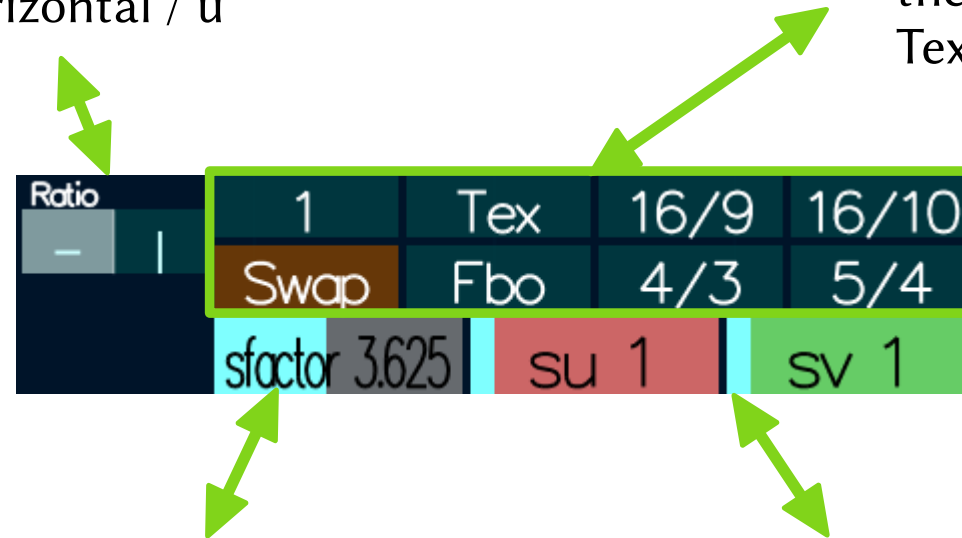
- This change the **sizes used by a MEU to render**

## Select direction

the ratio buttons will affect:  
here horizontal / u

## Ratio buttons

change the slider  
su or sv  
to match  
the ratio asked.  
Tex → Texture



**Size Factor:**  
size in both direction

**Size u and v:**  
size in uv direction

# TRS -> Translate Rotate Scale

- This control what is named in 3D: a **transformation**
- **Not moving the camera**
- **Changing the coordinates** of where an **object** is drawn

- Developer note

- Alter the model (model to world) matrix

- **Combine 3 Types of transformations**

- **Tra** → **Translate**

- **Rot** → **Rotate**

- Rotation unit in AASeed are turns

- 0.25 → a quarter turn

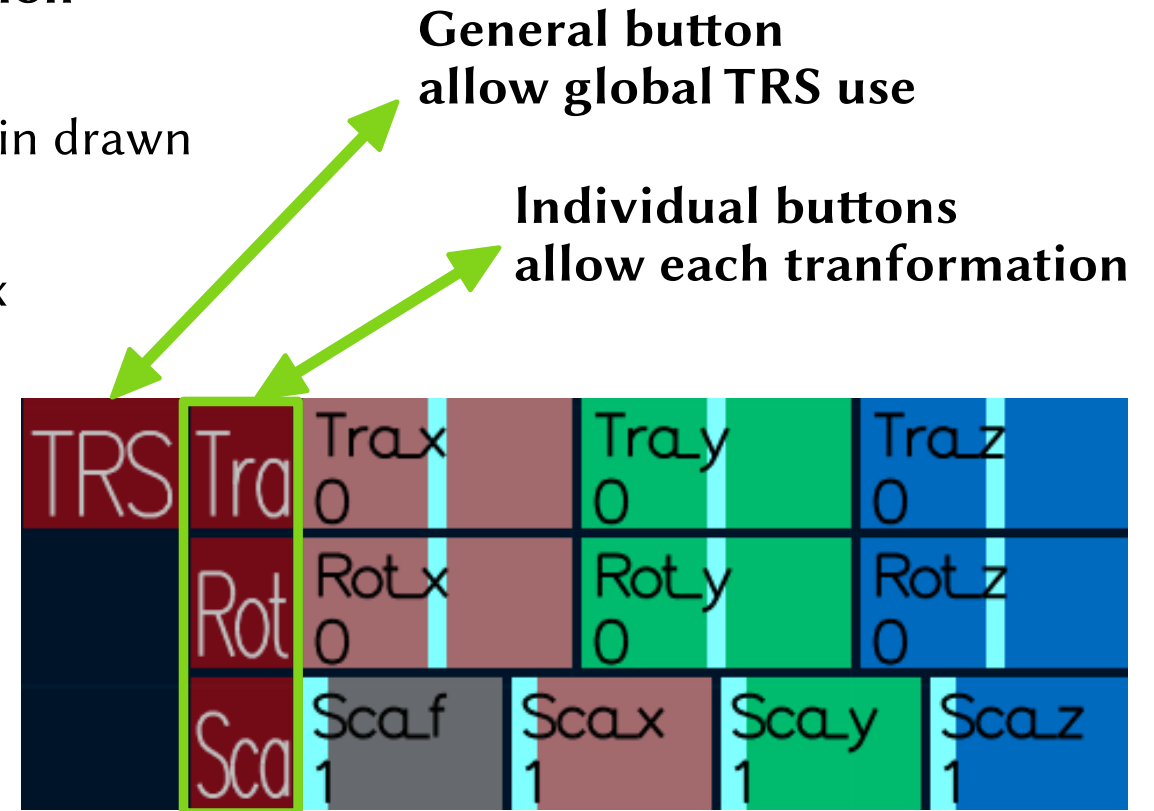
- 0.5 → a half turn

- 1 → a full turn

- **Sca** → **Scale**

- **Experiment and understand the in which order Tra Rot Sca are performed**

- Better **keep button TRS Off** if transformation is **not used**





# MEU PIP : Map

Ui5 PIP\_1 0.110ms Main Map Fbo<-> Save X  
S UIUD Lua Def Both Load

nb\_u 16 nb\_v 16

U Min Max 1 V Min Max 1

hexa top\_line

du 0 dv 0

offset\_2 1 offset\_4 1 offset\_6 1

Preset 2 4 6 8

- nb\_u, nb\_v : number
- U Min Max, V Min Max : stretch the texture
- hexa :
- top\_line :
- du, dv :
- offsets :

# Blending

mapping_blend_menu					✕
Min	Max	Add	Sub	RSub	
Mul	Screen	Overlay	Darken	Lighten	
ColDodge	ColBurn	HardLight	SoftLight	Diff	
Exclusion	HSL_Hue	HSL_Sat	HSL_Col	HSL_Lum	
		Add			

# MEU Out: Display an Image in Output

The screenshot displays a dark-themed MEU interface with the following elements:

- Top Bar:** Contains labels 'Ui5', 'Out\_2', 'Main', 'Map', 'Fbo <- ->', and 'Save X'. Below this are 'S UIUD 0.163ms', 'More', 'Master', 'Lua', 'Def', 'Both', and 'Load'.
- Control Row 1:** Includes 'Use Fbo', 'Add', 'Focus', a 'No Once Owner' dropdown, and a 'cam\_index' row with buttons 1-7.
- Control Row 2:** Includes 'Crop', 'Force White', and a 'screen\_dst' row with buttons 'Full', 1-6.
- Preview Area:** A central area with a 'Use' checkbox, a cyan bar showing 'Master\_Gamma 0.764', and a pink-bordered box labeled 'Shader'.
- Bottom Bar:** Labeled 'Preset' with a grey square and buttons 2, 4, 6, 8.

# MEU Out: Display an Image in Output

Ui5 Out\_2 Main Map Fbo <-> Save X  
S UIUD 0.622ms More Master Lua Def Both Load

cam\_index  
Use Fbo Add Focus No Once Owner screen\_dst 1 2 3 4 5 6 7  
Crop Force White Full 1 2 3 4 5 6

color  
Color Gamma  
By pixel  
Ratio 1 Tex 16/9 16/10  
Swap Screen 4/3 5/4  
sfactor 1 su 8 sv 4.5

Gamma 1 SetGet SetGet Gamma 1  
0 LR 1  
0 BT 1  
Gamma 1 SetGet SetGet Gamma 0  
1 2 3 4 1 2 3 4

Light Back FillLinePoint Line 1 Nor  
Depth Front FillLinePoint Point 1 8  
Preset 2 4 6 8



# MEU Out: Display an Image in Output

Ui5 Out\_2 Main Map Fbo<-> Save X  
S UIUD 0.168ms More Master Lua Def Both Load

Use Fbo Add Focus No Once Owner cam\_index  
screen\_dst 1 2 3 4 5 6 7

Crop Force White Full 1 2 3 4 5 6

V center 0.5 V 1 0

0 U 1

U center 0.5

Preset 2 4 6 8

# Rendering

Light	Back	Fill	Line	Point	Line 1	Nor
Depth	Front	Fill	Line	Point	Point 1	1

# MEU TRAX

Ui5 TRAX\_New Fbo<-> Save X

S UIUD 0.142ms Lua Def Both Load

com\_index

1	0	Range In	1	Inv	1	2	3	4	5	6	7
Plug No											
In	In 0										
<input checked="" type="checkbox"/>	Sinus	Ch 1	1								
Phase 0		Freq 1									
GB	Gain 0.5	Bias 0.5									
Thr	Threshold	Threshold 0.5									
Remap	0	Min Max	1		3		0	Range Out	1	Inv	
Filter											
	Up 0.25		Down 0.25								
0.062											
					Midi	0	Range	1		Inv	
					Plug	Ch 1	1		Clear Probe		

Presets: 2, 4, 6, 8

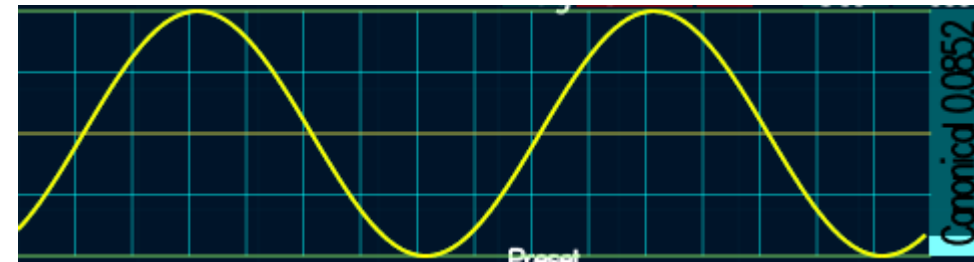
RUN Duration

1	0	Range In	1	Inv
Plug No				

1	0	Range In	1	Inv
Plug PIP_1				
transfo1.Tra_y				
				1

- 1 : open the trax
- Plug : plug it to something
- Control : gain bias threshold
- Visualize input

<input checked="" type="checkbox"/>	Sinus	Ch
Phase 0		
GB	Gain 0.5	
Thr	Threshold	T
Remap	0	Min M
Filter	Up 0.2	



- Out setting

1	0	Range Out	1	Inv	
Plug No					
2	0	Range Out	1	Inv	
Plug No					
3	0	Range Out	1	Inv	
Plug No					
Midi	0	Range	1		Inv
Plug	Ch 1	1		Clear Probe	

RUN Duration

## **AAASeed**

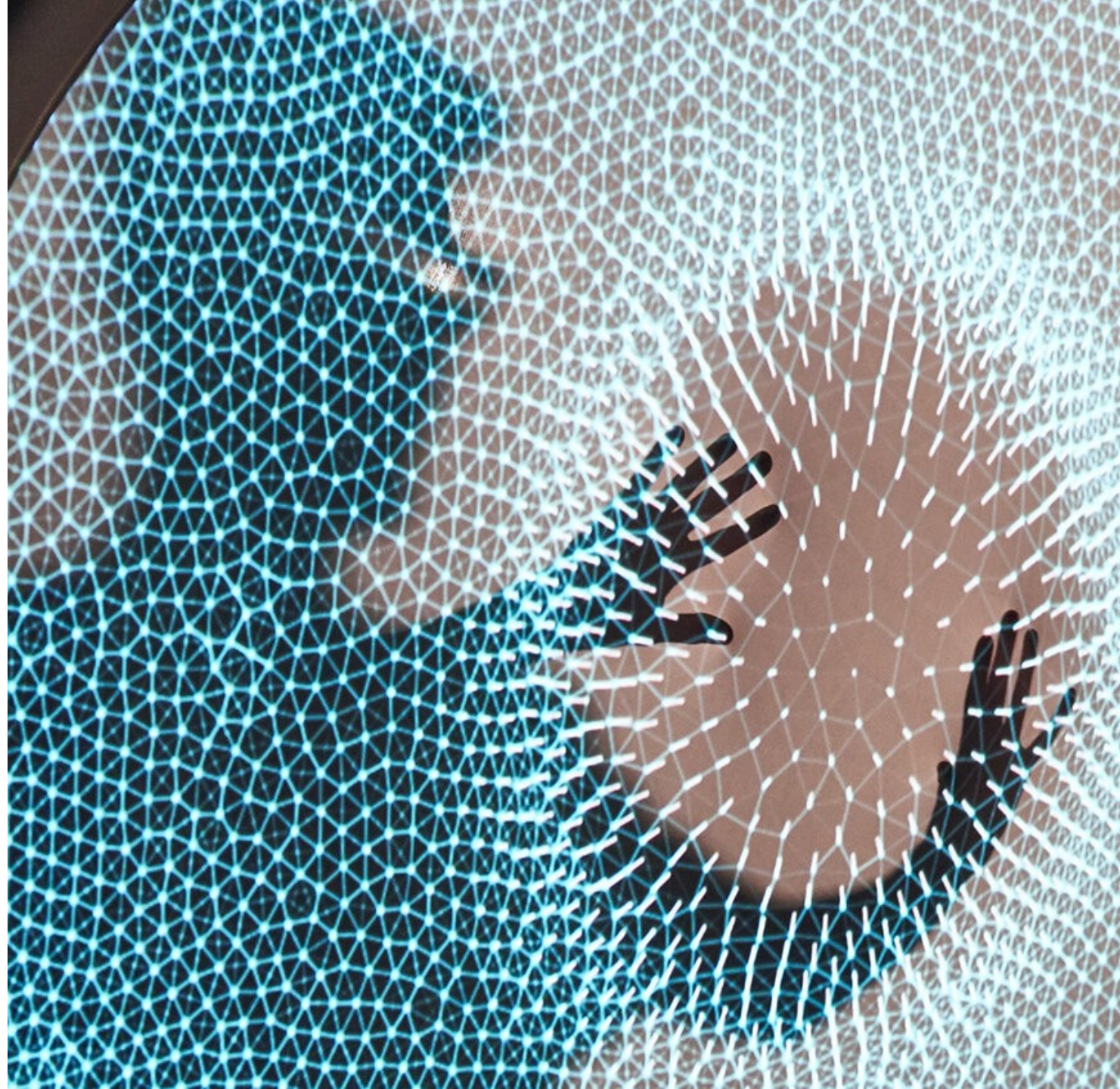
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- **Meu Monitor**
- **Create MEU**
- **Import MEU**
- **MEU Video**
- **MEU PIP**
- **MEU Out**





# MEU TK

Ui5 TK\_1 Fbo <-> Save X  
 S UIUD 0.140ms Lua Def Both Load

Shader FFT cam\_index  
 1 2 3 4 5 6 7

Size 8 Sample Nb 512 Gain 7.517 offset 0  
 Nb U 2 ABS Clamp Th 0

Softness 0.1 Range 0.9 Filter Filter Value 0.9

no Tex Vid 11  
 Tex:L@107  
 0 U Min Max 1  
 0 V Min Max 1  
 Add

Color  
 0 Radius 1 Turn 1  
 inter 0 Angle 0

Edge Ep 1 Nb V 2 Side Amount 1 Side NB 3  
 Edge  
 Spiral Factor 0

Periodic Color  
 X 0 Y 0  
 RotX 0 RotY 0 RotZ 0

Light Back Fill LinePoint Line 1 Nor  
 Depth Front Fill LinePoint Point 1  
 4 8  
 12 16

# Shader StarMenu

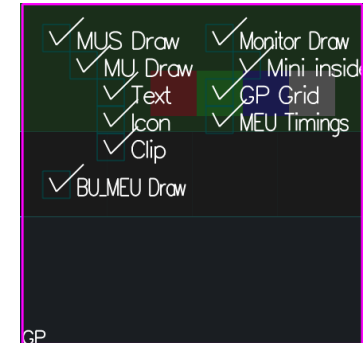
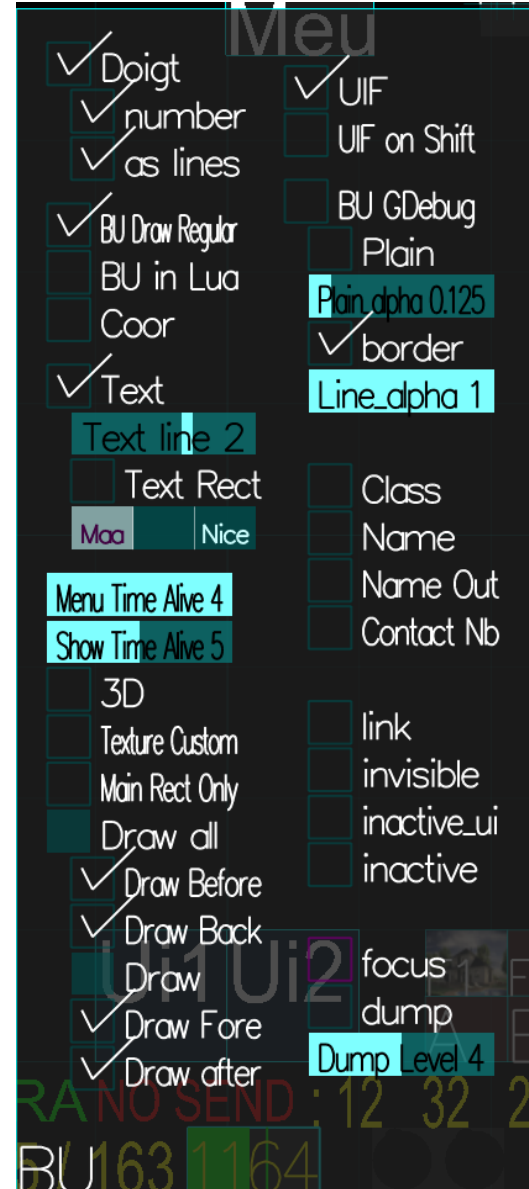
Shader



- **Min/Max : Off/On**
- **open the shader code**
  - Vertex**
  - Geometry**
  - Fragment**
  - Compute**
- **reload : reload the shaders used**

# Window GA BU GP

- Garden Party
- Ctrl S, Esc/Esc Save it



# Doc Window

- Documentation
- Lua inspector

The screenshot shows the Doc Window interface with the following components:

- Info Panel:** Located at the top left, it contains a small image of a book and a search bar.
- Show Filter:** A row of buttons labeled "Private", "All", and "Public".
- Global:** A button labeled "Global".
- GaBu Classes:** A button labeled "GaBu Classes".
- Class List:** A grid of class names, each on a green background with white text. The classes are:

AAACAM	APP	APP_FACTORY	APP_GP
BALUE	BDD_CLEAR_SCREEN	BDD_FBX	BIND_TEX
BLOB	BLOBS	BOID	BU
BU_ALIVE	BU_BLOB	BU_CAM	BU_COLOR
BU_CREATE_MEU	BU_DOC	BU_EYE	BU_FPS
BU_KEY	BU_LIST	BU_MAAEB	BU_MEMORY
BU_MENU	BU_MESS	BU_MEU	BU_MONITOR
BU_OBJ	BU_PB	BU_POWER	BU_RECT
BU_SEND	BU_SHADING	BU_SHOW	BU_TEXT
BU_TEXTURE	BU_VIZ	BU_WATCH	BU_WINDOW
BU_WINDOW_LIST	BU_WWW	BUI	BUP
BUS	BUS_CTX	BUSS	BUTTON
CALAGE	CELT	CHANGER	CHANGERS
COLOR_REF	CREATURE	DATAGRID	EVENT
- Code Panel:** Located at the top right, it displays Lua code snippets such as "# LUA : BU\_DOC | Doc : BUIhp\_full\_page\_and\_mini() y : 407473110984788".
- Ui4 Panel:** Located at the bottom left, it contains the text "Ui4".
- Doc Panel:** Located at the bottom, it contains the text "Doc" and "Use Add BU".

# Lua example



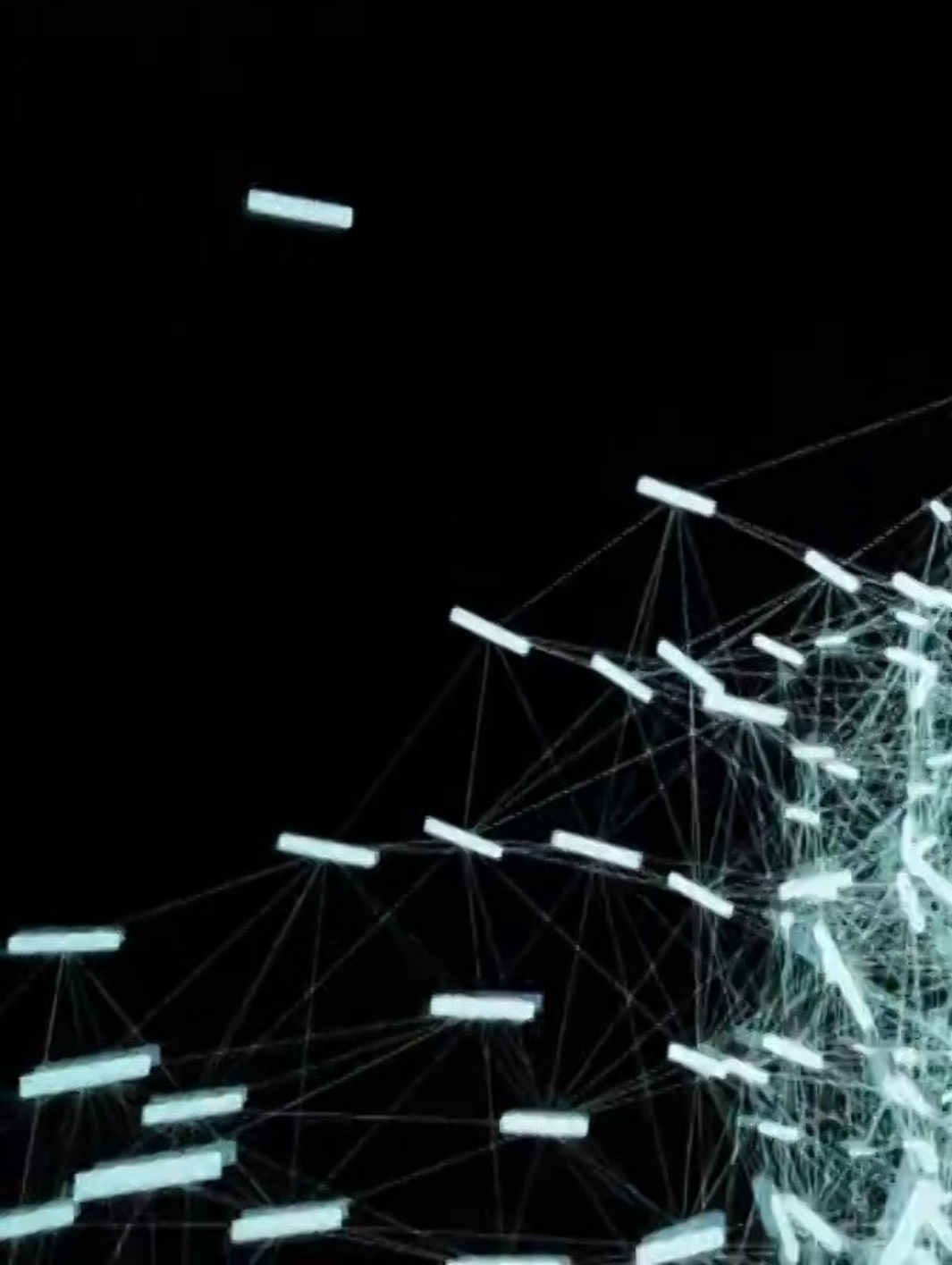
- Example of drawing with lua using OpenGL directly
- The concept look like processing

iterative process

How to deal with errors

Flatland / Pref(F10)/ Master / lua / error\_trig\_editor





- Q&A
  - Shaders
  - Scripting
- and artists

# File system Raw Approach

- AAADoc

  - lua\_aaaseed\_draw.lua

  - lua\_aaaseed\_interface.lua

- AAKernel

  - wher developer working on the core works

- Visual code workspace

- AAAUser

  - Duplicate folder

  - Rename it

  - Rename User

- APP

  - Create a New App just for you

    - Duplicate an existing one

  - Quick navigation in it