Overview

The purpose of this document is to track the active set of specifications that are used for the CSCI 2340: Software Engineering Art Generation semester-long project. Throughout the semester, this document will be maintained to accurately reflect the specifications that are used within the system.

TouchDesigner (TD) Implementation Specifications

Dynamic Parameters (**DPs**) – Data Visualization & User Input Handling – req: AG_ART_REQ_2

Core Parameters – PARAM_INTERFACE_1

- All **Patches** contain and dynamically set a subset of the following
  - Color
    - `RGB`
    - `Alpha (Opacity)`
    - `Black level`
  - Texture
    - `Noise`
      - `Random` (Perlin)
      - `Simplex 3D` (higher dimension exponents → 'smoother')
    - `Gaussian blur`
    - `Trail`
    - `Emboss`
  - Animation of `Texture nodes` (pre-made graphics) through:
    - `Amplitude`
    - `Speed`
    - `Sample Rate`
    - `Spread`
  - Size & Zoom
    - `Density`
    - `Scale`

Interface Definitions (`<PATCH>_params.csv`) – PARAM_INTERFACE_2

- Maps **DPs'** values to relevant nodes' parameters.

- Defines the `Table DAT` **nodes** in **TD**, which set or "export" parameters on a **Patch**-wise configuration
- All **DPs** are handled analogously, regardless of data source (user or api)
- @ `code/TouchDesigner/Patches/{loop, watercolor, instance, shore, particle}_params.csv`
- := `path,parameter,value,enable=1`
- `Ex)`
  - 

Dynamic setting or "exporting" of parameters – PARAM_INTERFACE_3

- Sets **nodes'** parameters' values according to dynamic program input
- Exports directly from the `Table` == `<PATCH>_params.csv`
- Ex) `code/TouchDesigner/Patches/extra/Export_examples.toe`

Image Manipulation – AG_ART_REQ_3

- Our **TD Patches** import Images through `Import` **nodes** using projectRoot-relative paths
- Images are transformed through specific **TD Patch nodes**

Patches – AG_ART_REQ_1

1. **Atmospheric Gas Levels** (loop.toe)

   PARAM_SPECIFICATION_1
   Specification Type: Parameter Adjustment
   Specification Description: The user interface shall provide a slider for the 'Grid1' size within a reasonable range of 6 to 10 to control the high density to low density ratio of the grid layout in the loop patch.

   PARAM_SPECIFICATION_2
   Specification Type: Parameter Adjustment
   Specification Description: The user interface shall permit multiplication adjustments through a slider for 'Math3' with values ranging from 0.1 to 0.5 to modify the speed of grid animations from low to high speed within the loop patch.

   PARAM_SPECIFICATION_3
   Specification Type: Parameter Adjustment

Specification Description: The user interface shall provide a slider for the 'Feedback' component where 'Gamma1' can be set between 1 and 2 to invert the visual effects from black-white to color inversion within the loop patch.

PARAM_SPECIFICATION_4
Specification Type: Color Configuration
Specification Description: The user interface shall enable users to set the 'constant1' color through three channels (RGB), each with a range from 0 to 1, to adjust the base color of the elements within the each patch: loop, watercolor, instance, shore, and hexagon.

2. **Melting Ice Caps** (watercolour.toe)

PARAM_SPECIFICATION_5
Specification Type: Parameter Adjustment
Specification Description: The user interface shall offer slider controls for 'Displace1' displacement weight, with a range for x-values from 0.0001 to 0.001 and y-values from 0.0001 to 0.001, enhancing the visual effect by creating streaks and spread strengths within the watercolor patch.

PARAM_SPECIFICATION_6
Specification Type: Parameter Adjustment
Specification Description: The user interface shall enable users to adjust 'Displace1' UV Weight within a range from 0.999 to 1 through a slider to manipulate the radiation outward/entropy of the display within the watercolor patch.

PARAM_SPECIFICATION_7
Specification Type: Parameter Adjustment
Specification Description: The user interface shall allow the adjustment of 'Emboss1' strength from 0 to 100 using a slider to simulate texture or 3D effects resembling a geographic map on the visual output within the watercolor patch.

3. **Social Housing Displacement** (instance.toe)

PARAM_SPECIFICATION_8
Specification Type: Parameter Adjustment
Specification Description: The user interface shall allow for adjustments in ‘Noise1' through slider, controlling the channel/sample rate within a range from 1 to 8 to vary the moving speed from fast to slow of the visual effects within the instance patch.

PARAM_SPECIFICATION_9
Specification Type: Parameter Adjustment
Specification Description: The user interface shall provide a slider to adjust 'Noise1' amplitude rate from 1 to 5, affecting the closeness of photos to the screen, and 'Noise1' period from 0.1 to 1, controlling the rate of wave generation from fast to slow within the instance patch.

PARAM_SPECIFICATION_10
Specification Type: Parameter Adjustment
Specification Description: The user interface shall offer a slider for modifying 'Noise1 >> period' within a range from 0.1 to 1, which controls the rate of wave generation, altering speeds from fast to slow within the instance patch.

4. **Fluctuating Ocean Temperatures**(shore.toe)

PARAM_SPECIFICATION_12
Specification Type: Parameter Adjustment
Specification Description: The user interface shall provide a user interface slider allowing adjustment of 'Noise1 >> amp' within a range from 1 to 5 to alter the size of waves from small to big, affecting the visual representation of motion in the environment within the shore patch.

PARAM_SPECIFICATION_13
Specification Type: Parameter Adjustment
Specification Description: The user interface shall include a user interface slider for 'Noise1 >> harmonics' adjustment capability, with a reasonable integer range of 0 to 3, enabling the user to modify the environmental visuals from calm to rough wave conditions within the shore patch.

PARAM_SPECIFICATION_14
Specification Type: Parameter Adjustment
Specification Description: The user interface shall feature a user interface slider for 'cam1 >> translate' adjustment with the third value of translate being configurable within a range from 0 to 100, facilitating zoom in and zoom out capabilities in the visualization interface within the shore patch.

PARAM_SPECIFICATION_15
Specification Type: Color Configuration
Specification Description: The user interface shall provide a user interface slider for adjusting the 'line1 >> line >> line near color' setting, enabling users to manipulate the RGB channels each within a range from 0 to 1, to tailor the near color of lines according to user preference or data representation needs within the shore patch.

5. **Rising Global Temperatures** (earthquake.toe)

PARAM_SPECIFICATION_16
Specification Type: Parameter Adjustment
Specification Description: The user interface shall allow users to adjust 'noise4 >> amplitude' through a user interface slider within a range from 1 to 3, controlling the height of hexagonal graphical representations to depict varying environmental data intensities within the hexagon patch.

PARAM_SPECIFICATION_17
Specification Type: Parameter Adjustment
Specification Description: The user interface shall enable the adjustment of 'noise4 >> period' through a user interface slider within a range from 0.1 to 10, which affects the smoothness of wave generation in hexagonal layouts, enhancing the visual transition and flow within the hexagon patch.

PARAM_SPECIFICATION_18
Specification Type: Parameter Adjustment
Specification Description: The user interface shall provide a user interface slider for controlling 'Noise >> harmonic gain' with a range from 0.1 to 0.7, allowing users to adjust the shakiness of each hexagon to simulate varying degrees of environmental turbulence within the hexagon patch.

PARAM_SPECIFICATION_19
Specification Type: Color Configuration

Specification Description: The user interface shall include a user interface slider for the 'ramp5_keys' color configuration setting, where users can adjust each type's three channels within a range from 0 to 1 to enhance visual aesthetics or data representation accuracy within the hexagon patch.

System Specifications

SPECIFICATION_1
Specification Type: User Input, System Output
Specification Description: The interface will support a save button that allows the user to specify the desired output format ie. image, or short video, as well as a destination that includes local download and save to user profile options.
Associated Requirement: AG_SYS_REQ_2, AG_SYS_REQ_3, AG_SYS_REQ_4

SPECIFICATION_2
Specification Type: System Output
Specification Description: The web application will take user web cam data as input and generate various stylized, data-specific outputs. The generated output will be a creative representation of environmental data, using color, motion, and intensity to represent various trends in the data.
Associated Requirement: AG_ART_REQ_1

SPECIFICATION_3
Specification Type: System Output
Specification Description: The user will have the ability to choose from multiple environmental datasets including global temperature, water level, precipitation rates, etc… which will each generate different data-specific outputs that reflect creative renderings of the environmental data trends.
Associated Requirement: AG_ART_REQ_2

SPECIFICATION_4
Specification Type: System Setting
Specification Description: The main user interface will be a web application that takes user inputs through user panel and generate outputs(image/video) accordingly
Associated Requirement: AG_ART_REQ_3

SPECIFICATION_5
Specification Type: System Output
Specification Description: The interface will generate texts explaining how we generate the outputs(which dataset is employed) and the meaning behind them(what's the environmental or social impact) base on user's dataset choice
Associated Requirement: AG_ART_REQ_4

SPECIFICATION_6
Specification Type: User Input
Specification Description: The interface will include a user panel such that the user can adjust parameters or choosing between datasets to generate specific output they desire
Associated Requirement: AG_ART_REQ_5

SPECIFICATION_7
Specification Type: Data security
Specification Description: User data retrieved through Google OAuth SHALL not be exposed to unauthorized users.
Associated Requirement: AG_SEC_REQ_1

Frontend Specifications

User Interface

user-page:

SPECIFICATION_1
Specification Type:
Specification Description: Saved artwork is prominently displayed as either a grid or slider of thumbnails.
Associated Requirement: AG_UI_REQ_7

SPECIFICATION_2
Specification Type:
Specification Description: Clicking on a thumbnail of generated art will open up a media view that plays the video or displays the screenshot, depending on which media form the art was saved as.
Associated Requirement: AG_UI_REQ_7

SPECIFICATION_3
Specification Type:
Specification Description: Saved artwork slider is only activated/available when the user page has enough saved art pieces to slide across the screen continuously without repeats at any given time.
Associated Requirement: AG_UI_REQ_7

SPECIFICATION_4
Specification Type:
Specification Description: When an artwork is being viewed, the user can select a button to view the metadata associated with originally generating the selected artwork.
Associated Requirement: AG_UI_REQ_8

SPECIFICATION_5
Specification Type:
Specification Description: A “sign out” button on the page allows users to log out of their current profile home and return to the app landing page.
Associated Requirement: AG_UI_REQ_6

SPECIFICATION_6
Specification Type:
Specification Description: While viewing a specific artwork, users can return to the user page with a close button that exits the current media view.
Associated Requirement: AG_UI_REQ_7