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Animator: HUD

VS Visualizer supports Heads-Up Display (HUD) elements that overlay the rendered simulation scene. They are useful in displaying pertinent information relating to the dynamic vehicle properties or events of the simulation itself.

VS Visualizer HUD elements are built with specific VS Visualizer commands. These are documented in Chapter 13 in the VS Visualizer Reference Manual. The commands allow for a rich and varied set of HUD elements to be designed and implemented.

These commands, however, can be difficult to use. As a result, a graphical screen was developed to allow for the rapid development of some of the more common HUD elements.

The HUD development screen allows for the selection, placement, sizing, titling, coloration (if applicable), and interfacing of a variety of HUD elements. It also allows for the creation of text-only HUD elements, and novel HUD elements, including the use of user-supplied images for icons. The output of the HUD development screen are the VS Visualizer commands that would be used to create the selected HUD elements.

HUD Screen Overview

A HUD object is selected. It is then parameterized for location, size, color and titling. The user can also specify their own variables to provide values to the objects. Default variables are also available for some of the objects.

A representation of the object appears in the preview screen so the user can assemble and review a grouping of objects for a simulation. A simulation can make use of multiple HUD element screens, but some of the objects might overlap without coordinating the separate screens.

As mentioned above, the HUD interface simply outputs HUD Element visualizer commands that are part of the visualizer interface. The commands used to create each object can be seen by reviewing the .par file generated by the HUD screen. Although the HUD Screen tries to accommodate most user HUD element needs, it is possible that a complex object may need to be built using native commands. This can always be done using a general text screen.

The HUD objects are aligned to some edge of the screen (left center, right top, etc.) or its center. When the simulation screen is expanded on changed in size, the HUD objects will move with their aligned edges. The HUD objects do not change size when the simulation screen changes size.

There are about twenty different HUD objects that can be selected. The user can also select a text output and a generic alert object to perform a novel alert function with a user-supplied graphic.

HUD Object Choices

A variety of different HUD objects can be selected with the interface. The available HUD objects can be separated into four basic groups; Gauges, Alerts, Text, and Other.

Gauges are objects when provide some graphical measure of an output or variable. This includes the throttle (expanding colored line), the brake light (intensity varying light), various speedometers and a tachometer (needle movement), and the G-G diagram (movement of a mark on a 2D surface, based on two input variables). These all have default variables driving them, but they can also use variables designated by the user.

Alerts are icons which become visible when some variable changes. This is often due to an event such as a lane crossing or object detection in a blind spot. Alerts supported include ACC alerts, Blind Spot alerts, ESC alert, 4WD indicator, Lane Departure alerts, and a Generic (user-defined) alert.

Text objects are simply written words that can be sized, colored, and located on the simulation screen. The text to be presented is entered via the Title text box. No variable is associated with this HUD object, but if the user enters one, then the value of this variable will be written to the right of the title text (if present) on the simulation screen.

Other HUD objects include the No HUD Object Selected and the Rear View Mirror. Deselecting an object is useful for the user to temporarily remove an object for a simulation. The Rear View Mirror is used to present some other view of the simulation on the screen. A camera definition is used as the variable in the Rear View Mirror object.

HUD Screen Details

The HUD development screen allows for up to 5 elements to be added to the display. Multiple screens (links) can also be applied to the same display. The native HUD element commands can also be applied to a display that is using the HUD development screen(s).

The **Animator: HUD** screen (Figure 1) is used to define a grouping of HUD elements that can be used for various simulations.

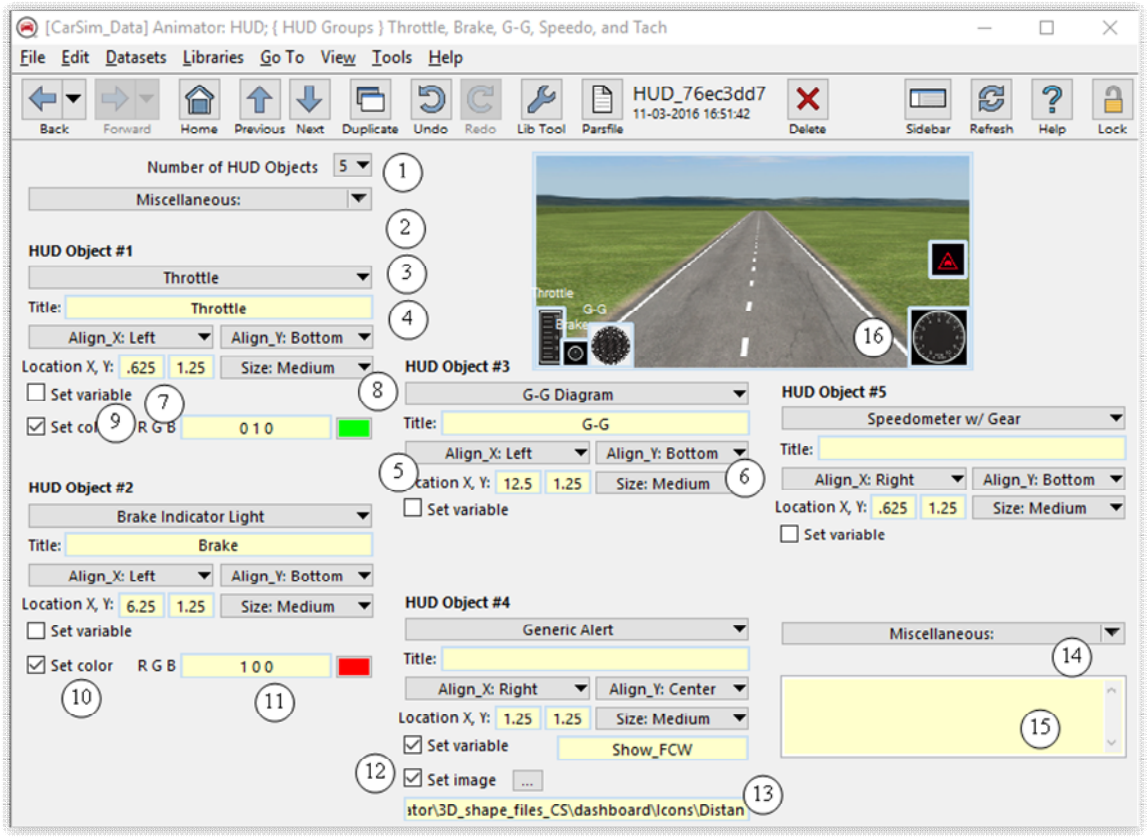

Figure 1. The Animator HUD screen.

(1) This control selects the number of HUD objects (1-5) to be used in the display. Based on the number selected, a number of input sets will become visible.

(2) Field for preliminary information related to the HUD objects. Any links or VS commands placed in this field will be executed before the VS Visualizer commands created by the screen to support the HUD elements. An additional Miscellaneous field ((14)) and yellow field ((15)) are also available for commands to be executed after the HUD objects are defined.

(3) This control selects the HUD object to be used. The drop-down selector allows about twenty different HUD element options for display. Some options allow for one or more additional controls for that object to be available. After selection, a small version of the HUD object will appear in the preview screen ((16)).

(4) This text box allows for an optional title to be displayed along with the icon itself. In the case of the text output HUD option, then the title is the text to be displayed, followed (optionally) by the value of the variable selected.

(5) This control selects the general X alignment (horizontal) of the HUD object to be displayed. The options are align left, align center, and align right.

(6) This control selects the general Y alignment (vertical) of the HUD object to be displayed. The options are align top, align center, and align bottom.

(7) These fields allow for more specific adjustment of the HUD object in X and Y (horizontal and vertical). The values represent the percent of the display width or height the HUD object should be adjusted. (Since the display is nominally twice as wide as it is high, the horizontal percentage needs to be twice as large for the same offset.) The adjustment is made with respect to the specified alignment, so a one percent adjustment for an object aligned to the top will move the object downward, and a one percent adjustment for an object aligned to the left will move the object to the right. Center alignments react to adjustments by moving to the right (horizontal) and upward (vertical).

(8) This control selects the overall size of the HUD object. The options are small, medium, large, and scale. If scale is selected, then a field text box allows for the user to set a specific size as a proportion of the medium-sized object (1.0 = 100%). The small and large objects are 66% and 133% of the medium object respectively.

(9) This check box allows the user to set the variable affecting the HUD object. The HUD objects have default variables that work in most circumstances, but sometimes a user-defined variable is needed. If selected, the variable text box allows for a new variable to be entered. To see the default variable used by a HUD object, right-click on the HUD object selection ((3)).

(10) This check box allows the user to set the color of the HUD object, if applicable. Some HUD objects (throttle, brake lights, others) can be altered with a color choice from the user. If selected, a color field will appear for the color selection.

(11) This is the color field that appears if the Set Color ((10)) check box is selected.

(12) As with the color option, some HUD objects allow for a user-specified image. This is useful if the user would like to use their own graphics for an ESC Alert or Blind Spot Alert (for example). If selected, a browser field will appear as will a text box for manual entry of an image file name, if desired.

(13) This is the text for the user-specified image. If the image is selected via the bowser field, the image name and path will still appear in the text box. Most image formats (.png, .jpg, .bmp, etc.) are supported.

(14) This is an additional miscellaneous field text box allows for commands to be executed after the HUD objects are defined. Another miscellaneous field is available at ((2)).

(15) This is a general yellow text box to allow for commands to be executed after the HUD objects are defined.

(16) The preview screen represents the placement and scale of the HUD objects on the simulation screen. The exact placement of the objects is verified by viewing the simulation screen itself.