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# LUA SCRIPTING MOD USER MANUAL

*NOTE: ENGLISH IS NOT MY PRIMARY LANGUAGE. THIS MANUAL CAN CONTAIN **A LOT OF** SPELLING MISTAKES. I ALSO DON'T KNOW HOW TO WRITE USER MANUALS. THIS IS A VERY BAD MANUAL TO BE HONEST. BETTER SEE EXAMPLES PROVIDED IN STEAM WORKSHOP PAGE. ENJOY!*

## INTRODUCTION

This mod provides the ability to create and run Lua scripts in game without any compilation process with multiplayer support allowing you to create much more complex machines. Scripts can only control local player machine; they do not affect the level or other players machines in any way.

Big thanks to the authors of UniLua.

### Quick summary of all available libraries

BASE LIBRARIES

| | |
|---|---|
| _G | Base module. |
| package | Loading other libraries, creating and using modules. |
| coroutine | Performing async tasks. |
| table | Functions to manipulate tables as arrays. |
| io | Removed. |
| time | Time (Game time, not OS time). |
| string | Functions to manipulate strings. |
| bit32 | Bitwise operations. |
| math | Common math functions. |
| debug | Traceback. |
| enc | Encoding and decoding. |

MOD LIBRARIES

| | |
|---|---|
| gui | Creating in-game GUI based on UnityEngine.GUI. |

| | |
|---|---|
| rect | Creating rectangles for GUI based on UnityEngine.Rect. |
| vector | Functions to manipulate vectors up to 4 dimensions based on UnityEngine.Vector4. |
| machine | Functions to manipulate player local machine. |
| input | Reading player direct input: keyboard, mouse, joysticks. |
| cursor | Enabling and disabling cursor. |
| physics | Ray casting and sphere overlapping based on UnityEngine.Physics. |

## USEFUL LINKS

- Lua 5.2 Reference Manual.
- Unity – Manual: Order of execution for event functions.
- UnityEngine.GUI.
- Unity – Scripting API: Vector4.
- Unity – Scripting API: Rect.
- Unity – Scripting API: Input.
- Unity – Scripting API: Physics.

## WHAT EXACTLY DOES MOD DO?

- When you load a machine or create a new one mod will automatically load it`s LuaRoot files if it has them. Otherwise, it will create a new LuaRoot inside this machine.
- LuaRoot is a folder where all Lua files and directories are stored. You can access this folder by pressing “Open LuaRoot Folder” in mod menu.
- When you run the simulation of your machine mod will run the script called “main.lua” and if everything started without critical errors then mod will save LuaRoot into machine.
- When you save your machine, this saved data will also be included into a save file. You also can save LuaRoot manually by pressing “Save LuaRoot manually”.
- Machine script contains all base unity calls. There are short descriptions for all of them inside default script file.

# QUICK SUMMARY OF THE MOD

- There are main functions: play, update, late_update, fixed_update and on_gui. Each has its own purpose. See Unity Scripting API about it.
    - Play called on simulation start. Most ly useless.
    - Update called each frame update. Used to get player input.
    - Late Update called after frame update.
    - Fixed Update called fixed times per second. Used for physics and so. Put all your cool code here.
    - On GUI called only to draw GUI on screen.
- You can emulate keys by creating a new key emulator:

  ```
  local some_key_emulator = machine.new_key_emulator('c')
  ```

  Starting and stopping emulation by:

  ```
  some_key_emulator.start()
  some_key_emulator.stop()
  ```

  Or just run it one time:

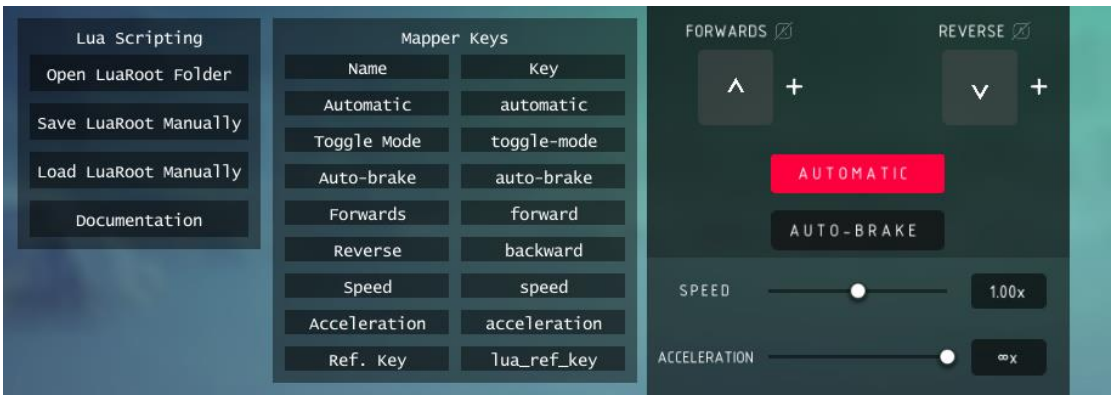
  ```
  some_key_emulator.click()
  ```

- You can change slider values by creating new reference controller. Firstly, you need to assign reference keys to blocks in block mapper. Don't forget to enable automatic mode because you are just changing speed, not forcing wheel to spin.


  Create reference controller:

  ```
  local rotor = machine.get_refs_control('rotor')
  ```

  Find how your slider is called, you can find its name by both enabling mod menu (Ctrl+L) and opening block mapper:




Here we have “Speed” slider called “speed”. It is necessary because “Power” may be called “strength”.

So begin changing slider values somewhere:

```
rotor.set_slider('speed', 0.5)
```

- You can get block position by getting block info by reference key. Block info is given by machine info, not just by machine because you can get machine info of other players machines.

```
local machine_info = machine.get_machine_info()
local starting_block = machine_info.get_block_info(0)
local position = starting_block.position()
```

Other player machine info:

```
for i = 0, players.count() do
      local other_player_mi = machine.get_machine_info(i)
      launch_rocket_at(other_player_mi.get_block_info(0).position())
end
```

- You can cast rays:

```
  local raycast_start = vector.add(starting_block.position(),
vector.multiply(starting_block.up(), -0.5))
  local raycast_direction = vector.multiply(starting_block.up(), -1)
  local raycast_hit = physics.raycast(raycast_start, raycast_direction)
```

- You can get all colliders in specified radius:

```
local colliders = physics.overlap_sphere(starting_block.position(), 5)
for i in pairs(colliders) do
      print(colliders[i].is_block)
end
```

- Draw lines:

```
local line = lines.new_line_renderer()
line.set_points(vector.new(0, 0, 0), vector.new(10, 10, 10))
```

- I`ll be happy to add suggested features!

# LUA TABLES

There is no such thing in this Lua interpreter used in mod as object-oriented programming, but there are tables! Tables allows to store values or even functions, so they are used as objects. However, remember: there are no references, only new tables every time (reference support WIP).

## Rectangle

| field | type |
|---|---|
| **x** | int |
| **y** | int |
| **width** | int |
| **height** | int |

## Vector

| field | type |
|---|---|
| **x** | number |
| **y** | number |
| **z** | number |
| **w** | number |

## Key Emulator

| field | type |
|---|---|
| **start** | function (no args; void) |
| **stop** | function (no args; void) |
| **click** | function (no args; void) |
| **active** | function (no args; returns boolean) |

## Refs Controller

| field | type |
|---|---|
| **set_slider** | function (args: string mapper_key, number value; void) |

## Block Info

| field | type |
|---|---|
| **position** | function (no args; returns table (vector)) |
| **forward** | function (no args; returns table (vector)) |
| **right** | function (no args; returns table (vector)) |
| **up** | function (no args; returns table (vector)) |
| **rotation** | function (no args; returns table (vector)) |
| **being_vacuumed** | function (no args; returns boolean) |
| **id** | function (no args; returns int) |
| **build_index** | function (no args; returns int) |
| **health** | function (no args; returns number) |
| **burning** | function (no args; returns boolean) |
| **flipped** | function (no args; returns boolean) |
| **frozen** | function (no args; returns boolean) |
| **in_wind** | function (no args; returns boolean) |
| **destroyed** | function (no args; returns boolean) |
| **zero_g** | function (no args; returns boolean) |
| **original_mass** | function (no args; returns number) |
| **scale** | function (no args; returns table (vector)) |

| | |
|---|---|
| **velocity** | function (no args; returns table (vector)) |
| **angular_velocity** | function (no args; returns table (vector)) |

## Machine Info

| field | type |
|---|---|
| **get_block_info (local machine only)** | function (args: string ref_key, int index_of_all (optional); returns table (block info)) |
| **get_block_info (both local and another player`s machine)** | function (args: int build_index (optional); returns table (block info)) |
| **block_count** | function (no args; returns int) |
| **cluster_count** | function (no args; returns int) |
| **center** | function (no args; returns table (vector)) |
| **mass** | function (no args; returns number) |
| **middle** | function (no args; returns table (vector)) |
| **name** | function (no args; returns string) |
| **player_id** | function (no args; returns int) |
| **position** | function (no args; returns table (vector)) |
| **rotation** | function (no args; returns table (vector)) |
| **velocity** | function (no args; returns table (vector)) |
| **angular_velocity** | function (no args; returns table (vector)) |
| **size** | function (no args; returns table (vector)) |
| **unbreakable** | function (no args; returns boolean) |
| **infinite_ammo** | function (no args; returns boolean) |
| **is_dragging_blocks** | function (no args; returns boolean) |
| **team** | function (no args; returns int) |

## Raycast Hit

| field | type |
|---|---|
| **distance** | number |
| **point** | table (vector) |
| **normal** | table (vector) |
| **is_block** | boolean |
| **get_block_info** | function (no args; returns table (block info)) |

## Collider

| field | type |
|---|---|
| **is_block** | boolean |
| **get_block_info** | function (no args; returns table (block info)) |

## Line Renderer (WIP)

| field | type |
|---|---|
| **set_points (multiple arguments possible, still don’t figured out how to pass vector array as argument)** | function (table (vector) start, table (vector) end; void) |
| **set_width** | function (number start_size, number end_size; void) |
| **set_color** | function (table (vector) color; void) |

# MOD LIBRARIES

Functions from UnityEngine were renamed in order to follow Lua style and make code cleaner and prettier. Basically: "`GUI.DragWindow()`" changes to "`gui.drag_window()`".

Warning! Every time when a function returns table it creates a **new** table, not returns a reference to a table, so don't get big tables such as machine info in update loop as these tables uses functions to get values, not stores values itself.

## Rectangle

`rect`

Used by GUI library.

| function | arguments | return values |
|---|---|---|
| **new** | int x (optional), int y (optional), int width (optional), int height (optional) | table (rectangle) |

## Graphical user interface

`gui`

Mod GUI library is based on UnityEngine.GUI class except for some functions where arguments were changed. See Unity Scripting API about GUI in Useful Links.

| function | arguments | return values |
|---|---|---|
| **label** | table (rectangle) position, string text | |
| **button** | table (rectangle) position, string text | boolean |
| **begin_group** | table (rectangle) position | |
| **begin_scroll_view** | table (rectangle) position, table (vector) scroll_position, table (rectangle) view_rect | |
| **box** | table (rectangle) position, string text | |
| **bring_window_to_front** | int window_id | |
| **bring_window_to_back** | int window_id | |
| **drag_window** | | |
| **end_group** | | |
| **end_scroll_view** | | |
| **focus_control** | string name | |
| **focus_window** | string name | |
| **get_name_of_focused_control** | | string |
| **horizontal_scrollbar** | table (rectangle) position, number value, number size, number left_value, number right_value | number |

| | | |
|---|---|---|
| **horizontal_slider** | table (rectangle) position, number value, number left_value, number right_value | number |
| **modal_window (arguments are changed)** | int id, table (rectangle) client_rect, string text, function (args: int window_id; void) | table (rectangle) |
| **password_field** | table (rectangle) position, string password, char mask | string |
| **repeat_button** | table (rectangle) position, string text | boolean |
| **scroll_to** | table (rectangle) position | |
| **selection_grid** | table (rectangle) position, int selected, table (string array) texts, int x_count | integer |
| **set_next_control_name** | string name | |
| **text_area** | table (rectangle) position, string text | string |
| **text_field** | table (rectangle) position, string text | string |
| **unfocus_window** | | |
| **vertical_scrollbar** | table (rectangle) position, number value, number size, number top_value, number buttom_value | number |
| **vertical_slider** | table (rectangle) position, number value, number top_value, number buttom_value | number |
| **window (arguments are changed)** | int window_id, table (rectangle) client_rect, string title, function (args: int window_id; void) | table (rectangle) |

# Vector

vector

Basic Vector4 library based on UnityEngine.Vector4. See Unity Scripting API about Vector4 in Useful Links.

| function | arguments | return values |
|---|---|---|
| **new** | int x (optional), int y (optional), int z (optional), int w (optional) | table (vector) |
| **distance** | table (vector) a, table (vector) b | number |
| **dot** | table (vector) a, table (vector) b | number |
| **lerp** | table (vector) a, table (vector) b, number t | table (vector) |
| **lerp_unclamped** | table (vector) a, table (vector) b, number t | table (vector) |
| **magnitude** | table (vector) a | number |
| **max** | table (vector) lhs, table (vector) rhs | table (vector) |
| **min** | table (vector) lhs, table (vector) rhs | table (vector) |

| | | |
|---|---|---|
| **move_towards** | table (vector) current, table (vector) target, number max_distance_delta | table (vector) |
| **normalize** | table (vector) a | table (vector) |
| **project** | table (vector) a, table (vector) b | table (vector) table (vector) |
| **scale** | table (vector) a, table (vector) b | table (vector) |
| **add** | table (vector) a, table (vector) b | table (vector) |
| **subtract** | table (vector) a, table (vector) b | table (vector) |
| **negative** | table (vector) a | table (vector) |
| **multiply** | table (vector) a, number b | table (vector) |
| **equals** | table (vector) a, table (vector) b | boolean |

## Machine

`machine`

Full control of local active machine.

| function | arguments | return values |
|---|---|---|
| **new_key_emulator** | string key_code | table (key emulator) |
| **get_refs_control** | string ref_key | table (refs controller) |
| **get_machine_info** | | table (machine info) |
| **get_machine_info** | string nickname | table (machine info) |
| **get_machine_info** | int player_id | table (machine info) |

## Input

`input`

Direct input from player. See Unity Scripting API about Input in Useful Links.

| function | arguments | return values |
|---|---|---|
| **mouse_screen_position** | | table (vector) |
| **mouse_raycast_hit_point** | | table (vector) |
| **get_axis** | string axis | number |
| **get_axis_raw** | string axis | number |
| **get_key** | string key_code | boolean |
| **get_key_down** | string key_code | boolean |
| **get_mouse_button** | int mouse_button | boolean |
| **get_mouse_button_down** | int mouse_button | boolean |
| **get_mouse_button_up** | int mouse_button | boolean |
| **any_key** | | boolean |
| **any_key_down** | | boolean |

## Cursor

`cursor`

Sets cursor visible to false and cursor lock state to locked and back.

| function | arguments | return values |
|---|---|---|
| **set_state** | boolean sate | |

## Physics
`physics`

Physics helper functions. See Unity Scripting API about Physics in Useful Links.

| function | arguments | return values |
|---|---|---|
| **raycast** | table (vector) origin, table (vector) direction | table (raycast hit) |
| **overlap_sphere** | table (vector) origin, number radius | array (collider) |

## Players
`players`

Players info.

| function | arguments | return values |
|---|---|---|
| **count** | | integer |

## Lines
`lines`

Drawing 3D lines (only for local client).

| function | arguments | return values |
|---|---|---|
| **new_line_renderer** | | table (line renderer) |

## Screen
`screen`

Screen info.

| function | arguments | return values |
|---|---|---|
| **width** | | number |
| **height** | | number |
| **fullscreen** | | boolean |
| **dpi** | | number |