

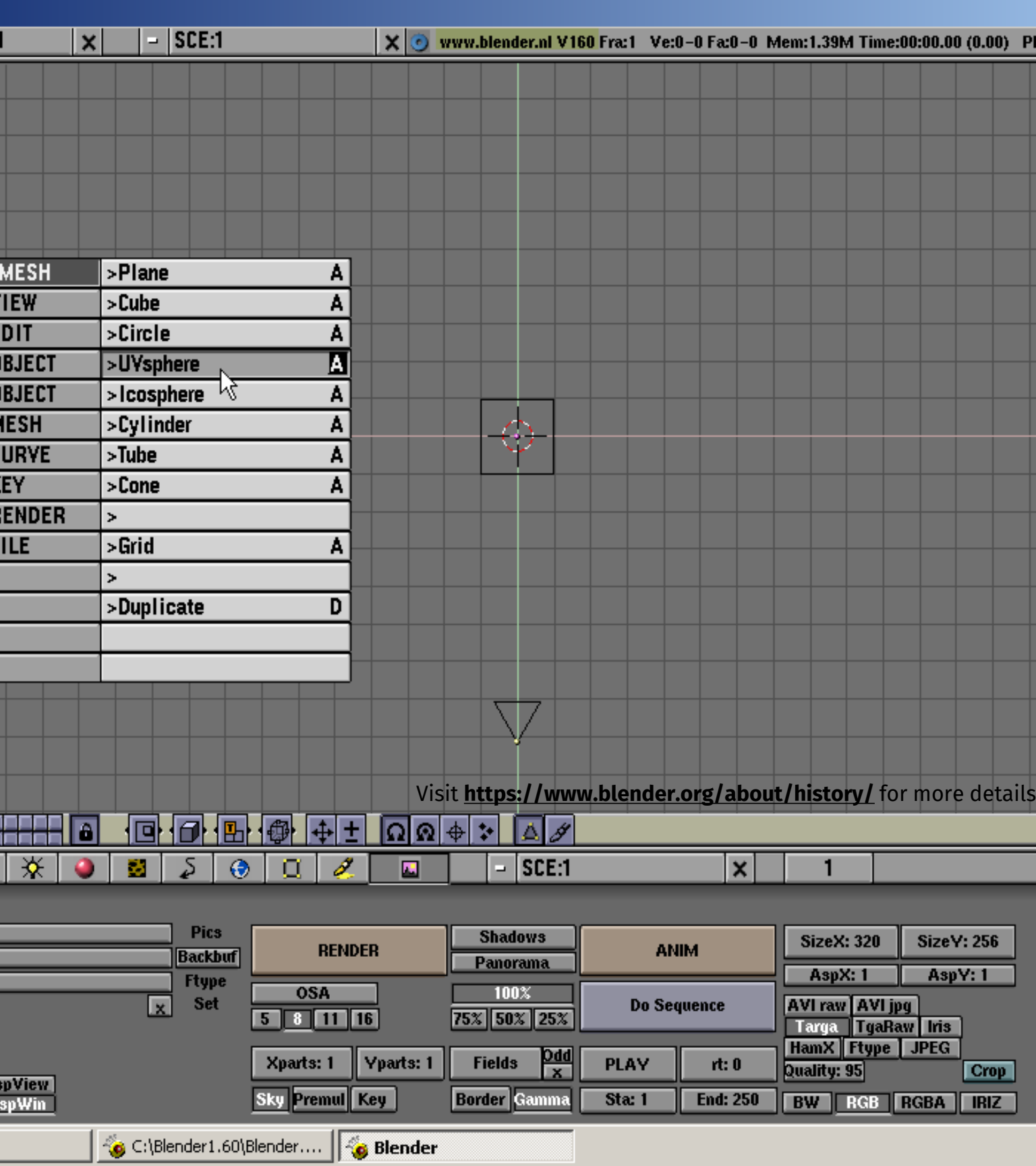
3D Art Using Blender, Python and Plugins

A dive into 3D creativity using Blender, its plugins and Python.

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- Software Engineer
 - currently working on 3D modeling at Arbisoft.
 - Discussion Topic: Art using Blender, Python and Plugins.
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 - <https://www.linkedin.com/in/maryam-fatima-4230051a1/>

What is Blender?



A bit of history

Visit <https://www.blender.org/about/history/> for more details.

ALL BLENDER OPEN MOVIES TILL DATE



2006



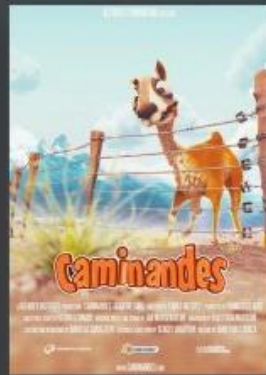
2008



2010



2012



2013



2015



2015



2016



2017



2017



2018



2019



2020



2021

Blender Open Movies





Present-day Blender

Blender is the free and open-source 3D creation suite. It supports the entirety of the 3D pipeline—modeling, rigging, animation, simulation, rendering, compositing and motion tracking, even video editing and game creation.

Blender and Python

Blender has its own Python environment

provides a dedicated Python environment with its interpreter, site packages, and access to Pypi packages.

1

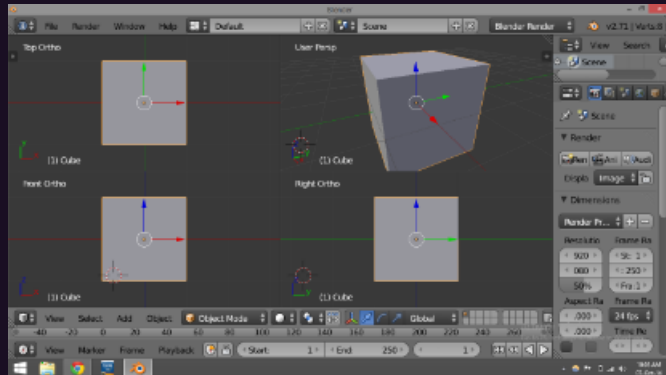
2

Blender Python API

uses Python C API for performance.

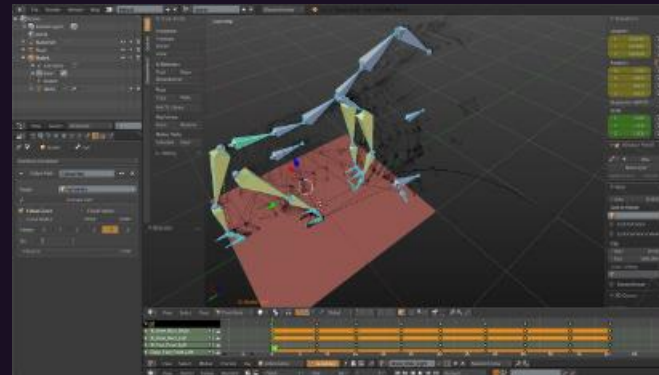
[Blender Python API Docs](#)

Animation



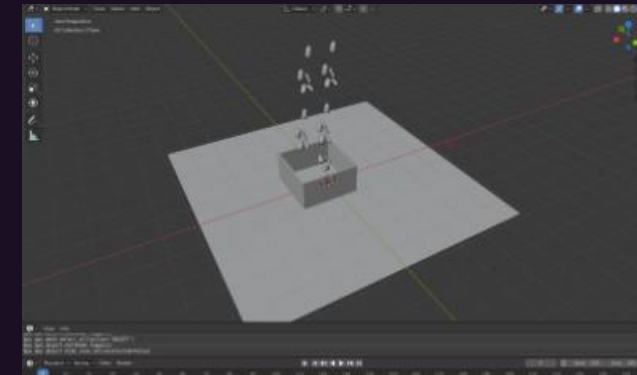
Keyframe Animation

Set key poses at specific points in time to define an object's movement.



Path Animation

Guide objects along a designated path throughout a defined duration.



Physics Simulation

Employ realistic physical properties and laws to animate and enable interactions.

How to Use Scripting

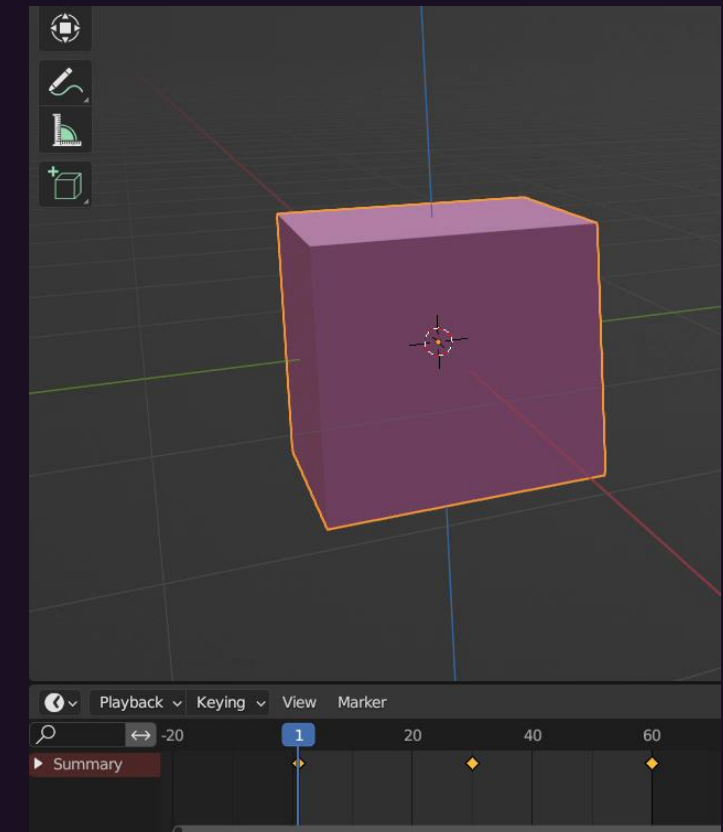


Example Code Snippets

Examples with code snippets and screenshots demonstrating how to use scripting in Blender.

Keyframe Animation Scripting

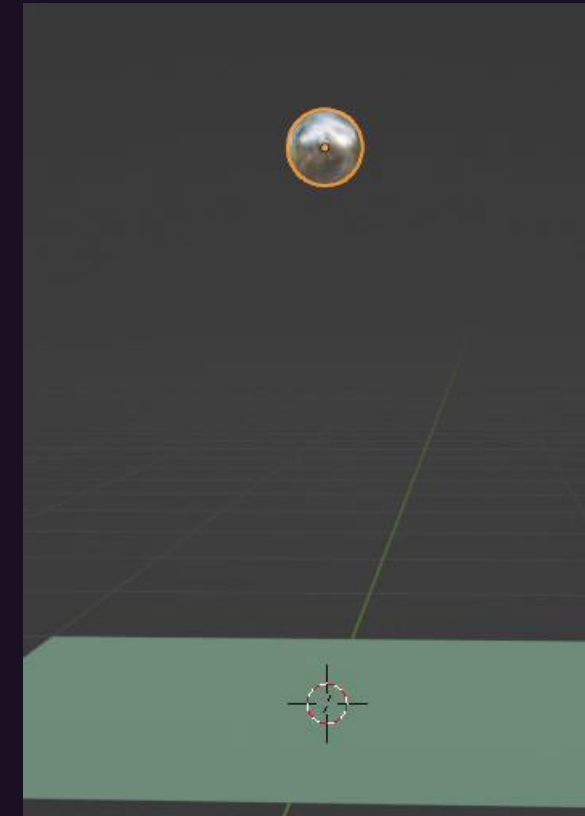
```
1 import bpy
2
3 bpy.ops.object.select_all(action="SELECT")
4 bpy.ops.object.delete()
5
6 # Add a cube
7 bpy.ops.mesh.primitive_cube_add(location=(0, 0, 0), size=1)
8 cube = bpy.context.active_object
9
10 # Rotate the cube at frame 1
11 cube.rotation_euler = (0, 0, 0)
12 cube.keyframe_insert(data_path="rotation_euler", frame=1)
13
14 # Rotate the cube by 180 degrees at frame 30
15 cube.rotation_euler = (0, 0, 3.1415)
16 cube.keyframe_insert(data_path="rotation_euler", frame=30)
17
18 # Rotate the cube by 360 degrees at frame 60
19 cube.rotation_euler = (0, 6.2830, 0)
20 cube.keyframe_insert(data_path="rotation_euler", frame=60)
21
22 # Reset the frame to 1
23 bpy.context.scene.frame_current = 1
24
```



Physics Animation Scripting

Rigid Body

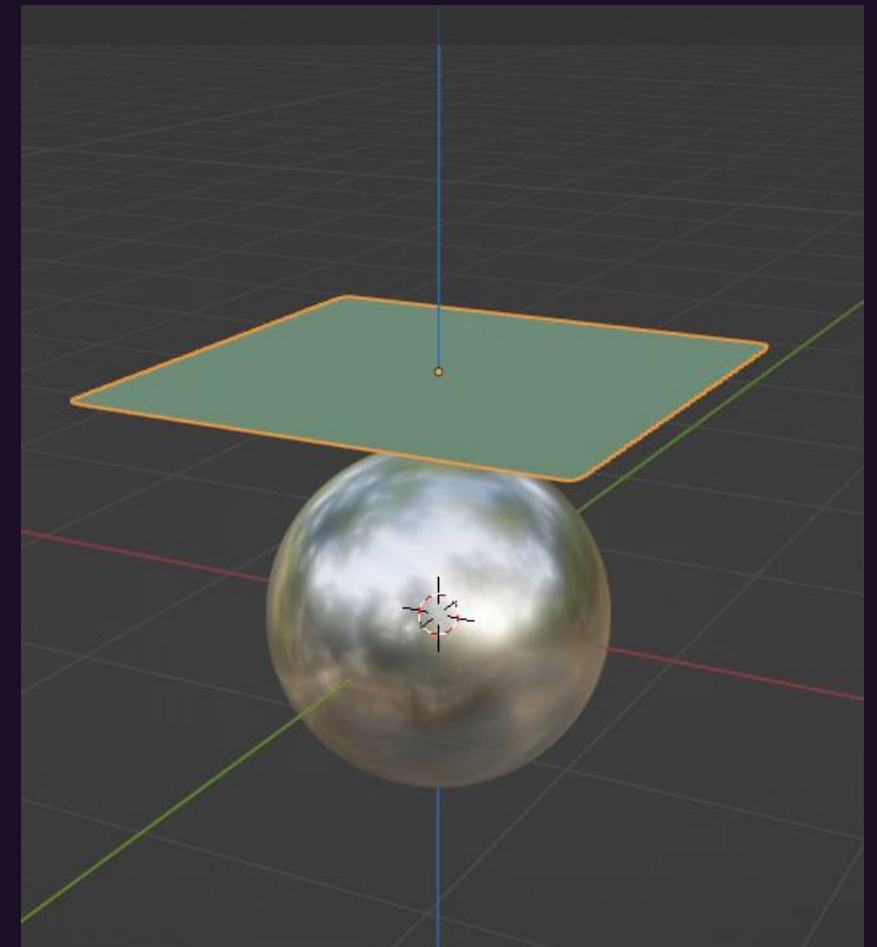
```
1 import bpy
2
3 # Clean the scene
4 bpy.ops.object.select_all(action="SELECT")
5 bpy.ops.object.delete()
6
7 # Add a surface for the ball to bounce
8 bpy.ops.mesh.primitive_plane_add(location=(0, 0, 0), scale=(2, 2, 2))
9 surface = bpy.context.active_object
10
11 # Add physics
12 bpy.ops.rigidbody.object_add()
13 surface.rigid_body.type = 'PASSIVE'
14 surface.rigid_body.friction = 0
15 surface.rigid_body.restitution = 1
16 surface.data.materials.append(bpy.data.materials["Material.001"])
17
18 # Add ball and physics
19 bpy.ops.mesh.primitive_uv_sphere_add(location=(0,0,1.5), radius=0.1)
20 ball = bpy.context.active_object
21
22 bpy.ops.object.shade_smooth()
23 bpy.ops.rigidbody.object_add()
24
25 ball.rigid_body.type = 'ACTIVE'
26 ball.rigid_body.friction = 0
27 ball.rigid_body.restitution = 0.7
28 ball.data.materials.append(bpy.data.materials["Material"])
29
```



Physics Animation Scripting

Cloth Simulation

```
1 import bpy
2
3 # Clean the scene
4 bpy.ops.object.select_all(action='SELECT')
5 bpy.ops.object.delete()
6
7
8 # Create sphere to place cloth on
9 bpy.ops.mesh.primitive_uv_sphere_add(location=(0,0,0), radius=0.7)
10 # Subdivide to add geometry for better interaction with cloth
11 bpy.ops.object.modifier_add(type='SUBSURF')
12 bpy.context.object.modifiers["Subdivision"].levels = 2
13 bpy.ops.object.modifier_add(type='COLLISION')
14
15 bpy.ops.object.shade_smooth()
16 bpy.context.object.data.materials.append(bpy.data.materials["Material"])
17
18 # Add a plane for cloth
19 bpy.ops.mesh.primitive_plane_add(location=(0, 0, 1), size=2)
20 bpy.ops.object.mode_set(mode='EDIT')
21 bpy.ops.mesh.subdivide(number_cuts=20)
22 bpy.ops.object.mode_set(mode='OBJECT')
23
24 # Add cloth modifier and configure
25 bpy.ops.object.modifier_add(type='CLOTH')
26 bpy.context.object.modifiers["Cloth"].collision_settings.distance_min = 0.0001
27 bpy.context.object.modifiers["Cloth"].collision_settings.use_self_collision = True
28 bpy.context.object.modifiers["Cloth"].collision_settings.self_distance_min = 0.0015
29 bpy.context.object.modifiers["Cloth"].settings.quality = 8
30 bpy.context.object.modifiers["Cloth"].collision_settings.collision_quality = 4
31 bpy.context.object.modifiers["Cloth"].point_cache.frame_end = 60
32
33 # Add thickness to cloth using solidify and smoothen it using subdivision
34 bpy.ops.object.modifier_add(type='SOLIDIFY')
35 bpy.context.object.modifiers["Solidify"].thickness = 0.001
36 bpy.ops.object.modifier_add(type='SUBSURF')
37 bpy.context.object.data.materials.append(bpy.data.materials["Material.001"])
38 bpy.ops.object.shade_smooth()
39
40 # Go to start frame
41 bpy.context.scene.frame_current = 1
42
```



Fun Projects

1 Script and Setting Up

Get ready to embark on a fun project by setting up the environment and diving into the script.

2 Render

Experience the joy of rendering your fun project in Blender and witnessing the captivating results.

Scripts

1

```
View Text Edit Select Format Templates generative_art.py
1 import bpy
2 import random
3
4 spacing = 2.2
5
6 bpy.ops.object.select_all(action='SELECT')
7 bpy.ops.object.delete(use_global=False)
8
9 for y in range(10):
10     for x in range(10):
11         location = (x * spacing, y * spacing, random.random() * 2)
12         bpy.ops.mesh.primitive_cube_add(size=2, enter_editmode=False, align='WORLD', location=location, scale=(1, 1, 1))
13
14         item = bpy.context.object
15
16         if random.random() < 0.2:
17             item.data.materials.append(bpy.data.materials["Material"])
18         else:
19             item.data.materials.append(bpy.data.materials["glass"])
20
```

2

```
View Text Edit Select Format Templates cool_triangles.py
1 # Get access to Blender's functionality
2 import bpy
3
4 # Extend python's math functionality
5 import math
6
7 # Create variables used in loop
8 radius_step = 0.1
9 current_radius = 0.1
10 number_traingles = 30
11
12 z_step = 10
13
14 for i in range(1, number_traingles):
15     current_radius = i * radius_step
16     bpy.ops.mesh.primitive_circle_add(vertices=3, radius=current_radius)
17     # Get reference to currently active object
18     triangle_mesh = bpy.context.active_object
19
20     # Rotate mesh aroyund x-axis
21     degrees = 90
22     radians = math.radians(degrees)
23     triangle_mesh.rotation_euler.x = radians
24
25     # Rotate mesh aroyund z-axis
26     degrees = z_step * i
27     radians = math.radians(degrees)
28     triangle_mesh.rotation_euler.z = radians
29
30     # Convert mesh into a curve
31     bpy.ops.object.convert(target='CURVE')
32
33     # Add bevel to curve
34     triangle_mesh.data.bevel_depth = 0.03
35
36     # shade smooth
37     bpy.ops.object.shade_smooth()
38
```

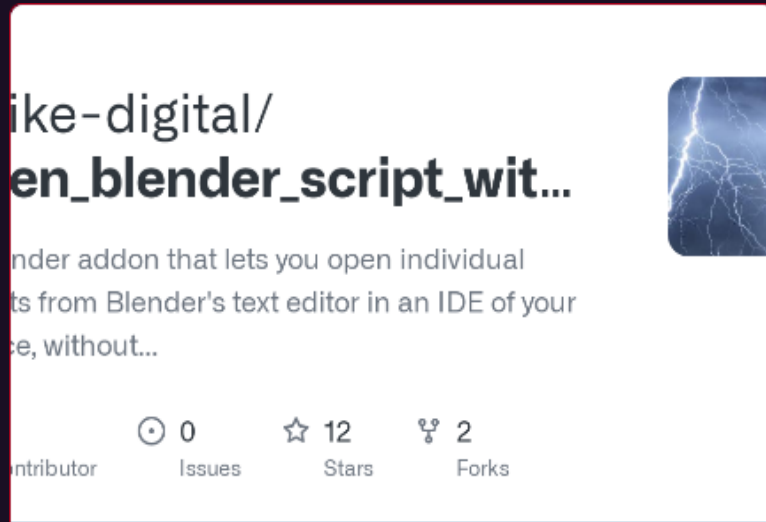

The World of Plugins

enhance and extend blender capabilities



open with IDE

saves time when working on
complex scripts



GitHub - strike-digital/open_blender_script_wit...

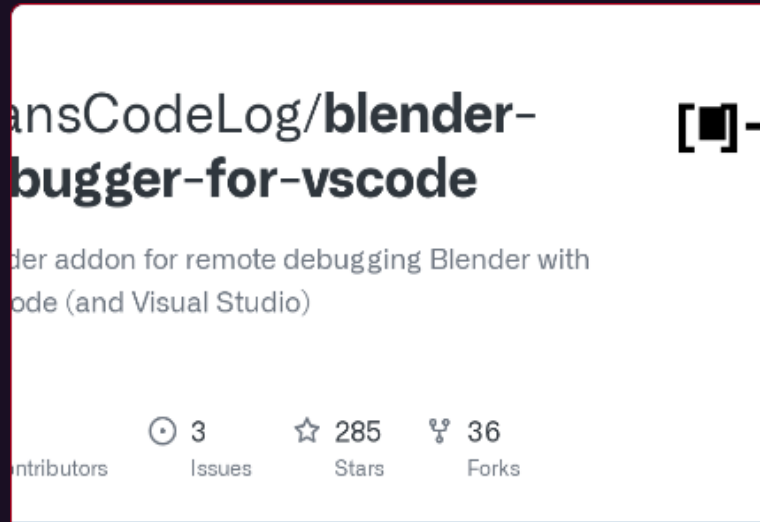
0 Contributors · 12 Issues · 2 Stars · 2 Forks

GitHub - strike-digital/o...
A blender addon that lets you open individual scripts from...



script debugger

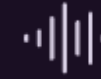
remotely debug python
scripts with vs code and vs



GitHub - AlansCodeLog/blender-debugger-for-vscode

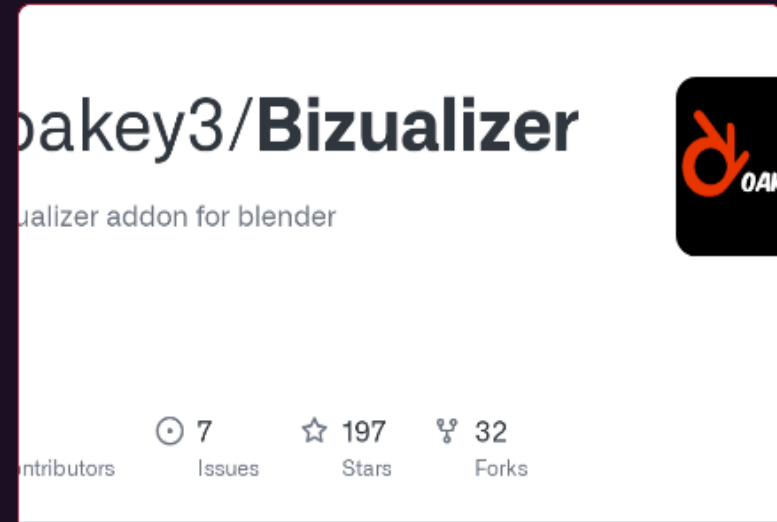
3 Contributors · 285 Stars · 36 Forks

GitHub - AlansCodeLog/...
Blender addon for remote debugging Blender with VS...



music visualizer

animate the objects based
on music



GitHub - doakey3/Bizualizer

7 Contributors · 197 Stars · 32 Forks

GitHub - doakey3/Bizual...
A visualizer addon for blender.
Contribute to...



Biome Reader

BIOME  READER



Gumroad



Biome-Reader

Install, Read, and Scatter any Biomes, Free of Charge. Great for Hobbyists or Beginners!Are yo...



Make Human

makehumancomm
unity/**mpfb2**



MPFB2 is a free and open source human generator for Blender



5

Contributors



49

Issues



236

Stars



28

Forks



GitHub



GitHub - makehumancommunity/mpfb2:...

MPFB2 is a free and open source human generator for Blender -...

and many more...

Where to find: [GitHub](#) [Blender Market](#) [Gumroad](#)

Resources

Here are some valuable resources to explore:



Official Documentation

The official blender documentation references

- [Blender Official Website](#)
- [Blender Documentation](#)



Tutorials and Courses

Online tutorials and course materials

- [YouTube : Blender Guru](#)
- [Blender Python Tutorials](#)



Communities and Forums

Communities for Blender users and developers

- [Blender Artists Community](#)
- [Blender Stack Exchange](#)

Interested in Learning Blender?

Watch The BEST way to learn Blender in 2024 by CG Obaid

Questions