**ΑΤΟΜΙΚΗ ΕΡΓΑΣΙΑ**

**ΓΡΑΦΙΚΑ ΥΠΟΛΟΓΙΣΤΩΝ**

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Τμήμα Μηχανικών Πληροφορικής και Ηλεκτρονικών Συστημάτων, ΔΙ.ΠΑ.Ε.

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**ΕΙΣΑΓΩΓΗ**

Το αντικείμενο της εργασίας είναι η δημιουργία μιας τρισδιάστατης σκηνής (low poly) με τη χρήση του προγράμματος Blender, με θέμα «Mountain House».Η σκηνή αποτελείται από το landscape στο οποίο έχουν τοποθετηθεί τα εξής:

* Βουνά
* Δέντρα
* Λίμνη
* Σπίτι
* UFO
* Πέτρες
* Ομίχλη
* Φώτα
* Background image
* Human 3D Model

Παρακάτω γινέται αναλυτική αναφόρα για την δημιουργία του κάθε αντικειμένου και πως υλοποιήθηκαν τα κριτήρια.

**Mountains and Lake**

Add Plane

Scale up

Subdivide

Enable Proportional Edit and Grab vertices to create mountains

Add different material colors to distinguish ground, mountains and snow with texture painting

Add plane for lake

Scale and move to place

Adjust Color and Roughness to low value from Material Properties to create high reflectivity effect for the surface

**House Frame**

Add Cube and cut in half

Add Mirror Modifier

Scale up and modify to a house-like shape

Add Loop Cuts and delete faces to create door and windows

Material Properties -> Settings -> Displacement and change to Displacement and Bump

Use node wrangler to set up the displacement mapping

Open Normals, Roughness, Displacement, Metalness and Colors images

Smart UV Unwrap

Add Subdivision Surface Modifier, check Simple and Adaptive Subdivision

Set Dicing Scale and Levels Viewport

Adjust Midlevel and Scale from Displacement node and Strength from Normal map node

Adjust Location and Scale from Mapping node

**Roof**

Select top vertices from house frame

Copy and Separate to new object

Merge extra vertices

Select all and Extrude to z axis for thickness

Move down to z axis to place on top of house frame

Select all and Recalculate Normals

Material Properties -> Settings -> Displacement and change to Displacement and Bump

Use node wrangler to set up the displacement mapping

Open Normals, Roughness, Displacement, Metalness and Colors images

Smart UV Unwrap

Add Subdivision Surface Modifier, check Simple and Adaptive Subdivision

Set Dicing Scale and Levels Viewport

Adjust Midlevel and Scale from Displacement node and Strength from Normal map node

Adjust Location and Scale from Mapping node

**Chimney**

Add Cube on roof

Scale z axis and place

Select top face and Inset for thickness

Extrude down

Material Properties -> Settings -> Displacement and change to Displacement and Bump

Use node wrangler to set up the displacement mapping

Open Normals, Roughness, Displacement and Colors images

Smart UV Unwrap and custom faces Unwrap

Add Subdivision Surface Modifier, check Simple and Adaptive Subdivision

Set Dicing Scale and Levels Viewport

Adjust Midlevel and Scale from Displacement node and Strength from Normal Map node

Adjust Location and Scale from Mapping node

**Floor**

Add Plane

Scale to fit size

Extrude z axis for thickness

Move to place

Adjust Material Properties (color)

Select all and Recalculate Normals

**Windows-Door Frames**

Select vertices, copy and Separate to new object

Scale up

Move back

Extrude to front for thickness

Select all, Extrude and Scale down

Move to place

Select all and Recalculate Normals

**Windows Glass Transparent**

Add Plane

Scale down to size

Move to place

Create New Material Glass BSDF

Adjust Roughness

**Door Handle**

Add Circle to door

Change vertices number

Scale down

Rotate and move to place

Extrude and Scale to final shape

Fill last face

Shade Smooth

Add Subdivision Surface Modifier

Add some Loop Cuts for finer shaping

Adjust Metalness, Roughness and Color to create a reflective metal feel

Select all and Recalculate Normals

**Trees**

Add Plane

Scale to zero and Merge vertices

Extrude vertices to form tree shape and branches

Add Skin Modifier

Add Subdivision Surface Modifier and Shade Smooth

Add UV Sphere

Scale to size

Grab and Proportional Edit to shape

Add Decimate Modifier for low poly look

Move to place

Adjust Material Properties (color)

Copy and make more

Select all and Parent together

**Rocks**

Add UV Sphere

Add Decimate Modifier

Adjust Color and Roughness

Add Noise Texture and Color Ramp nodes

Adjust Settings

**UFO**

Add UV Sphere and Scale to disk shape for main body

Add second UV Sphere for the glass

Apply Subdivision Surface Modifier to both

Add Boolean Modifier for second UV Sphere and delete extra faces from the lower part

Add Solidify Modifier for second UV Sphere and change Thickness

Add Subdivision Surface Modifier for second UV Sphere and change Viewport and Render values

Shade Smooth

Add third UV Sphere for lights, Scale and place and duplicate to the main body edge perimeter and Add Subdivision Surface Modifier and Shade Smooth

Add Glass Shader for UFO glass part

Add Emission Shader for UFO lights

Add Glossy Shader, Noise Texture and Color Ramp nodes for main body and adjust values

Add Glass Shader for UFO ring light part

**Lights**

Add Spot Light behind mountains to imitate aurora lights

Add Spot Light to right side for extra lighting

Add Area Light on top side for extra lighting

Add Area Light near UFO for reflection effect

Add Spot Light under UFO for beam effect

Add Spot Light for Background Image lighting

Add Point Light inside house

Adjust Color, Power and Radius

Apply Denoise from Render Properties

**Fog**

Add Cube

Scale and move to place

Create New Material -> Shader -> Principled Volume

Add Noise and Map Range Texture nodes

Adjust Emission, Strength and Settings

Add second fog box Cube under UFO for beam light effect to work with Cycles

**Background Image as Plane**

Enable Import Images as Plane addon

Add New Image as Plane

Scale and move to place

**Chimney Smoke Physics Animation**

Add Cylinder as Flow Object, Scale and place inside chimney

Add Cube as Domain Object, Scale and place to chimney

Select Cube and select Fluid in Physics tab and change Type to Domain

Select Cylinder and select Fluid in Physics tab and change Type to Flow, change Flow Behavior to Inflow, adjust Initial Temperature and Surface Emission, enable Texture

Create New Texture, set Type to Clouds, increase Contrast

Go to Physics tab and select the Cloud Texture and add a keyframe to first frame in offset value 0 and another keyframe to last frame in offset value 1.5

Select Domain Object and set Resolution Division to 160, Time Scale 0.02, enable Adaptive Domain, set Threshold to 0.001, set Heat to 1.5, enable Dissolve and set Time to 30, set end frame to 480, Type to Modular and enable Is Resumable

Add Force Field Wind and place to give smoke a direction, set Strength to 0.5 and Flow to 0

Select chimney -> Physics tab -> set Fluid -> set Type Effector

Bake Data

Set Domain material nodes -> add New Material -> delete Principled BSDF -> add Emission node, Volume Info, Light Path, Multiply and Color Ramp, connect them and adjust settings

**Keyframes Animation**

Import human 3D Model

Add Texture Image node and connect the Colors Image

Use Rigify to create human meta rig, Scale and modify to fit human, apply All Transform and Generate Rig

Select UFO Beam Spot Light and insert keyframes on its power value and place on the timeline to specify the ON/OFF duration

Select Human Metarig and insert keyframes on location, rotation and scale for each body part to create motion

Select UFO and Camera and insert keyframes on location, rotation and scale for each change on the timeline

Render animation

**ΕΡΓΑΛΕΙΑ**

Παρακάτω εμφανίζονται όλα τα εργαλεία που χρησιμοποιήθηκαν για την δημιουργία της εργασίας.

* Blender 3.5 (using Cycles render engine)
* Rigify (Blender built-in addon)
* Node Wrangler (Blender built-in addon)
* Import Export: Import Images as Planes (Blender built-in addon)
* 3D Model <https://sketchfab.com>
* Material Textures <https://ambientcg.com>
* Background Image <https://www.pexels.com>
* Microsoft Office Word