

Welcome to the Presentation on
Blender 3D

Presented By:

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BLENDER 3D



INTRODUCTION

- Blender is an open source 3D graphic software developed by means of a wide public collaboration between individual artists, scientists, students, etc...



Characteristics:

- Open Source

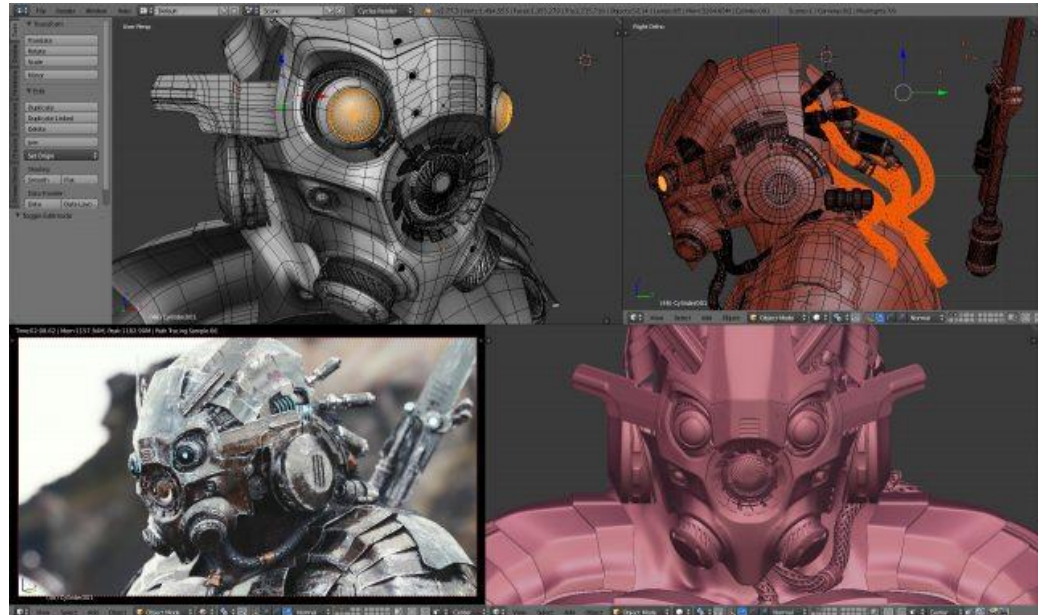
Every one can contribute in implementing new add-ons, libraries and plugins.

This spread-out cooperation all over around the world allows Blender to be always updated and optimized for supporting the entire pipeline, from the 3D environment creation – modelling/rigging objects – up to video/image rendering and game characters creation.

- Wide development of Mesh, polygons, interpolators, etc..

Thanks to the several gaming applications and character generation, a huge amount of geometrical features has been improved and optimized in performances.

This allows to create elaborate shapes and specific surface details.

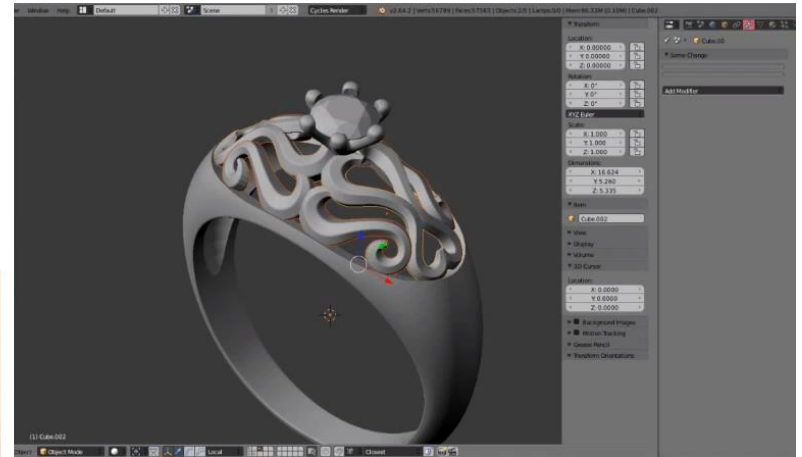
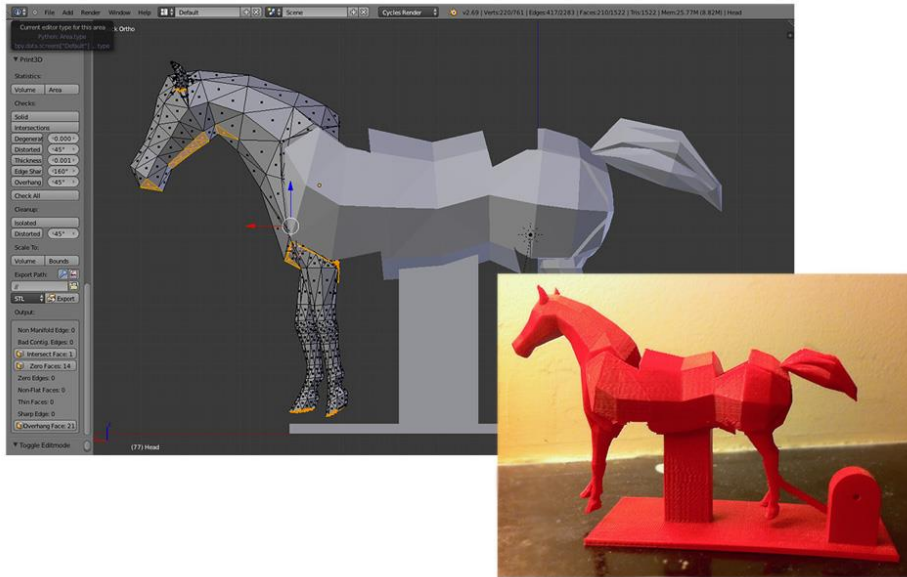


- Video/images rendering optimization (it allow to render by means of different rendering engines)



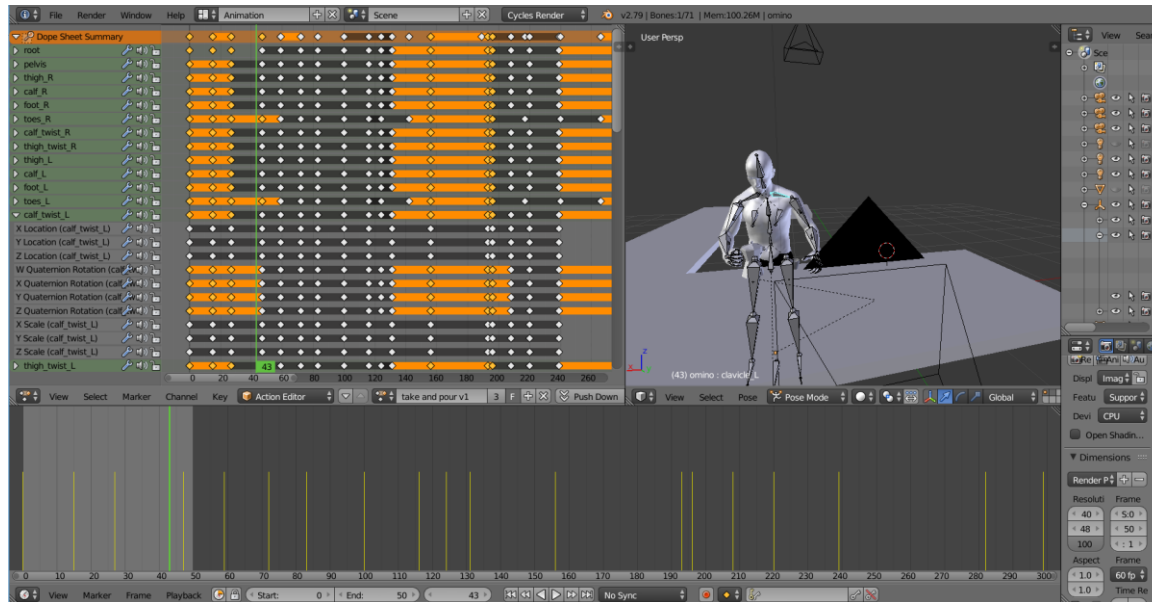
The wide usage of image and video rendering led to an increase of rendering engines performances and selection. This allows to choose which engine to use depending on the image target, outcome details and processing time.

- Create Models for 3D Printing



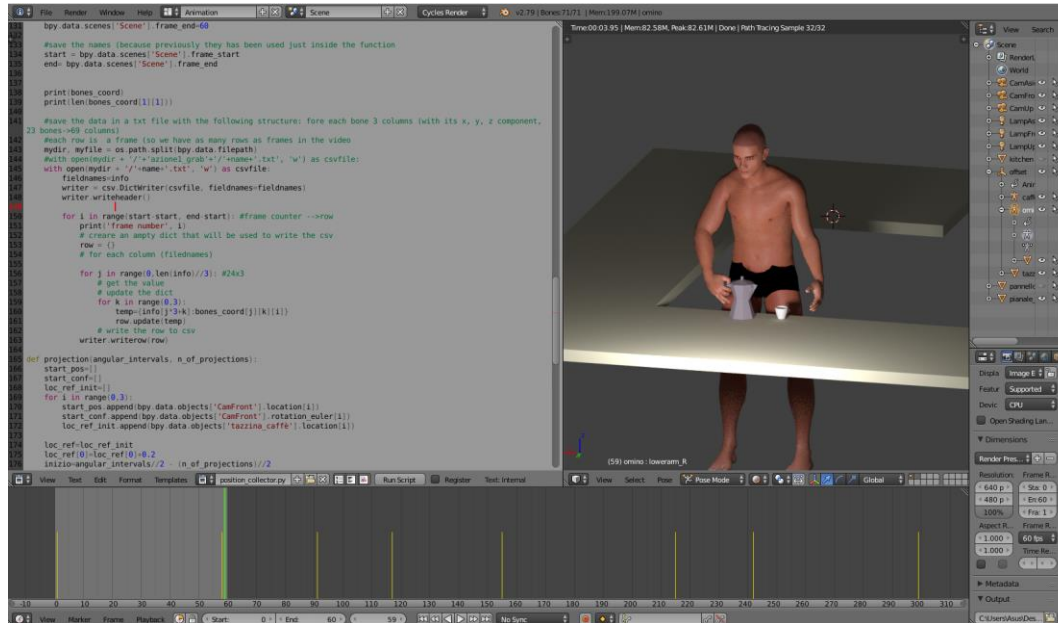
Related to the increasing interest in 3D printing, Blender offers a remarkable variety of model development tools.

- Key frames and animations timeline management



Thanks to the wide range of frame management and timeline options is it possible to control accurately the evolution of the whole animation.

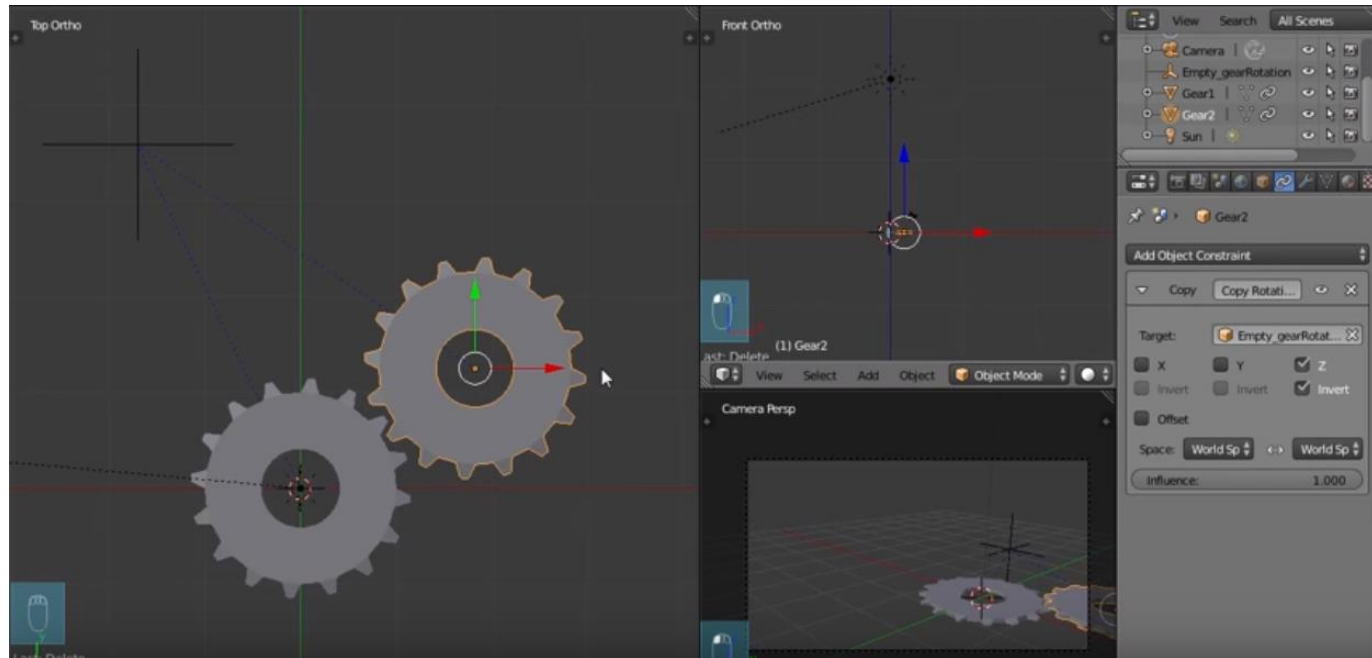
- Blender API is programmable using Python programming language (Several libraries already implemented and freely available)



In this way it is possible to automatize several processes and develop new specific tools.

- Impose Kinematics and Constraints

Thanks to a specific pre-developed specific set of tools it is possible to impose the kinematics and the constraints in order to simulate the movement of complex and structured systems.



Gears Kinematics and Constraints <https://www.youtube.com/watch?v=u8luKCW884Y>

Applications:

3D Graphic software used for :

- Gaming
- Animations
- Special effects
- Simulations
- 3D printing



Tree Creature <https://www.youtube.com/watch?v=nxrwx7nmS5A>

Agente 327: Operazione Barbieri <https://www.youtube.com/watch?v=mN0zPOpADL4>

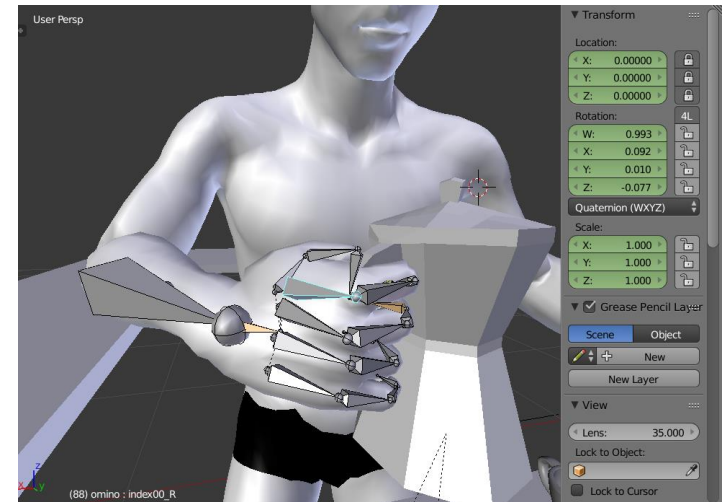
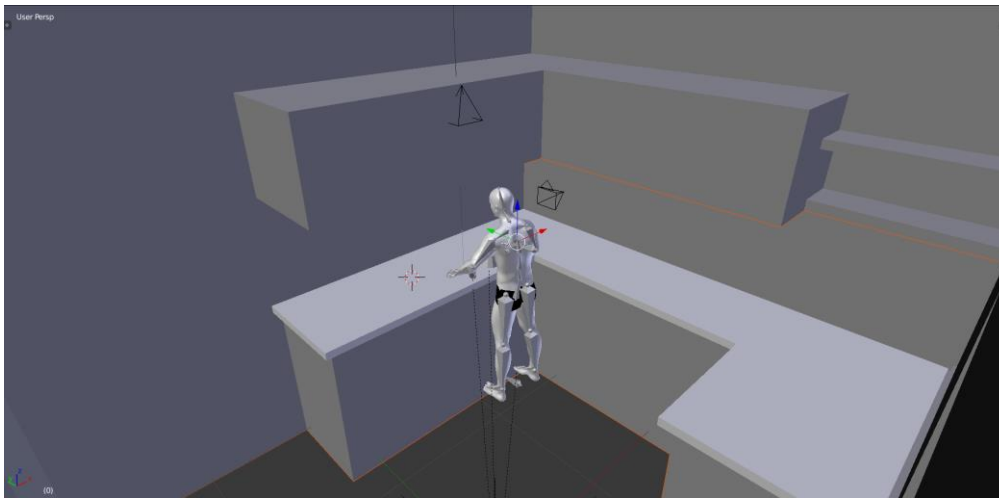
Sintel <https://www.youtube.com/watch?v=eRsGyueVLvQ>

Engineering Applications:

- Support Man/Machine relation - Generate a more intuitive/suitable interface between user and robots (eg. Patient in a domotic apartment or technicians during an installing/inspection operation)
- Display simulations – Animations allow to visualize feedback simulations before a process is run (eg. Vehicol Robots path or CNC machines operations)
- Generate a Virtual Environment for Action Recognition Machine Learning Training Dataset Generation.

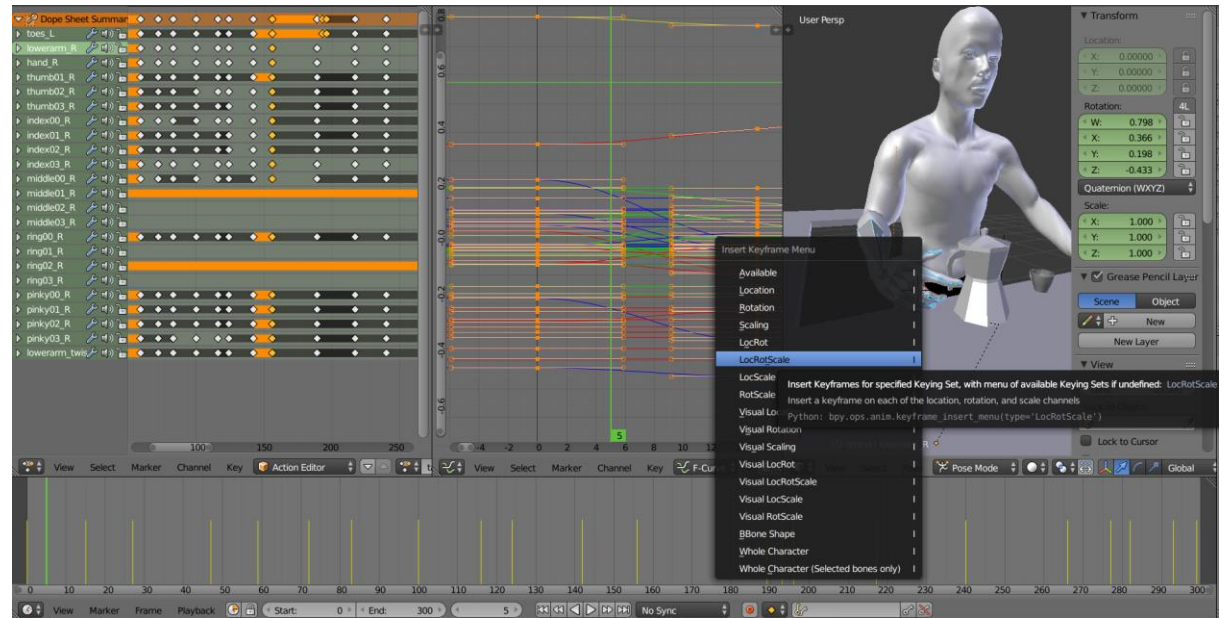
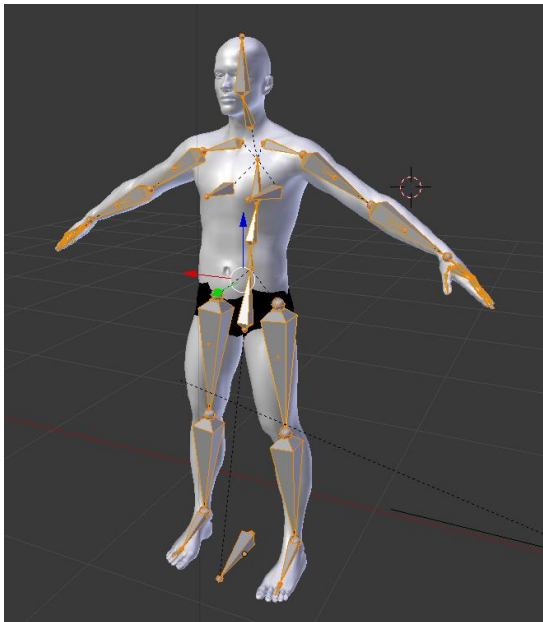
EXAMPLE - VIRTUAL ENVIRONMENT BASED TRAINING FOR GESTURE RECOGNITION

Recreate a Virtual Environment and simulate the gesture by means of Virtual characters (Avatars).



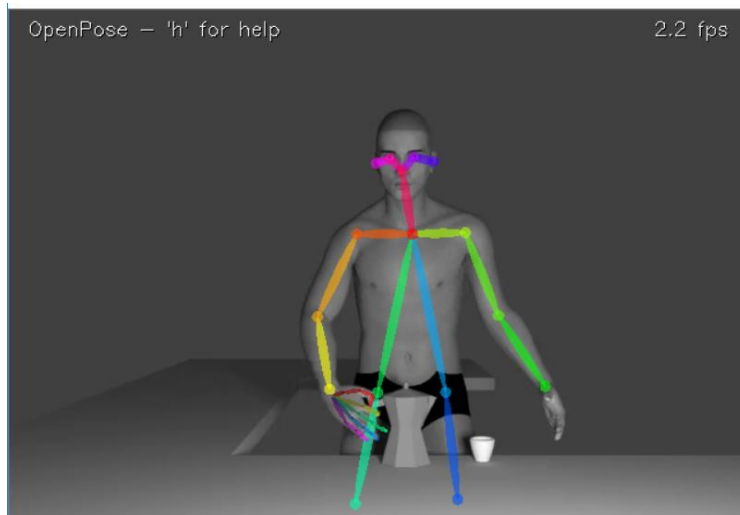
STRUCTURE ORGANIZATION AND KEY FRAMES SAVING

Set location and attitude of each the bone of the structure, then freeze the configuration saving the key frame.

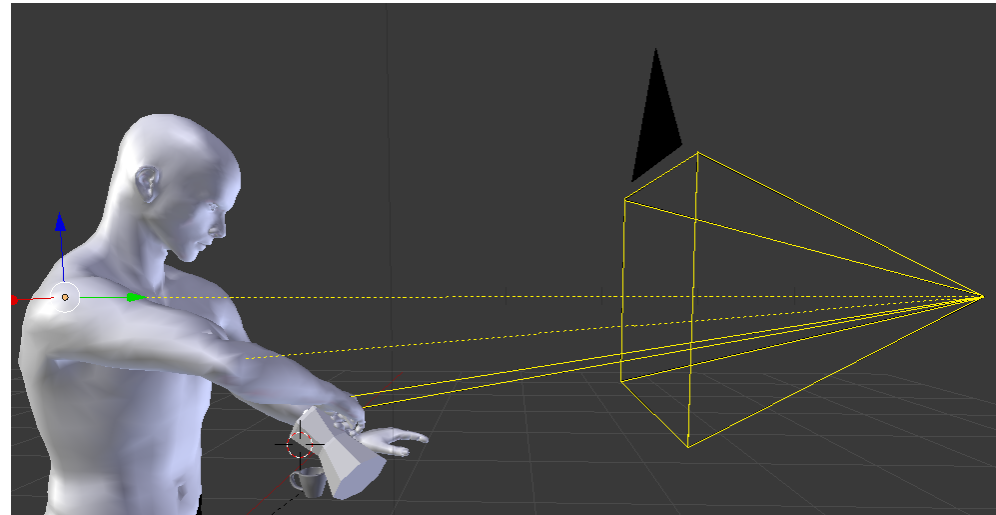


JOINT COORDINATES COLLECTION

Rendering videos and using human detection software



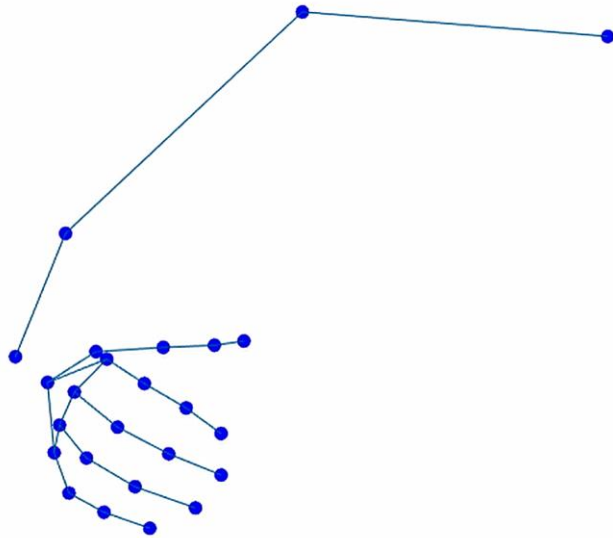
Projecting directly the coordinates from the 3D environment on camera



FEATURES COMPUTATION AND TRAINING DATASET GENERATION

Select and compute a proper choice of features

Fill up a dataset for Training



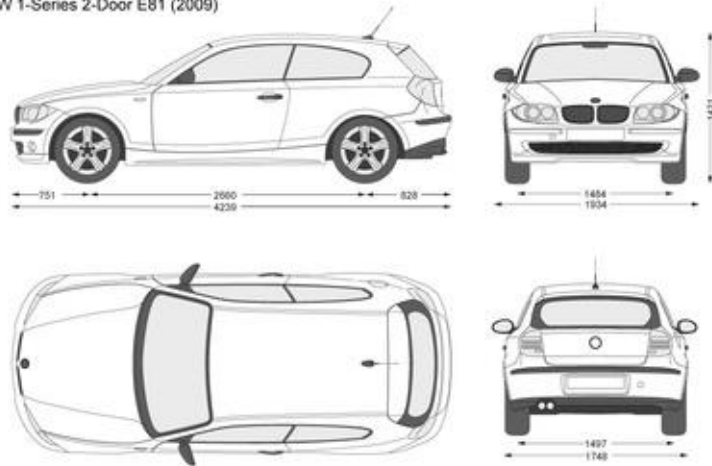
	HQ	HR	HS	HT	HU	HY	HW	HX	HY
	TESTREALVIDEOS								
	Dist_pinkie04_ring03	Dist_pinkie01_ring04	Dist_pinkie02_ring04	Dist_pinkie03_ring04	Dist_pinkie04_ring04	Dist_pinkie03_pinkie01	Dist_pinkie04_pinkie01	Dist_pinkie04_pinkie02	action
#Number	#Number	#Number	#Number	#Number	#Number	#Number	#Number	#Number	Categorical
1	0.0322123537397339	0.15725253510377	0.29942752439558	0.340706268838567	0.046613066663853	0.15793751402925	0.26794027239018	0.308403854217086	grab
3	0.03639377948663	0.2114825162086	0.35011141956402	0.4248721218891	0.0529430124301895	0.17135400000388	0.26462489561012	0.29298988511731	grab
4	0.025750246081378	0.244474658924	0.3596807340492	0.42746020021475	0.04244523643956	0.165121268369	0.26999402216588	0.289232042438355	grab
5	0.020286529191828	0.18770578209848	0.3335352683827	0.38015936000051	0.0431479520911482	0.13052676866143	0.279542154515356	0.313211876153289	grab
6	0.03718795491787	0.20205089942107	0.33929031544162	0.408125754124429	0.068232326988101	0.1790629915165	0.267776884714	0.3172788687419	grab
7	0.04051595811264	0.207788562369304	0.34937836840192	0.453648084569137	0.0779802841700306	0.217080291534546	0.272482052312087	0.319278498711235	grab
8	0.0546828999150537	0.22891339403494	0.348741087512032	0.45224852158799	0.0936178195681432	0.24443706227262	0.261988039168179	0.300979195140284	grab
9	0.05020208217097	0.18941253812525	0.2774262518011	0.36444641510669	0.080760243821107	0.22438197078986	0.298181675628156	0.296818175628156	grab
10	0.050593991198005	0.18373380330991	0.2734414188626	0.36161548353668	0.101381887281142	0.20389494824817	0.227781881439111	0.37216801121054	grab
11	0.076469915714167	0.220986875453735	0.34000250642668	0.439081604563459	0.11294485075158	0.243757881828362	0.292473338618691	0.4578254215912	grab
12	0.103991658630738	0.22121693029598	0.34031268888261	0.436491536872432	0.13670187090348	0.24300845742456	0.299329818499561	0.434042862964047	grab
13	0.1089703897927	0.1511016250882	0.273722287885788	0.30031154578488	0.13526147978877	0.165454239064725	0.206115294738239	0.28504139066499	grab
14	0.0739499564179489	0.1380958954817815	0.26238656213663	0.28339079623813	0.15319904881185	0.17830181296574	0.2193892838262487	0.284443518195039	grab
15	0.0427912914887294	0.185794802625297	0.25155538911426	0.27783420843982	0.13648992024764	0.20102878956435	0.25252846657079	0.25617055017687	grab
16	0.0488744687203705	0.21847128120758	0.28732793280883	0.31585641605701	0.13023954654713	0.21687026270898	0.268120284119644	0.278511094941804	grab
17	0.10556254030374	0.214478144795468	0.307878769319499	0.346139078534209	0.159798784000142	0.205995729115217	0.30769593581461	0.33116305071223	grab
18	0.11302328040519	0.229981814271227	0.35711235188666	0.4310012538887207	0.17509626728389	0.2931918619608782	0.34878184878123	0.388888805076653	grab
19	0.12331181207741	0.23885115832386	0.391972403724407	0.48913936239843	0.201496418127116	0.331785643385056	0.399631458005354	0.42923139570792	grab
20	0.14558942188408	0.286786916614809	0.4298340691304	0.528117263140062	0.258120429051754	0.399541064596023	0.474805897582624	0.519488912750067	grab
21	0.155633401523881	0.30424586118409	0.45464362127226	0.60735002318685	0.37538928999737	0.41725361891787	0.49157511068914	0.57270286687824	grab
22	0.154118894882607	0.313727383838683	0.46809595898466	0.643643040370934	0.389631274160806	0.463547316274175	0.568758813074619	0.588758813074619	grab
23	0.1598050448297	0.31479758704479	0.501327910002493	0.63789344273669	0.27421709218955	0.4077780118388	0.515463558838518	0.602779353313732	grab
24	0.166866488692076	0.326117176591445	0.505072727216033	0.64204814256821	0.287244056738254	0.46406905668531	0.552563933893581	0.63474189434051	grab
25	0.167973713665583	0.33676588643017	0.507651482723976	0.627113942451166	0.27228195045291	0.464747447393075	0.5530538540474	0.634211270665874	grab
26	0.18152364815599	0.338867791521249	0.49938936049001	0.62071118957277	0.246398826291946	0.460398451242295	0.549168826218657	0.64857074039517	grab
27	0.15746378811445	0.328722803803495	0.48958033915285	0.607413129188885	0.249888122112516	0.46613582215946	0.53819667115201	0.571027021854294	grab

USEFUL LINKS:

BLENDER BASICS: Generate a simple car

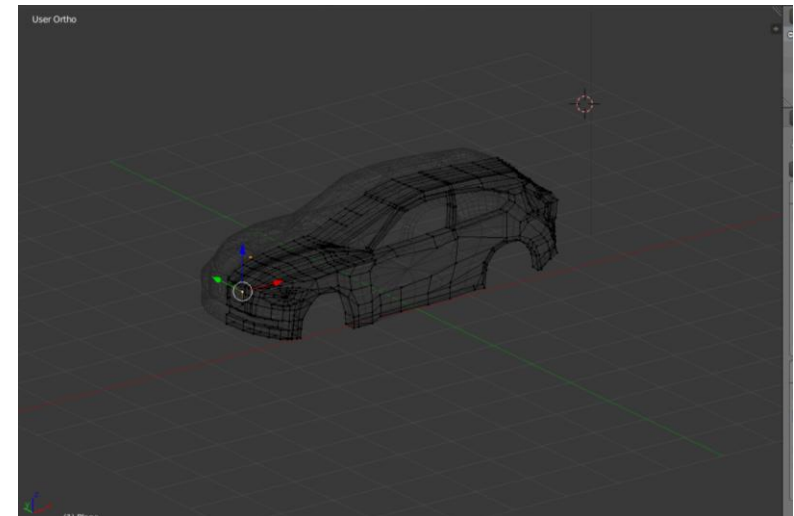
- <https://www.youtube.com/watch?v=5XfcDceKICk>
- <https://www.the-blueprints.com/modules/vectordrawings/preview/00493-mid.jpg>
- <https://www.the-blueprints.com/>
- <https://www.the-blueprints.com/modules/vectordrawings/preview/06371-mid.jpg>

BMW 1-Series 2-Door E81 (2009)



Scale 1:20
0.5m
1m
All measurements in millimeters

 the-blueprints.com



USEFUL COMMANDS:

BLENDER BASICS: Orbiting, Panning, Select View:

COMMAND	Keyboard
Select	Mouse right
Move/Drag	G
Confirm movement	Mouse left
Undo movement/command	Mouse right
Undo	Ctrl Z
Redo	Shift Ctrl Z
New element list	Shift A
Select all	A

USEFUL COMMANDS:

COMMAND	Keyboard
Rotating	R
Rotating w.r.t axis	R + axis (X,Y, Z)
Move w.r.t. axis	G + axis (X,Y, Z)
Origin to 3D Cursor	Ctrl + shift + alt + C
Line subdivision	Ctrl + R
Upper view	Numpad 7
Frontal view	Numpad 3
Lateral view	Numpad 1
Merge command	Alt + M

USEFUL COMMANDS:

COMMAND	Keyboard
Generate surface	F
Edit mode	Tab
See through vision	Z
Delete (Surface,vertex,etc, in edit mode)	X
Special options(Subdivide, Bridge Edged, etc... in edit mode)	W
Hide	H
Hide back (show)	Alt + H
With Automatic Weights(pose mode)	Ctrl + P
Start animation	Alt + A

USEFUL COMMANDS:

COMMAND	Keyboard
Save key frame (Loc Roc Scale)	I
Delete key frame	Alt + I (on the 3D view framing)
Select all	A
Copy object	Ctrl + C
Paste object	Ctrl + V
Duplicate object	Shift + D

Thank You