Welcome to the Presentation on Blender 3D Presented By: Mr. Nikhil B Shinge Vivekanand College, Kolhapur

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

This allows to create elaborate shapes and specific surface datails.



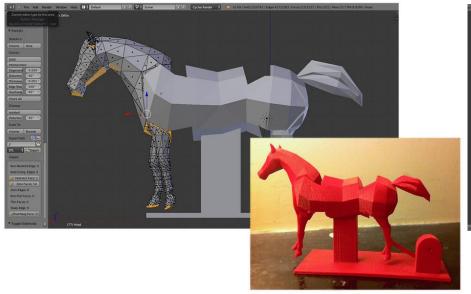
 Video/images rendering optimization (it allow to render by means of different rendering engines)

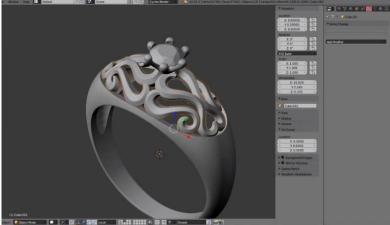




The wide usage of image and video rendering led to an increase of rendering engines performances and selection. This allows to choose which engine to use depending on the image target, outcome details and processing time.

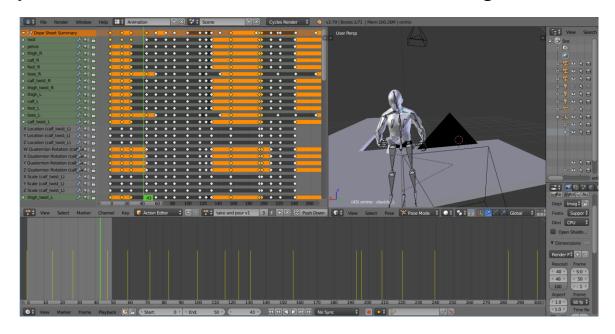
Create Models for 3D Printing



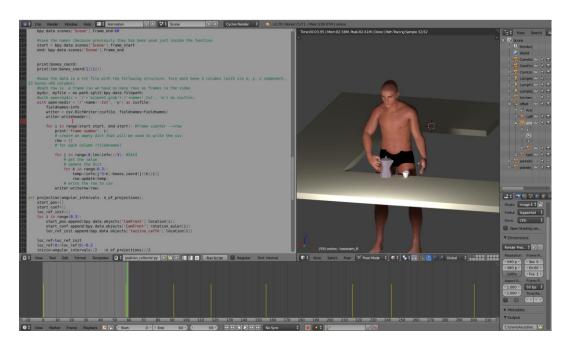


Related to the increasing interest in 3D printing, Blender offers a remarkable variety of model development tools.

Key frames and animations timeline managment

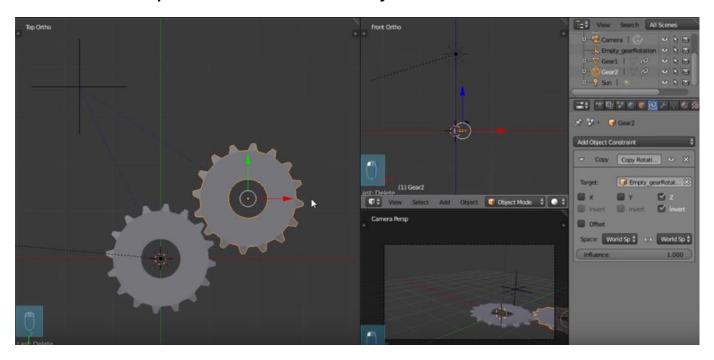


Thanks to the wide range of frame management and timeline options is it possible to control accurately the evolution of the whole animation. Blender API is programmable using Python programming language (Several libraries already implemented and freely available)



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 Barbiere https://www.youtube.com/watch?v=ensogyueVLvQ
Sintel https://www.youtube.com/watch?v=ensogyueVLvQ

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.

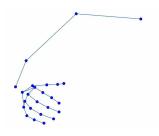
EXAMPLE - VIRTUAL ENVIRONMENT BASED TRAINING FOR GESTURE RECOGNITION

Traditional approach (Real Environment based):

Record gesture from Real Environment



Compute Features



Collect joints coordinates

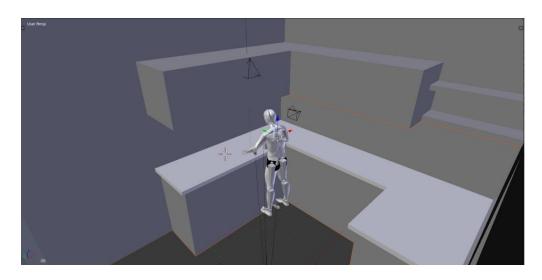


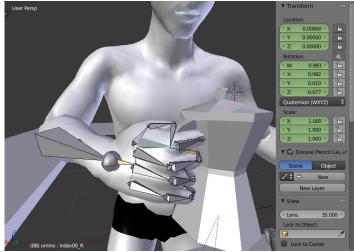
Fill up datasets for training and Testing

HQ	HR	HS	HT	HU	HV	HW	HX	HY
				TESTREALVIDEOS				
Dist pinkle04 ring03	Dist pinkin01 ring64	Diet pinkie62 ring64	Dist pinkir03 ring04	Dist pinkle04 ring04	Dist pinkie03 pinkie01	Dist pinkied4 pinkied1	Dist_pinkie04_pinkie02_	actione
Yllunder	*Number	*Sunter	*Number	*Number	*Namber	Harter	*Number	*Categorical
Olet pinker04 ring00	Dist pinked1 ring04	Dist_plinkie02_ring04_	Dist_pinkieS3_ringS4_	Oliz pinklet4 ringt4	Dist pinklett? pinklett	Dist pinker04 pinker01	Olar pinkleS4 pinkleS2	azione
0.0322323537397339		0.299427532439550	0.340706268838567	0.0466106566663853		0.263794927239018	0.308432954217086	2195
0.0363091779458663	0.211148251623986	0.350111419566402	0.422487213218841	0.8520420124301895	0.171355400050888			grab
	0.21444740560424	0.359681073454592		0.0424452626439566	0.105342174503009	0.201090462216508	0.209523004306535	grab
00203685251516283	0.107705705009848	0.335535532093087	0.580155006000051	0.0431479990911492	0.130537876686143	0.270542154515356	0.113211878155829	grab
0.037318795491787			0.408125754124429		0.173068629915765	0.26277668887714	0.317277906674119	0.00
0.040535992611264	0.207786562369304			0.0770602541700006	0.217003915345546	0.272493052332087		grab
	0.228091353403454		0.452243852150799			0.261968029168179	0.300979195140284	grab
10.0550320382171097	0.196412353612525		0.396644641510699	0.86760243621137	0.223435810778998	0.23798979355291	0.298181675628156	grab
0.0635929971358085	0.107329802928991	0.279441441998426	0.391615648552668		0.203890694542847		0.37261620112104	grab
		0.340003506432668		0.11294465075158				grab
0.103991658630738	0.221216830229598	0.348312668888261		0.136721018790348	0.243026845742456			grab
0.100975039097827	0.15110162500602	0.279722287605788	0.300311545782498	0.13526147979877	0.156454229064725	0.206115294739239	0.285041390096499	grab
0.0730499964719689	0.158050965407015	0.263286562213663		0.153199044901185		0.219922828262487	0.20444353619550	grab
0.0627912914681394		0.251535389113436	0.277835436843992	0.133646890324764			0.256170058017687	gist
0.0608744667203795	0.218477128120758	0.267332793298983			0.21687629270898	0.266120284110664	0.278513594943804	grab
	0.214479144795468	0.307070709373499	0.346139078534209	0.158790704000142		0.307095083561461		grab
		0.337112331818999		0.175099636726589	0.290170196067872			grab
	0.258855115832386	0.391972403734457	0.499139962396843	0.201496418127116	0.331785643585506	0.399631458005354	0.42992139530292	998
0.145508942189408	0.298786816614609	0.42903240693304	0.558717263145062	0.258120429055754	0.399541062459022	0.474465887528224	0.519489812750067	grab
0.155638340132581	0.309435606160409		0.607355002818685		0.412725061893187	0.491537151069514		990
0.164118894962607	0.313772836386983	0.40095959894868		0.209631724160006		0.495140399220919	0.588758813074619	998
0.159990583448297	0.314797507044739	0.501327910002493	0.646729044273609	0.274217099291855	0.407770071103030	0.512463555804510		grab
0.166866948652576			0.63204914256821			0.552563933699581		gride
0.167597313665583	0.336765686453017	0.507651462725976	0.627110342451166		0.467474473933075	0.553655796415474	0.634211270669974	gráti
0.16125294021599	0.338907774511249	0.499369363495001		0.246395865361936	0.403294512542205	0.549168029213657	0.604570147039517	grab

EXAMPLE - VIRTUAL ENVIRONMENT BASED TRAINING FOR GESTURE RECOGNITION

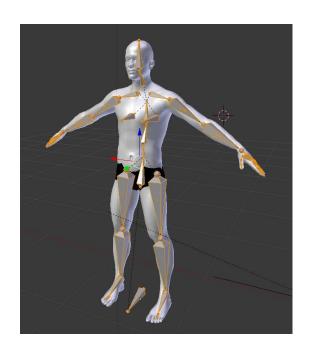
Recreate a Virtual Environment and simulate the gesture by means of Virtual characters (Avatars) .

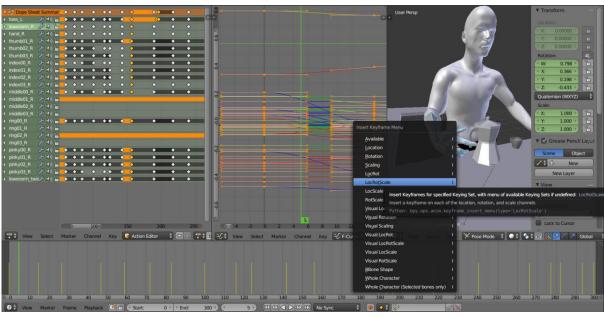




STRUCTURE ORGANIZATION AND KEY FRAMES SAVING

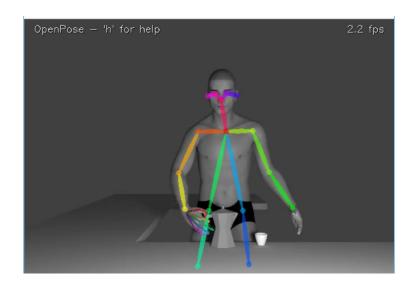
Set location and attitude of each the bone of the structure, then freeze the configuration saving the key frame.



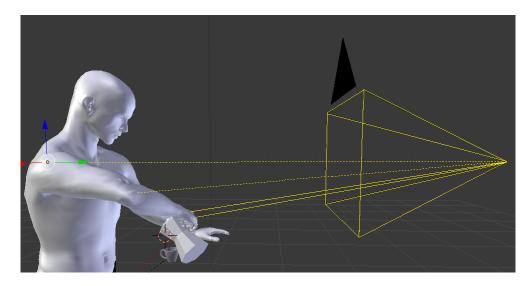


JOINT COORDINATES COLLECTION

Rendering videos and using human detection software

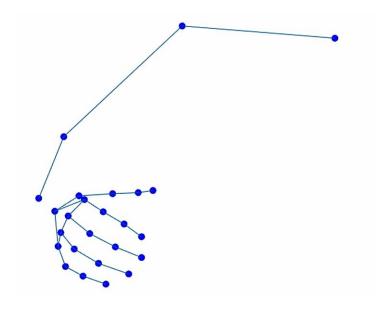


Projecting directly the coordinates from the 3D environment on camera



FEATURES COMPUTATION AND TRAINING DATASET GENERATION

Select and compute a proper choice of features



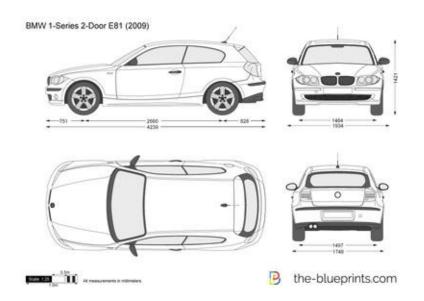
Fill up a dataset for Training

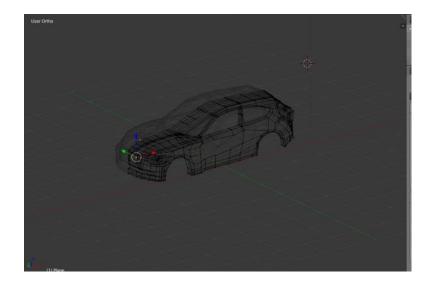
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					TESTREALVIDEOS				
	Dist_pinkie04_ring03_	Dist_pinkie01_ring04_	Dist_pinkie02_ring04_	Dist_pinkie03_ring04_	Dist_pinkie04_ring04_	Dist_pinkie03_pinkie01_	Dist_pinkie04_pinkie01_	Dist_pinkie04_pinkie02_	azione
	▼Number	▼Number	*Number	▼Number	◆Number	*Number	▼Number	*Number	*Categorical
1	Dist_pinkie04_ring03_	Dist_pinkie01_ring04_	Dist_pinkie02_ring04_	Dist_pinkie03_ring04_	Dist_pinke04_ring04_	Dist_pinkie03_pinkie01_	Dist_pinkie04_pinkie01_	Dist_pinkie04_pinkie02_	azione
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3	0.0363091779458663	0.211148251622086	0.350111419566402	0.422487213218841	0.0520420124301895	0.171355400050388	0.264462698567012	0.29089688511731	grab
4	0.0257458246983379	0.21444748560424	0.359681073454592	0.442160200321475	0.0424452626439566	0.165342174583609	0.269090462216508	0.289523004386535	grab
5	0.0203665291916283	0.187705785009848	0.335535532693887	0.388155906000051	0.0431479590911492	0.130537876686143	0.270542154515356	0.313211876155829	grab
6	0.037318795491787	0.200509089042107	0.339029031544162	0.408125754124429	0.0682332336985101	0.173068629915765	0.26777668847714	0.317277986874119	grab
7	0.040535992611264	0.207788562369304	0.349379368040192	0.453645084569137	0.0770602841700306	0.217085915345546	0.272492052332087	0.319278499731235	grab
8	0.0546082999158537	0.228091359403494	0.349741087512032	0.452243852158799	0.0936376195681432	0.234437062227262	0.261988029168179	0.300979195140284	grab
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10	0.0635929971358085	0.187339803928991	0.279441441998426	0.391615648552668	0.101263887283142	0.203890494542847	0.22791061439511	0.37261609112104	grab
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12	0.103991658630738	0.221216930229598	0.340312688888261	0.436491536872432	0.136701018790348	0.243026845742456	0.299329183499561	0.434042862964047	grab
13	0.108975039097927	0.15110162500682	0.273722287685788	0.300311545782498	0.13526147979877	0.156454239064725	0.206115294739239	0.285041390696499	grab
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15	0.0627912974687394	0.195704006305297	0.251535389113436	0.277835426843992	0.133646890324764	0.201282787056435	0.252258046657079	0.256170358017687	grab
16	0.0688744667203755	0.218477128120758	0.267332793298983	0.315036641605701	0.130379546547613	0.21687629270898	0.266120284110664	0.278513594941804	grab
17	0.105562754403974	0.214479144795468	0.307878769373499	0.346139078534209	0.159798784000142	0.285905729115217	0.307695083561461	0.331163050771223	grab
18	0.113023228924519	0.229901814271227	0.357112351818666	0.431001253687207	0.175039626726389	0.293170196067872	0.345678438792123	0.380898925076653	grab
19	0.123311812077741	0.258855115832386	0.391972403734407	0.489139362398843	0.201496418127116	0.331785643585506	0.399631458005354	0.42992139570792	grab
20	0.145588942188408	0.298786916614609	0.42983240693304	0.558717263145062	0.258120429055754	0.399541062459822	0.474465897528224	0.519489812750067	grab
21	0.155638345152581	0.309435686168409	0.455464362122725	0.607355002818685	0.275389928999737	0.412725061693167	0.491537151069514	0.573928698678324	grab
2	0.164118894982607	0.313772836386983	0.48095959894868	0.643647840070924	0.289631724160806	0.403547316274175	0.495140399220919	0.589758813074619	grab
23	0.159980503448297	0.314797587044739	0.501327910002493	0.646739344273669	0.274217093291855	0.407778071183838	0.512463555884518	0.602279753313732	grab
24	0.166866948692076	0.326117176554145	0.505072277216033	0.63204914256821	0.287244056738254	0.44696059968531	0.552563933693581	0.63474189434051	grab
25	0.167597313665583	0.336765686453017	0.507651482725976	0.627110342451166	0.277203150543291	0.467474473933075	0.553655706410474	0.634211270665974	grab
26	0.16125294821599	0.338907774511249	0.499369360495001	0.620171110957277	0.246395865261936	0.483394512542205	0.549168029213657	0.604570147039517	grab
27	0.15746371821145	0.328722085965845	0.489500333915285	0.607413129108885	0.240988812221156	0.466515582213646	0.536196497115201	0.571027201854294	orah

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





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

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

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	Н		
Hide back (show)	Alt + H		
With Automatic Weights(pose mode)	Ctrl + P		
Start animation	Alt + A		

COMMAND	Keyboard		
Save key frame (Loc Roc Scale)	1		
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