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A PATH FOR HORIZING YOUR INNOVATIVE WORK

VIRTUAL THEORY OF MACHINE LAB

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Abstract: This paper demonstrates the utilization of VRML (Virtual Reality Modeling Language) as a tool for interactive environment for teaching learning process. We have taken a problem of Virtual Theory of Machine Laboratory to check and test effectiveness of VRML capabilities. The traditional teaching/ learning multimedia in engineering involves 2D graphics mostly created with Adobe Dreamweaver or animated .gif files whereas this paper focus on interactive 3D models, which will be more realistic to real word mechanisms. VRML enables user to explore 3D models in their working condition on any Internet browser like Internet Explorer, Chrome, Mozilla Firefox or Opera etc. The paper focus on methodology adopted for creating Virtual Models, its application and future scope of VRML capabilities in teaching learning Process.

Keywords: Virtual, Machine Lab, Chrome

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INTRODUCTION

3D graphics are available in all range today. We see them everywhere: in video games, advertising, even movies. We have come to a point in history where we can create completely synthetic worlds that exist entirely inside a computer's memory. These worlds have been referred to in the popular media as "*virtual reality*," "*cyberspace*," or "*the metaverse*." These terms are great for a science fiction writer in search of a new book idea, but we are many years away from virtual worlds that are anywhere near the rich detail of the real world. However, 3D graphics give us much more than the future promise of virtual reality. They give us a powerful new tool for the presentation of information, art, and entertainment. And while I don't think virtual reality will ever overtake the real world, as so many science fiction movies would like us to believe, they will add to our repertoire of creative outlets. The World Wide Web adds an interesting new twist to the use of 3D graphics. In the past, the presentation of art or information was limited to those who could get their work shown in an art gallery, or to someone with access to a publishing house or television studio. But, access to the Web is relatively inexpensive, so almost anyone can communicate their ideas, as long as they know how to use the tools that turn their dreams into reality.

VRML is the tool for creating 3D virtual experiences on the World Wide Web. Even though it is in its infancy, VRML will allow you to realize your visions and make them available to everyone on the Web.

Methodology

The entire creation of virtual Theory of Machine lab can be divided into following steps/stages

- Solid Modelling
- Simulation
- Representation

Each step explain in brief as below

Solid Modelling: The first basic step to create *Virtual World* is to create 3D models of the mechanism which needs to be diplayed in the Virtual Lab. Any commericaly available software like Pro/Engineer, AutoCad or Catia Etc. can be used for this purpose. We preferred, Pro/E for its parametric capabilitites. The dimensions of the parts were transferred using reverse engineering techniques. The activity of solid modelling can be roughly divided into two stages:

- Part modelling
- Assembly

Following mechanisms were chosen for Virtual Lab:

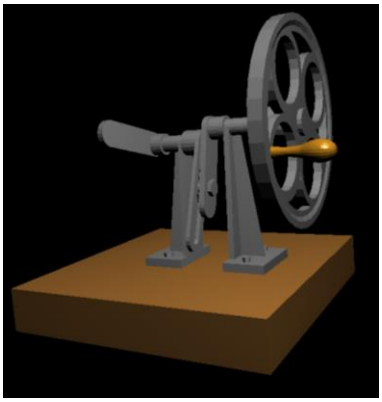

Fig. 1: Withowrth Quick Return Mechanism

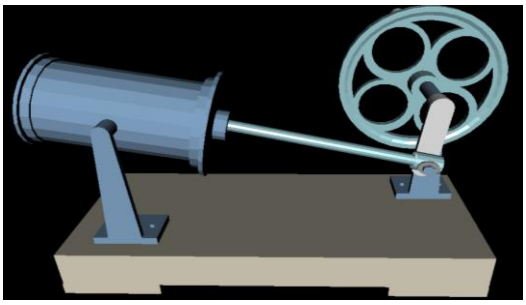

Fig. 2: Oscillating Cylinder

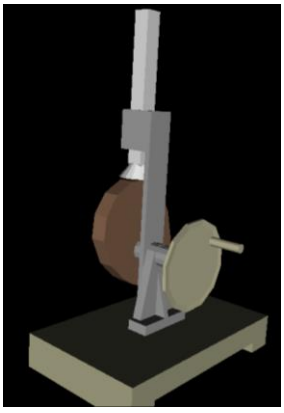

Fig. 3: Cam and Flat Base Cam Follower

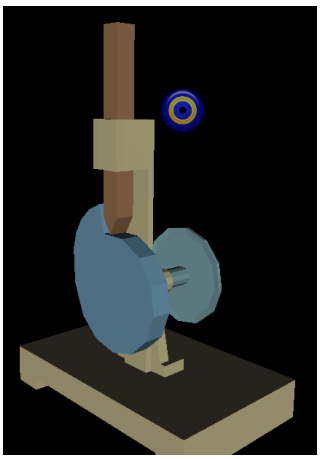

Fig. 4: Cam with Knife Edge Follower

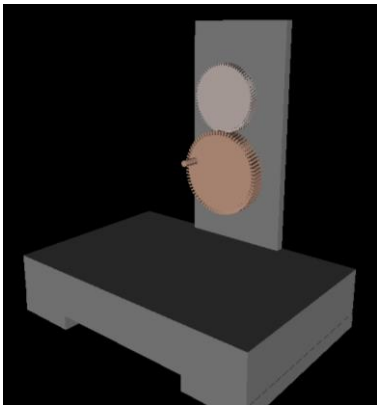

Fig. 5: Helical Gear

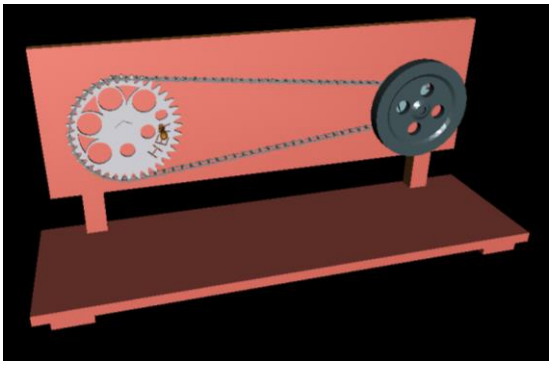

Fig. 6: Chain Drive

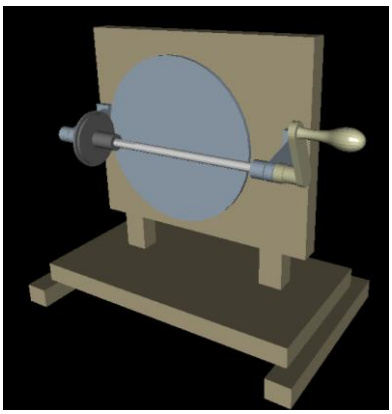

Fig. 7: Friction Wheel Drive

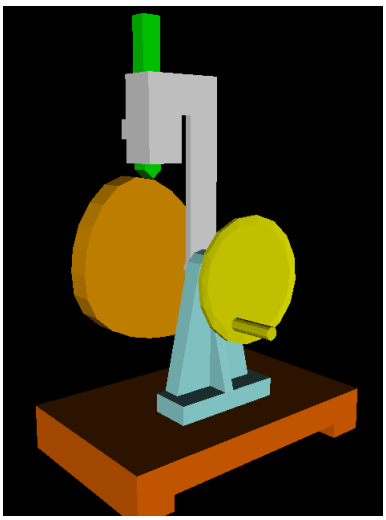

Fig. 8: Cam Offset Follower

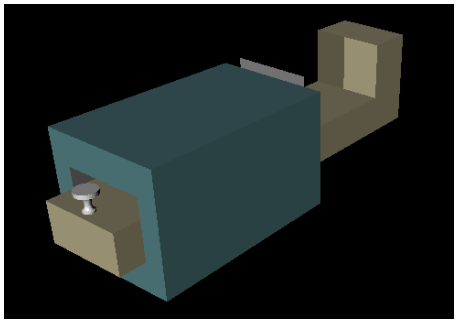

Fig. 9: Sliding Pair

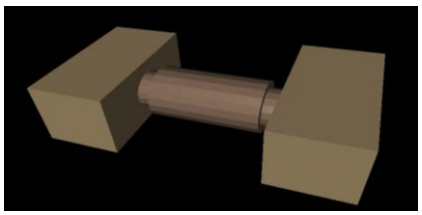

Fig. 10: Turning Pair

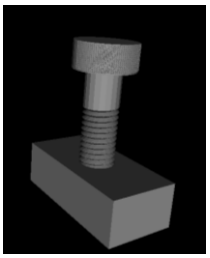

Fig. 11: Screw Pair

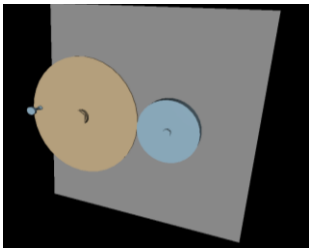

Fig. 12: Friction Disk

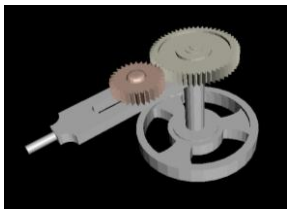

Fig. 13: Epycycloid Gear

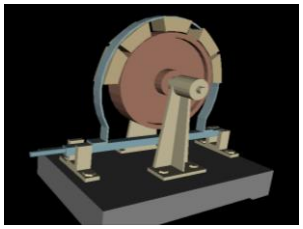

Fig. 14: Block and Band Break

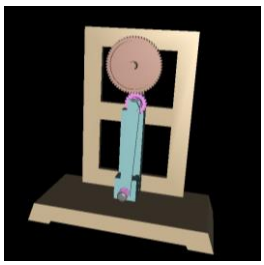

Fig. 15: Crank and Slotted Lever Mechanism

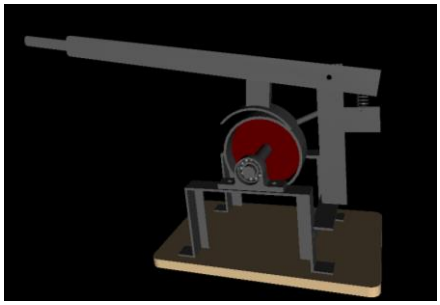

Fig. 16: Shoe Brake

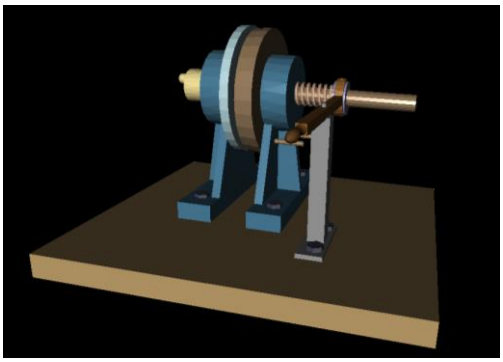

Fig. 17: Disk Brake

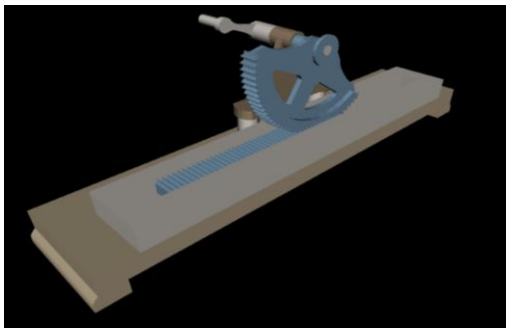

Fig. 18: Rack and Quadrant Mechanism

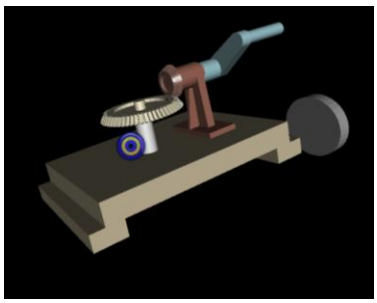

Fig. 19: Bevel Gear

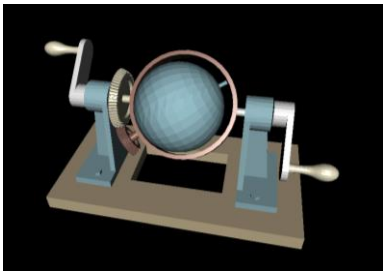

Fig. 20: Cycloidal Gear

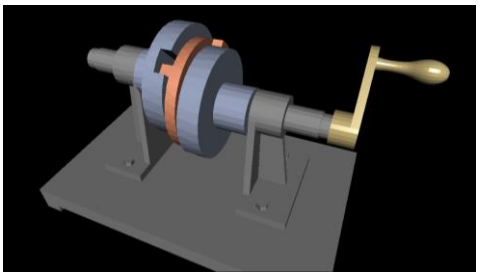

Fig. 21: Oldham Coupling

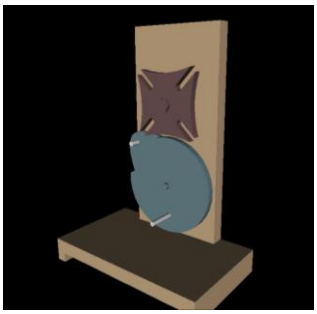

Fig. 22: Geneva Mechanism

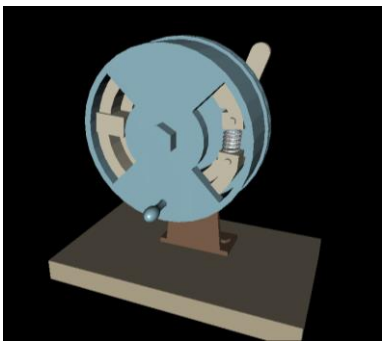

Fig. 23: Internal Expanding Brake

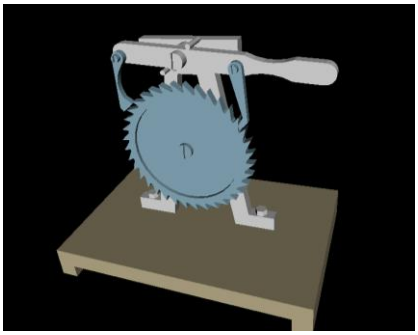

Fig. 24: Pawl and Ratchet Mechanism

Simulation*:* Simulation here means Graphical Simulation i.e. Giving required motions to the links of Mechanism imported from solid Modelling package. 3DS Max Studio was used for this purpose.

Representation: Once simulation is complete, model can be exported to .wrl file format for final representation in web browser.

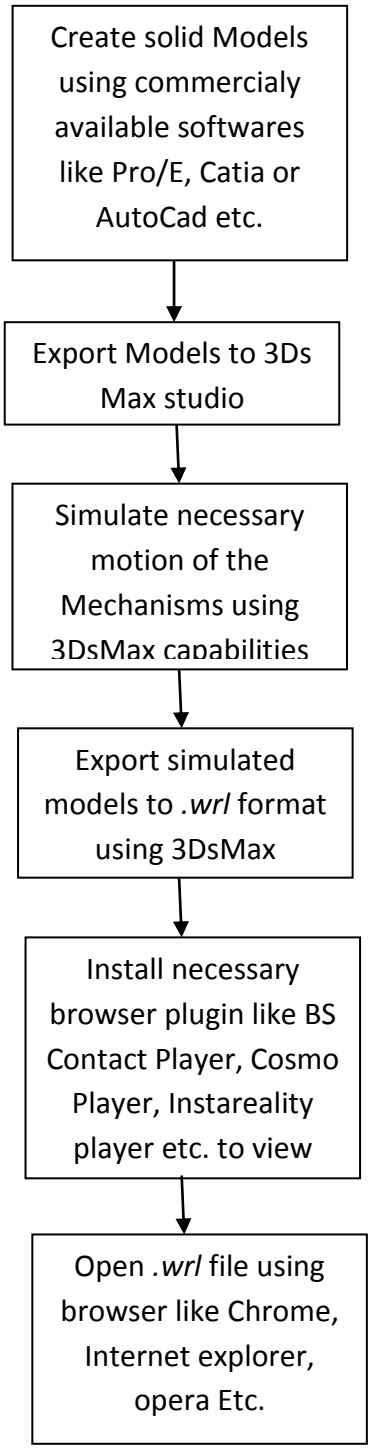

Fig. 25: Step by Step Procedure Adopted for Creation of Virtual Lab

CONCLUSION

This work has given us a chance to tryout our hands on modelling, simulation and VRML.

FUTURE SCOPE

VRML is a powerful tool for representation of 3D objects. We are planning to add following in the next version of the ***Interactive Virtual Theory of Machine Lab***

- Sound (Intensity increasing/ Decreasing as user comes closer/goes away from the object)
- Mapping (Real skin of Metal/wood/Paint etc)
- Incorporation of software sensors like *proximity*, *touch* etc to make Virtual Lab more interactive.
- Organizing all models under one roof exactly like a real lab with detail mapping for floor, Windows, Door, Glass, Curtains, Plywood , Table, Chair, celling fan and other objects if any.

REFERENCES

1. Project Report on *" Virtual Theory of Machine Lab"* submitted by Mr. Amol Khurana, Mr. Anurag Goel, Mr. Gaurav Rampal, Mr. Santosh Tiwari and Mr. Hemant Ade in the year 2004 under the Guidance of Prof. D.V. Shirbhate for the partial fulfillment of award of Bachelor of Production Engineering at College of Engineering and Technology, Babhulgaon (Jh) Akola (M.S.)

2. CD-ROM based on the project work titled *" Virtual Theory of Machine Lab"* created under the guidance of Prof. D.V. Shirbhate.