



Abstract

A Computer Aided design system is a combination of hardware and software that enables engineers and architects to design that allows them to view and print to specifications. Autodesk inventor is a 3D mechanical solid modeling design software developed to create 3D digital prototypes. It can be used for 3D mechanical design, design communication, tooling creation and production simulation. This software enables users to produce accurate 3D models to aid in designing, visualizing and simulating products. 3D printing or additive manufacturing is a process of making three dimensional solid objects from a digital file. Inventor allows you to create a three dimensional object that can be printed by using an additive process by laying down successive layers of material until the entire object is created.

Research Objectives

My objective it to use the design process to successfully create a physical prototype. Explain how 3D digital models can be used as visualization tools for design ideation. Explain the significance of 3D visualization for the development of design form concepts to finished production prototypes. Understand the prototyping process in engineering. Learn the fundamentals of 3D modeling software. Print and learn the 3D printer interface, the STL (stereo lithography) format, the operation of a 3D printer, and the prototyping process in engineering.

Methodology

Assess the student's competency in operating the 3D printer to print their robot wheel. Test the overall quality of the final prototype. The goal is to get students to visually communicate to themselves and others, and to clearly define the problem that guided the design and articulate the key criteria that are addressed in the solution.

Figure 1

Research and Design a prototype wheel that can be put on a robot. The image to the right is an example of a robot that has been design to maneuver on different terrain in space. The parts that hold the wheels in place where 3D model and create with a 3D printer.

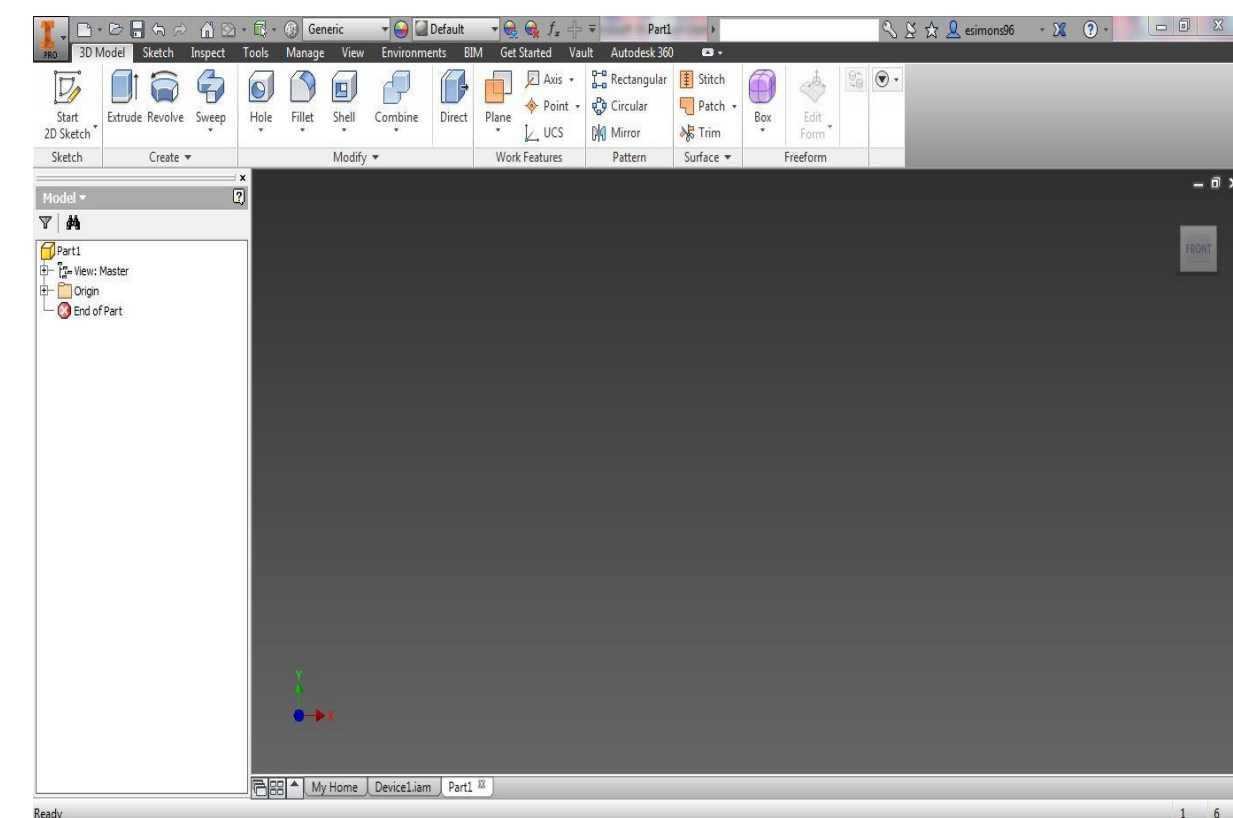
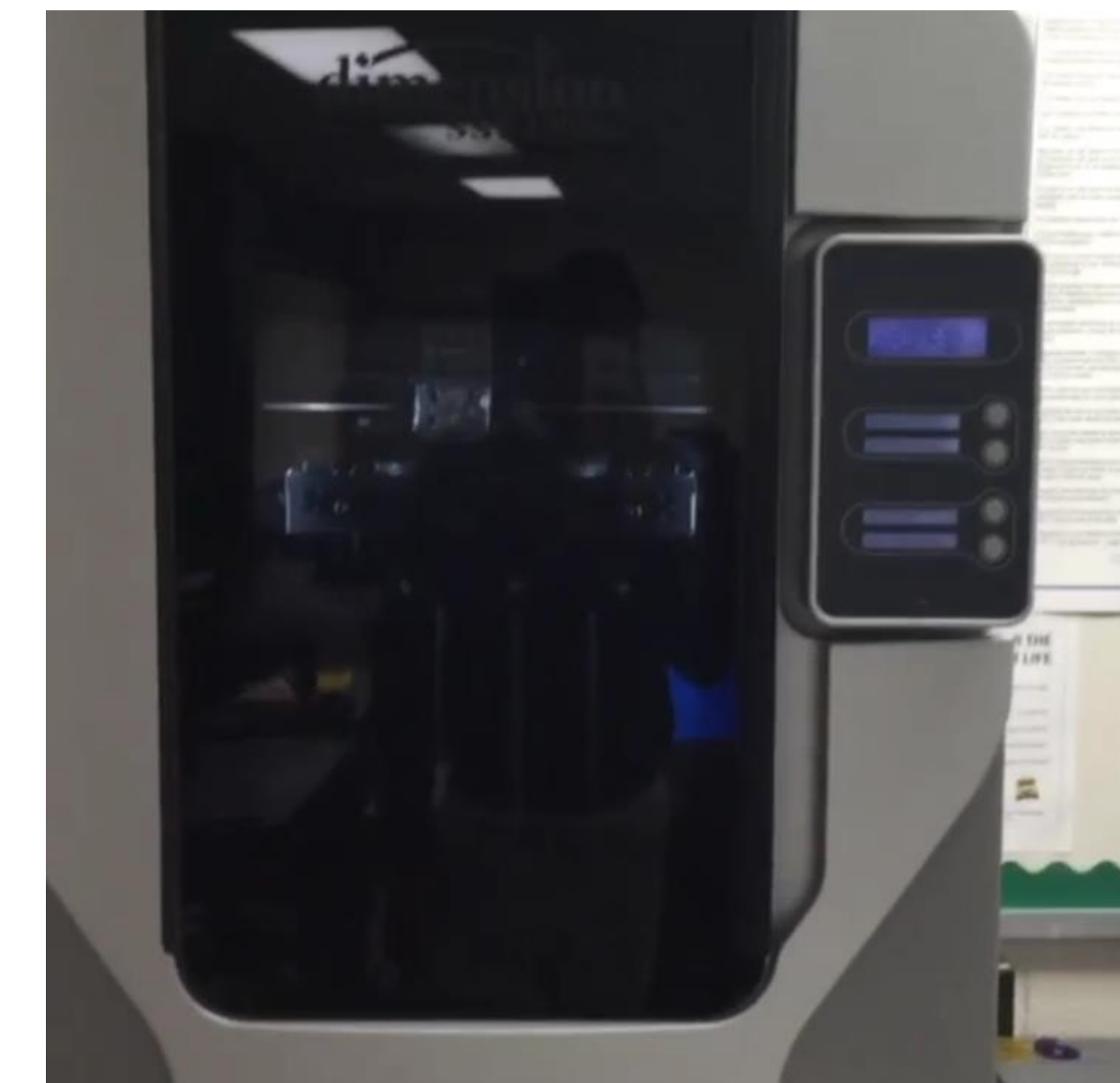
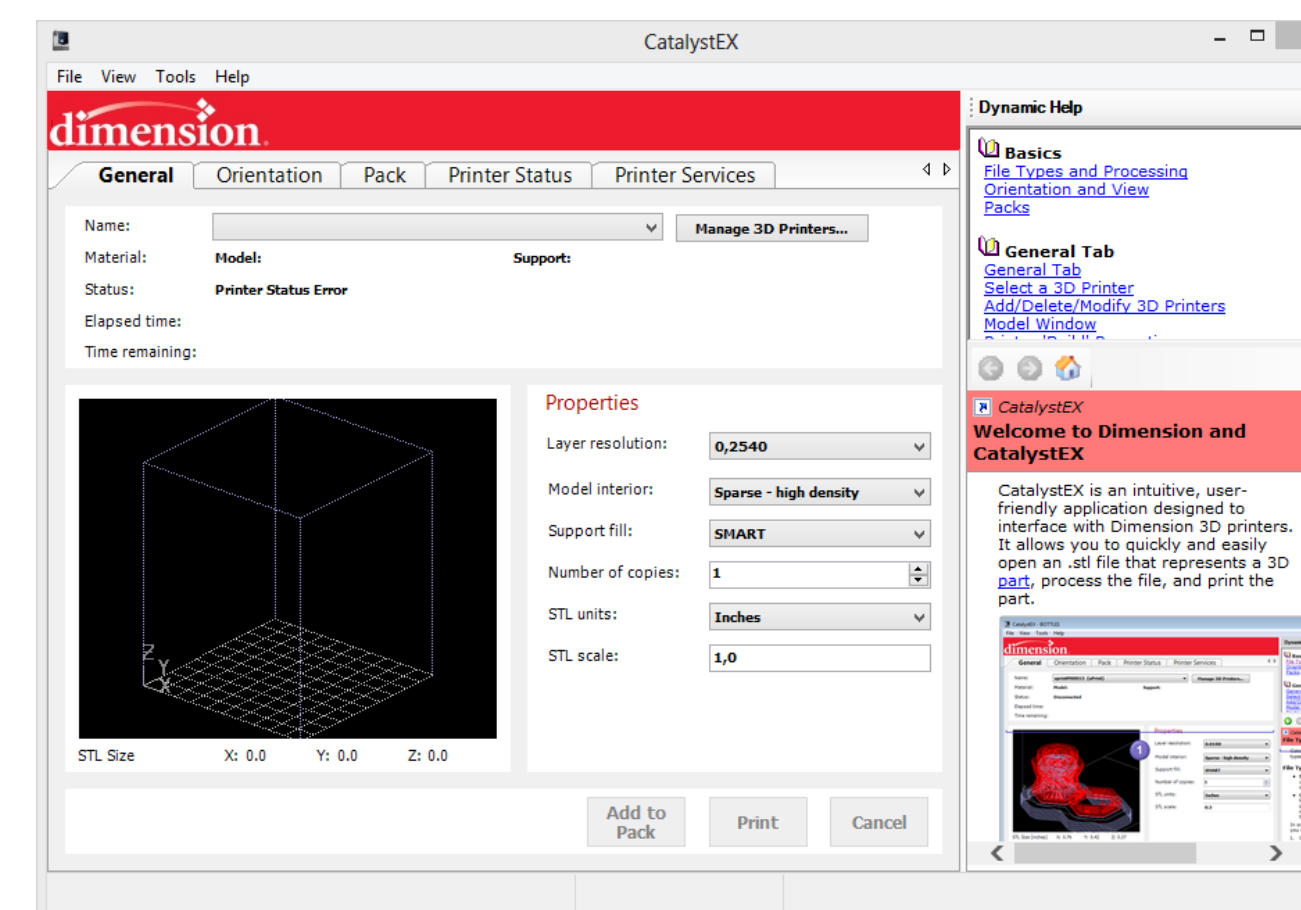


Figure 2

Creating 3D model and presentation drawing of the design of the 3D wheel using Autodesk inventor to be printed on a 3D printer. The image on the left is the drawing screen in Autodesk Inventor.

Figure 3

Using a program called CatalstEX to take the 3D inventor design and transfer into a stl file to be sent to a 3D printer to create the prototype of the robot wheel. The image to the right is the setup of the program to prepare the 3D model to be printed.



With this process students can build models, do testing, which allows them to produce a final prototype, and instructions that reflect the intended product.



Results and Conclusions

My goal in this research is to stress the importance of using software tools to visualize, animate, and present the same way real professionals do every day. How to generate creative solutions, and how to communicate ideas and knowledge through a variety of written, visual, and oral formats. Create a virtual and physical prototypes using Autodesk Inventor. Demonstrate how this research has helped them expand and enhance their learning and innovation skills: critical thinking, communication, collaboration, and creativity.

References

- "CAD - Computer-aided Design." What Is Computer-Aided Design CAD? Webopedia. Web. 8 July 2015. <http://www.webopedia.com/TERM/C/CAD.html>
- "What Is 3D Printing? How Does 3D Printing Work?" 3D Printing. Web. 8 July 2015. <http://3dprinting.com/what-is-3d-printing/>
- "What Is Autodesk Inventor? - Definition from Techopedia." Techopedias. Web. 8 July 2015. <http://www.techopedia.com/definition/24055/autodesk-inventor>
- Baggot, M. (n.d.). CTE Online. Retrieved July 8, 2015. <http://ctetech.cteonline.org/portal/default/Curriculum/Viewer/Curriculum?action=2&cmobjid=782960&view=viewer&refcmobjid=782960>