**“The PowPanda team is building an online platform for children in which children can engage in the creation of characters and 3D print them. Challenges in this project include the need to have a custom online builder window, the quality of drawing services on the website, and the translation of the 2D art work into a 3D print file.”**

**From W Booth School of Engineering Practice and Technology**

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**Print A Pal**

**Background**

3D printing technology is rapidly expanding, with more and more ways to construct 3D models and print them into existence each day. The acquisition of newer and more advanced ways to make 3D printed objects goes hand in hand with the demand for easier, more accessible ways of bringing 3D models of your own to life. The idea is minimizing the divide between all the knowledge and additional technology needed to create these 3D objects and the creativity and originality of everyday users who want to create them, regardless of skill level.  
  
Our objective is to create a user friendly drawing application for children to create 3D toys of their very own. The designing software will be a web based program that lets kids draw a 2D shape or creature that will undergo a conversion process to print into a physical toy. Emphasis will be placed on allowing as much user creativity as possible, while not being limited by lack of knowledge or formal training of 3D software.

**Motivation**

The motivation for this project stemmed from curiosity for 3D image rendering and learning about 3D image processing. This project took inspiration from the trending use of 3D printing, and understanding the power and limitations of this field of technology. The 3D design process continues to become more advanced and intuitive, and thus gives us the capability to do more with the various different hardware or software.

We were interested in working towards bridging the gap between people unfamiliar with the 3D printing process and the formal training or assets needed to accurately produce what was intended to be made. Creating a software product that provides users with tools to explore and construct 3D designs while also sticking to the limitations of the technology we currently have access to will be a challenge, but will prove to be very rewarding if done effectively.

**Objectives**

We must design a drawing interface for creating 2D images with standard web technology (HTML/CSS/Javascript) on a web based platform. We want to ensure that any object that a user creates can be printed while allowing them full freedom and flexibility to modify the images as they please. We have to creating a backend web server that processes the user created 2D images and renders a 3D model of that image. This piece will have constraints regarding how each 2D shape converts over to a 3D shape based on assumptions on the drawing and what we are limited to understanding from a 2D image..

We will also have to create a slicer that will correctly parse the 3D model and return a STL file for printing. This will consist of parsing a 3D model in accordance with STL conventions and creating a printable mesh to send to 3D printers to actually produce. We will bridge the gap between the user creation on the web application and the available printers that will create the toys by establishing a user management system, with a database connection for user accounts and created images. This will allow users to manage their progress on current and previous works, and also request their creations to be printed in relation to that user.

**Challenges**

One of the biggest challenges for meeting our desired goal is designing an intuitive set of drawing tools that allow the user the maximum amount of freedom to create, while still adhering to the boundaries of a printable 3D Model. Not every 2D model will be able to be recreated as a 3D rendering while matching what the user intended, and in fact not every 3D rendering will be able to print into a physical object. This limitation is due to the restrictions of the hardware (3D printer). In order for an object to be 3D printable, it must meet a set of guidelines to make sure it can be printed, such as having a certain thickness or ensuring that all elements of the 3D model are stable without outside support, so that the printed structure doesn’t fall apart under it’s own weight. We want to allow the children to design what their mind intends but also assure that a toy will be able to be created and delivered to them according to what they expected.