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**15-112**

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**Project Proposal**

**Goal:**

The goal of my project is to create a python program that will allow a user to draw any shape on a canvas and then 3d print that shape. I will do this by using gcode slicing and tkinter.

**Methods:**

To allow the user to create the shape that they wish to 3d print, I will create a user interface that will act as a drawing space using tkinter. In the drawing space the user can define points and then manipulate those points to create their preferred shape. The user will be able to manipulate the points by dragging, deleting, and adding points.

Once the user has decided on a shape that they like they can add it to the profiles section, where profiles of the defined shapes will be stacked to create a complex 3d shape. Users can define the number of layers thick they want that specific profile to be and add that profile to the entire object’s profile group.

For the printer to be able to print the object, the user must tell the program what the temperature and speed of the print head will be. They will define these conditions in settings on the bottom portion of the window.

The user will be able to slice the object using the slice function. This will output the gcode for the printer to read and print from. The program will slice using an algorithm that will generate the path of the print head by iteratively defining the intersections of a proposed toolpath with the shape created. When the intersections are found, the program will place those intersections into a gcode function and move on to the next toolpath.

Since the places of intersection are arbitrary based on the shape of the proposed toolpath, I can implement more complex fill patterns like a Hilbert curve or diagonals. This means that less filament will be used and the object will print much more rapidly.

**Future Development:**

I can add even more functionality to this by creating fun add-ons for the user. I can create a function that allows the user to input text and have the text output onto the canvas so that they can put their name on any of their works. I can also predefine a few shapes to help the user create their object. Predefining shapes would be as easy as writing a function to generate the points around the shape every time a predefined profile button is pressed.

Adding more views to the UI is another way to enhance the user experience. The user might be able to see their entire object from the side or from the bottom. This would be as easy as finding the outline of the model and placing the outline in another panel on the actual screen.