One of my hobbies is making three-dimensional (3D) models. It is just tangential enough from computer science that I can be confident at least a few people in the room are not familiar with the concept but it can be an element needed for a software development project. The colloquial explanation for what the 3D art is would be movies like Toy Story, Frozen, or Moana. Basically, every movie Pixar has made and most of Disney’s more recent movies were examples of 3D models in action.

My hobby ran into computer science when I was on a senior design team in college. It turned out to be a project to develop a video game, “Teaching Children Safety Through an Interactive Gaming Experience”. Since I was the only one on my team with experience making 3D art assets, I was given the artist position by default. For this presentation, I will describe what overall steps I needed to accomplish to make those 3D assets for that senior design project.

The first step was deciding the overall style for the models. The fancy actual artists would develop concept art to visualize how the models should look before creating them. Since the senior design project didn’t give me so much time, we wouldn’t be trying that. Instead, we went with the colloquial description of “make it look like Animal Crossing.”

With that description, I could begin producing assets in a 3D modeling program such as Blender. It is an open-source GNU-General-Public-Licensed program you can download at their website for free:

<https://www.blender.org/>

It is a pretty good idea to start learning 3D modeling with Blender before you get serious with arguably better, but more expensive 3D modeling programs.

We begin using Blender by defining the geometry. A sculpture needs to be chiseled to be recognized as something. A house needs walls and floors before you can paint it. This step involves manipulating vertices, edges, and then faces to define the shape of the 3D model.

Next the geometry needs to be organized into a UV map, so that a texture can be produced to wrap around the geometry. This is the paint that would go on a sculpture. For a house, this is that checkerboard tile design commonly used for kitchen floors. Blender has the functionality to effectively make UV maps. However, making textures is easier with another free open-source GNU-General-Public-Licensed program, Inkscape. Inkscape creates pictures with vector manipulation.

Finally, the 3D model needs to be rigged and animated. These are like the adjustable wires needed to reposition a sculpture’s head or the hinges needed to open the doors of a house. In Blender, the best method for animation is to use “armatures” or “bones” that are associated with vertices in the geometry of a model through “vertex painting”. The bones are objects placed around the geometry based on what vertices need to move. So that typical door would only really need one bone because the it only rotates back and forth. The sculpture would need bones for its neck, to move its eyes, and possibly bones for its cheeks so it can smile. Vertex painting is selected which vertices will move with a specific bone when that bone is moved. In Blender, you would select a specific bone and then highlight the vertices you want, then confirm the association by “brushing” the vertices red.