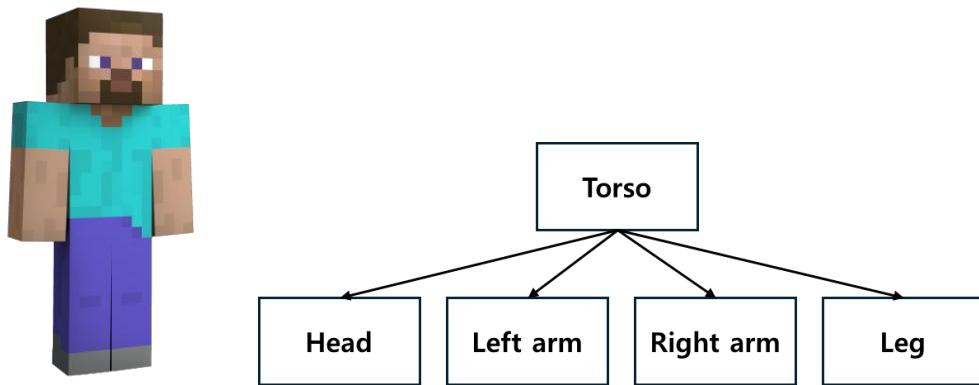


Assignment 3: Texture Mapping & Hierarchical Models

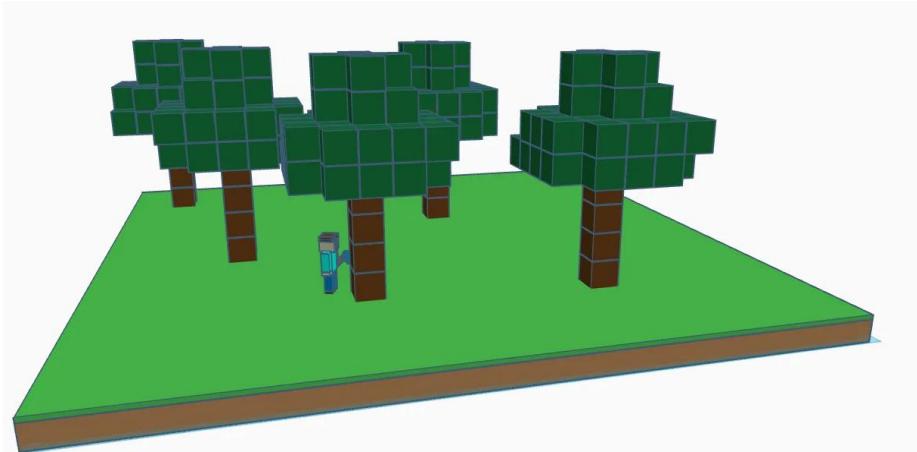
In this assignment, you will learn how to use texture mapping and how to build hierarchical models. Using the provided papercraft images, write code that renders 3D humanoid models with texture mapping, as shown below.



Each humanoid model is composed of five parts: the torso, head, left and right arms, and legs. Each body part can be modeled using a simple textured cube. Refer to Lecture 18 as a guide for constructing your model.

For texture mapping, you must load the image, create a 2D texture, and assign per-vertex texture coordinates. Because the texture coordinates are not provided, you will need to manually determine the pixel location of each cube corner (vertex) on the texture image. You will also need to manually design the geometry of the 3D model, which will primarily consist of multiple cubes. Use the I/O functions in `bmploader.cpp` to load BMP images (see the `init()` function in `main.cpp` for an example of how to use `LoadBMPFile()`).

Once your textured 3D characters are created, build a 3D scene containing multiple characters and animate them (see below figure). You may use the provided grass and stone textures, but feel free to incorporate additional textures from the internet to creatively enhance your scene. To animate your characters—such as rotating their arms, head, or moving their position—use the GLUT “idle” callback to update their posture and location over time.



Steve character and an example 3D scene
(<https://www.printables.com/model/604084-minecraft-scene/files>)

Grading (100 pts):

- Render at least one correctly texture-mapped humanoid model (20 pts).
- Create at least three textured humanoid models. You may use your own texture images in addition to the provided papercraft images (20 pts).
- Create your own 3D scene with textured 3D humanoid models and extra objects, such as stones, grass, etc (20 pts).
- Implement animation of humanoid models (20 pts).
- Virtual trackball to rotate (left mouse click and drag) and zoom (right mouse click and drag) the entire scene (10 pts).
- Submit a report describing your work (10 pts).

Submission:

You should modify the skeleton code, and submit **main.cpp, *.frag, *.vert, extra texture images (if used), and a report in pdf format** in a single zip file.

Good luck and have fun!!!