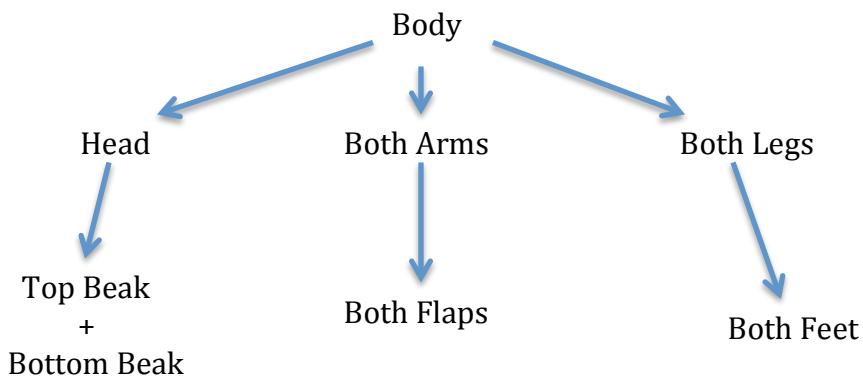


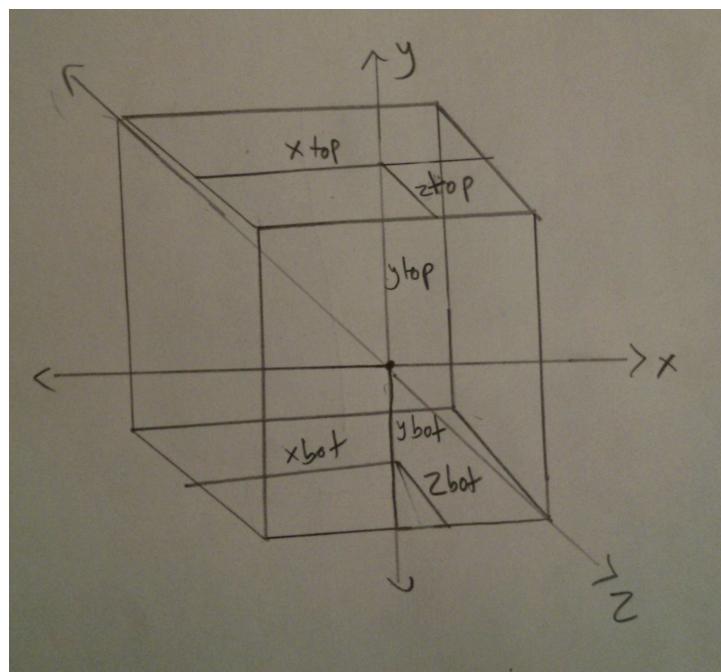
## CSC418 Assignment 2

### Design

To design the Penguin, I used Hierarchical Kinematic Modeling, since it allows us to easily perform transformations and ensure that the object remains connected. It also applies the transformation on all child nodes, which makes it easy to work with. I used the torso as the root node of the design and built around it in a Kinematic Modeling method. I also used fixed pipeline approach for this assignment.



I used single function *drawWeightedPrism* to draw all of the shapes. It takes in dimensions in terms of top and bottom areas to make rectangular prism as shown below.



## Polygon rendering

To draw wireframe, I used *GL\_LINE* in *glPolygonMode* and *GL\_FILL* for solid. For both solid and outline mode, I drew the penguin with fill settings and than I drew it again with lines.

For displaying *METALLIC* and *MATTE* models, we had to set the material settings to add ambient, diffuse and specular. OpenGL needs normals to calculate lighting equations so we also had to add *glNormalF* function to add normal to sides of the rectangular prism.

To add METALLIC looking material, I set the diffuse value to be low and increased the specular value. I also added shininess. For MATTE material, I set it to high diffuse and low specular.

We also had to add a light source using *glLight* to get the effect out of matte and metallic views. I added light source with sufficient radius and added a control to move it parallel to xy-plane going from -90 to 290 degrees.

## Keyframe Animations

I designed the parts and used DOFs the same way as A1 but with more DOFs. I added a number of keyframes to show how the transformations and rotations work and also to show off the 24 DOFs. Keyframe Animation was easier to do than Skeletal Animation. I took snapshots of a mesh with different poses, which are keyframes. As time passes, I compute the current frame using the old vertex position and newer vertex position.