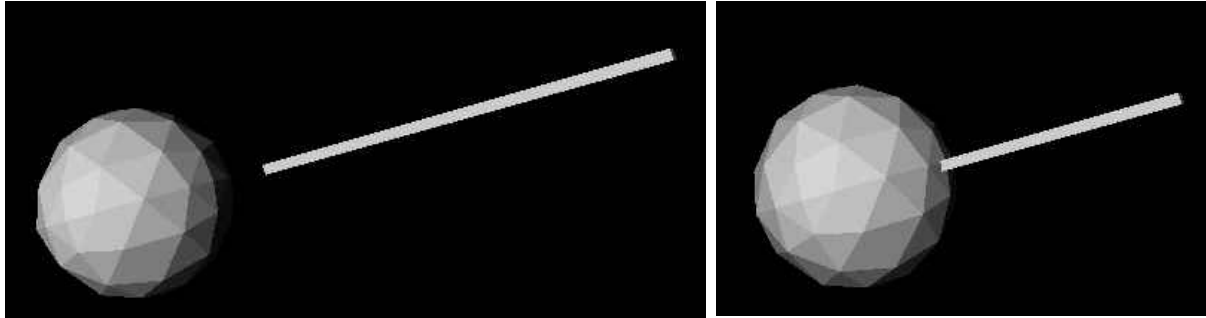


**ME 534 COMPUTER-BASED MODELING AND SIMULATION**  
**Instructor: Prof. Cagatay Basdogan**

***COLLISION DETECTION***



**No Collision**

**Collision**

In this project, you will develop a code for detecting collisions between a simulated probe and a 3D virtual object. For this purpose, you will first construct a database for geometrical properties of a 3D object made of triangular elements. The information in this database will include the coordinates of vertices of each triangular element, the indices of triangular elements, and the connectivity of triangular elements. Using the information in the database, you will compute the bounding box of the object (i.e. a box that is constructed from maximum and minimum global coordinates of the object along the X, Y, and Z axes) and the bounding boxes of each triangular element of the object. Then, you will check the collisions between the simulated probe and the virtual object as you manipulate the probe in 3D space. In order to speed up the detection of collisions between the probe and the object, a simplified model of the probe will be considered (a line segment) and the collision detection will be executed in two consecutive stages: (1) first check the collision between the probe and the bounding box of the virtual object and (2) then check the collision between the probe and the bounding box of the each triangular element.

Bonus: Can you further improve the speed of collision detection?