TPA 7: Object modeling using Constructive Solid Geometry

CSG gives a high-level description of geometry. It is intuitive because its syntax resembles the way humans may describe objects in space. Re- verting for a moment to two dimensions, the object , " A Simple Two- Dimensional Object " could, sacrificing any mathematical accuracy, be described as "a circle with four rectangles sticking out its sides" or "two rectangles crossed on top of a circle". Having a computer come up with such a description is surprisingly hard, mainly because humans, unlike computers, can "see" the circle in spite of the fact that its characteristic circumference is interrupted by rectangles. As it turns out, having the same computer generate a geometry from such a description is relatively simple.

Input :
 Polygonal meshes of basic 3-D shapes and a scene graph (say, for a CAD/ some real object) .

Output :
Creating and Rendering of objects using Boolean set operations.
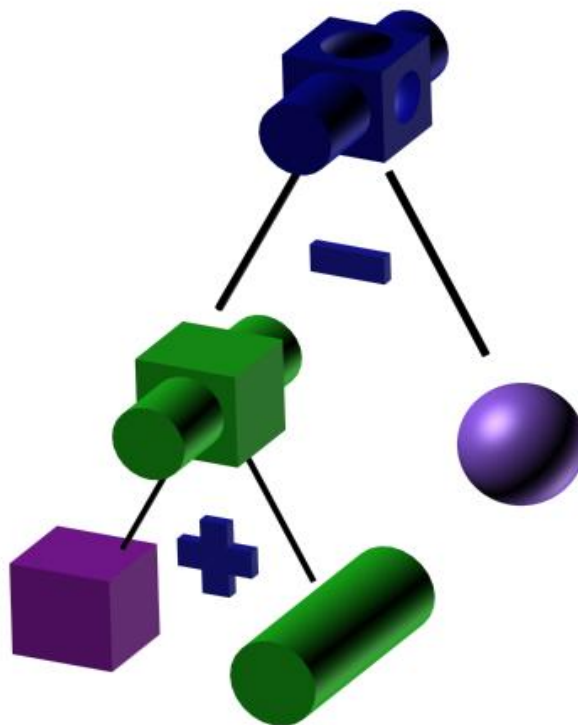   Examples – **Robot, Hammer, Gear assembly, bicycle**, etc.

Figure 1: A typical scene graph

References
1. Carve is a C++ library designed to perform regularized boolean operations between two arbitrary polygonal meshes. http://code. google.com/p/carve/
2. Library intended to provide a set of useful functions to deal with 3D surfaces meshed with interconnected triangles. gts.sourceforge.net/index.html
3. http://cse.csusb.edu/tong/courses/cs520/notes/mesh.php
4. Constructive Solid Geometry tutorial http://www.codecreator.net/csg/csg.html.
5. CSG in MesoRD http://mesord.sourceforge.net/man/mesord/docbook/ch04.html