Graphics 2 exercise classes

Exercise 8

Viewing transforms and animation

1. (Pen and paper exercise)

   Propose an algorithm for creating a sequence of animation frames showing the view of the figure "N" while a camera flies around the figure in a circle centred on the Y axis as schematically shown below. The starting point for the VRP is (12, 36, 22). The target point PT=(2, 6, 2) should remain the same throughout all the frames of the animation. The view should be shown in perspective projection.

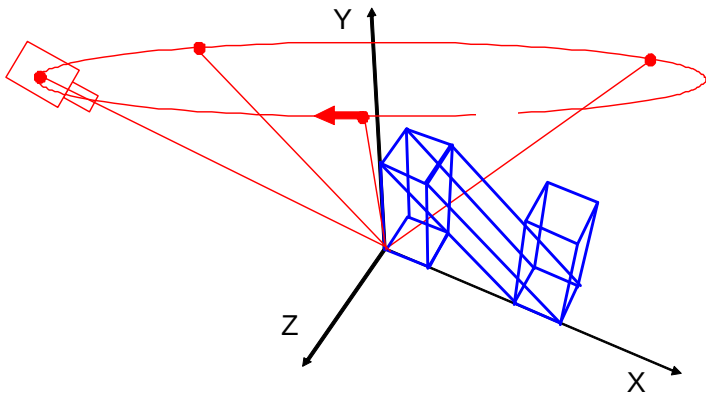
   Your solution should include:

   - a pseudo-code showing the program flow (in particular any loops should be parametrised),
   - parametrised basic (T, R, S, P) individual transformation matrices (i.e. with actual parameters specified),
   - brief explanation how the matrix parameters were derived,
   - for any combined matrices, the order in which the matrices are computed by multiplication of the basic matrices (you don't need to carry out the multiplications).

   The winning solutions will be those which use the smallest number of transformations.

   Email your solutions by 14 March 2012 to E.Claridge@cs.bham.ac.uk

   There will be no marks, but possibly some prizes.



2. Write Matlab implementation of the exercises 1. Matlab file ex8_BigN.m includes code for the definition and display of the figure "N". Matlab functions related to transformation matrix definitions, some vector operations etc. are listed below.

3. Analyse Matlab script intials.m which animates a (2D) transition between two initials (E and C in this case). Define and animate your own initials. Experiment by changing the number of steps of animation (and subsequently the increment in parameter u).

Relevant Matlab functions

- dot product of two vectors: dot(A,B)
- cross product of two vectors: cross(A,B)
- vector length: vlength(A,B)
- define a transformation matrix for translation by vector A: makehgtform('translate',A)
- define a transformation matrix for rotation by t radians:
  - about X axis: makehgtform('xrotate',t)
  - about Y axis: makehgtform('yrotate',t)
  - about Z axis: makehgtform('zrotate',t)
- define an identity matrix of size n x n: eye(n)