

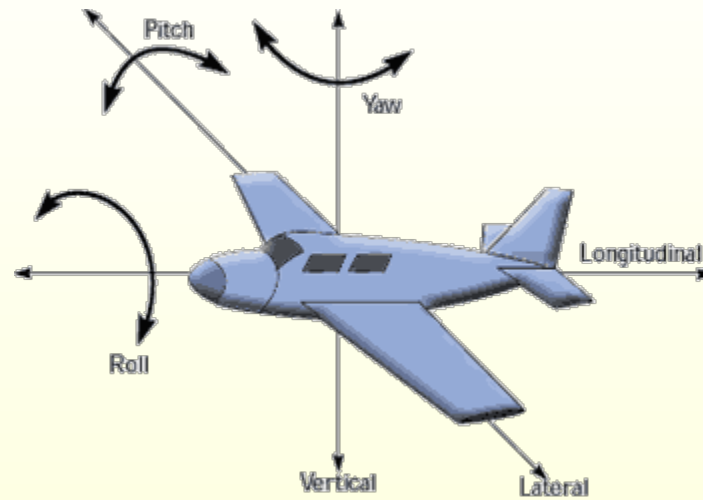
CS164: 2D and 3D Transformations



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Pitch, Yaw, and Roll



Leonhard Euler



1707 -- 1783

Euler Angles

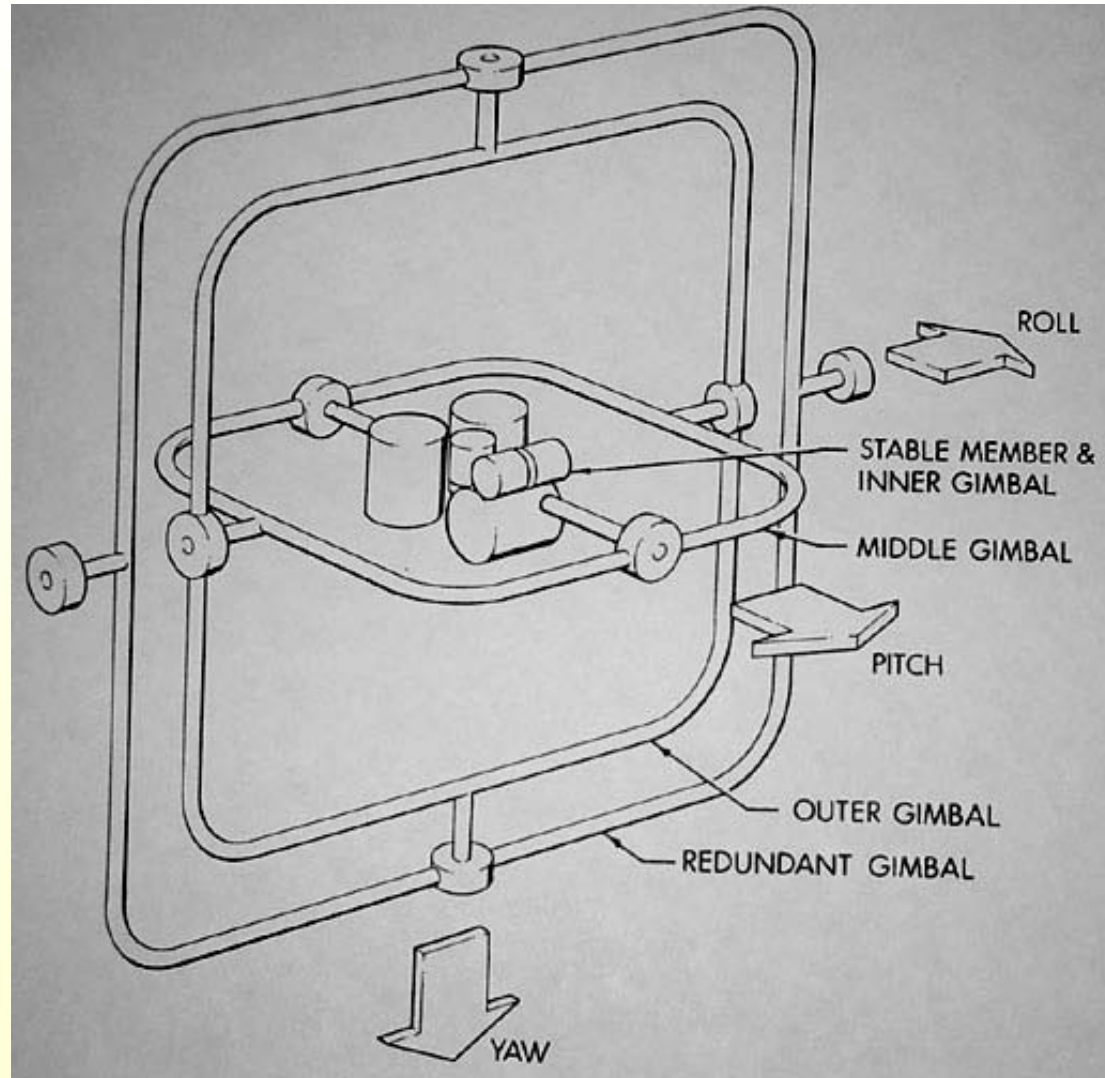
● *Gimble*

- Hardware implementation of Euler angles
- Aircraft, Camera



Euler Angles

- Rotation about three orthogonal axes
 - 12 combinations
 - XYZ, XYX, XZY, XZX
 - YZX, YZY, YXZ, YXY
 - ZXY, ZXZ, ZYX, ZYZ
- ***Gimble (or Gimbal) lock***
 - Coincidence of inner most and outmost gimbals' rotation axes
 - Loss of degree of freedom



Gimbal Lock

Gimbal Lock

