## 6DoF *primitive motions* on Kinect Sensor

* 6DoF
  + Forward/backward, leftward/rightward, upward/downward.
  + Yaw/pitch/roll
* We will deal with Yaw/pitch/roll first
  + Select shoulder point / elbow point as stationary
  + Observe the relative movement of elbow point / wrist point
  + It would be easy to calculate the relative yaw/pitch/roll angle as the reference frame is relative.
* XYZ coordinates requires an absolute reference frame.
  + Yeah…
  + Kinect sensor provides a perfect absolute reference frame.
  + For a satisfactory result, it would be the best to only observe the XYZ motion of the relative reference frame.
* Motion synthesis
  + There’s a reason of only observing relative reference frame.
  + Motion synthesis – motion of elbow =
    - XYZ motion of relative reference frame (shoulder)
    - + YPR motion of upper arm \* length of upper arm.
    - In my experiment this week I will only observe the wrist in relative to elbow.

### Experiment and application:

* Real-time tracking joint 9/10.
* Calculate the YPR movement and the XYZ movement.
* Show the primitive motions as real-time tracking.
  + YPR motion of joint 10 (wrist) in related to joint 9 (elbow reference frame). Finished
  + XYZ of joint 9 (elbow reference frame) as related to the absolute reference frame. Finished

### Motion classifier: *primitive motion* to *synthesized motion*

* Probably using naïve Bayes classifier.
* Synthesized motion = Sum of
  + XYZ motion of joint 8 (Right shoulder)
  + YPR motion of joint 9 (Right elbow) \* ||upper right arm||
  + YPR motion of joint 10 (Right wrist) \* ||lower right arm||
* Based on these three motions, we can classify the total motion.