

COLLEGE OF COMPUTER & INFORMATION SCIENCES
COMPUTER ENGINEERING DEPARTMENT
Second Semester 1427-1428 H.

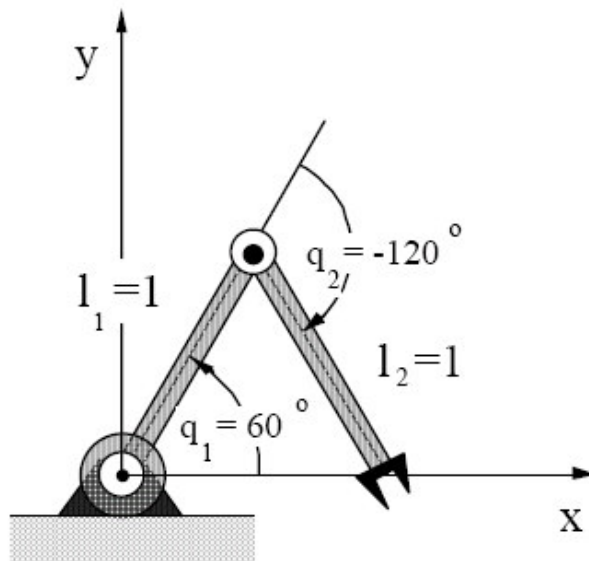
HW # 8

CEN 459: Robotics

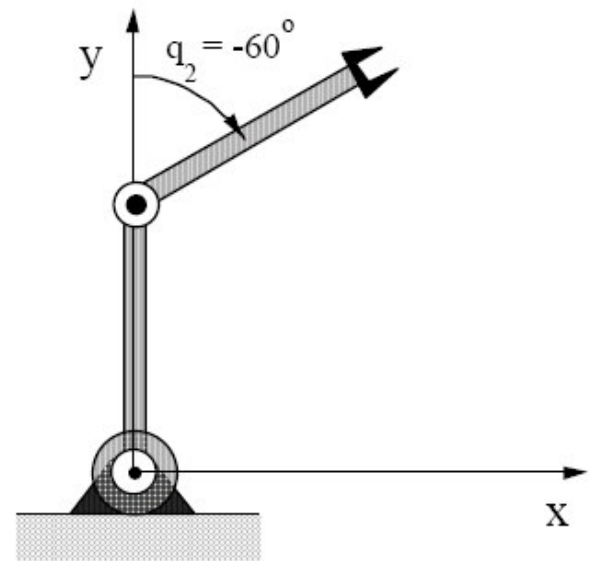
Instructor: Dr R. HEDJAR

For the two link manipulator show below:

- (a) Generate a *joint* space trajectory $q_{1,d}(t)$, $q_{2,d}(t)$, connecting the initial and final joint positions. (The subscript d stands for *desired*). Use a linear function with parabolic blends, assuming that the velocity at the start and end of the path is zero. Assume that the duration of the motion is $t_f = 2.0$ sec and that of the acceleration (and deceleration) is $t_b = 0.5$ sec.
- (b) Sketch the path of the end-effector in the Cartesian space, showing its position at 0, 0.5, 1.0, 1.5, and 2.0 sec. Also sketch the path in the joint space. What comments can you make about the shape of the paths?
- (c) Repeat step (a) by generating a *Cartesian* space trajectory $x_{E,d}(t)$, $y_{E,d}(t)$ connecting the initial and final end-effector positions.
- (d) Sketch the path of the end-effector in Cartesian space, showing its position at 0, 0.5, 1.0, 1.5, and 2.0 sec. Also sketch the path in the joint space. What kind of paths result?



Initial position



Final position